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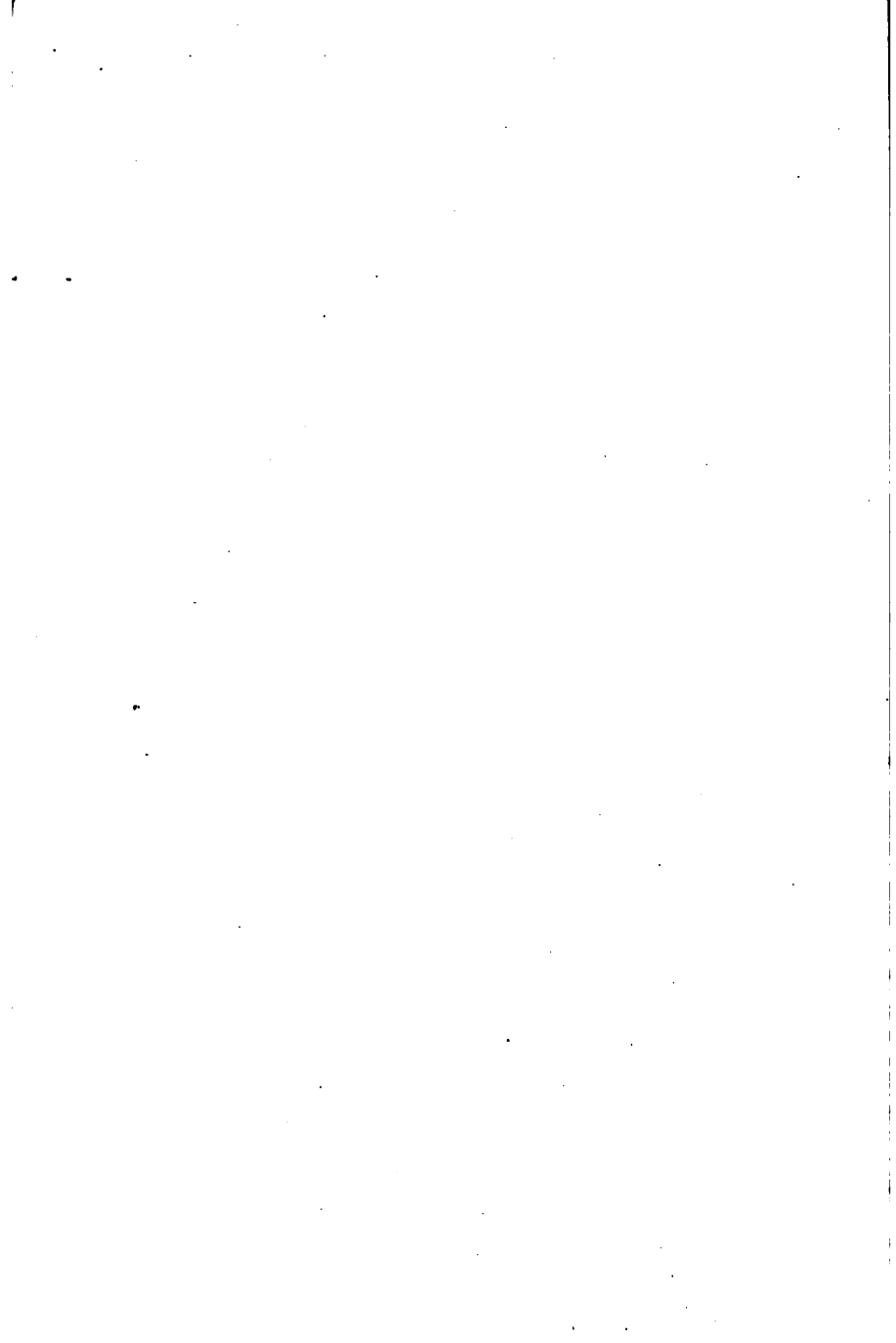
BOUGHT
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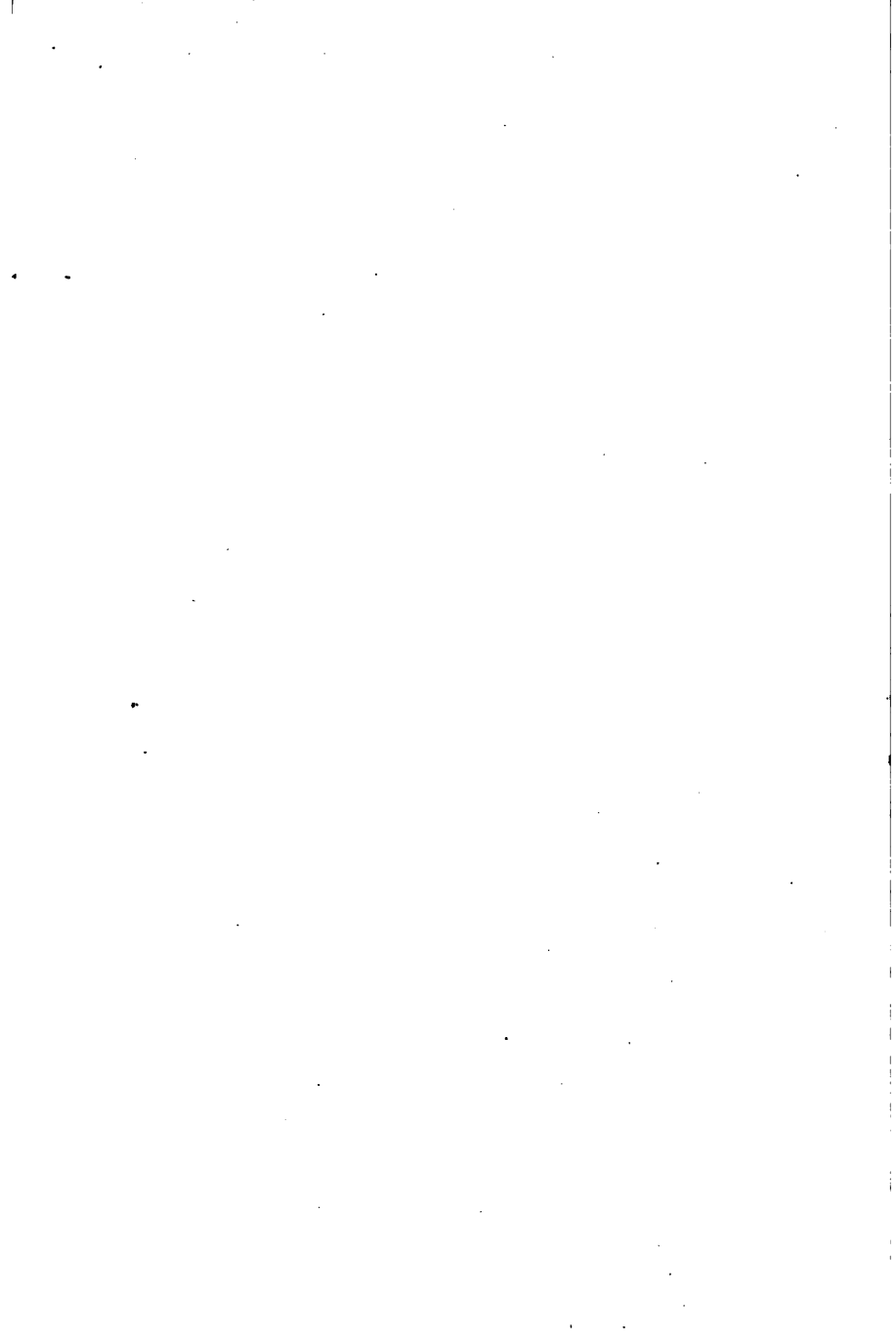
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LESSON XII

19. I spent the sum of 20 cents and 10 cents, which is 30 cents; I had left the difference between 65 cents and 30 cents, which is 35 cents.

LESSON XIV

5. He paid me the sum of 15 dollars and 10 dollars, which is 25 dollars. He still owed me the difference between 34 dollars and 25 dollars, which is 9 dollars.

8. Both had the sum of 18 marbles and 18 marbles, which is 36 marbles; if when they stopped one had 25 marbles, the other had the difference between 36 marbles and 25 marbles, which is 11 marbles.

9. On the south and east walls there are the sum of 7 pictures and 11 pictures, which is 18 pictures. 18 pictures are 13 more than 5 pictures.

11. The sum of the first three numbers is 9 plus 5 plus 6, which is 20. Therefore the fourth number is the difference between 24 and 20, which is 4.

14. He is worth the sum of 20 dollars and 10 dollars, which is 30 dollars. He owes the sum of 5 dollars, 6 dollars, and 10 dollars, which is 21 dollars. Should he pay his debts, he would be worth the difference between 30 dollars and 21 dollars, which is 9 dollars.

LESSON XVI

4. The sum of 19 and 10 is 29; the difference between 17 and 10 is 7; if I take 7, the difference, from 29, the sum, 22 will be left.

21. There are as many peach trees in the orchard as the sum of 15 peach trees, 9 peach trees, and 10 peach trees, which is 34 peach trees. There are as many apple trees as the sum of 5 apple trees, 11 apple trees, and 10 apple trees,

which is 26 apple trees. Therefore there are as many more peach trees than apple trees as the difference between 34 trees and 26 trees, which is 8 trees.

LESSON XVII

22. If 1 yard of muslin costs 11 cents, 3 yards will cost 3 times 11 cents, which is 33 cents.

LESSON XIX

4. Each triangle will take 3 splints; 9 triangles will take 9 times 3 splints, which is 27 splints.

11. If a man travels 7 miles in 1 hour, in 8 hours he will travel 8 times 7 miles, which is 56 miles.

17. In 1 hour they would be as far apart as the sum of 2 miles and 4 miles, which is 6 miles; in 3 hours they would be 3 times 6 miles apart, which is 18 miles.

LESSON XX

4. 4 yards of cloth at \$2 cost \$8; 2 pairs of gloves at \$1 cost \$2; \$8 plus \$2 plus \$2 = \$12, her bill; 3 times \$5 = \$15. Her change should be \$15 - \$12 = \$3.

19. 20 yards at \$1 a yard cost \$20; $20 - 5 = 15$ yards, sold at \$2 a yard, brought \$30; $\$30 - \$20 = \$10$, the gain.

LESSON XXII

22. Each one would receive one sixth of 36 dollars, which is 6 dollars.

23. Since there are 4 quarts in 1 gallon, in 36 quarts there are as many gallons as 4 quarts are contained times in 36 quarts, which are 9.

LESSON XXIV

24. One man will earn in 3 days one ninth of \$108, which is \$12. In one day he would earn one third of \$12, which is \$4.

25. In 1 day the former travels one third of 15 miles, which is 5 miles. In 1 day the latter travels one half of 20 miles, which is 10 miles; and if the latter travels 10 miles in 1 day, and the former, 5 miles, the latter travels as much farther in 1 day than the former as the difference between 10 miles and 5 miles, which is 5 miles.

LESSON XXVI

4. The sum of 1, 2, and 3 is 6, and 6 is contained in 60 ten times. If I have as many marbles as 3 times the number of times 6 is contained in 60, I have 3 times 10 marbles, which is 30 marbles.

5. Six boxes of buttons will cost 6 times \$5, which is \$30; 5 pieces of calico will cost 5 times \$4, which is \$20. Both will cost the sum of \$30 and \$20, which is \$50; and if he gave in exchange flour at \$5 a barrel, it took as many barrels as \$5 are contained times in \$50, which are 10.

6. If a train goes 6 miles in 5 min., it will take as many times 5 min. to go 24 miles as 6 miles are contained times in 24 miles, which are 4; 4 times 5 min. are 20 min.

28. It will take 1 man 3 times 10 days, which is 30 days. It will take as many men to do it in 5 days as 5 days are contained times in 30 days, which are 6.

36. 6 pounds at 3 cents cost 18 cents; 4 pounds at 8 cents cost 32 cents; $6 + 4 = 10$ pounds cost 18 cents + 32 cents = 50 cents. Therefore 1 pound costs $50 \text{ cents} \div 10 = 5$ cents, average price.

37. 20 minutes + 30 minutes + 25 minutes + 45 minutes + 20 minutes = 140 minutes in 5 days. $140 \text{ minutes} \div 5 = 28$ minutes, average per day.

LESSON XXX

2. One third of the string is $\frac{1}{3}$ of three inches, which is 1 inch.

5. One fourth of a peck is worth $\frac{1}{4}$ of 8 quarts, which is 2 quarts; $\frac{3}{4}$ of a peck are worth 3 times 2 quarts, which is 6 quarts.

23. One calf cost $\frac{1}{2}$ of \$120, which is \$60; and if 1 calf cost \$60, he sold the 7 calves for 7 times \$60, which is \$420.

LESSON XXXI

9. 1 inch is $\frac{1}{5}$ of the string and 5 inches are 5 times $\frac{1}{5}$, which is $\frac{5}{5}$ of the string.

16. One fifth of 30 is 6; $\frac{3}{5}$ of 30 are 3 times 6, which is 18; and 18 is $\frac{3}{5}$ of 30.

LESSON XXXII

7. One sixth of the buttons will be $\frac{1}{6}$ of 35, which is 5; therefore, $\frac{5}{6}$, or all the buttons, will be 6 times 5 buttons, which is 30 buttons.

17. One fourth of 8 cents is 2 cents, and $\frac{3}{4}$ are 3 times 2 cents, which is 6 cents; and if 6 cents are $\frac{2}{3}$ of mine, $\frac{1}{3}$ of mine is $\frac{1}{3}$ of 6 cents, which is 2 cents; and if 2 cents are $\frac{1}{3}$, then $\frac{2}{3}$ will be 3 times 2 cents, which is 6 cents.

LESSON XXXIII

4. One yard will cost $\frac{1}{5}$ of 5 dollars, which is 1 dollar.

LESSON XXXIV

4. Since there are $\frac{1}{4}$ in 1, in 3 there are 3 times $\frac{1}{4}$, which is $\frac{3}{4}$; and $\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$. Other answers, $\frac{1}{2}$, $\frac{2}{4}$, $\frac{2}{4}$.

LESSON XXXV

13. To reduce a fraction to its lowest terms, divide both terms by their greatest common divisor. Of 27 and 36, the G. C. D. is 9; 9 in 27 is contained 3 times, and 9 in 36 is contained 4 times.

Therefore, $\frac{27}{36}$ changed to its lowest terms = $\frac{3}{4}$.

LESSON XXXVI

10. Since there are $\frac{2}{3}$ in 1, in $\frac{1}{4}$ there is $\frac{1}{4}$ of $\frac{2}{3}$, which is $\frac{2}{12}$; and if $\frac{2}{3} = \frac{1}{4}$, then $\frac{2}{3}$ will be 3 times $\frac{2}{3}$, which is $\frac{2}{3}$.

LESSON XXXVIII

2. Three fourths = $\frac{3}{4}$, and $\frac{1}{2} = \frac{2}{4}$. He gave for both $\$ \frac{3}{4} + \$ \frac{2}{4} = \$ \frac{5}{4} = \$ 1\frac{1}{4}$.

3. The distance from A to C is the sum of the distances from A to B and B to C. $\frac{1}{2}$ mile = $\frac{2}{4}$ mile; $\frac{2}{3}$ mile = $\frac{2}{3}$ mile; $\frac{2}{3}$ mile + $\frac{2}{3}$ mile = $\frac{4}{3}$ mile = $1\frac{1}{3}$ miles.

LESSON XXXIX

3. One half of the first = $\frac{2}{3}$ of a melon; $\frac{2}{3}$ of the second = $\frac{1}{3}$ of a melon. $\frac{2}{3} - \frac{1}{3} = \frac{1}{3}$.

4. $1\frac{1}{2}$ inches = $\frac{5}{4}$ inch = $1\frac{5}{4}$ inch; $\frac{2}{3}$ inch = $\frac{2}{3}$ inch; $1\frac{5}{4}$ inch - $\frac{2}{3}$ inch = $1\frac{7}{12}$ inch.

LESSON XL

10. $\frac{1}{3} + \frac{1}{6} + \frac{1}{4} = \frac{2}{6} + \frac{1}{6} + \frac{1}{4} = \frac{3}{6} + \frac{1}{4} = \frac{7}{12}$; $\frac{5}{8} = \frac{15}{24}$; $\frac{15}{24} - \frac{7}{12} = \frac{1}{24}$ of a mile.

14. Find how much is in both air and water: as much as the sum of $\frac{1}{2}$ and $\frac{1}{3}$. $\frac{1}{2} = \frac{2}{3}$ and $\frac{1}{3} = \frac{1}{3}$; their sum is $\frac{3}{3}$. Since there are $\frac{2}{3}$ in the pole, there would be as much in the earth as the difference between $\frac{2}{3}$ and $\frac{3}{3}$, which is $\frac{1}{3}$.

LESSON XLII

2. To 5 horses he would give 5 times $\frac{1}{2}$ peck, which is $\frac{5}{2}$ pecks; and $\frac{5}{2}$ pecks = $2\frac{1}{2}$ pecks.

LESSON XLIII

8. Since 2 pounds are $\frac{1}{2}$ of 4 pounds they should sell for $\frac{1}{2}$ of 30 cents, which is 15 cents.

28. One seventh of 18 is $2\frac{4}{7}$; $\frac{2}{7} = 2$ times $2\frac{4}{7}$ feet, which is $5\frac{1}{7}$ feet; and $\frac{5}{7} = 5$ times $2\frac{4}{7}$ feet, which is $12\frac{20}{7}$ feet.

29. $\frac{2}{3} + \frac{1}{3} = \frac{6}{15} + \frac{5}{15} = \frac{11}{15}$; $\frac{1}{5} - \frac{1}{15} = \frac{4}{15}$, C's share; $\frac{2}{3}$ of \$15 = \$6, A's share; $\frac{1}{3}$ of \$15 = \$5, B's share; $\frac{4}{15}$ of \$15 = \$4, C's share.

LESSON XLV

2. $4\frac{2}{3}$ miles = $1\frac{4}{3}$ miles; $6 \times 1\frac{4}{3}$ miles = $8\frac{4}{3}$ miles = 28 miles he walked. 28 miles \div 5 miles = $5\frac{3}{5}$. $5\frac{3}{5}$ hours.

3. $8 \times \$5 = \40 ; $8 \times \$\frac{1}{4} = \2 ; $\$40 + \$2 = \$42$; $\$42 \div \$6 = \$7$; 7 tons.

LESSON XLVII

9. One pound will cost $\frac{1}{4}$ of $\$5\frac{5}{8} = \$\frac{5}{16}$; therefore 7 pounds will cost 7 times $\$ \frac{5}{16} = \$\frac{35}{16} = \$2\frac{3}{16}$.

11. $2 \times 4\frac{2}{3}$ miles = $9\frac{1}{3}$ miles; $9\frac{1}{3}$ miles \div 5 miles = $1\frac{1}{3}$ days.

LESSON XLVIII

16. The sum of $\frac{1}{3}$ and $\frac{2}{3} = \frac{3}{3}$; $\frac{5}{6} - \frac{3}{6} = \frac{2}{6}$; hence 14 feet = $\frac{2}{3}$ of the pole; $\frac{1}{3} = 7$ feet; $\frac{5}{6} = 35$ feet.

23. $\$12 = \frac{4}{3}$ of the cost; $\frac{1}{3}$ of the cost is $\frac{1}{4}$ of $\$12 = \3 ; $\frac{3}{8} = \$9$. One yard cost $\frac{1}{4}$ of $\$9 = \$1\frac{3}{4}$.

28. One eighth of the cost was $\frac{1}{8}$ of \$50, which is \$10; hence $\frac{3}{8}$ were 8 times \$10, which is \$80. It would take as many \$10 bills as \$10 are contained times in \$80, which are 8.

LESSON XLIX

11. One third of the number is $\frac{1}{3}$ of 56, which is 7; hence $\frac{2}{3}$ are 3 times 7, which is 21; 21 is 3 times 7.

LESSON L

8. One fourth of a bushel of wheat is worth $\frac{1}{4}$ of a bushel of rye; $\frac{1}{4}$ of a bushel of wheat are worth $\frac{1}{4}$ of a bushel of rye; $\frac{1}{2}$ of a bushel of wheat is worth $\frac{1}{2}$ of $\frac{1}{4}$ of a bushel of rye, which is $\frac{1}{8}$ of a bushel of rye; and $\frac{3}{4}$ of a bushel of wheat are worth 4 times $\frac{1}{8}$ of a bushel of rye, which is $\frac{1}{2}$, or $1\frac{1}{2}$ bushels of rye.

LESSON LII

22. As many bushels of rye as $\frac{3}{4}$ are contained times in $4\frac{1}{2}$. $4\frac{1}{2} = \frac{18}{4}$; $\frac{18}{4} \div \frac{3}{4} = 6$.

LESSON LIV

22. A walks 5 miles 7 times in walking 35 miles; B walks 3 miles 7 times in the same time. Therefore B walks 7 times 3 miles, which is 21 miles.

25. One horse will eat $\frac{1}{6}$ of 12 bushels in a week, which is 2 bushels a week; then 10 horses will eat 10 times 2 bushels in a week, which is 20 bushels.

26. Five horses will eat in 1 week $\frac{1}{2}$ of 16 bu., which is 8 bu.; to eat 56 bu., it will take them as many weeks as 8 is contained times in 56, which are 7.

28. It will take 6 times 12 horses, which is 72 horses, to eat it in 1 day; and to eat it in 9 days it will take $\frac{1}{9}$ of 72 horses, which is 8 horses.

LESSON LV

6. Nine times 9 = 81. $81 \div 12 = 6\frac{9}{12}$, or $6\frac{3}{4}$.

8. $\frac{48}{120} = \frac{2}{5}$. $\frac{54}{81} = \frac{2}{3}$. $\frac{240}{88} = \frac{5}{8}$.

9. One ninth = $\frac{16}{144}$, $\frac{8}{9} = \frac{48}{144}$; $\frac{1}{6} = \frac{24}{144}$, $\frac{4}{18} = \frac{36}{144}$;
 $\frac{1}{2} = \frac{72}{144}$, $\frac{1}{2} = \frac{72}{144}$.

12. If he traveled $\frac{1}{4}$, or $\frac{2}{8}$, the first day, and $\frac{1}{8}$, or $\frac{1}{8}$, the second day, then the third day he must have traveled $\frac{1}{2}$ less $\frac{1}{8}$, which is $\frac{3}{8}$; $\frac{3}{8}$ of 84 miles = 31 miles.

21. \$99 = $\frac{3}{8} \div \frac{3}{8}$, or $\frac{1}{8}$, of the cost; hence $\frac{1}{8}$ = \$9, and $\frac{3}{8}$, the cost, = \$72.

22. One eighth of \$96 = \$12, or $\frac{1}{8}$ of the cost; hence the cost was 5 times \$12 = \$60. It took as many barrels of flour to pay for the horse as \$6 are contained times in \$60, which are 10.

23. Eighty-four is $\frac{4}{9}$ of 72, and 72 is 8 times 9.

25. Eight ninths of $81 = 72$, and $72 = \frac{2}{3}$ of 64.
26. Four sevenths of 35 are 20, and 20 is $\frac{5}{8}$ of 24. Three eighths of 16 are 6, and 24 is 4 times 6.
27. $\$17\frac{1}{2} = \$3\frac{5}{8}$. $4\frac{3}{8}$ yd. $= \frac{35}{8}$ yd. $\frac{1}{8}$ of a yard would cost $\frac{1}{8}$ of $\$3\frac{5}{8}$, which is $\$ \frac{1}{2}$; hence $\frac{3}{8}$ of a yard would cost $\$ \frac{3}{2}$, or $\$4$.
33. In one week he would earn $\frac{1}{3}$ of $\$72$, which is $\$9$; in one day he would earn $\frac{1}{4}$ of $\$9$, which is $\$1\frac{1}{4}$.
37. One half of 20 years $= 10$ years, or $\frac{1}{2}$ of the father's age; hence 5 times 10 years $= 50$ years, the father's age.
38. $\$21 = \frac{7}{8}$ of the cost. $\frac{1}{8} = \frac{1}{7}$ of $\$21$, which is $\$3$. $\frac{5}{8} = \$15$, or the cost. $\$15 \div \$5 = 3$, the number of $\$5$ bills.
39. Three times the distance $= \frac{15}{8}$ the distance. $\frac{15}{8}$ are 5 times $\frac{3}{8}$; 5 times $\frac{3}{8}$ of a mile are $\frac{15}{8} = 3\frac{1}{8}$ miles.
41. One half of $12 = 6$. $6 + 2 = 8$. 8 is $\frac{1}{3}$ of 24.
44. Three fourths of $24 = 18$. $18 - 6 = 12$. 12 is $\frac{2}{3}$ of 18. 18 is 6 more than $\frac{2}{3}$ of itself.
50. Two fifths of 30 yards $= 12$ yards. He sold one yard for $\frac{1}{2}$ of $\$48$, which is $\$4$.
60. Three fifths of $\$20$ are $\$12$. Fourteen is $\frac{7}{9}$ of 18, and 2 times 18 are 36. Twelve is $\frac{1}{3}$ of 36.
74. One fourth $+ \frac{1}{8} = \frac{5}{8}$; $\frac{1}{2} - \frac{5}{8} = \frac{1}{8}$, the remainder; $\frac{1}{8}$ of $\frac{7}{2} = \frac{7}{16}$ in the third field; 28 is $\frac{7}{4}$ of 96.
75. If $\frac{2}{3}$ of the product is 90, the product is $\frac{1}{2}$ of 5 times 90, or 150. $150 \div 3 = 50 = \frac{5}{6}$ of the number, and the number is $\frac{1}{5}$ of $6 \times 50 = 60$.
76. The first remainder is $\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$; $\frac{1}{8}$ of $\frac{3}{8} = \frac{1}{64}$. The second remainder is $\frac{3}{8} - \frac{1}{64} = \frac{23}{64}$. Since $\frac{2}{3}$ of my money is 40¢, my money is $\frac{1}{2}$ of $5 \times 40¢ = \$1$.
77. It will take 6 men $\frac{5}{8}$ of $\frac{2}{3}$ days, which are $3\frac{1}{4}$ days.
84. Two fifths of 10 yards are 4 yards, and they cost $\frac{2}{3}$ of $\$90$, which is $\$36$. $\$40 - \$36 = \$4$, the gain on 4 yards, and on 1 yard the gain is $\$1$.

85. B gains in one day 23 miles less 18 miles, which are 5 miles. It will take as many days to gain 40 miles as 5 miles are contained times in 40 miles, which are 8.

90. In one hour the cistern would lose 9 gallons less 6 gallons, which are 3 gallons; and it would take as many hours to empty the cistern as 3 gallons are contained times in 36 gallons, which are 12.

94. Such part of the journey as $2\frac{1}{2}$ days are of $3\frac{3}{8}$ days. $3\frac{3}{8} = \frac{27}{8}$. $2\frac{1}{2} = \frac{18}{8}$. $\frac{18}{8} = \frac{1}{2}\frac{9}{4}$, or $\frac{2}{3}$, of $\frac{27}{8}$. He can therefore perform $\frac{2}{3}$ of the journey in $2\frac{1}{2}$ days.

95. Such part as $5\frac{1}{2}$ days are of $7\frac{1}{8}$ days. $7\frac{1}{8} = \frac{57}{8} = \frac{114}{16}$; $5\frac{1}{2} = \frac{11}{2} = \frac{33}{8}$; $\frac{33}{8} = \frac{33}{16}$ of $\frac{114}{16}$. $\frac{33}{114} = \frac{1}{3}$ of the work.

96. Twenty yards at \$4 per yard = \$80. 15 yards at \$3 per yard = \$45. \$80 + \$45 = \$125, or what I paid for 35 yards. I received for $\frac{2}{3}$, or 30 yards, \$3 per yard = \$90, and for $\frac{1}{3}$, or 5 yards, \$4 per yard = \$20. For all I received \$90 + \$20 = \$110. My loss on 35 yards was \$125 - \$110 = \$15, or $\$ \frac{15}{35} = \$ \frac{3}{7}$ per yard.

98. Three fourths of 6 miles are $4\frac{1}{2}$ miles. 6 miles less $4\frac{1}{2}$ miles = $1\frac{1}{2}$ miles, the distance B gains in one hour. To gain 36 miles, it will take as many hours as $1\frac{1}{2}$ miles are contained times in 36 miles, which are 24.

LESSON LXII

2. 6 ft. \times 4 ft. = 24 sq. ft.
3. 10 ft. \times 12 ft. = 120 sq. ft.
4. 6 in. \times 8 in. = 48 sq. in.
5. 10 ft. \times 10 ft. = 100 sq. ft.
6. 12 ft. \times 12 ft. = 144 sq. ft.
7. 12 ft. \times 8 ft. = 96 sq. ft.
8. 3 mi. \times 2 mi. = 6 sq. mi.
9. 11 in. \times 11 in. = 121 sq. in.
10. 8 yd. \times $\frac{1}{2}$ yd. = $\frac{8}{2}$ sq. yd. = 4 sq. yd.

11. $16 \text{ yd.} \times \frac{1}{2} \text{ yd.} = \frac{1}{2}^{\text{sq}} \text{ sq. yd.} = 8 \text{ sq. yd.}$
13. Since the room is 9 ft. or 3 yd. wide, 3 strips each 100 ft. long will be required; $3 \times 100 = 300 \text{ ft.} = 100 \text{ yd.}$
14. Since the room is 12 ft. or 4 yd. wide, 4 strips each 30 ft. long will be required; $4 \times 30 = 120 \text{ ft.} = 40 \text{ yd.}$; $40 \times \$1 = \$40.$
15. Since the room is 15 ft. or 5 yd. wide, 5 strips each 15 ft. long will be required; $5 \times 15 \text{ ft.} = 75 \text{ ft.} = 25 \text{ yd.}$
16. $30 \text{ in.} \times 20 \text{ in.} = 600 \text{ sq. in.}$
17. $42 \text{ ft.} \times 10 \text{ ft.} = 420 \text{ sq. ft.}$
18. $20 \text{ ft.} \times 16 \text{ ft.} = 320 \text{ sq. ft.}$
19. $30 \text{ ft.} \times 16 \text{ ft.} = 480 \text{ sq. ft.}$
20. $2 \times (16 \text{ ft.} \times 10 \text{ ft.}) = 320 \text{ sq. ft.}$ for 2 walls; $2 \times (30 \text{ ft.} \times 10 \text{ ft.}) = 600 \text{ sq. ft.}$ for other 2 walls. $320 \text{ sq. ft.} + 600 \text{ sq. ft.} = 920 \text{ sq. ft.}$ for 4 walls; $16 \text{ ft.} \times 30 \text{ ft.} = 480 \text{ sq. ft.}$ for ceiling. $920 \text{ sq. ft.} + 480 \text{ sq. ft.} = 1400 \text{ sq. ft.}$ for 4 walls and ceiling.
21. $2 \times (20 \text{ ft.} \times 10 \text{ ft.}) = 400 \text{ sq. ft.}$ for 2 walls; $2 \times (10 \text{ ft.} \times 10 \text{ ft.}) = 200 \text{ sq. ft.}$ for 2 other walls. $20 \text{ ft.} \times 10 \text{ ft.} = 200 \text{ sq. ft.}$ for ceiling; $400 \text{ sq. ft.} + 200 \text{ sq. ft.} + 200 \text{ sq. ft.} = 800 \text{ sq. ft.}$ for 4 walls and ceiling.
23. $18 \text{ ft.} \times 2 \text{ ft.} = 36 \text{ sq. ft.}$; $36 \times 1 = 36 \text{ board feet.}$
24. $12\frac{1}{2} \text{ ft.} \times 2 \text{ ft.} = 25 \text{ sq. ft.}$ $25 \times 2 = 50 \text{ board feet.}$
25. $15 \text{ ft.} \times 3 \text{ ft.} = 45 \text{ sq. ft.}$ $45 \times 3 = 135 \text{ board feet.}$
26. $14 \text{ ft.} \times 2 \text{ ft.} = 28 \text{ sq. ft.}$ $28 \times 2 = 56 \text{ board feet.}$
27. $12 \text{ ft.} \times 4 \text{ ft.} = 48 \text{ sq. ft.}$ $48 \times 3 = 144 \text{ board feet.}$
28. $12 \text{ ft.} \times \frac{1}{2} \text{ ft.} = 6 \text{ sq. ft.}$ $6 \times 2 = 12 \text{ board feet.}$
29. $16 \text{ ft.} \times 1\frac{1}{2} \text{ ft.} = 24 \text{ sq. ft.}$ $24 \times 1 = 24 \text{ board feet.}$
30. $3 \text{ ft.} \times 2 \text{ ft.} \times 1 \text{ ft.} = 6 \text{ cu. ft.}$
31. $3 \text{ in.} \times 1 \text{ in.} \times 2 \text{ in.} = 6 \text{ cu. in.}$
32. $3 \text{ ft.} \times 3 \text{ ft.} \times 3 \text{ ft.} = 27 \text{ cu. ft.}$

33. $2 \text{ ft.} \times 2 \text{ ft.} \times 2 \text{ ft.} = 8 \text{ cu. ft.}$; $4 \text{ ft.} \times 4 \text{ ft.} \times 4 \text{ ft.} = 64 \text{ cu. ft.}$ $64 \text{ cu. ft.} \div 8 \text{ cu. ft.} = 8 \text{ boxes.}$

34. $20 \text{ ft.} \times 10 \text{ ft.} \times 10 \text{ ft.} = 2000 \text{ cu. ft.}$

35. $8 \text{ ft.} \times 4 \text{ ft.} \times 4 \text{ ft.} = 128 \text{ cu. ft.}$

36. $16 \text{ ft.} \times 4 \text{ ft.} \times 4 \text{ ft.} = 256 \text{ cu. ft.}$ $256 \div 128 = 2.$
2 cords at \$4 a cord cost $2 \times \$4 = \$8.$

37. $40 \text{ ft.} \times 20 \text{ ft.} \times 5 \text{ ft.} = 4000 \text{ cu. ft.}$

LESSON LXIII

1. Five bu. will cost 5 times 60 cents, which is \$3; 3 pk. will cost $\frac{3}{4}$ of 60 cents, which is 45 cents; then 5 bu. and 3 pk. will cost \$3.45.

2. Four gal. 2 qt. 1 pt. = 37 pt.; at 5 cents a pint, the milk will cost 37 times 5 cents, which is \$1.85.

4. One rd. contains 198 in.; 2 yd. 2 ft. 3 in. = 99 in., or $\frac{1}{2}$ a rod; then $5\frac{1}{2}$ rd. will cost $5\frac{1}{2}$ times \$12, which is \$66.

5. Twenty six minutes and 40 seconds = $\frac{1}{3}$ of an hour; 9 hours + $\frac{1}{3}$ hours = $9\frac{1}{3}$ hours. If it traveled 9 miles an hour, the distance is $9\frac{1}{3}$ times 9 miles = 85 miles.

8. Three tenths da. = $\frac{3}{10}$ of 24 hr., which is $7\frac{1}{5}$ hr.; $7\frac{1}{5}$ hr. + $\frac{2}{5}$ hr. = $7\frac{3}{5}$ hr.

9. One third rd. = $5\frac{1}{2}$ ft., or $5\frac{1}{4}$ ft.; $\frac{1}{2}$ yd. = $1\frac{1}{2}$ ft., or $1\frac{1}{4}$ ft.; $5\frac{1}{4}$ ft. + $1\frac{1}{4}$ ft. + $\frac{3}{4}$ ft. = $7\frac{3}{4}$ ft.

10. In $\frac{1}{2}$ a bushel there are $\frac{1}{2}$ of 4 pk. = 2 pk. Therefore the bushel will hold 2 pk. more.

11. One bu. 3 pk. = 7 pk.; 1 pk. is worth $\frac{1}{7}$ of 70 cents, which is 10 cents; 2 bu. 1 pk. = 9 pk.; and 4 qt. = $\frac{1}{2}$ pk.; hence $9\frac{1}{2}$ pk. are worth $9\frac{1}{2}$ times 10 cents, which is 95 cents.

13. One third of a ton cost $\frac{1}{3}$ of \$8, which is \$4; 1 T. cost \$12; 1 cwt. cost $\frac{1}{20}$ of \$12, which is 60 ct.; 3 cwt. 75 lb. = $3\frac{3}{4}$ cwt.; hence $3\frac{3}{4}$ cwt. cost $3\frac{3}{4}$ times 60 ct., which is \$2.25.

14. In 2 hr. 24 min. there are 144 min.; the rate per minute is $\frac{1}{144}$ of 60 mi. = $\frac{60}{144}$ mi., or $\frac{5}{12}$ mi.; the rate per hour is 60 times $\frac{5}{12}$ mi., which is $\frac{300}{12}$ mi. = 25 mi.

15. In 3 yd. 1 ft. 6 in. there are $3\frac{1}{2}$ yd.; in 1 rd. 5 yd. there are $10\frac{1}{2}$ yd.; the wheel would make as many revolutions in going $10\frac{1}{2}$ yd. as $3\frac{1}{2}$ yd. are contained times in $10\frac{1}{2}$ yd., which are 3.

17. I bought as many pounds as 40 ct. are contained times in 235 ct., which are $5\frac{7}{8}$; $\frac{7}{8}$ lb. = 14 oz. I bought 5 lb. 14 oz.

20. In 150 bu. there are 6 T.; 6 T. will cost 6 times \$5.75, which is \$34.50; 1 bu. will cost $\frac{1}{15}$ of \$5.75, which is 23 ct.

21. The distance around the lot is 50 ft. + 50 ft. + 100 ft. + 100 ft. = 300 ft.; 300 ft. = 100 yd.; 100 yd. = $18\frac{2}{3}$ rd. If 1 rd. costs \$5, then $18\frac{2}{3}$ rd. will cost $18\frac{2}{3}$ times \$5, which is \$90 $\frac{2}{3}$.

22. Twelve rolls will cost 6 times as much as 2 rolls; 6 times 3 ct. are 18 ct.

LESSON LXIV

14. Sixty min. + 2 min. = 30. An hour is 30 times 2 min.; therefore the car will run 30 mi. an hour.

15. It is 15 min. past 5 o'clock. Since 6 o'clock is 60 min. past 5 o'clock, it is 60 min. - 15 min. = 45 min. to 6 o'clock.

17. The entire cost was \$90 plus $\$3 \times 6 = \108 ; the sum received for him was $\$42 + \$99 = \$141$; all gained $\$141 - \$108 = \$33$; each man received $\frac{1}{3}$ of \$33, which is \$11.

LESSON LXV

12. In 6 da. of 8 hr. each there are 48 hr.; in 7 da. of 9 hr. each there are 63 hr.; $\$9\frac{3}{5} = \$4\frac{3}{5}$. In 1 hr. he would earn $\frac{1}{48}$ of $\$4\frac{3}{5}$, which is $\frac{1}{8}$; in 63 hr., $\$4\frac{3}{5} = \$12\frac{3}{5}$.

15. In $3\frac{1}{2}$ there are $\frac{7}{2}$; $2\frac{1}{3} = \frac{7}{3}$. $\frac{1}{3}$ of the number is $\frac{1}{3}$ of $\frac{7}{2} = \frac{7}{6}$; $\frac{3}{4} = \frac{3}{4}$, or $1\frac{1}{2}$. $1\frac{1}{2} \times 2\frac{1}{2} = \frac{3}{2} \times \frac{5}{2} = \frac{15}{4} = 3\frac{3}{4}$.

18. Two thirds of $\frac{4}{3} = \frac{8}{9}$. If $\frac{4}{3}$ are $\frac{2}{3}$, then $\frac{1}{3}$ is $\frac{1}{2}$ of $\frac{4}{3}$, which is $\frac{2}{3}$; and $\frac{1}{3}$ would be 7 times $\frac{2}{3}$, which is $1\frac{2}{3} = 2\frac{2}{3}$.

22. Two thirds of $1\frac{2}{3}$ are $\frac{2}{3}$. If $\frac{2}{3}$ are $\frac{1}{2}$, then $\frac{2}{3}$ are $1\frac{1}{3}$, and 2 is contained in $1\frac{1}{3}$, $\frac{2}{3}$ or $1\frac{2}{3}$ times.

25. Four fifths of 10 marbles are 8 marbles. If 8 is $\frac{8}{11}$, then $\frac{1}{11}$ is 1, and $1\frac{1}{11}$ are 11.

26. Three fifths of 60 plums are 36 plums; $\frac{2}{5}$ of 36 are 27; $\frac{1}{5}$ of 27 are 12, or what she gave away. She had left $36 - 12 = 24$.

27. Five sevenths of the distance is 35 mi.; then $\frac{1}{7}$ is 7 mi., and $\frac{2}{7}$ are 14 mi.; $\frac{3}{7}$ of 14 mi. = 6 mi.; 14 mi. - 6 mi. = 8 mi.

30. Seven sevenths less $\frac{2}{7} = \frac{5}{7}$; $\frac{2}{7}$ of $\frac{5}{7} = \frac{2}{7}$; $\frac{5}{7} - \frac{2}{7} = \frac{3}{7}$, the part she had left. $\frac{3}{7} = 6$, $\frac{1}{7} = 2$, $\frac{4}{7} = 14$.

31. Two thirds of 12 ct. are 8 ct. $\frac{1}{2}$ of $\frac{4}{3} = \frac{2}{3}$ of William's money. If 8 ct. is $\frac{2}{3}$ of William's money, William's money is $\frac{1}{2}$ of 5×8 ct. = 20 ct.

32. If $\frac{1}{2}$ of B's money equals $\frac{2}{3}$ of A's, then all of B's money = $\frac{4}{3}$ of A's; $\frac{1}{3} - \frac{2}{3} = \frac{1}{3}$, the difference between A's and B's money; $\frac{1}{3} = 12$ ct., $\frac{1}{3} = 4$ ct., $\frac{2}{3} = 28$ ct., A's money; 28 ct. - 12 ct. = 16 ct., B's.

33. One third = $\frac{1}{3}$, $\frac{1}{4} = \frac{3}{12}$; $\frac{1}{3} + \frac{3}{12} + \frac{1}{4} = \frac{8}{12} = \frac{2}{3}$; $32 = \frac{2}{3}$; $\frac{3}{2} = 96$, the number of trees in the orchard. $\frac{1}{3}$ of 96 = 32 apple; $\frac{1}{4}$ of 96 = 24 pear; $\frac{1}{12}$ of 96 = 8 plum.

34. If $\frac{2}{3}$ are pear trees, $\frac{1}{3}$ must be apple trees. The excess of apple trees is therefore $\frac{1}{3}$ of the whole; 25 is $\frac{1}{3}$ of the whole; $\frac{2}{3}$, or the pear trees, = 10, and $\frac{1}{3}$, or the apple trees, = 35.

LESSON LXVI

5. The whole number will be six times the first part; the first part = $\frac{1}{6}$, the second $\frac{2}{6}$, the third $\frac{3}{6}$; or 4, 8, and 12, respectively.

10. The difference of the two numbers is $6 + 2 = 8$; the sum of 8, the difference, and 4, one of the numbers, $= 12$, the other number.

11. The sum of 19 and 6 is 25; $25 - 10 = 15$, the difference between the numbers; then $19 - 15 = 4$, the smaller number.

12. The sum of the numbers is $10 + 8 = 18$; $18 - 5 = 13$, the other number.

18. They had at first $32 \text{ ct.} - 8 \text{ ct.} = 24 \text{ ct.}$; each had $\frac{1}{2}$ of $24 \text{ ct.} = 12 \text{ ct.}$ If Edward found 8 more, he had $12 \text{ ct.} + 8 \text{ ct.} = 20 \text{ ct.}$

19. They bought $4 \text{ peaches} + 6 \text{ peaches} + 20 \text{ peaches} = 30$ peaches; each one bought $\frac{1}{2}$ of 30 peaches, which is 15 peaches. Frank had left $15 - 4 = 11$; William had left $15 - 6 = 9$.

20. Both bought $24 \text{ cherries} + 7 \text{ cherries} + 5 \text{ cherries} = 36$ cherries. Since Mary bought twice as many as Ruth, both bought three times as many as Ruth; therefore Ruth bought $\frac{1}{3}$ of 36 cherries $= 12$ cherries, and Mary bought 2 times 12 cherries $= 24$ cherries; $24 - 7 = 17$, the number of cherries Mary had left; $12 - 5 = 7$, the number Sarah had left.

21. Three times the number is $50 - 5 = 45$; $\frac{1}{3}$ of 45 is 15, the number.

22. Three fourths of the number would be $31 - 10 = 21$; $\frac{1}{4}$ would be $\frac{1}{3}$ of $21 = 7$; $\frac{4}{3}$, or the number, would be 28.

23. Four fifths of the number would be $21 + 7 = 28$; then $\frac{1}{5}$ is $\frac{1}{4}$ of $28 = 7$, and $\frac{5}{4} = 35$.

LESSON LXVII

2. Both have to pay $\frac{3}{7} + \frac{7}{7} = \frac{10}{7}$; $\frac{1}{7}$ is $\frac{1}{10}$ of $\$60 = \6 . John pays 3 times $\$6 = \18 ; Thomas pays 7 times $\$6 = \42 .

3. Four fourths $+ \frac{3}{4} = \frac{7}{4}$; $\frac{1}{4}$ is $\frac{1}{4}$ of 56 mi. = 8 mi.; $\frac{4}{4}$ are 32 mi., and $\frac{3}{4}$ are 24 mi., the distance traveled each day, respectively.

4. Since the first, plus $\frac{5}{7}$ of the first, less 8 (that is, $\frac{12}{7}$ of the first less 8), = 100, $\frac{12}{7}$ of the first = 108; $\frac{1}{7}$ is $\frac{1}{7}$ of 108 = 9; $\frac{7}{7} = 63$, the first; $\frac{5}{7} = 45$, and 45 less 8 = 37, the second.

5. Four fourths $+ \frac{2}{4} + \frac{3}{4} = \frac{9}{4}$, or 45; $\frac{1}{4}$ is $\frac{1}{9}$ of 45 = 5. $\frac{4}{9} = 20$, the first part; $\frac{2}{9} = 10$, the second part; $\frac{3}{9} = 15$, the third part.

10. If $\frac{1}{2}$ of the cows = $\frac{2}{7}$ of the sheep, then all of the cows = $\frac{4}{7}$ of the sheep, and $1 + \frac{4}{7} = \frac{11}{7}$ of the sheep; $\frac{1}{7}$ of the sheep is $\frac{1}{11}$ of 55 = 5; $\frac{7}{7} = 35$, the number of sheep; $\frac{4}{7} = 20$, the number of cows.

11. If $\frac{1}{3}$ of the less = $\frac{2}{5}$ of the greater, $\frac{5}{3}$, or the whole of the less, = 3 times $\frac{2}{5}$, which is $\frac{6}{5} = \frac{3}{5}$; $\frac{5}{3} + \frac{3}{5} = 60$; $\frac{1}{3}$ is $\frac{1}{3}$ of 60 = 20; $\frac{2}{5} = 24$, the greater number; $\frac{3}{5} = 36$, the smaller number.

12. If $\frac{1}{4}$ of Mary's age = $\frac{1}{3}$ of Sarah's, $\frac{3}{4}$ of Mary's age = $\frac{3}{4}$ of Sarah's; $\frac{3}{4} + \frac{3}{4} = \frac{3}{2}$; $\frac{1}{2}$ of Sarah's age is $\frac{1}{2}$ of 14 = 7; $\frac{3}{4} = 6$, Sarah's age; $\frac{3}{4} = 8$, Mary's age.

13. If $\frac{2}{3}$ of the first = $\frac{3}{4}$ of the second, $\frac{1}{3}$ is $\frac{1}{2}$ of $\frac{4}{3} = \frac{4}{3}$, and $\frac{4}{3}$, or the whole of the first, = $\frac{4}{3}$ of the second. If the first is $\frac{2}{3}$ of the second, and the second $\frac{3}{4}$, both = $\frac{1}{2}$ of the second. $\frac{1}{2}$ is $\frac{1}{2}$ of 51 = 25.5; $\frac{2}{3} = 34$, the first part; $\frac{3}{4} = 42$, the second.

14. If $\frac{2}{3}$ of the apple trees = $\frac{3}{4}$ of the peach trees, $\frac{1}{3} = \frac{3}{4}$, and $\frac{4}{3} = \frac{3}{4}$; $\frac{4}{3}$ of the peach trees + $\frac{3}{4}$ of the peach trees = $\frac{17}{12}$ of the peach trees, and $\frac{1}{12}$ is $\frac{1}{12}$ of 65 trees = 5 trees. $\frac{4}{3} = 35$, the number of peach trees; $\frac{3}{4} = 30$, the number of apple trees.

15. If $\frac{2}{3}$ of A's distance = $\frac{3}{4}$ of B's, then $\frac{1}{3} = \frac{3}{4}$, and $\frac{4}{3} = \frac{3}{4}$, or $\frac{4}{3}$; A traveled $\frac{4}{3}$ as far as B, and both traveled $\frac{4}{3} + \frac{3}{4} = \frac{11}{4}$, or 66 mi. $\frac{1}{4}$ is $\frac{1}{4}$ of 66 mi. = 16.5 mi.; $\frac{4}{3} = 49.5$ mi.,

B's distance; $\frac{2}{3} = 30$ mi., A's distance; and 36 mi. $- 30$ mi. $= 6$ mi., the number of miles B traveled more than A.

17. From noon to midnight is 12 hr. The time elapsed since noon is $\frac{2}{3}$ of the time to midnight, and the time to midnight is $\frac{2}{3}$ the time. $\frac{2}{3} + \frac{2}{3} = \frac{4}{3}$, and $\frac{4}{3} = 12$ hr.; $\frac{1}{3}$ is $\frac{1}{3}$ of 12 hr. $= 4$ hr.; $\frac{2}{3} = 8$ hr. Therefore it is half past 4 o'clock, P.M.

18. Since once the time past noon $+ 3$ hr. is $\frac{1}{2}$ the time to midnight, twice the time past noon $+ 6$ hr. $=$ the whole time to midnight; but the time past noon $+ 6$ hr. $= 12$ hr.; hence the time past noon, with twice the time past noon $+ 6$ hr. $= 12$ hr.; hence 3 times the time past noon is 6 hr., and the time past noon is $\frac{1}{3}$ of 6 hr. $= 2$ hr.

19. Let $\frac{2}{3} =$ the whole time past midnight; the time past noon is $\frac{1}{3}$; from midnight to noon is $\frac{1}{3}$; hence $\frac{2}{3} = 12$ hr.; and $\frac{1}{3} = 3$ hr. It is 3 o'clock in the afternoon.

20. Let $\frac{3}{4} =$ the whole time past midnight; from midnight to noon is $\frac{3}{4}$; the time past noon $= \frac{1}{4}$; $\frac{3}{4} = 12$ hr.; $\frac{1}{4} = 4$ hr. It is 4 o'clock in the afternoon.

21. If $\frac{1}{2}$ the time past noon $= \frac{1}{10}$ of the time past midnight, the whole time past noon $= \frac{1}{5}$ the time past midnight; $\frac{1}{5} =$ the whole time past midnight; $\frac{1}{5} =$ the time past noon; $\frac{4}{5} =$ the time from midnight to noon, or 12 hr.; $\frac{1}{5} = 1\frac{1}{2}$ hr. It is 20 min. past 1 o'clock, P.M.

LESSON LXVIII

2. One $+ \frac{2}{3} = \frac{5}{3}$; $\frac{1}{3}$ is $\frac{1}{3}$ of $20 = 4$; $\frac{2}{3} = 12$, the number.

4. Twice the number is $\frac{1}{5}$, and $\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$. If $\frac{3}{5} = 52$, then $\frac{1}{5}$ is $\frac{1}{3}$ of $52 = 4$, and $\frac{2}{5} = 20$, the number.

5. Twice the number is $\frac{1}{7}$, and $\frac{1}{7}$ less $\frac{1}{7} = \frac{1}{7}$. If $\frac{1}{7} = 40$, then $\frac{1}{7}$ is $\frac{1}{7}$ of 40 , which is 4 , and $\frac{6}{7} = 28$.

6. Let $\frac{2}{3} =$ the number; 3 times $\frac{2}{3}$ less $\frac{2}{3} = \frac{4}{3}$. If $\frac{4}{3} = 48$, then $\frac{2}{3}$ is $\frac{1}{2}$ of $48 = 4$, and $\frac{5}{3} = 20$.

7. Let $\frac{2}{3} =$ his age; then $\frac{2}{3} + \frac{2}{3} + \frac{1}{3} = \frac{5}{3}$. If $26 = \frac{5}{3}$ then $\frac{1}{3} = 2$, and $\frac{2}{3} = 12$.

8. Her age = $\frac{1}{2}$, and $\frac{1}{2} + \frac{4}{12} + \frac{3}{12} = \frac{11}{12}$; twice her age is $\frac{11}{6}$, and $\frac{11}{6} - \frac{1}{2} = \frac{5}{6}$; 10 years = $\frac{5}{6}$, and $\frac{1}{2} = 2$ years; hence $\frac{1}{2}$, her age, is 24 years.

9. Five fifths less $\frac{2}{5} = \frac{3}{5}$; $\frac{3}{5}$ are 30 cents, and $\frac{5}{5}$ are 50 cents.

10. Let $\frac{1}{10}$ = the number; $\frac{1}{10} + \frac{5}{10} + \frac{6}{10} = \frac{12}{10}$; three times the number is $\frac{36}{10}$; $\frac{36}{10} - \frac{12}{10} = \frac{24}{10}$; $27 = \frac{24}{10}$; $\frac{1}{10} = 3$; $\frac{1}{10} = 30$.

11. Let $\frac{1}{11}$ = the father's age; $\frac{1}{11} - \frac{3}{11} = \frac{2}{11}$; $\frac{2}{11} = 40$ yr.; $\frac{1}{11} = 5$ yr.; $\frac{1}{11} = 55$ yr.; 55 yr. - 40 yr. = 15 yr.

12. Let $\frac{5}{8}$ = her age; $\frac{5}{8} + \frac{4}{8} = \frac{9}{8}$; three times her age is $\frac{15}{8}$; $\frac{15}{8} - \frac{9}{8} = \frac{6}{8}$; 18 yr. = $\frac{6}{8}$; $\frac{1}{8} = 3$ yr.; $\frac{5}{8} = 15$ yr.

13. Let $\frac{2}{3}$ = the whole length; $\frac{2}{3} - \frac{2}{3} = \frac{7}{3}$; $\frac{7}{3} = 28$ yd.; $\frac{1}{3} = 4$ yd.; $\frac{2}{3} = 36$ yd.

LESSON LXIX

4. As many lots as $\frac{3}{8}$ are contained times in $\frac{3}{8}$, which are $2\frac{3}{8}$.

5. In $2\frac{1}{2}$ days there are $\frac{5}{2}$ days; in $\frac{1}{2}$ day he would do $\frac{1}{5}$ of the work; in 1 day he would do $\frac{2}{5}$ of the work.

7. In $3\frac{1}{2}$ days there are $\frac{10}{2}$ days. In $\frac{1}{2}$ of a day he would walk $\frac{1}{10}$; in 1 day, $\frac{2}{10}$; in 2 days, $\frac{4}{10} = \frac{2}{5}$.

8. Both do $\frac{1}{2} + \frac{1}{4}$, which are $\frac{3}{4}$.

9. All do the sum of $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$, which is $\frac{5}{8}$.

11. A digs $\frac{1}{6}$ in 1 day; B digs $\frac{1}{12}$ in 1 day; both dig $\frac{2}{12} = \frac{1}{6}$ in 1 day. If they dig $\frac{1}{6}$ in 1 day; it will take 4 days to dig the whole trench.

12. C does $\frac{1}{3}$ in 1 day; B does $\frac{1}{3}$ in 1 day; both do $\frac{2}{3}$ in 1 day. It will take as many days to do it all as $\frac{12}{2}$ are contained times in $\frac{2}{3}$, which are $2\frac{1}{2}$.

13. A can do $\frac{1}{2}$ in 1 day, B $\frac{1}{3}$, and C $\frac{1}{6}$; all do in 1 day the sum of $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{6}$, which is $\frac{2}{3}$. Therefore, all three do it in 1 day.

15. Both drink $\frac{1}{2}$ in 1 day; the woman drinks $\frac{1}{80}$ in 1 day; the man drinks $\frac{1}{2} - \frac{1}{80} = \frac{39}{80}$ in 1 day. If he drinks $\frac{1}{80}$ in 1 day, he would drink it all in 20 days.

16. All do $\frac{1}{4}$ in 1 day; A and B do $\frac{1}{8} + \frac{1}{12} = \frac{5}{24}$ in 1 day; C does in 1 day $\frac{1}{4} - \frac{5}{24} = \frac{1}{24}$. Therefore, C can reap it all in 24 days.

17. Both do in 1 day $\frac{1}{2} + \frac{1}{8} = \frac{5}{8}$. If they do $\frac{5}{8}$ in 1 day, they would do it all in $1\frac{1}{8}$ days.

18. A digs $\frac{2}{3}$ in 1 day; and B digs $\frac{2}{15}$ in 1 day; both dig $\frac{2}{3} + \frac{2}{15} = \frac{7}{15}$ in 1 day. Therefore, if they dig $\frac{7}{15}$ in 1 day, they would dig it all in $1\frac{2}{7}$ days.

19. C reaps $\frac{1}{3}$ in 1 day; D reaps $\frac{2}{15}$ in 1 day; both reap in 1 day $\frac{1}{3} + \frac{2}{15} = \frac{5}{15} = \frac{1}{3}$. If they reap $\frac{1}{3}$ in 1 day, they would reap the whole in 2 days.

LESSON LXX

36. The ratio of 21 to 7 is 3; $36 \div 3 = 12$, the number.

37. The ratio of 20 to 2 is 10; $10 - 5 = 5$, 5 is $\frac{1}{4}$ of 20, and 20 is the ratio of 40 to 2.

38. The ratio of 18 to 2 is 9, $+ 3 = 12$, $+ 7 = 19$; and 19 is the ratio of 38 to 2.

39. The ratio of 27 to 9 is 3, $+ 5 = 8$; and 8 is the ratio of 20 to $2\frac{1}{2}$.

42. The ratio of 18 to 6 is 3. Therefore, 18 rolls cost 3 times 5 ct., which is 15 ct.

43. The ratio of $\frac{3}{4}$ to $\frac{3}{8}$ is 2. Therefore, $\frac{3}{4}$ of a yard will cost 2×30 ct., which is 60 ct.

44. The ratio of $\frac{5}{8}$ to $\frac{2}{15}$ is $1\frac{10}{8}$. Therefore, $\frac{5}{8}$ of the house will cost $1\frac{10}{8}$ of \$300, which is \$1000.

45. $2\frac{2}{7} \times 14$ inches = 44 inches.

46. The ratio of \$1 to 10 ct. is 10. Therefore, $10 \times 12 = 120$ pencils can be bought.

47. The ratio of 75 ct. to 25 ct. is 3. Therefore, $3 \times 13 = 39$ can be bought.

48. The ratio of 75 ct. to 5 ct. is 15. Therefore, $15 \times 3 = 45$ lemons can be bought.

LESSON LXXI

17. The ratio of $12\frac{1}{2}$ to 75 is 6. Therefore, 6 yd. can be bought for 75 ct. The ratio of $12\frac{1}{2}$ to 50 is 4. Therefore, 4 yd. can be bought for 50 ct.

18. The ratio of $33\frac{1}{4}$ ct. to \$1 is 3. Therefore, 3 lb. can be bought.

19. The ratio of $16\frac{3}{4}$ ct. to \$2 is 12. Therefore, 12 lb. can be bought.

20. The ratio of $37\frac{1}{2}$ ct. to \$1.50 is 4. Therefore, 4 yd. can be bought.

21. The ratio of $87\frac{1}{2}$ ct. to \$1.75 is 2. Therefore, 2 yd. can be bought.

23. $5 + 7 = 12$; $\frac{5}{12}$ of $48 = 20$, the first part; $\frac{7}{12}$ of $48 = 28$, the second part.

28. Once the number + 3 times the number = 4 times the number, or 48; and $\frac{1}{4}$ of 48 is 12, the number.

29. $One + 4 = 5$; the first is $\frac{1}{5}$ of 25 yd. = 5 yd.; the second is $\frac{4}{5} = 20$ yd.

32. The first should have $\frac{3}{8}$ of $7\frac{1}{2}$ doz. = 5 doz.; the second should have $\frac{1}{8}$ of $7\frac{1}{2}$ doz. = $2\frac{1}{2}$ doz.

33. A paid $\frac{2}{5} = \frac{2}{5}$ of the cost, and B paid $\frac{1}{5} = \frac{1}{5}$ of the cost. A should receive $\frac{3}{5}$ of \$56 = \$35, and B should receive $\frac{2}{5}$ of \$56 = \$21.

34. $Three + 2 = 5$. C's loss was $\frac{3}{5}$ of \$30 = \$18; D's loss was $\frac{2}{5}$ of \$30 = \$12.

LESSON LXXII

3. Three thirds + $\frac{1}{3} = \frac{4}{3}$. A has $\frac{2}{3}$ of 14 ct. = 6 ct.; B has $\frac{1}{3}$ of 14 ct. = 8 ct.

5. In $2\frac{1}{2}$ are $\frac{5}{2}$, and $4\frac{1}{2} = \frac{9}{2}$; $\frac{5}{2} + \frac{9}{2} = 1\frac{7}{2}$. The first would receive $\frac{5}{14}$ of $\$28 = \10 ; the second would receive $\frac{9}{14}$ of $\$28 = \18 .

6. Three thirds $+ \frac{5}{3} = \frac{8}{3}$. William's age is $\frac{5}{8}$ of 32 yr. = 20 yr.; Frank's age is $\frac{3}{8}$ of 32 yr. = 12 yr.

7. Three thirds $+ \frac{7}{3} = \frac{10}{3}$. $\frac{7}{10}$ of 30 apples = 21 apples, the number of sound ones; $\frac{3}{10}$ of 30 apples = 9 apples, the number not sound.

8. Four fifths $+ \frac{5}{5} = \frac{9}{5}$. One built $\frac{4}{9}$ of 27 ft. = 12 ft.; the other, $\frac{5}{9} = 15$ ft.

10. $One + 2 + 3 + 4 = 10$. The first part is $\frac{1}{7}$ of 70 = 7; the second, $\frac{2}{7}$ of 70 = 14; the third, $\frac{3}{7}$ of 70 = 21; the fourth, $\frac{4}{7}$ of 70 = 28.

11. One half = $\frac{6}{12}$; $\frac{1}{3} = \frac{4}{12}$; $\frac{1}{4} = \frac{3}{12}$; and $\frac{6}{12} + \frac{4}{12} + \frac{3}{12} = \frac{13}{12}$. The first is $\frac{6}{13}$ of 39 = 18; the second, $\frac{4}{13} = 12$; the third is $\frac{3}{13} = 9$.

12. All had 3 ct. + 4 ct. + 5 ct. = 12 ct. William's share, $\frac{3}{12}$ of 36, = 9; Thomas's, $\frac{4}{12}$ of 36, = 12; John's, $\frac{5}{12}$ of 36, = 15.

13. The whole loss was $\$864 - \$500 = \$364$; $\frac{1}{3}$ of $\$364$ is $\$121\frac{1}{3}$, A's loss; $\frac{1}{4}$ of $\$364$ is $\$91$, B's loss; $\frac{5}{8}$ of $\$364$ are $\$273$, C's loss.

14. A has $\frac{1}{4}$, B $\frac{2}{4}$, and C $\frac{1}{4}$; all have $\frac{1}{4} + \frac{2}{4} + \frac{1}{4} = \frac{4}{4}$. A has $\frac{1}{4}$ of $\$42 = \$10\frac{1}{2}$; B has $\frac{2}{4}$ of $\$42 = \21 ; and C has $\frac{1}{4}$ of $\$42 = \$10\frac{1}{2}$.

15. $Four + 3 + 2 = 9$. A has $\frac{4}{9}$, B $\frac{3}{9}$, and C $\frac{2}{9}$, or 20, 15, and 10, respectively.

16. $One + 3 + 6 = 10$. $\frac{1}{10}$ of 60 = 6, the horses; $\frac{3}{10}$ of 60 = 18, the cows; $\frac{6}{10}$ of 60 = 36, the sheep.

17. $One + 2 + 3 = 6$. A has $\frac{1}{6}$ of 42 = 7; B, $\frac{2}{6} = 14$; C, $\frac{3}{6} = 21$.

18. $One + 2 + 4 = 7$. Edith has $\frac{1}{7}$ of 35 = 5; Kate has $\frac{2}{7}$ of 35 = 10; Alice has $\frac{4}{7}$, = 20.

LESSON LXXIII

2. 15 times 8 men = 120 men do the work in 1 day; to do it in 12 days will take $\frac{1}{12}$ of 120 men = 10 men.

4. One will fill it in 9 times $2\frac{1}{2}$ hr. = $22\frac{1}{2}$ hr.; then 5 pipes will fill it in $\frac{1}{5}$ of $22\frac{1}{2}$ hr. = $4\frac{1}{2}$ hr.

6. Fifteen cents = $\$ \frac{3}{20}$; 80 times $\$ \frac{3}{20}$ = $\frac{240}{20}$ = \$12.

7. Sixty cents = $\$ \frac{3}{5}$; 80 times $\$ \frac{3}{5}$ = $\$ \frac{240}{5}$ = \$48.

10. It will make 3 times 20 = 60 one-cent loaves. $\frac{1}{4}$ of 60 = 15 four-cent loaves; $\frac{1}{3}$ of 60 = 20 five-cent loaves.

11. A loaf will weigh 3 times 8 oz. = 24 oz., when flour is \$1 a bbl.; and $\frac{1}{4}$ of 24 oz. = 6 oz., when it is \$4 a bbl.

12. Six times 10 oz. = 60 oz.; $\frac{1}{5}$ of 60 oz. = 12 oz.

13. In $\$ 5\frac{1}{2}$ there are $\$ \frac{11}{2}$; $\frac{1}{8}$ times 7 oz. = $1\frac{1}{8}$ oz.; $\$ 4\frac{2}{3}$ = $\$ \frac{14}{3}$. When flour is worth $\$ 4\frac{2}{3}$ a barrel, a loaf will weigh as many ounces as $\frac{1}{8}$ are contained times in $1\frac{1}{8}$ = 8.

14. 5 times 5 men = 25 men do the work in $\frac{1}{2}$ the time; to do twice as much will take 2 times 25 men = 50 men.

15. Six men will do $\frac{1}{2}$ of it in $\frac{1}{2}$ of 5 days = $2\frac{1}{2}$ days; one man will do the other $\frac{1}{2}$ in 6 times $2\frac{1}{2}$ days = 15 days. $6 + 3 = 9$; 9 men will do it in $\frac{1}{9}$ of 15 days = $1\frac{2}{3}$ days. Therefore, the whole time is $2\frac{1}{2}$ days + $1\frac{2}{3}$ days = $4\frac{1}{6}$ days.

16. Seven men will do $\frac{1}{2}$ of the work in 2 days; one man will do the other half in 7 times 2 days = 14 days. $7 - 3 = 4$; 4 men will do it in $\frac{1}{4}$ of 14 days = $3\frac{1}{2}$ days. Therefore, it will take 2 days + $3\frac{1}{2}$ days = $5\frac{1}{2}$ days to do the whole work.

17. Four men do $\frac{1}{4}$ in 2 da., hence 1 man does $\frac{1}{4}$ in 8 da. and $\frac{3}{4}$ in 24 da. $4 + 4 = 8$ men. 8 men do the remaining $\frac{3}{4}$ in $\frac{1}{8}$ of 24 = 3 da.

LESSON LXXIV

2. One horse eats as much as $1\frac{1}{2}$ cows, and 14 horses eat as much as 21 cows; 15 cows + 21 cows = 36 cows. A pays $\frac{2}{3}$ = $\frac{7}{12}$ of \$60 = \$35; B pays $\frac{1}{3}$ = $\frac{5}{12}$ of \$60 = \$25.

3. B's 120 sheep = 6 horses; his 15 oxen = 10 horses; then B has the same as 6 horses + 10 horses = 16 horses. Both have 16 horses + 8 horses = 24 horses. A should pay $\frac{8}{24}$, or $\frac{1}{3}$, of \$72 = \$24; B should pay $\frac{2}{3}$ of \$72 = \$48.

5. Mr. Allen's and Mr. Blake's capital together is \$200 + \$300 = \$500; Mr. Allen's is $\frac{2}{3}$, and Mr. Blake's $\frac{1}{3}$ of the whole. $\frac{2}{3}$ of \$100 = \$40, Mr. Allen's gain; $\frac{1}{3}$ of \$100 = \$60, Mr. Blake's gain.

6. The capital of both is \$300 + \$500 = \$800; A's is $\frac{3}{8}$, and B's $\frac{5}{8}$; $\frac{3}{8}$ of \$200 = \$75, A's gain. $\frac{5}{8}$ of \$200 = \$125, B's gain.

7. The whole stock was \$70 + \$150 + \$80 = \$300; A's = $\frac{7}{30}$, B's $\frac{15}{30}$, C's $\frac{8}{30}$. $\frac{7}{30}$ of \$120 = \$28, A's gain; $\frac{15}{30}$ of \$120 = \$60, B's gain; $\frac{8}{30}$ of \$120 = \$32, C's gain.

8. C's \$50 for 4 mo. = \$200 for 1 mo.; D's \$60 for 5 mo. = \$300 for 1 mo.; \$200 + \$300 = \$500. C has $\frac{2}{3}$ of \$45 = \$30; D has $\frac{1}{3}$ of \$45 = \$15.

9. A's \$25 for 2 mo. = \$50 for 1 mo.; B's \$20 for 5 mo. = \$100 for 1 mo.; \$50 + \$100 = \$150; $\frac{50}{150} = \frac{1}{3}$ A's; $\frac{100}{150} = \frac{2}{3}$ B's. $\frac{1}{3}$ of \$30 = \$10, A's gain; $\frac{2}{3}$ of \$30 = \$20, B's gain.

10. A's \$300 for 5 mo. = \$1500 for 1 mo.; B's \$600 for 5 mo. = \$3000 for 1 mo.; C's \$500 for 3 mo. = \$1500 for 1 mo.; \$1500 + \$3000 + \$1500 = \$6000; A's = $\frac{1500}{6000} = \frac{1}{4}$, B's = $\frac{3000}{6000} = \frac{1}{2}$, C's = $\frac{1500}{6000} = \frac{1}{4}$. A's loss = $\frac{1}{4}$ of \$100 = \$25; B's loss = $\frac{1}{2}$ of \$100 = \$50; C's loss = $\frac{1}{4}$ of \$100 = \$25.

11. There will be 1 + 3 + 5 = 9 parts. $\frac{1}{9}$ of \$90 = \$10, first part; $\frac{3}{9}$ of \$90 = \$30, second part; $\frac{5}{9}$ of \$90 = \$50, third part.

12. A's \$200 for 10 mo. = \$2000 for 1 mo.; B's \$300 for 12 mo. = \$3600 for 1 mo.; C's \$100 for 4 mo. = \$400 for 1 mo.; \$2000 + \$3600 + \$400 = \$6000. A's gain is $\frac{1}{3}$ of \$150 = \$50; B's gain is $\frac{2}{3}$ of \$150 = \$90; C's gain is $\frac{2}{3}$ of \$150 = \$100.

13. Three men for 4 days = 12 men 1 day; 5 men 3 days = 15 men 1 day; 12 men + 15 men = 27 men. A receives $\frac{4}{27}$ of \$81 = \$36; B receives $\frac{15}{27}$ of \$81 = \$45.

14. A's \$2 for 5 mo. = \$10 for 1 mo.; B's \$3 for 4 mo. = \$12 for 1 mo.; \$10 + \$12 = \$22. A receives $\frac{10}{22}$ of \$55 = \$25; B, $\frac{12}{22}$ = \$30.

15. E's 4 horses = 6 cows; 6 cows for 5 mo. = 30 cows 1 mo.; F's 10 cows for 6 mo. = 60 cows 1 mo.; 30 cows + 60 cows = 90 cows. E pays $\frac{1}{3}$ of \$27 = \$9; F pays $\frac{2}{3}$ of \$27 = \$18.

16. The net gain is \$300 - \$150 = \$150; \$600 + \$900 = \$1500. M has $\frac{2}{3}$ of \$150 = \$60; N has $\frac{1}{3}$ of \$150 = \$90.

17. C's capital = \$600 for 12 mo., or \$7200 for 1 mo.; D's = \$600 for 8 mo., or \$4800 for 1 mo.; \$7200 + \$4800 = \$12000. C has $\frac{7200}{12000}$ = $\frac{3}{5}$ of \$250 = \$150; D has $\frac{4800}{12000}$ = $\frac{2}{5}$ of \$250 = \$100.

18. E had \$1000 for 12 mo. = \$12000 for 1 mo.; F had \$3000 for 12 mo. = \$36000 for 1 mo., less \$1000 for 4 mo. = \$4000 for 1 mo., and \$36000 - \$4000 = \$32000; \$32000 + \$12000 = \$44000. E had $\frac{12000}{44000}$ of \$770 = \$210; F had $\frac{32000}{44000}$ of \$770 = \$560.

19. \$240 - \$20 = \$220; B's share is $\frac{1}{2}$ of \$220 = \$110; A's share is \$110 + \$20 = \$130. B has $\frac{110}{240}$ = $\frac{11}{24}$ of the gain, and also $\frac{1}{4}$ of the capital, \$240, = \$60; A has $\frac{130}{240}$ of the gain, and also $\frac{3}{4}$ of \$240, = \$180.

20. Since D's time was only $\frac{3}{4}$ of C's, he must have had $\frac{1}{4}$ more capital than C; then $\frac{4}{3}$ = D's capital, and $\frac{3}{4}$ = C's capital; $\frac{4}{3} + \frac{3}{4} = \frac{7}{4}$, and $\frac{7}{4}$ = \$980. $\frac{1}{4}$ = $\frac{1}{7}$ of \$980 = \$140; $\frac{3}{4}$ = \$560, D's capital; $\frac{4}{3}$ = \$420, C's capital.

21. A's gain per month was $\frac{1}{10}$ of \$70 = \$7; B's gain per month was $\frac{1}{8}$ of \$80 = \$10. Both gained \$7 + \$10 = \$17 per month. If A has $\frac{7}{17}$ of the gain, his capital is $\frac{7}{17}$ of \$1700 = \$700; B's capital is $\frac{10}{17}$ of \$1700 = \$1000.

22. The ratio of their stock was 2 to 3, and of the time 10 to 12; $2 \times 10 = 20$; $3 \times 12 = 36$; $20 + 36 = 56$. E's gain was $\frac{20}{56}$ of \$840 = \$300; F's gain was $\frac{36}{56}$ of \$840 = \$540.

LESSON LXXVIII

15. $\frac{30}{5} = \frac{3}{5} = 66\frac{2}{3}$ per cent.
16. He gains $\frac{5}{5} = \frac{1}{5}$, and $\frac{1}{5} = 20$ per cent.
21. He gained $\$24 - \$15 = \$9$; $\$9 = \frac{3}{5}$ of the cost, or 60 per cent.
22. In 5 gal. there are 20 qt. $\frac{6}{10} = \frac{3}{5} = 30$ per cent was lost.
23. Six ct. = $\frac{2}{5}$ of the cost; $\frac{2}{5} = 5$ ct., the cost; 8 ct. - 5 ct. = 3 ct.; $\frac{3}{5} = 60$ per cent.
24. He paid $\frac{1}{3}$ of $\$3 = 50$ ct. for 1 yd.; he sold 1 yd. for $\frac{1}{4}$ of $\$4 = 80$ ct.; 80 ct. - 50 ct. = 30 ct.; $\frac{30}{50} = \frac{3}{5} = 60\%$.
25. Eight ct. = $\frac{2}{5}$ of the cost; $\frac{2}{5} = 10$ ct., the cost. $\frac{1}{3}$ of 25 ct. = $8\frac{1}{3}$ ct.; $10 - 8\frac{1}{3} = 1\frac{2}{3} = \frac{12}{10} = \frac{6}{50} = \frac{1}{5} = 16\frac{2}{3}\%$ loss. $\frac{1}{3}$ of 25 ct. = $12\frac{1}{3} - 10 = 2\frac{1}{3}$; $\frac{2\frac{1}{3}}{10} = \frac{5}{20} = \frac{1}{4}$; $\frac{1}{4} = 25\%$ gain.
26. One lemon cost $\frac{1}{3}$ of 3 ct. = $1\frac{1}{3}$ ct. He sold 1 lemon for $\frac{1}{3}$ of 2 ct. = $\frac{2}{3}$ ct. $1\frac{1}{3} = \frac{4}{3}$; $\frac{2}{3} = \frac{2}{3}$; $\frac{4}{3} - \frac{2}{3} = \frac{2}{3}$; $\frac{2}{3}$ are $\frac{2}{3}$ of $\frac{3}{2}$, and $\frac{2}{3} = 55\frac{1}{3}\%$.

LESSON LXXIX

2. $\$26 = 130$ per cent of the cost, or $\frac{13}{10}$; $\frac{1}{10} = \frac{1}{8}$ of $\$26 = \2 ; $\frac{1}{8} = \$20$, the cost.
3. Fourteen ct. = $\frac{1}{4}$ of the cost; $\frac{1}{10}$ is $\frac{1}{4}$ of 14 ct. = 1 ct.; $\frac{1}{10} = 10$ ct., the cost.
4. $\$81 = \frac{9}{8}$ of the cost; $\frac{1}{8} = \$9$; $\frac{9}{8} = \$72$.
5. $\$63 = \frac{9}{10}$ of the cost; $\frac{1}{10} = \$7$; $\frac{1}{10} = \$70$.
6. $\$21 = \frac{7}{4}$ of the cost; $\frac{1}{4} = \$3$; $\frac{7}{4} = \$12$.
7. Forty ct. = $\frac{4}{5}$ of the cost; $\frac{1}{5} = 10$ ct.; $\frac{4}{5} = 30$ ct. Each orange cost $\frac{1}{10}$ of 30 ct. = 3 ct.
8. $\$10 = \frac{5}{4}$ of the cost; $\frac{1}{4} = \$2$; $\frac{5}{4} = \$8$, the cost; $\$12 - \$8 = \$4$. He would gain $\frac{4}{8} = 50$ per cent.
9. Seven ct. = $\frac{7}{8}$ of the cost; $\frac{1}{8} = 1$ ct.; $\frac{7}{8} = 8$ ct., the cost. 8 ct. - 6 ct. = 2 ct.; and 2 ct. are $\frac{1}{4}$ of the cost = 25 per cent loss.

10. $\$35 = \frac{5}{8}$ of the cost; $\frac{1}{8} = \$7$; $\frac{3}{8} = \$42$, the cost. $\$63 - \$42 = \$21$; $\$21$ is $\frac{1}{2}$ of the cost = 50 per cent gain.

11. $\$18 = \frac{3}{5}$ of its value; $\frac{2}{5} = \$15$, its value; 10 per cent of $\$15$ is $\frac{1}{10}$ of $\$15 = \1.50 ; $\$18 - \$15 = \$3$. He lost $\$3 + \$1\frac{1}{2} = \$4\frac{1}{2}$.

12. $\$60 = \frac{3}{5}$ of the cost; $\frac{2}{5} = \$50$, the cost. A gained $\$60 - \$50 = \$10$; B lost 20 per cent, or $\frac{1}{5}$ of $\$60 = \12 . B lost $\$12 - \$10 = \$2$ more than A gained.

13. $\$30 = \frac{3}{4}$ of the cost of the first; $\frac{1}{4} = \$24$, the cost. The gain was $\$30 - \$24 = \$6$. $\$30 = \frac{3}{4}$ of the cost of the second; $\frac{1}{4} = \$40$, the cost. The loss on the watch was $\$40 - \$30 = \$10$; loss by sale $\$10 - \$6 = \$4$.

14. One apple sold for $\frac{1}{4}$ of 3 ct. = $\frac{3}{4}$ ct.; $\frac{3}{4}$ ct. = 150%, or $\frac{3}{2}\%$ of the cost. $\frac{1}{2} = \frac{1}{4}$ ct.; $\frac{3}{4} = \frac{3}{4}$ ct. = $\frac{1}{2}$ ct., the cost. 5 apples for 4 ct. = $\frac{4}{5}$ ct. for 1 apple. Gain $\frac{4}{5} - \frac{1}{2} = \frac{3}{10}$, and $\frac{3}{10} = \frac{3}{10}$ of $\frac{5}{10}$, or 30 per cent.

15. One lemon sold for $\frac{4}{5}$ ct.; $\frac{1}{5}$ ct. = $\frac{1}{5}$ of the cost; 1 ct. = the cost; 6 for 5 ct. = $\frac{5}{6}$ ct. for 1; 1 ct. - $\frac{5}{6}$ ct. = $\frac{1}{6}$ ct.; $\frac{1}{6}$ of 1 ct. = $16\frac{2}{3}$ per cent.

16. Ten per cent of 60 = 6; $\frac{2}{3}$ of 6 = 4; 4 is $\frac{1}{2}$ of 8; $8 = \frac{1}{2}$, or 20 per cent, of 40.

17. 50% of 120 = 60; $\frac{2}{3}$ of 60 = 36; $\frac{1}{2}$ of 36 = 18; 18 is 10 less than 28, and 28 is 20 per cent, or $\frac{1}{5}$, of 140.

18. Sixty per cent of 10 is 6; $\frac{2}{3}$ of 6 = 4; $\frac{1}{4}$ of 4 = 1. 1 is 5 less than 6, and 6 is 50 per cent, or $\frac{1}{2}$, of 12.

19. 75% of 15 = $\frac{45}{2}$; $\frac{2}{3}$ of $\frac{45}{2} = \frac{15}{2}$; $\frac{3}{4}$ of $\frac{15}{2} = \frac{27}{4}$; $\frac{27}{4}$ are $1\frac{3}{4}$ more than $\frac{7}{4}$, and $\frac{7}{4}$ are 50 per cent, or $\frac{1}{2}$, of $\frac{14}{4} = 3\frac{1}{2}$.

20. 25% of 4 is 1; $\frac{2}{3}$ of 1 = $\frac{2}{3}$; $\frac{3}{2}$ times $\frac{2}{3} = \frac{3}{3} = 1$; 1 is 25 per cent, or $\frac{1}{4}$, of 4; and 4 is $\frac{1}{2}$ of 8.

LESSON LXXX

1. One fifth of $\$3$ is 60 ct.; $\$3 - 60$ ct. = $\$2.40$.
2. One fifth of $\$125 = \25 ; $\$125 - \$25 = \$100$.
3. One sixth of $\$840 = \140 ; $\$840 - \$140 = \$700$.

4. Twenty % = $\frac{1}{5}$; $\frac{1}{5}$ of \$500 = \$100; \$500 - \$100 = \$400. 5 % = $\frac{1}{20}$; $\frac{1}{20}$ of \$400 = \$20; \$400 - \$20 = \$380.
5. One sixth of \$1200 = \$200; \$1200 - \$200 = \$1000. 5 % = $\frac{1}{20}$; $\frac{1}{20}$ of \$1000 = \$50; \$1000 - \$50 = \$950.
6. \$4.80 = $\frac{1}{5}$ of the retail price; $\frac{1}{5}$ = \$1.20; $\frac{1}{5}$ = \$6.
7. \$720 = $\frac{2}{3}$ of the retail price; $\frac{1}{3}$ = \$360; $\frac{2}{3}$ = \$1080.
8. One hundred per cent less 5 per cent = 95 %, or $\frac{19}{20}$; $\frac{19}{20}$ = \$133; $\frac{1}{20}$ = \$7; $\frac{2}{5}$ = \$140. \$140 is $\frac{1}{3}$ of the list price; $\frac{1}{3}$ = \$35; $\frac{2}{3}$ = \$175.
9. \$399 = $\frac{1}{8}$ of the remainder after $\frac{1}{8}$ % discount; $\frac{1}{8}$ = \$21; $\frac{7}{8}$ = \$420. \$420 = $\frac{1}{7}$ of the list price; $\frac{1}{7}$ = \$60; $\frac{6}{7}$ = \$480.
10. \$50 less $\frac{1}{5}$ = \$40; \$40 less $\frac{1}{20}$ = \$38; \$20 less $\frac{1}{10}$ = \$18; \$18 less $\frac{1}{20}$ = \$17.10; \$38 + \$17.10 = \$55.10.

LESSON LXXXI

1. His commission was $2\frac{1}{2}$ %, or $\frac{1}{40}$, of \$4000, = \$100.
2. One twentieth of \$560 = \$28.
3. The corn cost 1000 times 50 ct. = \$500; $\frac{1}{40}$ of \$500 = \$12.50.
4. Five times \$300 = \$1500; $\frac{1}{20}$ of \$1500 = \$75. The owner receives \$1500 - \$75 = \$1425.
5. The wheat sells for 800 times \$1.25 = \$1000; $\frac{1}{10}$ of \$1000 = \$20, the commission; \$1000 - \$20 = \$980.
6. \$100 = $\frac{1}{20}$ of \$2000.
7. \$60 = $\frac{1}{10}$ of \$600.
8. The commission was $\frac{1}{20}$ of \$1000 = \$50; \$1000 - \$50 = \$950. \$950 \div \$50 = 19.

LESSON LXXXII

1. One per cent of \$2000 = \$20; $\frac{1}{2}$ % = $\frac{1}{2}$ of \$20 = \$10.
2. One half of \$3000 = \$1500; $\frac{1}{10}$ of \$1500 = \$150.
3. Two thirds of \$2400 = \$1600; 1 % of \$1600 is \$16.

4. $\$2500 + \$1500 = \$4000$; 1% of $\$4000$ is $\$40$; $\frac{3}{4}\%$ is $\frac{3}{4}$ of $\$40 = \30 .

5. Two thirds of $\$1800$ are $\$1200$; 1% of $\$1200 = \12 ; $\frac{2}{3}$ of $\$1200$ are $\$800$; 1% of $\$800 = \8 ; $\frac{1}{2}\%$ is $\frac{1}{2}$ of $\$8 = \4 ; and $\$12 + \$4 = \$16$.

6. One half of $\$2600 = \1300 ; $\frac{1}{5}$ of $\$1300 = \26 ; $\frac{3}{4}$ of $\$1500 = \1000 ; $\frac{1}{10}$ of $\$1000 = \10 ; $\$26 + \$10 = \$36$.

LESSON LXXXIII

4. The interest on $\$1$ for 1 yr. is 8 ct.; for 3 yr. 3 times 8 ct. = 24 ct.; for $\$20$ it is 20 times 24 ct. = $\$4.80$.

5. The interest on $\$1$ for 6 yr. at 4% is 24 ct.; and for $\$25$ it is 25 times 24 ct. = $\$6$.

6. The interest for $\$1$ is 20 ct.; for $\$40$ it is $\$8$.

7. $\$9$. 8. $\$8.40$. 9. $\$9$. 10. $\$36$.

LESSON LXXXIV

2. Four mo. = $\frac{1}{3}$ of a year. The interest on $\$1$ for 4 mo. is $\frac{1}{3}$ of 5 ct. = $1\frac{2}{3}$ ct.; on $\$60$ it is 60 times $1\frac{2}{3}$ ct. = $\$1$.

3. The interest on $\$1$ for 7 mo. at 6% is $3\frac{1}{2}$ ct.; on $\$80$ it is $\$2.80$.

4. On $\$1$ it is $\frac{3}{4}$ of 8 ct. = 6 ct.; on $\$40$ it is $\$2.40$.

5. Two thirds of 9 ct. = 6 ct.; 75 times 6 ct. = $\$4.50$.

7. The interest for 1 yr. is 180 times 4 ct. = $\$7.20$; for 1 mo. $\frac{1}{12}$ of $\$7.20 = \0.60 ; for 10 mo. 10 times 60 ct. = $\$6$; for 10 da. $\frac{1}{3}$ of 60 ct. = 20 ct.; for 10 mo. 10 da., $\$6.20$.

9. One year's int. = $\$12$; 1 mo. int. = $\$1$; for 4 mo. $\$4$; for 24 da. $\frac{2}{3}$ of $\$1 = 80$ ct.; for 4 mo. 24 da., $\$4.80$.

10. The interest for 1 yr. is $\$24$; for 1 mo. $\$2$; for 9 mo. $\$18$; for 18 da. $\frac{3}{8}$ of $\$2 = \1.20 ; for 9 mo. 18 da. it is $\$19.20$.

11. $\$8.45$.

12. The interest for 1 yr. is $\$5.76$; for 1 mo. 48 ct.; for 8 mo. $\$3.84$; for 25 da. $\frac{5}{8}$ of 48 ct. = 40 ct.; for 8 mo. 25 da. $\$3.84 + \$0.40 = \$4.24$.

13. \$3.20. 14. \$6.75. 15. \$3.80.
 16. The interest for 1 yr. is \$1; for 3 yr. \$3. The amount is $\$25 + \$3 = \$28$.
 17. \$44. 18. \$68.20. 19. \$32.80.
 20. \$56.80. 21. \$99.12.

LESSON LXXXV

2. The interest for \$1 for 3 yr. at 4% is 12 ct. It will take as many dollars to acquire \$6 interest as 12 ct. are contained times in 600 ct., which are 50. *Ans.* \$50.
 3. \$60. 4. \$75. 5. \$140. 6. \$240. 7. \$350.
 8. As many dollars as 5 ct. are contained times in \$200, which are 4000. *Ans.* \$4000.

LESSON LXXXVI

2. The amount of \$1 for 3 yr. at 6% is \$1.18. It will take as many dollars to amount to \$236 as \$1.18 is contained times in \$236, that is, 200.
 3. \$500. 4. \$250. 5. \$300. 6. \$25.
 7. The amount of \$1 for 2 yr. 6 mo. at 8% is \$1.20. It will take as many dollars to amount to \$60 as \$1.20 is contained times in \$60, that is 50. If $\$50 = \frac{2}{3}$ of the principal, $\frac{3}{2}$, or the whole, = \$125.

LESSON LXXXVII

2. The interest on \$40 for 1 yr. at 5% is \$2. To gain \$8, it will take 4 yr.
 3. 2 yr. 6 mo. 4. 2 yr. 8 mo. 5. $3\frac{1}{2}$ yr.
 6. $6\frac{1}{2}$ yr. = 6 yr. 8 mo.
 9. Any principal to treble itself must gain 200%. At 5% it will take as many years as 5 is contained times in $200 = 40$.

LESSON LXXXVIII

2. At 1% the interest on \$50 for 5 yr. is \$2.50. To amount to \$20, the rate will be as many times 1% as \$2.50 are contained times in \$20, which are 8. *Ans.* 8 per cent.

3. Interest at 1% = \$2.25; \$11.25 ÷ \$2.25 = 5. *Ans.* 5%.

4. 7%.

5. Interest at 1% = \$6.75; \$54 ÷ \$6.75 = 8. *Ans.* 8%.

6. Interest at 1% = \$8; \$56 ÷ \$8 = 7. *Ans.* 7%.

7. \$240 less \$200 = \$40, the interest; interest at 1% = \$8; \$40 ÷ \$8 = 5. *Ans.* 5%.

8. \$183 less \$150 = \$33, the interest; interest at 1% = \$5.50; \$33 ÷ \$5.50 = 6. *Ans.* 6%.

LESSON LXXXIX

1. For 4 yr. 2 mo. 25%; $\frac{25}{100} = \frac{1}{4}$.

2. For 5 yr. 25% interest; $100\% + 25\% = 125\%$, amount; $\frac{25}{125} = \frac{1}{5}$.

3. For 1 yr. $\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{4}$; $\frac{1}{4}$ of 100% is 25%.

4. Two yr. 6 mo. = 30 mo.; $\frac{1}{30}$ of $\frac{1}{2} = \frac{1}{60}$ for 1 mo.; 12 times $\frac{1}{60} = \frac{1}{5}$; $\frac{1}{5}$ of 100% = 20%.

5. The interest at 10% = $\frac{1}{10}$ of the principal in 1 yr.; to equal $\frac{2}{3}$, or $\frac{4}{6}$, it will take 6 yr.

6. The yearly interest is $\frac{1}{3}$ of $\frac{3}{25} = \frac{1}{25}$; $\frac{1}{25} = \frac{4}{100} = 4\%$.

7. The interest for 2 yr. is 5 times $\frac{1}{5} = \frac{1}{10}$; for 1 yr. $\frac{1}{2}$ of $\frac{1}{10} = \frac{1}{20}$; $\frac{1}{20} = \frac{5}{100} = 5\%$.

8. Five eighths of the interest for 1 yr. = $\frac{5}{8}$ of the principal. If $\frac{3}{8}$ are $\frac{1}{2}$, then $\frac{1}{2}$ is $\frac{1}{2}$ of $\frac{3}{8} = \frac{3}{4}$, and $\frac{3}{4} = \frac{7.5}{100} = 7.5\%$.

9. One yr. 4 mo. = 16 mo. The interest for 16 mo. is twice $\frac{1}{8} = \frac{2}{8}$ of \$200 = \$50.

10. One yr. 4 mo. = 16 mo. The interest for 12 mo. = $\frac{3}{4}$ of $\frac{3}{4} = \frac{9}{16}$ = 56.25%. The interest of \$100 for 1 yr. 8 mo. 12 da. at 9% is \$15.30.

11. In 2 times 4 yr. = 8 yr.

12. In $3\frac{1}{2}$ there are $\frac{1}{8}$; $\frac{1}{8}$ is $\frac{1}{10}$ of $\$40 = \4 ; $\frac{3}{8} = \$12$; $\$12$, the interest for 1 yr., = 5%, or $\frac{1}{20}$ of the principal; the principal = $\frac{2}{5}$, or $\$240$. A has 2 parts; B, 1 part; both, 3 parts. A has $\frac{2}{3}$ of $\$240 = \160 ; B has $\frac{1}{3} = \$80$.

13. In $1\frac{1}{2}$ there are $\frac{7}{8}$; $\frac{1}{8} = \frac{1}{4}$ of $\$49 = \7 ; $\frac{7}{8} = \$35$. $\$35 = \frac{1}{10}$ of the principal; $\frac{1}{10} = \$5$; $\frac{1}{10} = \$500$. If twice A's money = 3 times B's, then once A's money = $1\frac{1}{2}$ times B's; B's, $\frac{2}{3}$; A's, $\frac{3}{2}$; both, $\frac{5}{6}$ of B's; $\frac{2}{3}$ of whole = $\$200$, B's money; $\frac{3}{2}$ of whole = $\$300$, A's money.

LESSON XC

1. One apple is worth $\frac{1}{3}$ of 24 plums = 3 plums; and 84 apples are worth 84 times 3 plums = 252 plums. One peach is worth $\frac{1}{2}$ of 252 plums = 126 plums; and 5 peaches are worth 105 plums.

2. Ethel has 5 more than Frank, and Lucy 3 more than Frank. $5 + 3 = 8$, and $32 - 8 = 24$; $\frac{1}{3}$ of 24 = 8, Frank's share; $8 + 3 = 11$, Lucy's; $8 + 5 = 13$, Ethel's.

3. Sixteen is twice the number; the number is 8.

4. C has $\frac{2}{3}$; B has $\frac{3}{4}$; A has $\frac{1}{5}$; C has $\frac{5}{8}$ more than A; $\frac{5}{8} = \$15$; $\frac{1}{5} = \$3$, A's; $\frac{2}{3} = \$18$, C's; $\frac{3}{4} = \$6$, B's.

5. Four fourths = James's money; $\frac{1}{4} + \frac{3}{4} = \frac{1}{2}$; $\$34 - \$6 = \$28$; $\$28 = \frac{7}{8}$; $\frac{1}{8} = \$4$; $\frac{1}{4} = \$16$, James's money; $\frac{3}{4} + \$6 = \18 , Thomas's money.

6. Eight eighths less $\frac{3}{8} = \frac{5}{8}$; $\frac{1}{8}$ of $\frac{5}{8} = \frac{5}{64}$; $\frac{5}{8} = \frac{40}{64}$; and $\frac{40}{64} + \frac{5}{64} = \frac{45}{64}$; $\frac{1}{2} = \frac{1}{65}$ of 65 sheep = 1 sheep; $\frac{7}{2} = 72$ sheep.

7. 4×10 hr. = 40 hr. Working 6 hr. a day he can do the work in $40 \div 6 = 6\frac{2}{3}$ da.

8. At 2 for 3 ct., 1 dozen cost 6 times 3 ct. = 18 ct.; at 2 for 5 ct., 1 doz. cost 6 times 5 ct. = 30 ct.; the 2 doz. cost 18 ct. + 30 ct. = 48 ct. At 3 for 7 ct., 1 doz. sold for 4 times 7 ct. = 28 ct.; 2 doz. cost 56 ct.; and 56 ct. - 48 ct. = 8 ct., the gain on 2 doz.; 4 ct., gain on 1 doz.

9. Four horses, 2 mo. = 8 horses 1 mo.; 9 cows, 3 mo. = 27 cows, 1 mo.; 20 sheep, 5 mo. = 100 sheep, 1 mo. If 10 sheep = 2 horses, 100 sheep = 20 horses; 1 cow = $\frac{2}{3}$ of a horse, and 27 cows = 18 horses. Hence, A has the same as 8 horses; B, 18; and C, 20; and all have 46. A pays $\frac{2}{3}$ of \$92 = \$61.33; B, $\frac{1}{3}$ = \$30.67; C, $\frac{1}{3}$ = \$30.67.

10. He gave to each pair \$5; and \$5 in \$20 are contained 4 times. He had 4 sons and 4 daughters.

11. 60% of 200 = $\frac{3}{5}$ of 200 = 120; 135 - 120 = 15.

12. One pipe fills $\frac{1}{4}$ of the cistern in 1 hour; the other empties $\frac{1}{8}$ in 1 hour. $\frac{1}{4} - \frac{1}{8} = \frac{1}{8}$ of the cistern is filled in 1 hour. Therefore it takes 8 hours to fill it.

13. A can do $\frac{1}{2}$ in 1 day, and B $\frac{1}{3}$ in 1 day. Together they do $\frac{1}{2} + \frac{1}{3} = \frac{5}{6}$ in 1 day. To do 1 it will take them $\frac{6}{5} = 1\frac{1}{5}$ days.

14. Eggs sold 10 for 25 ct. are sold for $2\frac{1}{2}$ ct. each or for 30 ct. a dozen. The gain on a dozen is 30 ct. - 18 ct. = 12 ct. To gain \$5 there must be sold as many dozen as 12 ct. is contained times in 500 ct., that is $41\frac{2}{3}$ doz.

15. If 1 ox is worth 8 sheep, 3 oxen are worth 24 sheep, or 2 horses are worth 24 sheep; and 24 sheep are worth 24 times \$5 = \$120; 1 horse is worth $\frac{1}{2}$ of \$120 = \$60.

16. The walls will take $4 \times 20 \text{ ft.} \times 8 \text{ ft.} = 640 \text{ sq. ft.}$ The ceiling will take $20 \text{ ft.} \times 20 \text{ ft.} = 400 \text{ sq. ft.}$ The walls and ceiling will take $640 \text{ sq. ft.} + 400 \text{ sq. ft.} = 1040 \text{ sq. ft.}$ of plastering.

17. $8 \text{ ft.} \times 2 \text{ ft.} \times 4 \text{ ft.} = 64 \text{ cu. ft.}$

18. If \$15 is $\frac{3}{4}$ of their difference, then \$20 = the whole of the difference. If $\frac{2}{3}$ of A's = $\frac{1}{3}$ of B's, $\frac{2}{3}$ of A's = $\frac{1}{3}$ of B's; $\frac{2}{3} = \frac{1}{3}$, and $\frac{2}{3} - \frac{1}{3} = \frac{1}{3}$, their difference; and $\frac{1}{3} = \$20$; $\frac{2}{3} = \$100$, B's; $\frac{1}{3} = \$120$, A's.

19. One half of 17 is $8\frac{1}{2}$; and 10 less $8\frac{1}{2} = 1\frac{1}{2}$; and $1\frac{1}{2}$ in 15 is contained 10 times. It will take 10 hours to fill it.

20. If 1 egg cost 2 ct., and 2 cost 6 ct., 3 cost 8 ct., and the average cost was $2\frac{2}{3}$ ct. 1 egg was sold for $\frac{1}{3}$ of 10 ct. = $3\frac{1}{3}$ ct. The gain on 1 was $3\frac{1}{3} - 2\frac{2}{3} = \frac{2}{3}$; $\frac{2}{3}$ is $\frac{1}{4}$ of $2\frac{2}{3}$, or 25 per cent.

22. John gains 2 steps every time he takes 7; to gain 30 steps he must take 7 steps as many times as 2 is contained in 30, or 15 times; 15 times 7 steps = 105 steps.

23. Let $\frac{7}{8}$ = the watch, and $\frac{7}{8}$ = the chain; three times $\frac{7}{8}$ plus 2 times $\frac{7}{8}$ = $\frac{20}{8}$, and $\frac{20}{8}$ = \$100; $\frac{1}{8}$ = \$5; $\frac{7}{8}$ = \$10, price of the chain; $\frac{7}{8}$ = \$35, price of the watch.

24. In $4\frac{1}{2}$ there are $\frac{3}{2}$; $2\frac{1}{2} = 1\frac{3}{2}$; A does $\frac{3}{2}$ in 1 day; both do $\frac{7}{8}$ in 1 day; $\frac{7}{8}$ less $\frac{3}{2} = \frac{1}{8}$, what B does in 1 day. If B does $\frac{1}{8}$ in 1 day, he would do it all in 6 days.

25. I gave $\frac{1}{2}$ ct. each for the first lot, and $\frac{1}{4}$ ct. each for the second lot; for two I gave $\frac{1}{2}$ ct. + $\frac{1}{4}$ ct. = $\frac{3}{4}$ ct.; average price $\frac{3}{8}$ ct. I sold them for $\frac{3}{8}$ ct. each; gain on each, $\frac{3}{8} - \frac{3}{8} = \frac{0}{8}$. If I gained $\frac{0}{8}$ ct. on one, to gain 18 ct. it took as many pears as $\frac{0}{8}$ ct. is contained times in 18 ct. = 80.

26. He sailed to the island 1 mi. in $\frac{1}{3}$ of an hour and returned 1 mi. in $\frac{1}{3}$ of an hour. To go and return 1 mi. took him $\frac{1}{3}$ hr. + $\frac{1}{3}$ hr. = $\frac{2}{3}$ of an hour. Since he was gone 8 hr., he sailed to the island and returned as many miles as $\frac{2}{3}$ is contained times in 8, that is 18 mi.

28. A's money = $\frac{5}{8}$; B's money = $\frac{2}{8} - \$5$; $\frac{5}{8} + \frac{2}{8} - \$5 = \$51$; $\frac{7}{8} = \$56$; $\frac{1}{8} = \$8$; $\frac{5}{8} = \$40$, A's money; $\$51 - \$40 = \$11$, B's.

29. One third of the gain = $\frac{2}{15}$ of the selling price, and $\frac{3}{8} = \frac{0}{15}$, or $\frac{2}{8}$; $3\frac{1}{4}$ times \$4 = \$15, the cost. If the gain is $\frac{2}{8}$ of the selling price, then $\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$, or the cost; $\frac{3}{8} = \$15$; $\frac{5}{8} = \$25$, the selling price.

30. If 10 ft. more or 40 ft. had been broken off, $\frac{3}{8}$ would have remained standing, and $\frac{5}{8} - \frac{3}{8} = \frac{2}{8}$ would have been broken off. Therefore 40 ft. = $\frac{2}{8}$ of the length at first, and the length at first = 100 ft.

31. Thomas's age = 3 parts; James's = 1 part; 3 parts - 1 part = 10, the difference. If 10 = 2 parts, then 5 yr. = James's age, and 15 yr. = Thomas's.

32. If $\frac{3}{8} = \frac{2}{5}$, then $7 = \frac{28}{5}$; and $\frac{28}{5} + \frac{15}{5} = \frac{43}{5}$ of George's distance; $\frac{43}{5} = 86$ mi.; $\frac{15}{5} = 2$ mi.; $\frac{43}{5} = 30$ mi., George's distance; $\frac{28}{5} = 56$ mi., John's distance.

33. Since 24 ct. = 120% or $\frac{3}{2}$ of the cost, the cost is 20 ct.; 25% or $\frac{1}{4}$ less than 20 ct. = 15 ct.; 30 ct. - 15 ct. = 15 ct. profit; $\frac{15}{15} = 100\%$ profit; $100\% - 20\% = 80\%$ greater.

34. The difference between selling the lot at 6 ct. a dozen and 10 ct. a dozen is 12 ct. + 18 ct. = 30 ct. The difference on 1 doz. is 10 ct. - 6 ct. = 4 ct. There were as many dozen as 4 ct. are contained times in 30 ct. = $7\frac{1}{2}$ doz. The cost of the lot was $6 \times 7\frac{1}{2} + 12 = 57$ ct.; and the cost of 1 doz. was 57 ct. + $7\frac{1}{2} = 7\frac{3}{2}$ ct.

35. On the first he gains 25%, or $\frac{1}{4}$. Therefore $\$75 = \frac{5}{4}$ of the cost; $\frac{1}{4}$ of the cost is $\frac{1}{5}$ of $\$75 = \15 , and $\frac{4}{5}$, or the whole cost, is $4 \times \$15 = \60 . On the second he loses 25%, or $\frac{1}{4}$. Therefore $\$75 = \frac{4}{3}$ of the cost; $\frac{1}{4}$ of the cost is $\frac{1}{3}$ of $\$75 = \25 , and $\frac{4}{3}$, or the whole cost, is $4 \times \$25 = \100 .

36. Seven eighths of 24 mi. = 21 mi. If 21 mi. are $\frac{3}{4}$, then $\frac{1}{4}$ is 7 mi., and $\frac{7}{4}$ are 49 mi., the distance from B to C; 49 mi. + 24 mi. = 73 mi., distance from A to C.

37. A, B, and C together can do $\frac{1}{4}$ in 1 da.; A and B together can do $\frac{1}{8}$ in 1 da.; B and C together can do $\frac{1}{8}$ in 1 da.; C can do in 1 da. $\frac{1}{4} - \frac{1}{8} = \frac{1}{8}$, and the whole in 8 da.; A can do in 1 da. $\frac{1}{4} - \frac{1}{8} = \frac{1}{8}$, and the whole in 12 da.; B can do in 1 da. $\frac{1}{8} - \frac{1}{8} = \frac{1}{24}$, and the whole in 24 da.

38. One duck cost $\$ \frac{1}{3}$; 1 chicken $\$ \frac{1}{6}$, and 2 chickens $\$ \frac{2}{3}$; $\frac{1}{3} + \frac{2}{3} = \frac{10}{6}$; $\frac{1}{3}$ of $\frac{10}{6} = \frac{10}{18} = \frac{5}{9}$, the average cost. One third of $\frac{1}{2} = \frac{1}{6}$, the average selling price; $\frac{1}{6} = \frac{6}{36}$, $-\frac{5}{9} = \frac{1}{36}$, the average gain; the whole gain was $\$2\frac{1}{2} = \$ \frac{5}{2}$; $\frac{5}{2} = \frac{90}{36}$; $\frac{90}{36} \div \frac{1}{36} = 90$, the whole number; $\frac{2}{3}$ of 90 = 60, the chickens; $\frac{1}{3}$ of 90 = 30, the ducks.

39. Eight ct. - 3 ct. = 5 ct.; 6 ct. + 29 ct. = 35 ct.; 35 ct. = $\frac{5}{8}$ of cost of oranges; $\frac{1}{8}$ = 7 ct., and $\frac{3}{8}$ = 56 ct.; 56 ct. - 6 ct. = 50 ct., James's money.

40. A rides $\frac{1}{8}$ of 10 mi. in $\frac{1}{4}$ of an hour, and 8 mi. in 1 hr.; A will travel 18 mi. in $18 \div 8 = 2\frac{1}{4}$ hr. B travels a mile in $\frac{1}{8}$ hr., and 5 mi. an hour; B will travel $2\frac{1}{4}$ times 5 mi. = $11\frac{1}{4}$ mi., while A travels 18 mi.

41. Three halves + \$2 $\frac{1}{2}$ = \$40; then $\frac{3}{2}$ = \$37 $\frac{1}{2}$; $\frac{1}{2}$ = \$12 $\frac{1}{2}$; $\frac{2}{3}$ = \$25, his money.

42. C received $\frac{3}{4} - \frac{6}{21} - \frac{7}{21} = \frac{8}{21}$; $\frac{8}{21} - \frac{6}{21} = \frac{2}{21}$; $\frac{2}{21} =$ \$160; $\frac{1}{21} =$ \$80; $\frac{6}{21} =$ \$480, A's legacy; $\frac{7}{21} =$ \$560, B's legacy; $\frac{8}{21} =$ \$640, C's legacy.

43. Both consume $\frac{6}{15}$ in 6 da., and $\frac{1}{5}$ less $\frac{6}{15} = \frac{9}{15} = \frac{3}{5}$ remaining. The woman consumes $\frac{1}{4}$ of $\frac{3}{5}$ in 1 da. = $\frac{3}{20} = \frac{1}{40}$, and all in 40 da. Both consume $\frac{1}{15}$ in 1 da.; $\frac{1}{15} - \frac{1}{40} = \frac{1}{20} = \frac{1}{24}$, what the man consumes in 1 da. It would last him alone 24 da.

44. Three and one half ct. + 6 $\frac{1}{2}$ ct. = 10 ct., the price of 2 lb. of the mixture; $100 \div 10 = 10$; 10 times 2 lb. = 20 lb.

45. Let $\frac{1}{10} =$ C's age; $\frac{2}{10} =$ B's; and $\frac{1}{10} =$ A's. $\frac{1}{10} - \frac{1}{10} = \frac{0}{10}$; $\frac{2}{10} = 45$ yr.; $\frac{1}{10} = \frac{1}{2}$ of 45 yr. = 5 yr., C's age; $\frac{2}{10} = 10$ yr., B's age; $\frac{1}{10} = 50$ yr. = A's age.

46. The quotient is $4 \times 4 = 16$; therefore the dividend, or the number, is 6×16 , plus the remainder 4, which equals 100.

47. Both do $\frac{4}{18}$ in 4 da.; and $\frac{1}{18} - \frac{4}{18} = \frac{3}{18}$, B finishes in 36 da. In 1 da. he does $\frac{1}{36}$ of $\frac{3}{4} = \frac{1}{48} = \frac{1}{48}$, and he does all in 48 da.; $\frac{1}{18} - \frac{1}{48} = \frac{1}{24}$, what A does in 1 da., and he would do all in 24 da.

48. Three doz. at 1 ct. each = 36 ct.; 2 doz. at 4 eggs for 3 ct. = 18 ct.; 2 doz., the remainder, at 4 eggs for 5 ct. = 30 ct.; 36 ct. + 18 ct. + 30 ct. = 84 ct.; $84 = 7$ doz.; $\frac{1}{7}$ of 84 ct. = 12 ct. a dozen.

50. If he had worked 30 da. he would have received 30 times 30 ct. = \$9. Each day he is idle he gives 20 ct. for board and forfeits 30 ct. for not working = 50 ct. $\$9 - \$5 = \$4$; $\$4 + 50 \text{ ct.} = 8$, number of days idle; 30 da. - 8 da. = 22, number of days he worked.

51. The difference per yard is $2\frac{1}{2}$ ct.; $40 + 2\frac{1}{2} = 16$, the number of yards.

52. Since 8 ft. is 4 times 2 ft., the staff that casts an 8 ft. shadow must be 4 times 3 ft. = 12 ft. long.

53. One man will do as much work as 6 boys; 2 men as much as 12 boys; then 2 men would do in 6 days as much as 12 boys, and to do it in 1 day it would take 6 times 2 men = 12 men.

54. One sixth of \$1200 = \$200; $\$1200 - \$200 = \$1000$; $\frac{1}{20}$ of \$1000 = \$50; $\$1000 - \$50 = \$950$; $\frac{1}{20}$ of \$1200 = \$60; $\$1200 - \$60 = \$1140$; $\frac{1}{3}$ of \$1140 = \$380; $\$1140 - \$380 = \$760$. Therefore both offers amount to the same.

55. For 24 days he would have received \$48. He loses \$2 each day he is idle, and pays 50 ct. for board = $\$2\frac{1}{2}$; $\$48 - \$38 = \$10$; $\$10 + \$2\frac{1}{2} = 4$, number of days he was idle; $24 - 4 = 20$, number of days he worked.

56. The interest on any sum for 3 years at 6% = $3 \times 6\% = 18\%$, or $\frac{9}{50}$ of the principal. Since \$36 is $\frac{9}{50}$ of the principal, the principal is \$200.

57. The cost is $3\frac{1}{2} \times 5 \text{ ct.} = 17\frac{1}{2} \text{ ct.}$ $\frac{2}{5}$ of $17\frac{1}{2} \text{ ct.} = 21 \text{ ct.}$, selling price.

58. To double itself a sum must gain 100%. Since in 1 year at 6% any sum gains 6%, it will take as many years to gain 100% as 6% is contained times in 100; that is, $16\frac{2}{3}$ years.

59. The difference between selling at 9 ct. and 12 ct. is \$1.50 on the whole; on 1 yard the difference is 3 ct.; there are as many yards as $\$1.50 \div 3 = 50$ yards.

60. $5 + 3 = 8$; $\frac{5}{8}$ of 48 = 30, the larger number; and $\frac{3}{8}$ of 48 = 18, the smaller number.

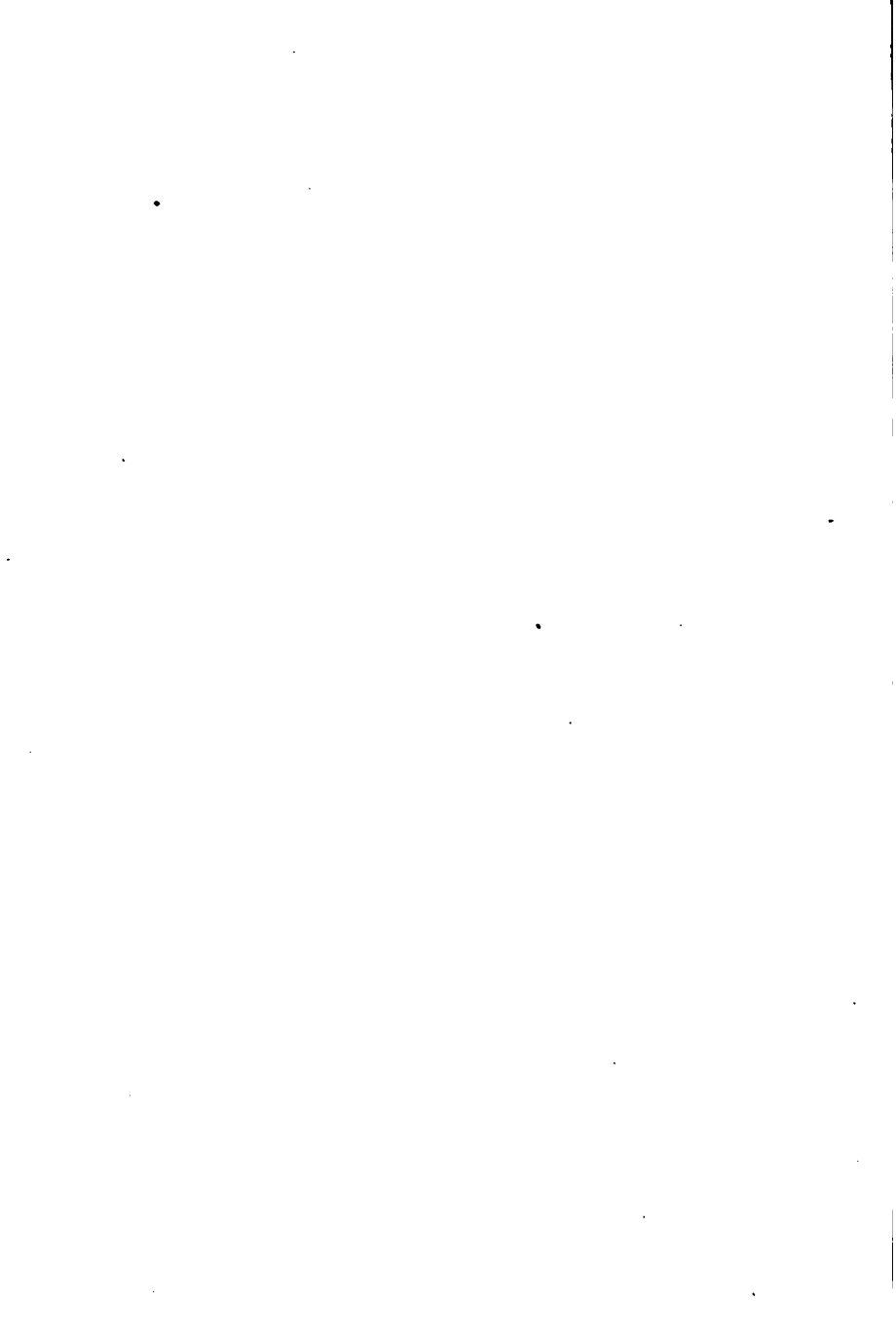
61. It takes him $10 \div 3 = 3\frac{1}{3}$ hr. to walk to the lake, and $10 \div 9 = 1\frac{1}{9}$ hr. to return by trolley. $3\frac{1}{3}$ hr. + $1\frac{1}{9}$ hr. + $2\frac{1}{4}$ hr. = $6\frac{2}{9}$ hr. for the whole excursion.

62. Since the room is 9 ft., or 3 yd. wide, 3 strips, each 13 ft. long, will be needed. 3×13 ft. = 39 ft. = 13 yd.; $13 \times \$2 = \26 .

63. The walls will take 4×12 ft. \times 10 ft. = 480 sq. ft. The ceiling will take 12 ft. \times 12 ft. = 144 sq. ft. The walls and ceiling together will take 480 sq. ft. + 144 sq. ft. = 624 sq. ft.

64. In 1 board there are $12 \times 1\frac{1}{4} \times 2 = 30$ board feet; in 3 boards $3 \times 30 = 90$ board feet.

65. Each block contains 3 in. \times 2 in. \times 5 in. = 30 cu. in. The box contains 12 in. \times 4 in. \times 10 in. = 480 cu. in. Therefore the box will hold $480 \div 30 = 16$ blocks.



SOLUTIONS
TO
QUESTIONS AND PROBLEMS
IN
RAY'S MODERN PRACTICAL ARITHMETIC.

NOTATION.

NUMBERS TO BE WRITTEN.

Art. 5.

- (1.) 23; 24; 25; 26; 27; 28; 29.
- (2.) 37; 42; 56; 69; 73; 87; 94.
- (3.) 83; 45; 99; 51; 36; 78; 62.
- (4.) 55; 93; 81; 67; 49; 74; 38.
- (5.) 76; 44; 82; 57; 35; 91; 63.

NUMBERS TO BE READ.

- (1.) Seventy-one; thirty-two; fifty-three; eighty-four; sixty-five; forty-six; ninety-seven.
- (2.) Fifty-eight; thirty-four; seventy-nine; sixty-six; forty-one; eighty-five; ninety-two.
- (3.) Seventy-five; forty-three; eighty-eight; sixty-one; fifty-nine; thirty-three; ninety-five.

(4.) Thirty-nine; seventy-two; fifty-four; eighty-six; forty-seven; ninety-eight; sixty-four.

(5.) Sixty-eight; seventy-seven; thirty-one; eighty-nine; fifty-two; ninety-six; forty-eight.

NUMBERS TO BE WRITTEN.

Art. 7.

(1.) 130; 140; 150; 160; 170; 180.

(2.) 123; 456; 789; 147; 258; 369.

(3.) 102; 345; 678; 234; 567; 890.

(4.) 453; 786; 912; 230; 450; 670.

(5.) 153; 486; 729; 103; 406; 709.

NUMBERS TO BE READ.

(1.) Two hundred ten; three hundred twenty; four hundred thirty, etc.

(2.) Two hundred thirteen; five hundred forty-six; eight hundred seventy-nine; four hundred seventeen, etc.

(3.) Two hundred one; four hundred thirty-five; seven hundred sixty-eight; three hundred twenty-four, etc.

Art. 11.

(2.) 2000; 30000; 400000.	(13.) 2003; 4050.
(3.) 5000000; 60000000; 700000000.	(14.) 45026.
(4.) 8000000000; 90000- 000000; 100000000000.	(15.) 80201.
(5.) 1200; 2100.	(16.) 90001.
(6.) 3450; 6789.	(17.) 410205.
(7.) 12345.	(18.) 100010.
(8.) 678912.	(19.) 3070509.
(9.) 1357924.	(20.) 45083026.
(10.) 68143792.	(21.) 909090000.
(11.) 1001; 1010; 1100.	(22.) 700010002.
(12.) 1101; 1110; 1111.	(23.) 40000200005.
	(24.) 726050001243.
	(25.) 80703000504.

NUMERATION.

Art. 12.

(2.) Forty-one thousand five hundred eighty-two; seven hundred sixty-three thousand four hundred ninety-one; two million five hundred nineteen thousand eight hundred thirty-four; three hundred seventy-five million four hundred eighty-six thousand nine hundred twenty-one; four billion nine hundred twenty-three million one hundred seventy-six thousand three hundred fifty-eight.

(3.) Thirty-seven billion five hundred eighty-four million two hundred sixteen thousand nine hundred seventy-four; four hundred thirty-two billion six hundred eighty-five million seven hundred twenty-nine thousand one hundred forty-five; six trillion two hundred fifty-three billion nine hundred seventy-one million four hundred thirty-eight thousand two hundred sixty-seven.

(4.) One thousand three hundred; two thousand five hundred forty; six thousand seventy; eight thousand nine; thirteen thousand two hundred; one thousand five.

(5.) Six hundred eighty-two thousand three hundred; eight million six hundred thousand fifty; three thousand forty; fifty thousand four; seven hundred four thousand two hundred eight.

(6.) Seven thousand eighty-five; sixty-two thousand one; four hundred thousand nine; two million one hundred two thousand one hundred two; nine million one thousand three.

(7.) One hundred thirty million six hundred seventy thousand nine hundred twenty-one; six billion nine hundred million seven hundred two thousand three; twenty-three billion four million ninety thousand seven hundred one; nine billion four hundred twenty million one hundred sixty-three thousand seventy.

(8.) Five hundred seventy trillion ten million three hundred twenty-six thousand forty-nine; one hundred three

trillion four hundred seventy-eight billion five hundred eleven million nine hundred ninety-two thousand four hundred eighty-five.

(9.) Nine hundred trillion twenty billion one hundred eight million five hundred seven; eight hundred trillion eight hundred twenty billion twenty million eight hundred two thousand eight.

Art. 14.

- (1.) 23, 39, 41, 66, 74, 98.
 (2.) 156, 244, 401, 609, 804, 1009.
 (3.) 1606, 1776, 1863, 1588, 1620, 1902.
 (4.) XXIII, LVII, CIX, CXCIX, DCCXXXIV, MLXVI, MCDXCII, MDCCLXXVI, MDCCC.
 (5.) XLVI, CI, CCXLVI, DCCCLIX, MCXIX, MDLXXII, MCDXXXI, MDXCVIII, MCCXV.
 (6.) LXXIII, CVI, CCCIX, CMLXXV, MCCLXXXV, MDCCCXII, MDCCCL, MDCCXCIII, MDXXVII.
 (7.) XCIV, CXVII, MX, CDX, DCCC, MDCCCXIV, MDCCIV, MDLXXXVIII, MCMIII.

ADDITION.

Art. 18.

(2.)	\$210	(3.)	4321	(4.)	50230
	142		1254		3105
	35		3120		423
	<u>\$387</u>		<u>8695</u>		<u>53758</u>

Art. 20.

(33)	(34)	(35)	(36)	(37)	(38)
263	943	615	3421	94753	312742
104	756	23	549	2847	401009
321	408	14	314	93688	71268
155	696	439	670	9386	314
843	713	98	2811	258	39
	559	76	1598	3456	71620
	<u>4075</u>	<u>1265</u>	<u>9363</u>	<u>204388</u>	<u>856992</u>

(39)	(40)	(41)	(42)	(43)
2567	329876	987654	1065310	4013009
16499	555555	321234	72444	42645
888764	909090	567897	3619	24
41239	784378	123456	412	132
5724	870960	749947	37	2460
8965	199999	403209	92654	1709
<u>963758</u>	<u>3649858</u>	<u>3153397</u>	<u>1234476</u>	<u>4059979</u>

(54.) $753 + 47 = 800$: $1700 \text{ yr.} + 800 \text{ yr.} = 2500 \text{ yr.}$

(55)	(56)	(57)	(58)
3005	275432	12000	880000889
42627	402030	40000	2002002
105	300005	38000	77436000
307004	872026	8000	206005207
80079	4002347	3500	49003
320600	<u>5851840</u>	<u>101500</u>	<u>990019919</u>
<u>753420</u>			<u>2155513020</u>

(59)	(60)	(61)	(62)	(63)
9268837	\$600	\$7850	\$8785	\$7000
6887794	1325	3275	12789	12875
94398	30	3275	878	5600
<u>16251029</u> sq. mi.	120	2650	1250	4785
	250	2650	<u>\$23702</u>	3500
	140	2650		<u>\$33760</u>
	120	<u>\$22350</u>		
	115			
	<u>\$2700</u>			

(64)	(65)	(66)	(67)	(68)
30	33587	463	33040	3681661
30	1245	756	9305	6449
25	<u>2067</u>	1219 mi.	9565	3531
25	36899		8315	114410
25			1250	150
25			4990	77
20			<u>66465</u> sq. mi.	1
20				<u>3806279</u> sq. mi.
<u>200</u> yd.				

SUBTRACTION.

Art. 25.

(49)	(50)	(51)	(52)	(53)	(54)
\$137	75	1900	\$1840	\$10104	\$100000
<u>65</u>	<u>37</u>	<u>1492</u>	<u>475</u>	<u>7426</u>	<u>11</u>
\$72	38 ft.	408	\$1365	\$2678	\$99989

(55)	(56)	(57)	(58)	(59)
4430	31200	15649	3437202	4335
<u>4205</u>	<u>7240</u>	<u>2408</u>	<u>1698575</u>	<u>2346</u>
225 ft.	23960 sq. mi.	13241	1738627	1989 mi.

(60)	(61)	(62)	(63)	(64)	(65)
\$30000	\$456721	\$32450	619346	1903	\$25690
<u>26967</u>	<u>297420</u>	<u>19275</u>	<u>452020</u>	<u>250</u>	<u>18040</u>
\$3033	\$159301	\$13175	167326	1653	\$7650

ADDITION AND SUBTRACTION.

Art. 26.

(1)	(2)	(3)	(4)
275	6723	\$250	\$2675
381	<u>479</u>	<u>650</u>	<u>4375</u>
<u>625</u>	6244	\$900	<u>1897</u>
1281	<u>347</u>		\$8947
<u>1098</u>	5897	\$1300	<u>7947</u>
183	<u>228</u>	<u>900</u>	\$1000, <i>Ans.</i>
	5669	\$400	

(5)	(6)	(7)
\$450	\$350	\$4875
725	125	4875
1235	375	2250
4675	<u>150</u>	<u>3725</u>
<u>1727</u>	\$1000	\$15725
\$8812		
<u>6812</u>	\$2300	\$20838
\$2000, <i>Ans.</i>	<u>1000</u>	<u>15725</u>
	\$1300, <i>Ans.</i>	\$5113, <i>Ans.</i>

	(8)		(10)
\$16785	\$49570	Received, \$50	Spent, \$25
<u>24937</u>	<u>41722</u>	<u>50</u>	<u>8</u>
\$41722	\$7848, <i>Ans.</i>	\$100	1
			5
			35
			8
			1
			<u>8</u>
			\$91

	(9)
\$7895	\$10093
<u>175</u>	<u>8073</u>
3	\$2020, <i>Ans.</i>
<u>\$8073</u>	

	(11).		(12)
\$5750	\$10000	\$4625	\$6955
<u>925</u>	<u>8925</u>	<u>3785</u>	<u>895</u>
1575	\$1075, <i>Ans.</i>	<u>985</u>	<u>1375</u>
<u>675</u>		\$9395	\$9395
\$8925		\$9225	\$9225
			\$170, <i>Ans.</i>

	(13)		(14)
2040	1050	3099	8000
<u>1059</u>	<u>985</u>	<u>2035</u>	<u>6000</u>
3099	2035	1064	4300
bu. raised.	bu. sold.	bu. left.	18300 in Gt. Br., Ger., and Fr.
			21360
			<u>18300</u>
			3060 more.

	(15)		(16)
51200000	111100000		9363235
<u>42800000</u>	<u>94000000</u>		<u>6887794</u>
94000000	17100000		<u>16251029</u>
			<u>3857504</u>
			12393525 sq. mi.

	(17)
\$110075	\$200000
<u>46025</u>	<u>156100</u>
\$156100	\$43900, <i>Ans.</i>

MULTIPLICATION.

Art. 31.

(25)	(26)	(27)	(28)	(29)
235	346	425	518	279
13	19	29	34	37
<u>705</u>	<u>3114</u>	<u>3825</u>	<u>2072</u>	<u>1953</u>
235	346	850	1554	837
<u>3055</u>	<u>6574</u>	<u>12325</u>	<u>17612</u>	<u>10323</u>

(30)	(31)	(32)	(33)	(34)
869	294	429	485	624
49	57	62	76	85
<u>7821</u>	<u>2058</u>	<u>858</u>	<u>2910</u>	<u>3120</u>
3476	1470	2574	3395	4992
<u>42581</u>	<u>16758</u>	<u>26598</u>	<u>36860</u>	<u>53040</u>

(35)	(36)	(37)	(38)
976	342	376	476
97	364	526	536
<u>6832</u>	<u>1368</u>	<u>2256</u>	<u>2856</u>
8784	2052	752	1428
<u>94672</u>	<u>1026</u>	<u>1880</u>	<u>2380</u>
	<u>124488</u>	<u>197776</u>	<u>255136</u>

(39)	(40)	(41)	(42)
2187	3489	1646	8432
215	276	365	635
<u>10935</u>	<u>20934</u>	<u>8230</u>	<u>42160</u>
2187	24423	9876	25296
4374	6978	4938	50592
<u>470205</u>	<u>962964</u>	<u>600790</u>	<u>5354320</u>

(43)	(44)	(45)	(46)
6874	2873	4786	87603
<u>829</u>	<u>1823</u>	<u>3497</u>	<u>9865</u>
61866	8619	33502	438015
13748	5746	43074	525618
54992	22984	19144	700824
<u>5698546</u>	<u>2873</u>	<u>14358</u>	<u>788427</u>
	5237479	16736642	864203595

(47)	(48)	(51)	(52)
83457	31624	675	248
<u>6835</u>	<u>7138</u>	<u>13</u>	<u>48</u>
417285	252992	2025	1984
250371	94872	675	992
667656	31624	8775 ct.	11904 ct.
<u>500742</u>	<u>221368</u>		
570428595	225732112		

(53)	(54)	(55)	(56)
152	1760	24	2029
<u>28</u>	<u>209</u>	<u>1460</u>	<u>1007</u>
1216	15840	8760	14203
<u>304</u>	<u>3520</u>	<u>8</u>	<u>2029</u>
4256 mi.	367840 yd.	70080 mi.	2043203

(57)	(58)	(60)	36
80401	101032	36	55
<u>60007</u>	<u>20001</u>	<u>45</u>	<u>180</u>
562807	101032	180	180
482406	202064	<u>144</u>	<u>1980</u>
<u>4824622807</u>	<u>2020741032</u>	1620	1620

Ans. 360 ct.

<p>(61)</p> $\begin{array}{r} 95 \text{ ct.} - 2 \text{ ct.} \\ = 93 \text{ ct.} \\ \underline{2650} \\ 93 \\ \hline 7950 \\ 23850 \\ \hline 246450 \text{ ct.} \end{array}$	<p>(62)</p> $\begin{array}{r} \$75 \times 6 = \$450 \\ 125 \times 5 = \underline{625} \\ \hline \$1075 \end{array}$ <p>$\\$150 \times 11 = \\1650</p> <p>$\\$1650 - \\$1075 = \\$575, \text{ Ans.}$</p>	<p>(63)</p> $\begin{array}{r} \$250 \\ \$325 \times 2 = 650 \\ 175 \times 3 = \underline{525} \\ \hline \$1425 \\ 356 \\ \hline \$1781, \text{ Ans.} \end{array}$
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<p>(64)</p> $\begin{array}{r} 24 \times \$5 = \$120 \\ 36 \times 14 = 504 \\ 9 \times 45 = 405 \\ \hline \$1029 \\ 275 \\ \hline \$754, \text{ Ans.} \end{array}$	<p>(65)</p> $\begin{array}{r} 75 \quad 85 \\ \underline{37} \quad \underline{54} \\ 525 \quad 340 \\ \hline 225 \quad 425 \\ 2775 \quad 4590 \\ \hline 4590 \\ 7365 \\ 5284 \\ \hline 2081, \text{ Ans.} \end{array}$	<p>(66)</p> $\begin{array}{r} 69 \quad 48 \\ \underline{53} \quad \underline{27} \\ 207 \quad 336 \\ \hline 345 \quad 96 \\ 3657 \quad 1296 \\ \hline 3657 \\ 4953 \\ 4279 \\ \hline 674, \text{ Ans.} \end{array}$
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<p>(67)</p> $\begin{array}{r} 63 \text{ lb.} \\ \underline{85} \\ 315 \\ \underline{504} \\ 5355 \text{ lb.} \\ \hline 5355 \\ 20 \text{ ct.} \\ \hline 107100 \text{ ct., Ans.} \end{array}$	<p>(68)</p> $\begin{array}{r} 2235 \\ \underline{28} \\ 17880 \\ \underline{4470} \\ 62580 \text{ steps.} \end{array}$	<p>(69)</p> <p>$16 + 17 = 33$ miles an hour apart.</p> <p>$2 \times 24 = 48$ hours.</p> $\begin{array}{r} 33 \\ 48 \\ \hline 264 \\ 132 \\ \hline 1584 \text{ miles.} \end{array}$
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<p>(70)</p> $\begin{array}{r} 125 \\ 248 \\ \hline 1000 \\ 500 \\ 250 \\ \hline 31000 \text{ tons.} \end{array}$	<p>(71)</p> $\begin{array}{r} 2347 \\ 196 \\ \hline 14082 \\ 21123 \\ 2347 \\ \hline 460012 \text{ pounds.} \end{array}$	<p>(72)</p> $\begin{array}{r} 196 \\ 75 \\ \hline 980 \\ 1372 \\ \hline 14700 \text{ pounds in each car.} \\ 18 \\ \hline 117600 \\ 14700 \\ \hline 264600 \text{ pounds in 18 cars.} \end{array}$
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Art. 32.

(2)		(3)		(4)
\$124	\$124	1512 mi.		2873 lb.
<u>6</u>	<u>8</u>	<u>8</u>		<u>9</u>
\$744	or \$992	12096 mi.		25857 lb.
<u>4</u>	<u>3</u>	<u>7</u>		<u>6</u>
\$2976	\$2976	84672 mi.		155142 lb.

(5)	(6)
2874	8074
<u>9</u>	<u>12</u>
25866	96888
<u>.8</u>	<u>9</u>
206928	871992

Art. 33.

(1)	(2)	(3)
245	138	428
<u>100</u>	<u>1000</u>	<u>10000</u>
24500	138000	4280000
(4)	(5)	(6)
872	9642	10045
<u>100000</u>	<u>1000000</u>	<u>1000000</u>
87200000	9642000000	10045000000

Art. 34.

(3)	(4)	(5)	(6)
2350	80300	10240	9600
<u>60</u>	<u>450</u>	<u>3200</u>	<u>2400</u>
141000	4015	2048	384
	<u>3212</u>	<u>3072</u>	<u>192</u>
	36135000	32768000	23040000

KEY TO RAY'S

(7)	(8)	(9)
18001	8602	3007
<u>26000</u>	<u>1030</u>	<u>9100</u>
108006	25806	3007
<u>36002</u>	<u>8602</u>	<u>27063</u>
468026000	8860060	27363700

(10)	(11)	(12)	(13)
80600	70302	904000	80360
<u>7002</u>	<u>80300</u>	<u>10200</u>	<u>25000</u>
1612	210906	1808	40180
<u>5642</u>	<u>562416</u>	<u>904</u>	<u>16072</u>
564361200	5645250600	9220800000	2009000000

SHORT DIVISION.

Art. 41.

$$\begin{array}{r} (24) \\ 3 \overline{) 894} \\ \underline{298} \end{array}$$

$$\begin{array}{r} (25) \\ 4 \overline{) 140} \\ \underline{35} \end{array}$$

$$\begin{array}{r} (29) \\ 4 \overline{) 321276} \\ \underline{80319} \end{array}$$

$$\begin{array}{r} (32) \\ 11 \overline{) 495} \\ \underline{45} \end{array}$$

$$\begin{array}{r} (33) \\ 9 \overline{) 3582} \\ \underline{398} \end{array}$$

$$\begin{array}{r} (46) \\ 4 \overline{) 144} \\ \underline{3) 36} \\ 12 \text{ Ans.} \end{array}$$

$$\begin{array}{r} (47) \\ 5 \overline{) 195} \quad 3 \overline{) 39} \\ \underline{39} \quad \underline{13} \text{ Ans.} \end{array}$$

$$\begin{array}{r} (48) \\ 8 \overline{) 192} \quad 11 \overline{) 275} \\ \underline{24} \quad \underline{25} \\ \underline{24} \\ 1, \text{ Ans.} \end{array}$$

LONG DIVISION.

Art. 42.

$$14) 11577 \text{ (826}\frac{1}{4}\text{, Ans.}$$

$$\begin{array}{r} 112 \\ \hline 37 \\ 28 \\ \hline 97 \\ 84 \\ \hline 13 \end{array}$$

$$15) 48690 \text{ (3246}$$

$$\begin{array}{r} (6) \\ 45 \\ \hline 36 \\ 30 \\ \hline 69 \\ 60 \\ \hline 90 \\ 90 \\ \hline \end{array}$$

$$23) 1110960 \text{ (48302}\frac{1}{3}$$

$$\begin{array}{r} (7) \\ 92 \\ \hline 190 \\ 184 \\ \hline 69 \\ 69 \\ \hline 60 \\ 46 \\ \hline 14 \end{array}$$

$$67) 122878 \text{ (1834}$$

$$\begin{array}{r} (8) \\ 67 \\ \hline 558 \\ 536 \\ \hline 227 \\ 201 \\ \hline 268 \\ 268 \\ \hline \end{array}$$

$$53) 12412 \text{ (234}\frac{1}{3}$$

$$\begin{array}{r} (9) \\ 106 \\ \hline 181 \\ 159 \\ \hline 222 \\ 212 \\ \hline 10 \end{array}$$

$$72) 146304 \text{ (2032}$$

$$\begin{array}{r} (10) \\ 144 \\ \hline 230 \\ 216 \\ \hline 144 \\ 144 \\ \hline \end{array}$$

$$54) 47100 \text{ (872}\frac{1}{4}$$

$$\begin{array}{r} (11) \\ 432 \\ \hline 390 \\ 378 \\ \hline 120 \\ 108 \\ \hline 12 \end{array}$$

$$88) 71104 \text{ (808}$$

$$\begin{array}{r} (12) \\ 704 \\ \hline 704 \\ 704 \\ \hline \end{array}$$

$$66) 43956 \text{ (666}$$

$$\begin{array}{r} (13) \\ 396 \\ \hline 435 \\ 396 \\ \hline 396 \\ 396 \\ \hline \end{array}$$

KEY TO RAY'S

(14)
99) 121900 (1231~~11~~)

99
229
198
310
297
130
99
31

(15)
112) 25312 (226
224
291
224
672
672

(16)
123) 381600 (3102~~54~~)

369
126
123
300
246
54

(17)
204) 105672 (518

1020
367
204
1632
1632

(19)
4321) 1234567 (285~~1111~~)
8642
37036
34568
24687
21605
3082

(18)
1234) 600000 (486~~1111~~)

4936
10640
9872
7680
7404
276

(20)
7819) 50964242 (6518

46914
40502
39095
14074
7819
62552
62552

(22)
12345) 4049160 (328
37035
34566
24690
98760
98760

(21)
9876) 48905952 (4952

39504
94019
88884
51355
49380
19752
19752

$$\begin{array}{r}
 (23) \\
 973) 552160000 \text{ (567482 } \frac{14}{878} \\
 \underline{4865} \\
 6566 \\
 \underline{5838} \\
 7280 \\
 \underline{6811} \\
 4690 \\
 \underline{3892} \\
 7980 \\
 \underline{7784} \\
 1960 \\
 \underline{1946} \\
 14
 \end{array}$$

$$\begin{array}{r}
 (25) \\
 26) 364 \text{ (14 days.} \\
 \underline{26} \\
 104 \\
 \underline{104}
 \end{array}$$

$$\begin{array}{r}
 (24) \\
 15) 3465 \text{ (231 A.} \\
 \underline{30} \\
 46 \\
 \underline{45} \\
 15 \\
 \underline{15} \\
 (26) \\
 19) 1083 \text{ (57 dollars.} \\
 \underline{95} \\
 133 \\
 \underline{133}
 \end{array}$$

$$\begin{array}{r}
 (27) \\
 107) 9523 \text{ (89 bu.} \\
 \underline{856} \\
 963 \\
 \underline{963}
 \end{array}$$

$$\begin{array}{r}
 (28) \\
 63) 14868 \text{ (236 hhd.} \\
 \underline{126} \\
 226 \\
 \underline{189} \\
 378 \\
 \underline{378}
 \end{array}$$

$$\begin{array}{r}
 (29) \\
 365) 50000 \text{ (136} \\
 \underline{365} \\
 1350 \\
 \underline{1095} \\
 2550 \\
 \underline{2190} \\
 360
 \end{array}$$

Ans. \$136 and \$360 over.

$$\begin{array}{r}
 (30) \\
 365) 379600 \text{ ($1040} \\
 \underline{365} \\
 1460 \\
 \underline{1460} \\
 0
 \end{array}$$

$$\begin{array}{r}
 (31) \\
 1235) 6571435 \text{ (5321} \\
 \underline{6175} \\
 3964 \\
 \underline{3705} \\
 2593 \\
 \underline{2470} \\
 1235 \\
 \underline{1235}
 \end{array}$$

$$\begin{array}{r}
 (32) \\
 405) 1247400 \text{ (3080} \\
 \underline{1215} \\
 3240 \\
 \underline{3240} \\
 0
 \end{array}$$

$$\begin{array}{r}
 \text{(33)} \\
 1006) 10401000 \text{ (10338 } \frac{272}{1000} \\
 \underline{1006} \\
 3410 \\
 \underline{3018} \\
 3920 \\
 \underline{3018} \\
 9020 \\
 \underline{8048} \\
 972
 \end{array}$$

$$\begin{array}{r}
 \text{(34)} \\
 684) 109440 \text{ (160 A.} \\
 \underline{684} \\
 4104 \\
 \underline{4104} \\
 0
 \end{array}$$

$$\begin{array}{r}
 \text{(35)} \\
 56) 8288 \text{ (148 A.} \\
 \underline{56} \\
 268 \\
 \underline{224} \\
 448 \\
 \underline{448} \\
 0
 \end{array}$$

$$\begin{array}{r}
 \text{(36)} \\
 269) 262275 \text{ (975 dollars.} \\
 \underline{2421} \\
 2017 \\
 \underline{1883} \\
 1345 \\
 \underline{1345}
 \end{array}$$

$$\begin{array}{r}
 \text{(37)} \\
 24) 24899 \text{ (1037 } \frac{11}{24} \text{ mi.} \\
 \underline{24} \\
 89 \\
 \underline{72} \\
 179 \\
 \underline{168} \\
 11
 \end{array}$$

$$\begin{array}{r}
 \text{(38)} \\
 238) 3731840 \text{ (15680} \\
 \underline{238} \text{ dollars.} \\
 1351 \\
 \underline{1190} \\
 1618 \\
 \underline{1428} \\
 1904 \\
 \underline{1904} \\
 0
 \end{array}$$

$$\begin{array}{r}
 \text{(39)} \\
 24) 27048 \text{ (1127 ft.} \\
 \underline{24} \\
 30 \\
 \underline{24} \\
 64 \\
 \underline{48} \\
 168 \\
 \underline{168}
 \end{array}$$

$$\begin{array}{r}
 \text{(40)} \\
 11520000) 92160000 \text{ (8 min.} \\
 \underline{92160000}
 \end{array}$$

$$\begin{array}{r}
 \text{(41)} \\
 94231 \\
 \underline{86247} \\
 16) 7984 \text{ (499, Ans.} \\
 \underline{64} \\
 158 \\
 \underline{144} \\
 144 \\
 \underline{144}
 \end{array}$$

$$\begin{array}{r}
 (42) \\
 46712 \\
 \underline{6848} \\
 104) 53560 (515 \\
 \underline{520} \\
 156 \\
 \underline{104} \\
 520 \\
 \underline{520} \\
 520 \\
 \underline{\quad}
 \end{array}$$

$$\begin{array}{r}
 (43) \\
 497 \\
 \underline{583} \\
 1491 \\
 \underline{3976} \\
 2485 \\
 71) 289751 (4081 \\
 \underline{284} \\
 575 \\
 \underline{568} \\
 71 \\
 \underline{71}
 \end{array}$$

$$\begin{array}{r}
 (44) \\
 2832 \\
 \underline{987} \\
 1845 \\
 \underline{678} \\
 87) 2523 (29 \\
 \underline{174} \\
 783 \\
 \underline{783}
 \end{array}$$

$$\begin{array}{r}
 (45) \\
 4896 \\
 \underline{2384} \\
 2512 \\
 \underline{49} \\
 22608 \\
 \underline{10048} \\
 112) 123088 (1099 \\
 \underline{112} \\
 1108 \\
 \underline{1008} \\
 1008 \\
 \underline{1008} \\
 1008 \\
 \underline{\quad}
 \end{array}$$

$$\begin{array}{r}
 (46) \\
 228 \\
 \underline{786} \\
 1014 \\
 \underline{95} \\
 5070 \\
 \underline{9126} \\
 114) 96330 (845 \\
 \underline{912} \\
 513 \\
 \underline{456} \\
 570 \\
 \underline{570}
 \end{array}$$

$$\begin{array}{r}
 (47) \\
 478 \quad 478 \\
 \underline{296} \quad \underline{296} \\
 182 \quad 774 \\
 \underline{182} \\
 1548 \\
 6192 \\
 \underline{774} \\
 387) 140868 (364 \\
 \underline{1161} \\
 2476 \\
 \underline{2322} \\
 1548 \\
 \underline{1548}
 \end{array}$$

$$\begin{array}{r}
 (48) \\
 7560 \\
 \underline{3885} \\
 175) 3675 (21 \text{ horses.} \\
 \underline{350} \\
 175 \\
 \underline{175}
 \end{array}$$

(49)	(50)	(51)
7350	58	240
<u>4655</u>	77	26
49) 12005 (245 A.	<u>406</u>	1440
98	406	<u>480</u>
<u>220</u>	4466	6240
196		<u>2820</u>
245	5742	180) 3420 (19 horses.
<u>245</u>	<u>4466</u>	180
	58) 1276 (22 dollars	<u>1620</u>
	116	1620
	<u>116</u>	
	116	

	(52)	
125 lots.	25) 20625 (825 dolls., gain per acre.	
250 dolls. each.	<u>200</u>	
<u>6250</u>	62	125) 20625 (165 dolls., gain
250	<u>50</u>	125 on each lot.
<u>31250</u>	125	<u>812</u>
10625	<u>125</u>	750
\$20625, whole gain.		<u>625</u>
		<u>625</u>

Art. 43.

(3)	(4)	(5)	(6)
9) 2583	4) 6976	4) 2744.	6) 6145
<u>7) 287</u>	8) 1744	7) 686	7) 1024—1 rem.
Ans. 41	Ans. 218	Ans. 98	146—2
			6 × 2 + 1 = 13 rem.
			Ans. 146 $\frac{1}{2}$

$$\begin{array}{r} (7) \\ 11)19008 \\ 12)1728 \\ \hline \text{Ans. 144} \end{array}$$

$$\begin{array}{r} (8) \\ 8)7840 \text{ Ans.} \\ 8)980 \quad 122\frac{2}{4} \\ \hline 122-4 \\ 8 \times 4 = 32 \text{ rem.} \end{array}$$

$$\begin{array}{r} (9) \\ 8)14771 \text{ Ans.} \\ 9)1846-3 \quad 205\frac{1}{3} \\ \hline 205-1 \\ 8 \times 1 + 3 = 11 \text{ rem.} \end{array}$$

$$\begin{array}{r} (10) \\ 9)10206 \\ 9)1134 \\ \hline \text{Ans. 126} \end{array}$$

$$\begin{array}{r} (11) \\ 11)81344 \\ 11)7394-10 \\ \hline 672-2 \\ 2 \times 11 + 10 = 32 \\ \text{Ans. } 672\frac{2}{11} \end{array}$$

$$\begin{array}{r} (11) \\ 121)81344 (672\frac{2}{11} \\ \hline 726 \\ \hline 874 \\ \hline 847 \\ \hline 274 \\ \hline 242 \\ \hline 32 \end{array}$$

$$\begin{array}{r} (12) \\ 9)98272 \\ 12)10919-1 \\ \hline 909-11 \\ 11 \times 9 + 1 = 100 \\ \text{Ans. } 909\frac{11}{100} \end{array}$$

$$\begin{array}{r} (12) \\ 108)98272 (909\frac{11}{100}, \text{ Ans.} \\ \hline 972 \\ \hline 1072 \\ \hline 972 \\ \hline 100 \end{array}$$

Art. 44.

$$\begin{array}{r} (2) \\ 1|0)268|2 \\ \hline 268\frac{2}{10} \end{array}$$

$$\begin{array}{r} (3) \\ 1|00)47|00 \\ \hline 47 \end{array}$$

$$\begin{array}{r} (4) \\ 1|00)372|01 \\ \hline 372\frac{1}{100} \end{array}$$

$$\begin{array}{r} (5) \\ 1|00)462|50 \\ \hline 462\frac{50}{100} \end{array}$$

$$\begin{array}{r} (6) \\ 1|000)18|003 \\ \hline 18\frac{3}{1000} \end{array}$$

$$\begin{array}{r} (7) \\ 1|000)56|055 \\ \hline 56\frac{55}{1000} \end{array}$$

Art. 45.

$$\begin{array}{r} (4) \\ 4|000)73|005 \\ \hline 18\frac{5}{1000} \end{array}$$

$$\begin{array}{r} (5) \\ 9|000)36|001 \\ \hline 4\frac{1}{9000} \end{array}$$

$$\begin{array}{r} (6) \\ 11|000)1078|000 \\ \hline 98 \end{array}$$

$$\begin{array}{r} (7) \\ 18 \overline{)04016} | 7(223 \overline{)27} \\ \underline{36} \end{array}$$

41

36

56

54

2

(9)

64 $\overline{)003640} | 06(56 \overline{)400}$ 320

440

384

56

$$\begin{array}{r} (8) \\ 21 \overline{)009072} | 37(432 \overline{)27} \\ \underline{84} \end{array}$$

67

63

42

42

(11)

634 $\overline{)00435637} | 54(687 \overline{)7854}$ 3804

5523

5072

4517

4438

79

$$\begin{array}{r} (10) \\ 25 \overline{)0000} | 7654 | 6037(306 \overline{)48037} \\ \underline{75} \end{array}$$

154

150

4

Art. 47.

$$\begin{array}{r} (1) \\ \$96 \quad \$500 \\ 120 \quad \underline{271} \\ \underline{55} \quad \$229, \text{ Ans.} \\ \$271 \end{array}$$

$$\begin{array}{r} (2) \\ \$243 \text{ 1st.} \quad \$243 \quad \$1265 \\ \underline{61} \quad \quad \quad \underline{772} \\ \$304 \text{ 2d.} \quad \underline{225} \quad \$493, \text{ Ans.} \\ \underline{79} \quad \quad \quad \$772 \\ \$225 \text{ 3d.} \end{array}$$

$$\begin{array}{r} (3) \\ 157 \quad 428 \\ 264 \quad \underline{186} \\ 305 \quad \underline{614} \\ 97 \\ \underline{123} \\ 946 \\ \underline{614} \\ 332, \text{ Ans.} \end{array}$$

$$\begin{array}{r} (4) \\ 9503 \quad 57068 \\ 586 \quad \underline{16967} \\ 4794 \quad \underline{40101}, \text{ Ans.} \\ 1234 \\ \underline{850} \\ 16967 \end{array}$$

	(5)	
\$12307	\$237	\$21013
<u>8706</u>	301	<u>5918</u>
\$21013, am't with gain.	<u>5380</u>	\$15095, <i>Ans.</i>
	\$5918, am't spent.	

	(6)	
86) 31173 (362 $\frac{1}{3}$)	28	(7)
<u>258</u>	3	\$
537	25) 1400 (56 dolls.	15) 315 (21, <i>Ans.</i>
<u>516</u>	<u>125</u>	<u>30</u>
213	<u>150</u>	15
<u>172</u>	<u>150</u>	<u>15</u>
41		

	(9)	
73900	148	148
<u>70</u>	56	<u>56</u>
214) 73830 (345, <i>Ans.</i>	92	204, sum.
<u>642</u>		<u>92, diff.</u>
963		408
<u>856</u>		<u>1836</u>
1070		23) 18768 (816, <i>Ans.</i>
<u>1070</u>		<u>184</u>

	(10)	
	36	23
	<u>23</u>	138
		<u>138</u>
(11)	\$60	\$45
	<u>8</u>	14
	\$480	<u>180</u>
	630	45
6) 1110	<u>\$630</u>	
185	<i>Ans.</i> , 185 yards.	

(12)

$$\begin{array}{r} \$30 \\ 70 \\ \hline \$2100 \end{array} \quad \begin{array}{r} \$6000 \\ 2100 \\ \hline \$3900 \end{array}$$

$$3900 \div 25 = 156$$

$$\begin{array}{r} 156 \text{ acres.} \\ 70 \text{ acres.} \\ \hline 226 \text{ acres, Ans.} \end{array}$$

(13)

$$\begin{array}{r} \$360 \\ 300 \\ 150 \\ 100 \\ 90 \\ \hline \end{array}$$

$$\$1800$$

$$\underline{1000}$$

$$\$800, \text{ saved each yr.}$$

$$\begin{array}{r} \text{yr.} \\ 800) 10400 \text{ (13, Ans.)} \\ \underline{800} \\ 2400 \\ \underline{2400} \end{array}$$

\$1000, spent each yr.

(14)

$$40 \times \$15 = \$600$$

$$80 \times 25 = 2000$$

$$\text{Amt. pd., } \$2600$$

$$\$6300$$

$$\underline{2600}$$

$$120 - 90 = 30 \text{ acres.}$$

$$30 \times 60 = 1800$$

$$\$4500 + \$1800 = \$6300, \text{ 1st Ans.}$$

$$\$3700, \text{ gain.}$$

(15)

$$275 \times \$4 = \$1100$$

$$250 \times \$5 = \$1250$$

$$25 \times 6 = \underline{150}$$

$$\$1400$$

$$\underline{1100}$$

$$\$300, \text{ Ans.}$$

(17)

$$\begin{array}{r} \text{(16)} \\ 125 \quad 75 \quad 175) 19250 \text{ (110, Ans.)} \\ \underline{\$85} \quad \underline{\$115} \quad \underline{175} \\ 625 \quad 375 \quad 175 \\ \underline{1000} \quad \underline{75} \quad \underline{175} \\ \$10625 \quad 75 \quad 0 \\ \quad \underline{\$8625} \\ \quad 10625 \\ \quad \underline{\$19250} \end{array}$$

$$\begin{array}{r} \$150 \quad \$125 \\ 15 \quad 20 \\ \hline 750 \quad \$2500 \\ 150 \\ \hline \$2250 \quad \$45 \\ 2500 \quad 50 \\ \hline \$4750 \quad \$2250 \\ 2250 \\ \hline \$2500 \\ 95 \\ \hline \$2405, \text{ Ans.} \end{array}$$

Art. 48.

(1) 94 80 88 90 $4 \overline{)352}$ 88% , <i>Ans.</i>	(3) $\$5 \times 10 = \50 $\$6 \times 15 = 90$ $\$4 \times 15 = 60$ $40 \overline{) \$200}$ $\$5$, <i>Ans.</i>	(4) $60 \text{ ct.} \times 8 = 480 \text{ ct.}$ $110 \text{ ct.} \times 2 = 220 \text{ ct.}$ $70 \text{ ct.} \times 6 = 420 \text{ ct.}$ $16 \overline{) 1120 \text{ ct.}}$ (70 ct. , <i>Ans.</i>) 112 0
--	---	--

(5) $3 \text{ ct.} \times 6 = 18 \text{ ct.}$ $8 \text{ ct.} \times 4 = 32 \text{ ct.}$ $10 \overline{) 50 \text{ ct.}}$ 5 ct. , <i>Ans.</i>	(6) $12 \text{ ct.} \times 25 = 300 \text{ ct.}$ $18 \text{ ct.} \times 25 = 450 \text{ ct.}$ $25 \text{ ct.} \times 40 = 1000 \text{ ct.}$ $90 \overline{) 1750 \text{ ct.}}$ $19\frac{1}{2} \text{ ct.}$, <i>Ans.</i>	(7) 3 $50 \text{ ct.} \times 12 = 600 \text{ ct.}$ $15 \overline{) 600 \text{ ct.}}$ 40 ct. , <i>Ans.</i>
--	---	---

(8) $\$3 \times 10 = \30 $\$4 \times 12 = 48$ $\$9 \times 8 = 72$ $30 \overline{) \$150}$ $\$5$, <i>Ans.</i>	(9) 71° 78° 83° 84° 81° 93° 91° 581°	(10) 995 1040 1080 1020 1075 $5 \overline{) 5210}$ 1042 , <i>Ans.</i>
--	--	--

(11) $14 \times 20 = 280$ $15 \times 20 = 300$ $16 \times 20 = 320$ $60 \overline{) 900}$ 15 years , <i>Ans.</i>	(12) 20 30 25 45 20 $5 \overline{) 140}$ 28 min. , <i>Ans.</i>	(13) $90 \times 5 = 450$ $95 \times 10 = 950$ $80 \times 10 = 800$ $25 \overline{) 2200}$ (88% , <i>Ans.</i>) 200 200 200
---	---	---

Art. 49.

(2.) $(2 + 3) = 5$; $(7 - 4) = 3$; $5 \times 3 = 15$.

(3.) $(6 + 8) = 14$; $10 - 3 = 7$; $14 \div 7 = 2$.

(4.) $[75 - 7 \times 3 + (4 \times 4) - 6] \div 8 = [75 - 21 + 16 - 6] \div 8 = 64 \div 8 = 8$.

(5.) $5 \times [13 + 2(3 + 4 \times 6) + 5] = 5[13 + 54 + 5] = 5 \times 72 = 360$.

(6.) $\{200 - 8 \times 8 + (3 \times 9) - 8\} \div 5 = \{200 - 64 + 27 - 8\} \div 5 = 155 \div 5 = 31$.

(7.) $8 \times (96 - 26) \times \overline{5 \times 6} - 13 \times 30(5 \times 4) = 8 \times 70 \times 30 - 7800 = 9000$.

(8.) $[84 - (7 \times 6) + (3 \times 5) - 3] \div 9 = [84 - 42 + 15 - 3] \div 9 = 54 \div 9 = 6$.

(9.) $25 \times (6 \times 3) \times 4 - (\overline{9 \times 8} + 90) = 25 \times 18 \times 4 - 162 = 1800 - 162 = 1638$.

(10.) $(54 - 16) \times \overline{11 + 4} - (15 \times 20) = 38 \times 15 - 300 = 270$.

(11.) $10 \times \{16 - 4 + 3(2 + 8 - 2) + 3 \times 6(4 + 2) + 8\} \div 10 = 10 \times \{16 - 4 + 24 + 36 + 8\} \div 10 = 80$.

COMPOUND NUMBERS.**U. S. MONEY.****EXAMPLES TO BE WRITTEN.****Art. 52.**

(1.) \$12.178

(4.) \$40.535

(7.) \$100.10

(2.) \$ 6.066

(5.) \$ 2.03

(8.) \$200.02

(3.) \$ 7.007

(6.) \$20.022

(9.) \$400.018

Art. 55.**ADDITION.**

$$\begin{array}{r}
 (2) \\
 \$17.15 \\
 23.43 \\
 7.19 \\
 8.37 \\
 \hline
 12.31 \\
 \hline
 \$68.45
 \end{array}$$

$$\begin{array}{r}
 (3) \\
 \$18.041 \\
 16.317 \\
 100.503 \\
 87.338 \\
 \hline
 \$222.199
 \end{array}$$

$$\begin{array}{r}
 (4) \\
 \$43.75 \\
 29.18 \\
 17.63 \\
 268.95 \\
 \hline
 718.07 \\
 \hline
 \$1077.58
 \end{array}$$

(5) \$200.00 43.87 56.93 8.50 2.31 <hr/> \$311.61	(6) \$504.06 420.19 105.50 304.00 888.47 <hr/> \$2222.22	(7) \$5.070 30.203 100.005 60.020 700.011 1000.100 40.004 64.587 <hr/> \$2000.000
---	--	--

SUBTRACTION.

Art. 56.

(2) \$29.342 17.265 <hr/> \$12.077	(3) \$46.28 17.75 <hr/> \$28.53	(4) \$20.05 5.50 <hr/> \$14.55	(5) \$3.00 .03 <hr/> \$2.97
(6) \$10.000 .001 <hr/> \$9.999	(7) \$50.000 .505 <hr/> \$49.495	(8) \$1000.000 1.011 <hr/> \$998.989	(9) \$1000.43 900.68 <hr/> \$99.75

MULTIPLICATION.

Art. 57.

(2) \$7.835 8 <hr/> \$62.680	(3) \$12.093 9 <hr/> \$108.837	(4) \$23.018 16 <hr/> 138108 23018 <hr/> \$368.288	(7) \$40.04 102 <hr/> 8008 4004 <hr/> \$4084.08
(5) \$35.14 53 <hr/> 10542 17570 <hr/> \$1862.42	(6) \$125.02 62 <hr/> 25004 75012 <hr/> \$7751.24		

KEY TO RAY'S

(8)	(9)	(10)	(11)
\$0.125	\$3.28	\$1.06	\$5.75
17	38	338	38
<hr/>	<hr/>	<hr/>	<hr/>
875	2624	848	4600
125	984	318	1725
<hr/>	<hr/>	<hr/>	<hr/>
\$2.125	\$124.64	318	\$218.50
		<hr/>	
		\$358.28	

(13)	(14)	(15)	(16)
\$0.17	\$5.67	\$2.69	\$1.25
178	24	169	691
<hr/>	<hr/>	<hr/>	<hr/>
136	2268	2421	125
119	1134	1614	1125
17	\$136.08	269	750
<hr/>		<hr/>	<hr/>
\$30.26		\$454.61	\$863.75

(17)	(18)
73	281 lb.
63 gal.	4
<hr/>	<hr/>
219	1124 lb.
438	\$0.065
<hr/>	<hr/>
4599 gal.	5620
\$0.55	6744
<hr/>	<hr/>
22995	\$73.060
22995	
<hr/>	
\$2529.45	

(19)	(20)	(21)
35	312	18
10 yd.	11 hr.	3 bu.
<hr/>	<hr/>	<hr/>
350 yd.	3432 hr.	54 bu.
\$0.01	10296	368
<hr/>	3432	460
\$3.50, Ans.	<hr/>	<hr/>
	\$446.16, Ans.	\$49.68

$$\begin{array}{r}
 (22) \\
 \$10.50 \\
 \underline{150} \\
 52500 \\
 1050 \\
 \hline
 \$1575.00
 \end{array}$$

$$\begin{array}{r}
 (23) \\
 17 \quad \$0.25 \\
 \underline{51 \text{ lb.}} \quad 867 \\
 17 \quad 175 \\
 85 \quad 150 \\
 \underline{867 \text{ lb.}} \quad 200 \\
 \$216.75, \text{ Ans.}
 \end{array}$$

DIVISION.

Art. 58.

CASE I.

$$\begin{array}{r}
 (2) \\
 9 \overline{)72} \\
 \underline{8 \text{ lb.}}
 \end{array}
 \qquad
 \begin{array}{r}
 (3) \\
 375 \overline{)6000} (16 \\
 \underline{375} \\
 2250 \\
 \underline{2250}
 \end{array}
 \qquad
 \begin{array}{r}
 (4) \\
 8 \overline{)280} \\
 \underline{35 \text{ yd.}}
 \end{array}
 \qquad
 \begin{array}{r}
 (5) \\
 25 \overline{)300} (12 \text{ yd.} \\
 \underline{25} \\
 50 \\
 \underline{50}
 \end{array}$$

$$\begin{array}{r}
 (6) \\
 405 \overline{)8100} (20 \text{ bbl.} \\
 \underline{810} \\
 0
 \end{array}
 \qquad
 \begin{array}{r}
 (7) \\
 5 \overline{)120} \\
 \underline{24}
 \end{array}
 \qquad
 \begin{array}{r}
 (8) \\
 905 \overline{)188240} (208 \text{ bu.} \\
 \underline{1810} \\
 7240 \\
 \underline{7240}
 \end{array}$$

CASE II.

$$\begin{array}{r}
 (3) \\
 8 \overline{)\$64.96} \\
 \underline{\$8.12}
 \end{array}
 \qquad
 \begin{array}{r}
 (4) \\
 23 \overline{)\$29.610} (\$1.287 + \\
 \underline{23} \\
 66 \\
 \underline{46} \\
 201 \\
 \underline{184} \\
 170 \\
 \underline{161} \\
 9
 \end{array}
 \qquad
 \begin{array}{r}
 (5) \\
 4 \overline{)\$92.250} \\
 \underline{\$23.062} + \\
 \\
 (6) \\
 8 \overline{)\$57.44} \\
 \underline{\$7.18}
 \end{array}$$

(7)		(9)
16) \$25.76 (\$1.61		313) \$800.000 (\$2.555 +
<u>16</u>	(8)	<u>626</u>
97	755) \$328.425 (\$0.435	1740
<u>96</u>	<u>3020</u>	1565
16	2642	<u>1750</u>
<u>16</u>	<u>2265</u>	1565
	<u>3775</u>	<u>1850</u>
	<u>3775</u>	<u>1565</u>
		<u>285</u>

(10)	(11)
133) 9310 (\$70	154) \$2704.24 (\$17.56
<u>931</u>	<u>154</u>
0	1164
	<u>1078</u>
	862
	<u>770</u>
	924
	<u>924</u>

(12)	(13)
25 lb.	235 lb.
<u>15</u>	<u>8</u>
125	lb. 1880) \$122.200 (\$0.065
<u>25</u>	<u>11280</u>
lb. 375) \$75.00 (\$0.20	9400
<u>750</u>	<u>9400</u>
0	

Art. 59.

(1)	(2)	(3)	(4)
\$47.50	\$35.25	\$18.38	\$0.75 \$5.00
38.45	23.75	81.62	.35 3.10
15.47	<u>\$59.00</u>	<u>\$100.00</u>	.50 <u>\$1.90, Ans.</u>
19.43	59.00	200.00	1.50
<u>\$120.85</u>	1.00	<u>\$300.00</u>	<u>\$3.10</u>
	<u>\$119.00</u>		

(5)	(6)
\$50.00	\$8.10 \$20.00
30.50	5.65 19.75
<u>\$19.50</u>	\$0.25 × 8 = 2.00 <u>\$0.25, Ans.</u>
6	4.00
<u>\$117.00</u>	<u>\$19.75</u>

(7)	(8)	(9)	(10)
\$3.85	\$37.06	143	435
1.25	200.85	<u>23 ct.</u>	<u>45 ct.</u>
2.50	400.00	429	2175
1.50	236.75	<u>286</u>	<u>1740</u>
<u>\$9.10</u>	<u>124.34</u>	<u>\$32.89</u>	<u>\$195.75</u>
	\$999.00	12.60	
\$21.75	<u>889.25</u>	<u>\$20.29, Ans.</u>	\$400.00
9.10	<u>\$109.75, Ans.</u>		195.75
<u>\$12.65, Ans.</u>			<u>\$204.25, Ans.</u>

(11)	(12)
365	\$400.00
<u>65 ct.</u>	237.25
1825	<u>\$162.75, Ans.</u>
2190	
<u>\$237.25</u>	
	63
	<u>35 ct.</u>
	315
	189
	<u>\$22.05, Ans.</u>

<p>(13)</p> $\begin{array}{r} 76 \\ 23 \text{ ct.} \\ \hline 228 \\ 152 \\ \hline \$17.48, \text{ Ans.} \end{array}$	<p>(14)</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: right;"> $\\$2000.00$ 163.75 <hr style="width: 50%; margin-left: auto; margin-right: 0;"/> $\\$1836.25$ </td> <td style="width: 50%; text-align: left;"> $5)\\$1836.25$ $5)\\$367.25$ <hr style="width: 50%; margin-left: 0; margin-right: auto;"/> $\\$73.45, \text{ Ans.}$ </td> </tr> </table>	$\$2000.00$ 163.75 <hr style="width: 50%; margin-left: auto; margin-right: 0;"/> $\$1836.25$	$5)\$1836.25$ $5)\$367.25$ <hr style="width: 50%; margin-left: 0; margin-right: auto;"/> $\$73.45, \text{ Ans.}$
$\$2000.00$ 163.75 <hr style="width: 50%; margin-left: auto; margin-right: 0;"/> $\$1836.25$	$5)\$1836.25$ $5)\$367.25$ <hr style="width: 50%; margin-left: 0; margin-right: auto;"/> $\$73.45, \text{ Ans.}$		

(15)

$$\begin{array}{r} 4)\$516.00 \\ 4)\$129.00 \\ \hline 43)\$32.25 (\$0.75, \text{ Ans.} \\ 301 \\ \hline 215 \\ \hline 215 \end{array}$$

(16)

$$\begin{array}{r} 4\overline{)0}\$9\overline{)0.00} \\ 10)\$2.25 \\ \hline \$0.225, \text{ Ans.} \end{array}$$

(17)

$$\begin{array}{r} 22 = 2 \times 11 \\ \\ \$1000.00 \\ 500.00 \\ \hline 2)\$1500.00 \\ 11)\$750.00 \\ \hline \text{Ans. } \$68.18 + \end{array}$$

BILLS AND ACCOUNTS.

Art. 60.

(3.) 9 lb. @ \$0.25 = \$2.25
 4 " " .60 = 2.40
 45 " " .06 = 2.70
 17 " " .16 = 2.72

 $\$10.07$

(4.) 22 yd. @ \$1.75 = \$38.50 25 yd. @ \$.65 = \$16.25
 18 " " .15 = 2.70 Credited.
 50 " " .65 = 32.50 74.78 - 16.25 = \$58.53,
 6 " " .18 = 1.08 *Ans.*

 $\$74.78$

(5.) 4 lb. @ \$0.18 = \$0.72
 8 " " .23 = 1.84
 7 " " .11 = .77
 6 " " .09 = .54
 13 " " .35 = 4.55
 26 " " .12 = 3.12

 $\$11.54, \text{ Ans.}$

DRY MEASURE.

Art. 63.

(5.) $4 \text{ bu.} \times 4 + 2 \text{ pk.} = 18 \text{ pk.}$: $18 \text{ pk.} \times 8 + 1 \text{ qt.} = 145 \text{ qt.}$: $145 \text{ qt.} \times 2 = 290 \text{ pt.}$, *Ans.*

(6.) $7 \text{ bu.} \times 4 + 3 \text{ pk.} = 31 \text{ pk.}$: $31 \text{ pk.} \times 8 + 7 \text{ qt.} = 255 \text{ qt.}$: $255 \text{ qt.} \times 2 + 1 \text{ pt.} = 511 \text{ pt.}$, *Ans.*

(7.) $3 \text{ bu.} \times 4 = 12 \text{ pk.}$: $12 \text{ pk.} \times 8 = 96 \text{ qt.}$: $96 \text{ qt.} \times 2 + 1 \text{ pt.} = 193 \text{ pt.}$, *Ans.*

(8.) $384 \text{ pt.} \div 2 = 192 \text{ qt.}$: $192 \text{ qt.} \div 8 = 24 \text{ pk.}$: $24 \text{ pk.} \div 4 = 6 \text{ bu.}$, *Ans.*

(9.) $47 \text{ pt.} \div 2 = 23 \text{ qt.}$ 1 pt.: $23 \text{ qt.} \div 8 = 2 \text{ pk.}$ 7 qt.
Ans. 2 pk. 7 qt. 1 pt.

(10.) $95 \text{ pt.} \div 2 = 47 \text{ qt.}$ 1 pt.: $47 \text{ qt.} \div 8 = 5 \text{ pk.}$ 7 qt.:
 $5 \text{ pk.} \div 4 = 1 \text{ bu.}$ 1 pk. Collecting the different remainders,
the *Ans.* is 1 bu. 1 pk. 7 qt. 1 pt.

(11.) $508 \text{ pt.} \div 2 = 254 \text{ qt.}$: $254 \text{ qt.} \div 8 = 31 \text{ pk.}$ 6 qt.:
 $31 \text{ pk.} \div 4 = 7 \text{ bu.}$ 3 pk. *Ans.* 7 bu. 3 pk. 6 qt.

LIQUID MEASURE.

Art. 64.

(1.) $17 \text{ gal.} \times 4 \times 2 = 136 \text{ pt.}$, *Ans.*

(2.) $13 \text{ gal.} \times 4 \times 2 \times 4 = 416 \text{ gi.}$, *Ans.*

(3.) $126 \text{ gal.} \times 4 \times 2 = 1008 \text{ pt.}$, *Ans.*

(4.) $1260 \text{ gal.} \times 4 \times 2 \times 4 = 40320 \text{ gi.}$, *Ans.*

(5.) $1120 \text{ gi.} \div 4 = 280$, $\div 2 = 140$, $\div 4 = 35 \text{ gal.}$, *Ans.*

(6.) $1848 \text{ cu. in.} + 231 = 8 \text{ gal., Ans.}$

(7.) $138138 \text{ cu. in.} + 231 = 598 \text{ gal., Ans.}$

AVOIRDUPOIS WEIGHT.

Art. 65.

(1.) $2 \text{ cwt.} \times 100 = 200 \text{ lb., Ans.}$

(2.) $3 \text{ cwt.} \times 100 = 300 \text{ lb.} + 75 \text{ lb.} = 375 \text{ lb., Ans.}$

(3.) $1 \text{ T.} \times 20 + 3 \text{ cwt.} = 23 \text{ cwt.} \times 100 = 2300 \text{ lb., Ans.}$

(4.) $3 \text{ T.} \times 20 \times 100 = 6000 \text{ lb.} + 75 \text{ lb.} = 6075 \text{ lb., Ans.}$

(5.) $4 \text{ cwt.} \times 100 + 44 \text{ lb.} = 444 \text{ lb., Ans.}$

(6.) $5 \text{ T.} \times 20 \times 100 + 90 \text{ lb.} = 10090 \text{ lb., Ans.}$

(7.) $2 \text{ cwt.} \times 100 + 77 \text{ lb.} = 277 \text{ lb.} : 277 \text{ lb.} \times 16 + 12 \text{ oz.} = 4444 \text{ oz., Ans.}$

(8.) $2 \text{ cwt.} \times 100 + 17 \text{ lb.} = 217 \text{ lb.} : 217 \text{ lb.} \times 16 + 3 \text{ oz.} = 3475 \text{ oz., Ans.}$

(9.) $1 \text{ T.} \times 20 + 6 \text{ cwt.} = 26 \text{ cwt.,} \times 100 + 4 \text{ lb.} = 2604 \text{ lb.,} \times 16 + 2 \text{ oz.} = 41666 \text{ oz., Ans.}$

(10.) $4803 \text{ lb.} \div 100 = 48 \text{ cwt. and } 3 \text{ lb. over, Ans.}$

(11.) $22400 \text{ lb.} \div 100 \div 20 = 11 \text{ T. and } 4 \text{ cwt., Ans.}$

(12.) $2048000 \div 16 = 128000 \text{ lb.,} \div 100 = 1280 \text{ cwt.,} \div 20 = 64 \text{ T., Ans.}$

(13.) $64546 \text{ oz.} \div 16 = 4034 \text{ lb. } 2 \text{ oz.} : 4034 \div 100 = 40 \text{ cwt. } 34 \text{ lb. Ans. } 40 \text{ cwt. } 34 \text{ lb. } 2 \text{ oz.}$

(14.) $97203 \text{ oz.} \div 16 = 6075 \text{ lb. } 3 \text{ oz.} : 6075 \div 100 = 60 \text{ cwt. } 75 \text{ lb.} : 60 \div 20 = 3 \text{ T. Ans. } 3 \text{ T. } 75 \text{ lb. } 3 \text{ oz.}$

(15.) $544272 \text{ oz.} \div 16 = 34017 \text{ lb.,} \div 100 = 340 \text{ cwt. } 17 \text{ lb.} : 340 \div 20 = 17 \text{ T. Ans. } 17 \text{ T. } 17 \text{ lb.}$

$$(16.) 52 \times 18 = 936 \text{ lb.} : 936 \div 100 = 9 \text{ cwt. } 36 \text{ lb., } \textit{Ans.}$$

$$(17.) 180 \times 75 = 13500 \text{ lb.} : 13500 \div 100 = 135 \text{ cwt.} \div 20 = 6 \text{ T. } 15 \text{ cwt., } \textit{Ans.}$$

LONG MEASURE.

Art. 66.

$$(1.) 2 \text{ yd.} \times 3 + 2 \text{ ft.} = 8 \text{ ft.} : 8 \text{ ft.} \times 12 + 7 \text{ in.} = 103 \text{ in., } \textit{Ans.}$$

$$(2.) 7 \text{ yd.} \times 3 = 21 \text{ ft.,} \times 12 + 11 \text{ in.} = 263 \text{ in., } \textit{Ans.}$$

$$(3.) 12 \text{ mi.} \times 320 = 3840 \text{ rd., } \textit{Ans.}$$

$$(4.) 7 \text{ mi.} \times 320 + 240 \text{ rd.} = 2480 \text{ rd., } \textit{Ans.}$$

$$(5.) 9 \text{ mi.} \times 320 + 31 \text{ rd.} = 2911 \text{ rd., } \textit{Ans.}$$

$$(6.) 133 \text{ in.} \div 12 = 11 \text{ ft. } 1 \text{ in.} : 11 \text{ ft.} \div 3 = 3 \text{ yd. } 2 \text{ ft.} \\ \textit{Ans. } 3 \text{ yd. } 2 \text{ ft. } 1 \text{ in.}$$

$$(7.) 181 \text{ in.} \div 12 = 15 \text{ ft. } 1 \text{ in.} : 15 \text{ ft.} \div 3 = 5 \text{ yd.} \\ \textit{Ans. } 5 \text{ yd. } 1 \text{ in.}$$

$$(8.) 2240 \text{ rd.} \div 320 = 7 \text{ mi., } \textit{Ans.}$$

$$(9.) 2200 \text{ rd.} \div 320 = 6 \text{ mi. } 280 \text{ rd., } \textit{Ans.}$$

$$(10.) 1 \text{ mi.} \times 320 \times 5\frac{1}{2} = 1760 \text{ yd., } \textit{Ans.}$$

$$(11.) 1 \text{ mi.} \times 320 \times 5\frac{1}{2} \times 3 = 5280 \text{ ft. } \textit{Ans.}$$

SQUARE MEASURE.

Art. 67.

$$(1.) 8 \text{ sq. yd.} \times 9 \times 144 = 10368 \text{ sq. in., } \textit{Ans.}$$

$$(2.) 4 \text{ A.} \times 160 = 640 \text{ sq. rd., } \textit{Ans.}$$

$$(3.) 1 \text{ sq. mi.} \times 640 \times 160 = 102400 \text{ sq. rd., } \textit{Ans.}$$

$$(4.) 2 \text{ sq. yd.} \times 9 + 3 \text{ sq. ft.} = 21 \text{ sq. ft.} : 21 \text{ sq. ft.} \times 144 \\ = 3024 \text{ sq. in., } \textit{Ans.}$$

$$(5.) 5 \text{ A.} \times 160 + 100 \text{ sq. rd.} = 900 \text{ sq. rd., } \textit{Ans.}$$

(6.) $960 \text{ sq. rd.} + 160 = 6 \text{ A.}$, *Ans.*

(7.) $3888 \text{ sq. in.} + 144 = 27 \text{ sq. ft.}$: $27 \text{ sq. ft.} + 9 = 3 \text{ sq. yd.}$, *Ans.*

(8.) $20000 \text{ sq. rd.} + 160 = 125 \text{ A.}$, *Ans.*

(9.) $515280 \text{ sq. rd.} + 160 + 640 = 5 \text{ sq. mi.}$ 20 A. 80 sq. rd. , *Ans.*

(10.) $4176 \text{ sq. in.} + 144 = 29 \text{ sq. ft.}$: $29 \text{ sq. ft.} + 9 = 3 \text{ sq. yd.}$ 2 sq. ft. , *Ans.*

Art. 68.

(2.) $16 \text{ ft.} \times 12 \text{ ft.} = 192 \text{ sq. ft.}$, *Ans.*

(3.) $5 \text{ yd.} \times 4 \text{ yd.} = 20 \text{ sq. yd.}$, *Ans.*

(4.) $18 \text{ ft.} + 3 = 6 \text{ yd.}$: $12 \text{ ft.} + 3 = 4 \text{ yd.}$: $21 \text{ ft.} + 3 = 7 \text{ yd.}$: $15 \text{ ft.} + 3 = 5 \text{ yd.}$ $6 \text{ yd.} \times 4 \text{ yd.} = 24 \text{ sq. yd.}$: $7 \text{ yd.} \times 5 \text{ yd.} = 35 \text{ sq. yd.}$: $24 \text{ sq. yd.} + 35 \text{ sq. yd.} = 59 \text{ sq. yd.}$, *Ans.*

(5.) $18 \text{ ft.} \times 14 \text{ ft.} = 252 \text{ sq. ft.}$: $252 \text{ sq. ft.} + 9 = 28 \text{ sq. yd.}$, *Ans.*

(6.) $35 \text{ rd.} \times 32 \text{ rd.} = 1120 \text{ sq. rd.}$: $1120 \text{ sq. rd.} + 160 = 7 \text{ A.}$, *Ans.*

(7.) $21 \text{ ft.} = 7 \text{ yd.}$: $18 \text{ ft.} = 6 \text{ yd.}$: $7 \text{ yd.} \times 6 \text{ yd.} = 42 \text{ sq. yd.}$: $42 \times \$0.17 = \7.14 , *Ans.*

Art. 69.

(1.) $132 \text{ sq. ft.} + 11 \text{ ft.} = 12 \text{ ft.}$, *Ans.*

(2.) $30 \text{ sq. yd.} \times 9 = 270 \text{ sq. ft.}$: $270 \text{ sq. ft.} + 18 \text{ ft.} = 15 \text{ ft.}$, *Ans.*

(3.) $9 \text{ A.} \times 160 = 1440 \text{ sq. rd.}$: $1440 \text{ sq. rd.} \div 45 \text{ rd.} = 32 \text{ rd.}$, *Ans.*

(4.) $21 \text{ A.} \times 160 = 3360 \text{ sq. rd.}$: $3360 \text{ sq. rd.} \div 35 \text{ rd.} = 96 \text{ rd.}$, *Ans.*

CUBIC MEASURE.

Art. 70.

(1.) $2 \text{ cu. yd.} \times 27 \times 1728 = 93312 \text{ cu. in.}$, *Ans.*

(2.) $28 \text{ C.} \times 128 = 3584 \text{ cu. ft.}$, *Ans.*

(3.) $34 \text{ C.} \times 128 \times 1728 = 7520256 \text{ cu. in.}$, *Ans.*

(4.) $1 \text{ C.} \times 128 \times 1728 = 221184 \text{ cu. in.}$, *Ans.*

(5.) $63936 \text{ cu. in.} \div 1728 = 37 \text{ cu. ft.}$: $37 \text{ cu. ft.} \div 27 = 1 \text{ cu. yd. } 10 \text{ cu. ft.}$, *Ans.*

(6.) $8 \text{ ft.} \times 5 \text{ ft.} \times 4 \text{ ft.} = 160 \text{ cu. ft.}$, *Ans.*

(7.) $8 \text{ yd.} \times 5 \text{ yd.} \times 2 \text{ yd.} = 80 \text{ cu. yd.}$, *Ans.*

(8.) $18 \text{ ft.} \times 15 \text{ ft.} \times 7 \text{ ft.} = 1890 \text{ cu. ft.}$: $1890 \text{ cu. ft.} \div 27 = 70 \text{ cu. yd.}$, *Ans.*

(9.) $40 \text{ ft.} \times 12 \text{ ft.} \times 8 \text{ ft.} = 3840 \text{ cu. ft.}$: $3840 \text{ cu. ft.} \div 128 = 30 \text{ C.}$, *Ans.*

(10.) $80 \text{ ft.} \times 8 \text{ ft.} \times 4 \text{ ft.} = 2560 \text{ cu. ft.}$: $2560 \text{ cu. ft.} \div 128 = 20 \text{ C.}$: $20 \times \$5.50 = \110 , *Ans.*

(11.) $24 \text{ ft.} = 8 \text{ yd.}$, $15 \text{ ft.} = 5 \text{ yd.}$, $6 \text{ ft.} = 2 \text{ yd.}$: $8 \text{ yd.} \times 5 \text{ yd.} \times 2 \text{ yd.} = 80 \text{ cu. yd.}$: $80 \times \$1.25 = \100 , *Ans.*

TIME MEASURE.

Art. 71.

(1.) $2 \text{ hr.} \times 60 \times 60 = 7200 \text{ sec.}$, *Ans.*

(2.) $7 \text{ da.} \times 24 \times 60 = 10080 \text{ min.}$, *Ans.*

(3.) $1 \text{ da.} \times 24 + 3 \text{ hr.} = 27 \text{ hr.}$: $27 \text{ hr.} \times 60 + 44 \text{ min.} = 1664 \text{ min.}$: $1664 \text{ min.} \times 60 + 3 \text{ sec.} = 99843 \text{ sec.}$, *Ans.*

(4.) $9 \text{ wk.} \times 7 + 6 \text{ da.} = 69 \text{ da.}$: $69 \text{ da.} \times 24 + 10 \text{ hr.} = 1666 \text{ hr.}$: $1666 \text{ hr.} \times 60 + 40 \text{ min.} = 100000 \text{ min.}$, *Ans.*

(5.) $4 \text{ wk.} \times 7 + 3 \text{ da.} = 31 \text{ da.}$: $31 \text{ da.} \times 24 = 744 \text{ hr.}$: $744 \text{ hr.} \times 60 + 4 \text{ min.} = 44644 \text{ min.}$, *Ans.*

(6.) $10800 \text{ sec.} + 60 = 180 \text{ min.}$: $180 \text{ min.} + 60 = 3 \text{ hr.}$, *Ans.*

(7.) $432000 \text{ sec.} + 60 = 7200 \text{ min.}$: $7200 \text{ min.} + 60 = 120 \text{ hr.}$: $120 \text{ hr.} + 24 = 5 \text{ da.}$, *Ans.*

(8.) $7322 \text{ sec.} + 60 = 122 \text{ min.}$ 2 sec.: $122 \text{ min.} + 60 = 2 \text{ hr.}$ 2 min. *Ans.* 2 hr. 2 min. 2 sec.

(9.) $4323 \text{ min.} + 60 = 72 \text{ hr.}$ 3 min.: $72 \text{ hr.} + 24 = 3 \text{ da.}$ *Ans.* 3 da. 3 min.

(10.) $20280 \text{ min.} + 60 = 338 \text{ hr.}$: $338 \text{ hr.} + 24 = 14 \text{ da.}$ 2 hr.: $14 \text{ da.} + 7 = 2 \text{ wk.}$ *Ans.* 2 wk. 2 hr.

(11.) $41761 \text{ min.} + 60 = 696 \text{ hr.}$ 1 min.: $696 \text{ hr.} + 24 = 29 \text{ da.}$: $29 \text{ da.} + 7 = 4 \text{ wk.}$ 1 da.: $4 \text{ wk.} + 4 = 1 \text{ mo.}$ *Ans.* 1 mo. 1 da. 1 min.

MISCELLANEOUS TABLES.

Art. 73.

(1.) $5 \text{ lb.} \times 12 + 4 \text{ oz.} = 64 \text{ oz.}$, *Ans.*

(2.) $8 \text{ lb.} \times 12 + 9 \text{ oz.} = 105 \text{ oz.}$: $105 \text{ oz.} \times 20 + 13 \text{ pwt.} = 2113 \text{ pwt.}$: $2113 \text{ pwt.} \times 24 + 17 \text{ gr.} = 50729 \text{ gr.}$, *Ans.*

(3.) $12530 \text{ gr.} + 24 = 522 \text{ pwt.}$ 2 gr.: $522 \text{ pwt.} + 20 = 26 \text{ oz.}$ 2 pwt.: $26 \text{ oz.} + 12 = 2 \text{ lb.}$ 2 oz. *Ans.* 2 lb. 2 oz. 2 pwt. 2 gr.

(4.) $4 \text{ lb.} \times 12 + 5 \text{ } \frac{3}{4} = 53 \text{ } \frac{3}{4}$: $53 \times 8 \times 3 \times 20 + 2 \text{ gr.} = 25442 \text{ gr.}$, *Ans.*

(5.) $975 \text{ sc.} + 3 = 325 \text{ dr.}$: $325 \text{ dr.} + 8 = 40 \text{ oz.}$ 5 dr.: $40 \text{ oz.} + 12 = 3 \text{ lb.}$ 4 oz. *Ans.* 3 lb. 4 oz. 5 dr.

(6.) $16 \frac{1}{2} \text{ hands} \times 4 = 66 \text{ in.}$: $66 + 12 = 5 \text{ ft.}$ 6 in., *Ans.*

(7.) 24 chains \times 4 = 96 rd.: 15 chains \times 4 = 60 rd.: 96 rd. \times 60 rd. = 5760 sq. rd.: $5760 \div 160 = 36$ A., *Ans.*

(8.) 267 cu. ft. \times 1728 + 624 cu. in. = 462000 cu. in.: $462000 \div 231 = 2000$ gal., *Ans.*

(9.) $8^\circ \times 60 + 41' = 521'$: $521' \times 60 + 45'' = 31305''$, *Ans.*

(10.) $61^\circ \times 60 + 59' = 3719'$: $3719' \times 60 + 28'' = 223168''$,
Ans.

(11.) $915' + 60 = 15^\circ 15'$, *Ans.*

(12.) $3661'' + 60 = 61' 1''$: $61' + 60 = 1^\circ 1'$. *Ans.* $1^\circ 1' 1''$.

(13.) 6 gross \times 12 = 72 doz., \times 5 ct. = \$3.60, *Ans.*

(14.) 4 score \times 20 + 10 yr. = 90 yr., *Ans.*

(15.) 3 bdl. \times 2 = 6 rm., \times 20 = 120 qr.: 120 @ 18 ct. = \$21.60, *Ans.*

Art. 74.

(1.) 2 bu. \times 4 \times 8 \times 2 = 128 pt.: 5 ct. \times 128 = 640 ct. = \$6.40, *Ans.*

(2.) 3 bu. \times 4 + 2 pk. = 14 pk.: 50 ct. \times 14 = 700 ct. = \$7.00, *Ans.*

(3.) 5 bu. 2 pk. = $5\frac{1}{2}$ bu.: 5×50 ct. = 250 ct.: $\frac{1}{2}$ of 50 ct. = 25 ct.: 250 ct. + 25 ct. = 275 ct. = \$2.75, *Ans.*

(4.) \$3 = 300 ct.: 300 ct. + 15 ct. = 20 pk.: 20 pk. \div 4 = 5 bu., *Ans.*

(5.) \$1.66 = 166 ct.: $166 \div 2 = 83$ pt.: $83 + 2 = 41$ qt. and 1 pt. over: $41 \div 4 = 10$ gal. and 1 qt. over. *Ans.* 10 gal. 1 qt. 1 pt.

(6.) 3 bu. 2 pk. = 14 pk.: 91 bu. = 364 pk.: 364 pk. \div 14 pk. = 26 bags, *Ans.*

(7.) $15 \text{ lb.} \times 16 + 12 \text{ oz.} = 252 \text{ oz.}$: $252 \div 4 = 63$, *Ans.*

(8.) $44 \text{ cwt. } 52 \text{ lb.} = 71232 \text{ oz.}$: $9 \text{ lb. } 15 \text{ oz.} = 159 \text{ oz.}$:
 $71232 \div 159 = 448$, *Ans.*

(9.) $14 \text{ cwt. } 28 \text{ lb.} = 1428 \text{ lb.}$: $1428 \div 84 = 17$, *Ans.*

(10.) $7 \text{ cwt. } 56 \text{ lb.} = 756 \text{ lb.}$: $756 \div 12 = 63$, *Ans.*

(11.) $6 \text{ cwt. } 10 \text{ lb.} = 9760 \text{ oz.}$: $3 \text{ lb. } 13 \text{ oz.} = 61 \text{ oz.}$:
 $9760 \div 61 = 160 \text{ wk.}$, *Ans.*

(12.) $2 \text{ A. } 125 \text{ sq. rd.} = 445 \text{ sq. rd.}$: $20 \text{ ct.} \times 445 = 8900$
 $\text{ct.} = \$89$, *Ans.*

(13.) $16 \text{ A. } 53 \text{ sq. rd.} = 2613 \text{ sq. rd.}$: $1 \text{ A. } 41 \text{ sq. rd.} =$
 201 sq. rd. : $2613 \div 201 = 13$, *Ans.*

(14.) $2 \text{ ft.} \times 2 \text{ ft.} \times 2 \text{ ft.} = 8 \text{ cu. ft.}$: $8 \text{ cu. ft.} \times 1728 =$
 13824 cu. in. , *Ans.*

(15.) $1000 \text{ oz.} \times 5 = 5000 \text{ oz.} = 312 \text{ lb. } 8 \text{ oz.}$, *Ans.*

(16.) $1000 \text{ oz.} \times 128 = 128000 \text{ oz.} = 4 \text{ T.}$, *Ans.*

(17.) $2 \text{ C.} \times 128 = 256 \text{ cu. ft.}$: $950 \text{ oz.} \times 256 = 243200$
 $\text{oz.} = 7 \text{ T. } 12 \text{ cwt.}$, *Ans.*

(18.) $63 \text{ gal.} \times 4 \times 2 = 504 \text{ pt.}$: $20 \text{ ct.} \times 504 = 10080$
 $\text{ct.} = \$100.80$, *Ans.*

(19.) $31 \text{ gal. } 2 \text{ qt.} = 126 \text{ qt.}$: $126 \text{ qt.} \times 5 = 630 \text{ qt.}$: 10
 $\text{ct.} \times 630 = 6300 \text{ ct.} = \63 , *Ans.*

(20.) $\$2 = 200 \text{ ct.}$: $200 \div 5 = 40 \text{ pt.}$: $40 \text{ pt.} = 5 \text{ gal.}$,
Ans.

(21.) $63 \text{ gal.} = 504 \text{ pt.}$: $3 \text{ qt. } 1 \text{ pt.} = 7 \text{ pt.}$: $7 \text{ pt.} \times 12$
 $= 84 \text{ pt. in } 1 \text{ doz. bottles}$: $504 \div 84 = 6 \text{ doz.}$, *Ans.*

(22.) $4 \text{ gal. } 3 \text{ qt. } 1 \text{ pt.} = 39 \text{ pt.}$: $58 \text{ gal. } 2 \text{ qt.} = 468 \text{ pt.}$:
 $468 \div 39 = 12$, *Ans.*

(23.) 1 da. = 1440 min.: 70 beats \times 1440 = 100800 beats, *Ans.*

(24.) 1876 is a leap year, because it is exactly divisible by 4; hence, February has 29 days: 29 days = 2505600 seconds, *Ans.*

(25.) 3 wk. 2 da. 3 hr. = 555 hr.: 8 mi. \times 555 = 4440 mi., *Ans.*

(26.) A peck is $\frac{1}{4}$ bushel, and will, therefore, cost $\frac{1}{4}$ of 44 ct. = 11 ct. per day: 365 \times 11 = \$40.15, *Ans.*

(27.) 40 bbl. \times 196 = 7840 lb. The gain equals 5 ct. — 3 ct., or 2 ct., a pound. 7840 \times 2 ct. = \$156.80, *Ans.*

Art. 75.

(4.) 26 bu. 1 qt. 1 pt., *Ans.*

(5.) 128 gal. 3 qt. 1 pt. 3 gi., *Ans.*

(6.) 79 T. 15 cwt. 48 lb. 6 oz., *Ans.*

(7.) 111 mi. 44 rd., *Ans.*

(8.) 14 yd. 4 in., *Ans.*

(9.) 299 A. 150 sq. rd. 24 sq. yd. 4 sq. ft. 73 sq. in., *Ans.*

(10.) 50 da. 3 hr. 10 min., *Ans.*

(11.) 143 cu. yd. 2 cu. ft. 990 cu. in., *Ans.*

(12.) 8 mo. 4 da. 8 hr. 49 min. 35 sec., *Ans.*

(13)	(14)	(15)
bu. pk.	lb. oz.	mi. rd.
21 3	13 11	104 50
14 1	17 13	95 270
23 2	14 14	<u>200 0</u>
18 1	16 0	
22 1	19 7	
<u>100 0</u>	<u>17 9</u>	
	99 6	

(16)		(17)			(18)	
A.	sq. rd.	sq. yd.	sq. ft.	sq. in.	C.	cu. ft.
186	134	17	3	119	7	78
286	17	18	0	141	16	24
113	89	23	7	0	35	127
<u>586</u>	<u>80</u>	<u>29</u>	<u>5</u>	<u>116</u>	<u>29</u>	<u>10</u>
		88	8	88	88	111

(19)		(20)			
bu.	pk.	hhd.	gal.	qt.	pt.
200	3		4642	3	1
143	1		945	0	0
400	3		1707	0	1
255	1		10206	1	0
<u>1000</u>	<u>0</u>	<u>277</u>	<u>50</u>	<u>1</u>	<u>0</u>

Art. 76.

- (4.) 19 gal. 1 qt. 1 pt. 3 gi., *Ans.*
 (5.) 11 T. 42 lb. 15 oz., *Ans.*
 (6.) 6 mi. 282 rd., *Ans.*
 (7.) 1 yd. 2 ft. 11 in., *Ans.*
 (8.) 2 sq. yd. 8 sq. ft. 104 sq. in., *Ans.*
 (9.) 8 C. 125 cu. ft., *Ans.*
 (10.) 55 da. 5 hr. 55 min. 55 sec., *Ans.*

(11)			(12)		(13)		(14)	
bu.	pk.	qt.	lb.	oz.	cwt.	lb.	mi.	rd.
4	0	0	46	4	32	66	24899	0
2	1	1	19	8	8	67	100	41
<u>1</u>	<u>2</u>	<u>7</u>	<u>26</u>	<u>12</u>	<u>23</u>	<u>99</u>	<u>24798</u>	<u>279</u>

(15)		(16)				(17)			
A.	sq. rd.	gal.	qt.	pt.	gi.	da.	hr.	min.	sec.
146	80	63	0	0	0	5	10	27	15
86	94	51	1	0	2	2	4	13	29
<u>59</u>	<u>146</u>	<u>11</u>	<u>2</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>6</u>	<u>13</u>	<u>46</u>

Art. 77.

(2)			(3)			(4)		
yr.	mo.	da.	yr.	mo.	da.	yr.	mo.	da.
1903	9	1	1192	7	12	1587	2	8
1776	7	4	1099	7	15	1215	6	15
<hr/>			<hr/>			<hr/>		
127	1	27	92	11	27	371	7	23

(5)			(6)		
yr.	mo.	da.	yr.	mo.	da.
1688	11	5	1815	6	18
1066	10	14	1805	12	2
<hr/>			<hr/>		
622	0	21	9	6	16

Art. 78.

(2)	(3)	(4)	(5)	(6)
da.	da.	da.	da.	da.
Mar. 14	12	25	19	11
Apr. 13	31	31	30	30
May 31	20	30	31	31
June 30	63 da.	7	31	30
July 31		93 da.	28	31
Aug. 31			31	31
Sept. 12			30	29
<hr/>			<hr/>	
179 da.			25	8
			<hr/>	
			225 da.	201 da.

Art. 79.

(2)				(3)		(4)	
bu.	pk.	qt.	pt.	T. cwt.	lb.	mi.	rd.
2	1	1	1	8	62	208	176
<hr/>				<hr/>		<hr/>	
6				9		15	
13	3	1	0	3	17 58	3128	80

(5)			(6)		(7)		
cu. yd.	cu. ft.	cu. in.	T. cwt.	lb.	gal.	qt.	pt.
23	9	228	16	74	47	3	1
<hr/>			<hr/>		<hr/>		
12			119		59		
280	1	1008	99	12 6	2824	2	1

(8)	(9)	(10)
mi. rd.	C. cu. ft.	mo. wk. da. hr. min. sec.
27 155	7 98	2 4 13 48 39
<u>31</u>	<u>17</u>	<u>75</u>
852 5	132 2	49 3 0 3 48 45

DIVISION.

Art. 80.

(4)

A. sq. rd.
16)69 64
<u>4 54</u>

(5)

lb. oz.
5)265 10
10)53 2
<i>Ans.</i> 5 5

(6)

T. cwt.
17)45 18
<u>2 14</u>

(7)

da. hr. min. sec.
6)114 22 45 18
9)19 3 47 33
<i>Ans.</i> 2 3 5 17

(8)

bu. pk. qt. bu. pk. qt.
78)309 2 2(3 3 7, <i>Ans.</i>
<u>234</u>
75
4
78)302(3 pk.
<u>234</u>
68
8
78)546(7 qt.
<u>546</u>

(9)

gal. qt. pt. gi.
63)127 3 1 3
gal. 2 . . 1
<u>4 qt. qt.</u>
4+3=7
pt. 15
<u>4</u>
60 + 3 gi. = 63 gi.
63 ÷ 63 = 1 gi.
<i>Ans.</i> 2 gal. 1 gi.

$$\begin{array}{r} \text{(10)} \\ \text{mi. rd. mi. rd.} \\ 319)788 \quad 169 \text{ (2 151, } \textit{Ans.} \end{array}$$

$$\begin{array}{r} 638 \\ \hline 150 \times 320 = 48000 \text{ rd.} \end{array}$$

$$\begin{array}{r} 169 \\ \hline 319)48169 \text{ (151 rd.} \end{array}$$

$$\begin{array}{r} 319 \\ \hline \end{array}$$

$$\begin{array}{r} 1626 \\ \hline \end{array}$$

$$\begin{array}{r} 1595 \\ \hline \end{array}$$

$$\begin{array}{r} 319 \\ \hline \end{array}$$

$$\begin{array}{r} 319 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(11)} \\ \text{lb. oz.} \end{array}$$

$$\begin{array}{r} 35 \quad 9 \\ \hline \end{array}$$

$$\begin{array}{r} 75 \quad 14 \\ \hline \end{array}$$

$$\begin{array}{r} 85 \quad 15 \\ \hline \end{array}$$

$$\begin{array}{r} 195 \quad 38 \\ \hline \end{array}$$

$$\begin{array}{r} 186 \quad 14 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \quad 24 \\ \hline \end{array}$$

$$\begin{array}{r} 8 \\ \hline \end{array}$$

$$\begin{array}{r} 72 \quad 192 = 84 \text{ lb.} \end{array}$$

$$84 \text{ lb.} + 64 = 1 \text{ lb. } 5 \text{ oz., } \textit{Ans.}$$

Art. 81.

(1)

$$30^\circ + 15 = 2. \textit{ Ans. } 2 \text{ hr.}$$

$$\begin{array}{r} \text{(2)} \\ 15)71^\circ \quad 4' \quad 0'' \\ \hline 4 \text{ hr. } 44 \text{ min. } 16 \text{ sec.} \end{array}$$

$$\begin{array}{r} \text{(3)} \\ 15)10^\circ \quad 35' \quad 0'' \\ \hline 0 \text{ hr. } 42 \text{ min. } 20 \text{ sec.} \end{array}$$

$$\begin{array}{r} \text{(4)} \\ \text{min. sec.} \\ 37 \quad 20 \\ \hline 15 \\ \hline 9^\circ \quad 20' \quad 0'' \end{array}$$

$$\begin{array}{r} \text{(5)} \\ \text{hr. min. sec.} \\ 1 \quad 4 \quad 56 \\ \hline 15 \\ \hline 16^\circ \quad 14' \quad 0'' \end{array}$$

$$\begin{array}{r} \text{(6)} \\ \text{hr. min. sec.} \\ 5 \quad 8 \quad 4 \\ \hline 15 \\ \hline 77^\circ \quad 1' \quad 0'' \end{array}$$

Art. 82.

(7)

$$\begin{array}{r} \text{hr. min. sec.} \\ \text{Time at C. } 12 \quad 0 \quad 0 \\ \text{Add diff. } \quad \quad 37 \quad 20 \\ \hline 12 \quad 37 \quad 20 \end{array}$$

(See Ex. 5, Art. 81.)

(8)

$$\begin{array}{r} \text{hr. min. sec} \\ \text{Time at N. Y. } 11 \quad 0 \quad 0 \text{ A. M.} \\ 30^\circ = 2 \quad 0 \quad 0 \text{ to be added.} \\ \hline 1 \quad 0 \quad 0 \text{ P. M.} \end{array}$$

$$\begin{array}{r}
 \text{(9)} \\
 \text{hr. min. sec.} \\
 \text{Time at Ph. } 12 \quad 0 \quad 0 \\
 \text{Subtr. diff. } \quad \underline{37 \quad 20} \\
 \hline
 11 \quad 22 \quad 40 \text{ A. M.}
 \end{array}$$

$$\begin{array}{r}
 \text{(10)} \\
 \text{hr. min. sec.} \\
 \text{Time at N.Y. } 11 \quad 0 \quad 0 \\
 \text{Subtr. diff. } \quad \underline{1 \quad 4 \quad 56} \\
 \hline
 9 \quad 55 \quad 4 \text{ A. M.}
 \end{array}$$

(See Ex. 6, Art. 81.)

(12.) Since the longitude of Philadelphia is 75° it has Eastern standard time, and since the longitude of Cincinnati is 84° it has Central standard time which is 1 hour less than Eastern time. *Ans.* 1 hr.

(13.) New York, 74° longitude, has Eastern standard time; St. Louis, 90° longitude, has Central standard time. The time in St. Louis is 1 hour earlier.

11 A. M. $- 1 = 10$ A. M., *Ans.*

FACTORING.

Arts. 87 and 88.

NOTE. — The principles and processes of factoring are so simple, and are so fully explained in the Arithmetic, that it seems unnecessary to give any solutions here.

Art. 89.

$$\begin{array}{r}
 \text{(2)} \\
 \begin{array}{r}
 2)16 \\
 \underline{2)8} \\
 2)4 \\
 \underline{2)2} \\
 1
 \end{array}
 \end{array}$$

$2 \times 2 \times 2 = 8$, G. C. D.

$$\begin{array}{r}
 \text{(4)} \\
 \begin{array}{r}
 2)36 \quad 54 \quad 90 \\
 \underline{3)18 \quad 27 \quad 45} \\
 3)6 \quad 9 \quad 15 \\
 \underline{\quad 2 \quad 3 \quad 5}
 \end{array}
 \end{array}$$

$2 \times 3 \times 3 = 18$, G. C. D.

$$\begin{array}{r}
 \text{(3)} \\
 \begin{array}{r}
 2)24 \quad 2)36 \quad 2)60 \\
 \underline{2)12 \quad 2)18 \quad 2)30} \\
 3)6 \quad 3)9 \quad 3)15 \\
 \underline{2)2 \quad 3)3} \\
 1 \quad 1
 \end{array}
 \end{array}$$

$2 \times 2 \times 3 = 12$, G. C. D.

$$\begin{array}{r}
 \text{(5)} \\
 \begin{array}{r}
 2)40 \quad 60 \quad 100 \\
 \underline{2)20 \quad 30 \quad 50} \\
 5)10 \quad 15 \quad 25 \\
 \underline{\quad 2 \quad 3 \quad 5}
 \end{array}
 \end{array}$$

$2 \times 2 \times 5 = 20$, G. C. D.

$$\begin{array}{r}
 \text{(6)} \\
 3 \overline{)54} \quad 81 \quad 108 \\
 3 \overline{)18} \quad 27 \quad 36 \\
 3 \overline{)6} \quad 9 \quad 12 \\
 \underline{\quad} \quad 2 \quad 3 \quad 4
 \end{array}$$

$$3 \times 3 \times 3 = 27, \text{ G. C. D.}$$

$$\begin{array}{r}
 \text{(7)} \\
 2 \overline{)60} \quad 90 \quad 120 \\
 3 \overline{)30} \quad 45 \quad 60 \\
 5 \overline{)10} \quad 15 \quad 20 \\
 \underline{\quad} \quad 2 \quad 3 \quad 4
 \end{array}$$

$$2 \times 3 \times 5 = 30, \text{ G. C. D.}$$

$$\begin{array}{r}
 \text{(8)} \\
 2 \overline{)32} \quad 48 \quad 80 \quad 112 \\
 2 \overline{)16} \quad 24 \quad 40 \quad 56 \\
 2 \overline{)8} \quad 12 \quad 20 \quad 28 \\
 2 \overline{)4} \quad 6 \quad 10 \quad 14 \\
 \underline{\quad} \quad 2 \quad 3 \quad 5 \quad 7
 \end{array}$$

$$2 \times 2 \times 2 \times 2 = 16, \text{ G. C. D.}$$

$$\begin{array}{r}
 \text{(9)} \\
 2 \overline{)48} \quad 72 \quad 96 \quad 120 \\
 2 \overline{)24} \quad 36 \quad 48 \quad 60 \\
 2 \overline{)12} \quad 18 \quad 24 \quad 30 \\
 3 \overline{)6} \quad 9 \quad 12 \quad 15 \\
 \underline{\quad} \quad 2 \quad 3 \quad 4 \quad 5
 \end{array}$$

$$2 \times 2 \times 2 \times 3 = 24, \text{ G. C. D.}$$

$$\begin{array}{r}
 \text{(10)} \\
 2 \overline{)72} \quad 108 \quad 144 \quad 180 \\
 2 \overline{)36} \quad 54 \quad 72 \quad 90 \\
 3 \overline{)18} \quad 27 \quad 36 \quad 45 \\
 3 \overline{)6} \quad 9 \quad 12 \quad 15 \\
 \underline{\quad} \quad 2 \quad 3 \quad 4 \quad 5
 \end{array}$$

$$2 \times 2 \times 3 \times 3 = 36, \text{ G. C. D.}$$

$$\begin{array}{r}
 \text{(11)} \\
 \text{(By 2d method.)} \\
 62 \overline{)93} (1 \\
 \underline{\quad} \quad 62 \\
 31 \overline{)62} (2 \\
 \underline{\quad} \quad 62
 \end{array}$$

$$31 = \text{G. C. D.}$$

$$\begin{array}{r}
 \text{(12)} \\
 78 \overline{)130} (1 \\
 \underline{\quad} \quad 78 \\
 52 \overline{)78} (1 \\
 \underline{\quad} \quad 52 \\
 26 \overline{)52} (2 \\
 \underline{\quad} \quad 52
 \end{array}$$

$$26 = \text{G. C. D.}$$

$$\begin{array}{r}
 \text{(13)} \\
 161 \overline{)253} (1 \\
 \underline{\quad} \quad 161 \\
 92 \overline{)161} (1 \\
 \underline{\quad} \quad 92 \\
 69 \overline{)92} (1 \\
 \underline{\quad} \quad 69
 \end{array}$$

$$23 = \text{G. C. D.}$$

$$\begin{array}{r}
 \text{(14)} \\
 247 \overline{)323} (1 \\
 \underline{\quad} \quad 247 \\
 76 \overline{)247} (3 \\
 \underline{\quad} \quad 228 \\
 19 \overline{)76} (4 \\
 \underline{\quad} \quad 76
 \end{array}$$

$$19 = \text{G. C. D.}$$

<p>(16)</p> $\begin{array}{r} 2145)3471(1 \\ \underline{2145} \\ 1326)2145(1 \\ \underline{1326} \\ 819)1326(1 \\ \underline{819} \end{array}$ <p>39 = G. C. D.</p>	<p>(15)</p> $\begin{array}{r} 391)697(1 \\ \underline{391} \\ 306)391(1 \\ \underline{306} \\ 85)306(3 \\ \underline{255} \\ 51)85(1 \\ \underline{51} \\ 34)51(1 \\ \underline{34} \\ 17)34(2 \\ \underline{34} \end{array}$ <p>17 = G. C. D.</p>	
<p>(17)</p> $\begin{array}{r} 16571)38363(2 \\ \underline{33142} \\ 5221)16571(3 \\ \underline{15663} \\ 908)5221(5 \\ \underline{4540} \\ 681)908(1 \\ \underline{681} \\ 227)681(3 \\ \underline{681} \end{array}$ <p>227 = G. C. D.</p>	<p>(18)</p> $\begin{array}{r} 72)120(1 \quad 24)132(5 \\ \underline{72} \quad \underline{120} \\ 48)72(1 \quad 12)24(2 \\ \underline{48} \quad \underline{24} \\ 24)48(2 \quad 12 = \text{G. C. D.} \\ \underline{48} \end{array}$	<p>(19)</p> $\begin{array}{r} 75)125(1 \quad 25)165(6 \\ \underline{75} \quad \underline{150} \\ 50)75(1 \quad 15)25(1 \\ \underline{50} \quad \underline{15} \\ 25)50(2 \quad 10)15(1 \\ \underline{50} \quad \underline{10} \\ \quad \quad \quad 5)10(2 \\ \quad \quad \quad \underline{10} \\ \quad \quad \quad 5 = \text{G. C. D.} \end{array}$

Art. 90.

$$\begin{array}{r}
 \text{(2)} \\
 2)4 \quad 6 \quad 8 \\
 \hline
 2)2 \quad 3 \quad 4 \\
 \hline
 2)3 \quad 2 \\
 \hline
 3
 \end{array}$$

$$2 \times 2 \times 2 \times 3 = 24, \text{ L. C. M.}$$

$$\begin{array}{r}
 \text{(3)} \\
 3)6 \quad 9 \quad 12 \\
 \hline
 2)2 \quad 3 \quad 4 \\
 \hline
 3 \quad 2
 \end{array}$$

$$3 \times 2 \times 3 \times 2 = 36, \text{ L. C. M.}$$

$$\begin{array}{r}
 \text{(4)} \\
 2)4 \quad 8 \quad 10 \\
 \hline
 2)2 \quad 4 \quad 5 \\
 \hline
 2 \quad 5
 \end{array}$$

$$2 \times 2 \times 2 \times 5 = 40, \text{ L. C. M.}$$

$$\begin{array}{r}
 \text{(5)} \\
 5)6 \quad 10 \quad 15 \\
 \hline
 3)6 \quad 2 \quad 3 \\
 \hline
 2)2 \quad 2
 \end{array}$$

$$5 \times 3 \times 2 = 30, \text{ L. C. M.}$$

$$\begin{array}{r}
 \text{(6)} \\
 3)6 \quad 8 \quad 9 \quad 12 \\
 \hline
 2)2 \quad 8 \quad 3 \quad 4 \\
 \hline
 2)4 \quad 3 \quad 2 \\
 \hline
 2 \quad 3
 \end{array}$$

$$3 \times 2 \times 2 \times 2 \times 3 = 72, \text{ L. C. M.}$$

$$\begin{array}{r}
 \text{(7)} \\
 5)10 \quad 12 \quad 15 \quad 20 \\
 \hline
 2)2 \quad 12 \quad 3 \quad 4 \\
 \hline
 3)6 \quad 3 \quad 2 \\
 \hline
 2)2 \quad 2
 \end{array}$$

$$5 \times 2 \times 3 \times 2 = 60, \text{ L. C. M.}$$

$$\begin{array}{r}
 \text{(8)} \\
 3)9 \quad 15 \quad 18 \quad 30 \\
 \hline
 5)3 \quad 5 \quad 6 \quad 10 \\
 \hline
 3)3 \quad 6 \quad 2 \\
 \hline
 2)2 \quad 2
 \end{array}$$

$$3 \times 5 \times 3 \times 2 = 90, \text{ L. C. M.}$$

$$\begin{array}{r}
 \text{(9)} \\
 3)12 \quad 18 \quad 27 \quad 36 \\
 \hline
 3)4 \quad 6 \quad 9 \quad 12 \\
 \hline
 2)4 \quad 2 \quad 3 \quad 4 \\
 \hline
 2)2 \quad 3 \quad 2 \\
 \hline
 3
 \end{array}$$

$$3 \times 3 \times 2 \times 2 \times 3 = 108, \text{ L. C. M.}$$

$$\begin{array}{r}
 \text{(10)} \\
 5 \overline{)15} \quad 25 \quad 30 \quad 50 \\
 \underline{5)3} \quad 5 \quad 6 \quad 10 \\
 \underline{2)3} \quad \quad 2 \quad 2 \\
 3
 \end{array}$$

$5 \times 5 \times 2 \times 3 = 150$, L. C. M.

$$\begin{array}{r}
 \text{(11)} \\
 7 \overline{)14} \quad 21 \quad 30 \quad 35 \\
 \underline{5)2} \quad 3 \quad 30 \quad 5 \\
 \underline{3)2} \quad 3 \quad 6 \\
 \underline{2)2} \quad \quad 2
 \end{array}$$

$7 \times 5 \times 3 \times 2 = 210$, L. C. M.

$$\begin{array}{r}
 \text{(12)} \\
 7 \overline{)15} \quad 20 \quad 21 \quad 28 \\
 \underline{5)15} \quad 20 \quad 3 \quad 4 \\
 \underline{3)3} \quad 4 \quad 3 \quad 4 \\
 \underline{2)4} \quad \quad 4 \\
 \underline{2)2} \quad \quad 2
 \end{array}$$

$7 \times 5 \times 3 \times 2 \times 2 = 420$, L. C. M.

$$\begin{array}{r}
 \text{(13)} \\
 5 \overline{)20} \quad 24 \quad 28 \quad 30 \\
 \underline{3)4} \quad 24 \quad 28 \quad 6 \\
 \underline{2)4} \quad 8 \quad 28 \quad 2 \\
 \underline{2)2} \quad 4 \quad 14 \\
 2 \quad 7
 \end{array}$$

$5 \times 3 \times 2 \times 2 \times 2 \times 7 = 840$,
L. C. M.

$$\begin{array}{r}
 \text{(14)} \\
 7 \overline{)45} \quad 30 \quad 35 \quad 42 \\
 \underline{5)45} \quad 30 \quad 5 \quad 6 \\
 \underline{3)9} \quad 6 \quad 6 \\
 \underline{2)3} \quad 2 \quad 2 \\
 3
 \end{array}$$

$7 \times 5 \times 3 \times 2 \times 3 = 630$, L. C. M.

$$\begin{array}{r}
 \text{(15)} \\
 5 \overline{)36} \quad 40 \quad 45 \quad 50 \\
 \underline{3)36} \quad 8 \quad 9 \quad 10 \\
 \underline{2)12} \quad 8 \quad 3 \quad 10 \\
 \underline{2)6} \quad 4 \quad 3 \quad 5 \\
 \underline{3)3} \quad 2 \quad 3 \quad 5 \\
 2 \quad 5
 \end{array}$$

$5 \times 3 \times 2 \times 2 \times 3 \times 2 \times 5 = 1800$, L. C. M.

$$\begin{array}{r}
 \text{(16)} \\
 7 \overline{)42} \quad 56 \quad 63 \\
 \underline{3)6} \quad 8 \quad 9 \\
 \underline{2)2} \quad 8 \quad 3 \\
 \underline{2)4} \quad 3 \\
 2 \quad 3
 \end{array}$$

$7 \times 3 \times 2 \times 2 \times 2 \times 3 = 504$,
L. C. M.

$$\begin{array}{r}
 \text{(17)} \\
 13 \overline{)78} \quad 104 \quad 117 \\
 \underline{3)6} \quad 8 \quad 9 \\
 \underline{2)2} \quad 8 \quad 3 \\
 \underline{2)4} \quad 3 \\
 2 \quad 3
 \end{array}$$

$13 \times 3 \times 2 \times 2 \times 2 \times 3 = 936$,
L. C. M.

<p>(18)</p> $\begin{array}{r} 5 \overline{)125} \quad 150 \quad 200 \\ 5 \overline{)25} \quad 30 \quad 40 \\ \underline{2)5} \quad 6 \quad 8 \\ \underline{2)5} \quad 3 \quad 4 \\ 5 \quad 3 \quad 2 \end{array}$	<p>(19)</p> $\begin{array}{r} 5 \overline{)10} \quad 24 \quad 25 \quad 32 \quad 45 \\ 3 \overline{)2} \quad 24 \quad 5 \quad 32 \quad 9 \\ \underline{2)2} \quad 8 \quad 5 \quad 32 \quad 3 \\ \quad 2)4 \quad 5 \quad 16 \quad 3 \\ \quad 2)2 \quad 5 \quad 8 \quad 3 \\ \quad \quad 2)5 \quad 4 \quad 3 \\ \quad \quad \quad 5 \quad 2 \quad 3 \end{array}$
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$5 \times 5 \times 2 \times 2 \times 5 \times 3 \times 2 = 3000$, L. C. M.

$5 \times 3 \times 2 \times 2 \times 2 \times 2 \times 5 \times 2 \times 3 = 7200$, L. C. M.

(20)

$$\begin{array}{r} 3 \overline{)2} \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \\ 2 \overline{)2} \quad \quad 4 \quad 5 \quad 2 \quad 7 \quad 8 \quad 3 \\ \quad 2)2 \quad 5 \quad \quad 7 \quad 4 \quad 3 \\ \quad \quad 5 \quad \quad 7 \quad 2 \quad 3 \end{array}$$

$3 \times 2 \times 2 \times 5 \times 7 \times 2 \times 3 = 2520$, L. C. M.

<p>(21)</p> $\begin{array}{r} 3 \overline{)16} \quad 27 \quad 42 \quad 108 \\ 2 \overline{)16} \quad 9 \quad 14 \quad 36 \\ \underline{3)8} \quad 9 \quad 7 \quad 18 \\ \underline{3)8} \quad 3 \quad 7 \quad 6 \\ \underline{2)8} \quad \quad 7 \quad 2 \\ \underline{2)4} \quad \quad \quad 7 \\ 2 \quad \quad \quad 7 \end{array}$	<p>(22)</p> $\begin{array}{r} 13 \overline{)13} \quad 29 \quad 52 \quad 87 \\ \quad 29)29 \quad 4 \quad 87 \\ \quad \quad 2)4 \quad 3 \\ \quad \quad \quad 2 \quad 3 \end{array}$ <p style="margin-left: 10%;">$13 \times 29 \times 2 \times 2 \times 3 = 4524$, L. C. M.</p>
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$3 \times 2 \times 3 \times 3 \times 2 \times 2 \times 2 \times 7 = 3024$, L. C. M.

			(23)		
5	120	360	144	720	72
3	24	72	144	144	72
3	8	24	48	48	24
2	8	8	16	16	8
2	4	4	8	8	4
2	2	2	4	4	2
			2	2	

$$5 \times 3 \times 3 \times 2 \times 2 \times 2 \times 2 = 720, \text{ L. C. M.}$$

CANCELLATION.

Art. 91.

$$(4.) \frac{18 \times 4}{18} = 4, \text{ Ans.}$$

$$(5.) \frac{17 \times \overset{3}{18}}{\underset{6}{6}} = 51, \text{ Ans.}$$

$$(6.) \frac{15 \times \overset{2}{8}}{\underset{4}{4}} = 30, \text{ Ans.}$$

$$(7.) \frac{24 \times \overset{3}{4}}{\underset{8}{8}} = 12, \text{ Ans.}$$

$$(8.) \frac{37 \times \overset{3}{18}}{\underset{9}{9}} = 111, \text{ Ans.}$$

$$(9.) \frac{6 \times \overset{6}{36} \times \overset{6}{40}}{\underset{6}{30} \times \underset{6}{8}} = 6, \text{ Ans.}$$

$$(10.) \frac{36 \times \overset{12}{6}}{\overset{18}{18} \times \underset{6}{6}} = 12, \text{ Ans.}$$

$$(11.) \frac{2 \times \overset{5}{42} \times \overset{6}{18}}{\overset{21}{21} \times \underset{6}{18}} = 60, \text{ Ans.}$$

$$(12.) \frac{23 \times \overset{2}{10}}{\underset{5}{5}} = 46, \text{ Ans.}$$

$$(13.) \frac{3 \times \overset{2}{15} \times \overset{2}{14}}{\underset{7}{35}} = 6, \text{ Ans.}$$

KEY TO RAY'S

$$(14.) \frac{\overset{3}{21} \times 11 \times \overset{2}{6} \times \overset{2}{26}}{\underset{2}{18} \times \underset{2}{8} \times \underset{2}{14} \times \underset{2}{2}} = 33, \text{ Ans.}$$

$$(15.) \frac{\overset{7}{21} \times \overset{3}{15} \times \overset{3}{33} \times \overset{2}{8} \times \overset{7}{14} \times \overset{7}{17}}{\underset{2}{20} \times \underset{2}{34} \times \underset{2}{22} \times \underset{2}{27}} = 49, \text{ Ans.}$$

$$\frac{4 \cdot \underset{2}{17} \cdot \underset{2}{9}}{\underset{2}{8}}$$

$$(16.) \frac{\overset{19}{21} \times \overset{2}{95} \times \overset{2}{6}}{\underset{2}{35} \times \underset{2}{9}} = 38, \text{ Ans.}$$

$$\frac{\underset{2}{5} \cdot \underset{2}{8}}$$

$$(17.) \frac{\overset{5}{35} \times \overset{3}{39} \times \overset{4}{40}}{\underset{2}{26} \times \underset{2}{30} \times \underset{2}{42}} = \frac{2}{3} = 1\frac{2}{3}, \text{ Ans.}$$

$$\frac{\underset{2}{8} \cdot \underset{2}{3} \cdot \underset{2}{6}}{\underset{2}{3}}$$

$$(18.) \frac{\overset{13}{26} \times \overset{11}{33} \times \overset{7}{35}}{\underset{2}{4} \times \underset{3}{9} \times \underset{5}{25}} = \frac{13 \times 11 \times 7}{2 \times 3 \times 5} = \frac{1001}{30} = 33\frac{11}{30}, \text{ Ans.}$$

$$(19.) \frac{\overset{3}{6} \times \overset{3}{9} \times \overset{3}{15} \times \overset{3}{21}}{\underset{2}{4} \times \underset{2}{6} \times \underset{2}{10} \times \underset{2}{14}} = 5\frac{1}{16}, \text{ Ans.}$$

$$(20.) \frac{\overset{2}{21} \times \overset{4}{24} \times \overset{7}{28} \times \overset{7}{35}}{\underset{2}{14} \times \underset{2}{18} \times \underset{5}{20} \times \underset{5}{25}} = \frac{2}{3} = 3\frac{2}{3}, \text{ Ans.}$$

FRACTIONS.

Art. 103.

(8.) 4 times $\frac{7}{8} = \frac{28}{8}$, or $\frac{7}{8} \times 4 = \frac{28}{8}$.

(9.) 8 times $\frac{7}{8} = \frac{56}{8}$, or $\frac{7}{8} \times 8 = \frac{56}{8}$.

(10.) 19 times $\frac{11}{8} = \frac{209}{8}$, or $\frac{11}{8} \times 19 = \frac{209}{8}$.

(11.) $\frac{30}{8} \times 25 = \frac{750}{8}$.

(12.) $\frac{31}{8} \times 37 = \frac{1147}{8}$.

Art. 104.

(2.) $\frac{3}{4} \times 4 + \frac{1}{2} = \frac{7}{2}$.

(3.) $\frac{3}{8} \times 2 + \frac{1}{2} = \frac{7}{4}$.

(8.) $\frac{3}{8} \times 15 + \frac{5}{8} = \frac{26}{8}$.

(9.) $\frac{31}{4} \times 26 + \frac{11}{4} = \frac{827}{2}$.

(12.) $\frac{511}{8} \times 21 + \frac{117}{8} = \frac{10809}{8}$.

(14.) $\frac{71}{1} \times 14 + \frac{6}{1} = \frac{1000}{1}$.

Art. 105.

(3)
$$\begin{array}{r} 3 \overline{)6} \\ 2 \end{array}$$

(4)
$$\begin{array}{r} 4 \overline{)12} \\ 3 \end{array}$$

(5)
$$\begin{array}{r} 4 \overline{)15} \\ 3\frac{3}{4} \end{array}$$

(6)
$$\begin{array}{r} 5 \overline{)17} \\ 3\frac{3}{5} \end{array}$$

(7)
$$\begin{array}{r} 7 \overline{)19} \\ 2\frac{5}{7} \end{array}$$

(8)
$$\begin{array}{r} 10 \overline{)23} \\ 2\frac{3}{10} \end{array}$$

(13)
$$\begin{array}{r} 24 \overline{)611(25\frac{1}{4}} \\ \underline{48} \\ 131 \\ \underline{120} \\ 11 \end{array}$$

(14)
$$\begin{array}{r} 75 \overline{)3000(40} \\ \underline{300} \\ 0 \end{array}$$

(15) $25)775(31$ $\underline{75}$ 25 $\underline{25}$	(16) $12)171$ $\underline{144}$ 27	(17) $11)509(46\frac{3}{11}$ $\underline{44}$ 69 $\underline{66}$ 3	(18) $298)6437(21\frac{17}{298}$ $\underline{596}$ 477 $\underline{298}$ 179
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(19) $125)7536(60\frac{36}{125}$ $\underline{750}$ 36	(20) $19)3781(199$ $\underline{19}$ 188 $\underline{171}$ 171 $\underline{171}$	(21) $101)1325(13\frac{12}{101}$ $\underline{101}$ 315 $\underline{303}$ 12
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Art. 106.

(2.) $\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$, Ans. (3.) $\frac{3}{4} \times \frac{3}{4} = \frac{9}{16}$, Ans.

(4.) $\frac{3}{4} \times \frac{3}{8} = \frac{9}{32}$, Ans. (5.) $\frac{5}{8} \times \frac{4}{4} = \frac{5}{2}$, Ans.

(6.) $\frac{5}{7} \times \frac{4}{4} = \frac{20}{7}$, Ans. (7.) $\frac{4}{21} \times \frac{4}{4} = \frac{16}{21}$, Ans.

(8.) $\frac{7}{8} \times \frac{9}{9} = \frac{63}{8}$, Ans. (9.) $\frac{8}{9} \times \frac{12}{12} = \frac{86}{9}$, Ans.

(10.) $\frac{9}{10} \times \frac{10}{10} = \frac{90}{100}$, Ans.

(11.) $20)720$; $\frac{9}{20} \times \frac{88}{8} = \frac{324}{20}$, Ans.

(12.) $14)2016(144$; $\frac{13}{24} \times \frac{144}{144} = \frac{1872}{2016}$, Ans.

$$\begin{array}{r} 14 \\ \hline 61 \\ 56 \\ \hline 56 \\ \hline 56 \end{array}$$

(13.) $43)1935(45; \frac{22}{43} \times \frac{45}{43} = \frac{990}{1849}, \text{ Ans.}$

$$\begin{array}{r} 172 \\ \hline 215 \\ 215 \\ \hline \end{array}$$

(14.) $41)8118(198; \frac{36}{41} \times \frac{198}{41} = \frac{6988}{1681}, \text{ Ans.}$

$$\begin{array}{r} 41 \\ \hline 401 \\ 369 \\ \hline 328 \\ 328 \\ \hline \end{array}$$

(15.) $17)5134(302; \frac{16}{17} \times \frac{302}{17} = \frac{4832}{289}, \text{ Ans.}$

$$\begin{array}{r} 51 \\ \hline 34 \\ 34 \\ \hline \end{array}$$

(16.) $81)23328(288; \frac{77}{81} \times \frac{288}{81} = \frac{22176}{6561}, \text{ Ans.}$

$$\begin{array}{r} 162 \\ \hline 712 \\ 648 \\ \hline 648 \\ 648 \\ \hline \end{array}$$

(17.) $21)2541(121; \frac{13}{21} \times \frac{121}{21} = \frac{1573}{441}, \text{ Ans.}$

$$\begin{array}{r} 21 \\ \hline 44 \\ 42 \\ \hline 21 \\ 21 \\ \hline \end{array}$$

Art. 107.

- (2.) The G. C. D. of 18 and 30 is 6: $6) \frac{18}{6} = \frac{3}{1}$, *Ans.*
- (3.) $10) \frac{30}{10} = \frac{3}{1}$: $3) \frac{3}{3} = \frac{1}{1}$, *Ans.*
- (4.) G. C. D. of 12 and 18 = 6: $6) \frac{12}{6} = \frac{2}{1}$, *Ans.*
- (5.) $5) \frac{30}{5} = \frac{6}{1}$: $3) \frac{6}{3} = \frac{2}{1}$, *Ans.*
- (6.) G. C. D. of 60 and 150 = 30: $30) \frac{60}{30} = \frac{2}{1}$, *Ans.*
- (7.) G. C. D. of 42 and 70 = 14: $14) \frac{42}{14} = \frac{3}{1}$, *Ans.*
- (8.) G. C. D. of 96 and 112 = 16: $16) \frac{96}{16} = \frac{6}{1}$, *Ans.*
- (9.) $5) \frac{60}{5} = \frac{12}{1}$, *Ans.*
- (10.) $2) \frac{12}{2} = \frac{6}{1}$: $9) \frac{6}{9} = \frac{1}{1}$, *Ans.*
- (11.) $2) \frac{18}{2} = \frac{9}{1}$: $7) \frac{9}{7} = \frac{1}{1}$, *Ans.*
- (12.) $5) \frac{615}{5} = \frac{123}{1}$: $3) \frac{123}{3} = \frac{41}{1}$, *Ans.*
- (13.) G. C. D. of 873 and 1067 = 97: $97) \frac{873}{97} = \frac{9}{1}$, *Ans.*
- (14.) G. C. D. of 777 and 1998 = 111: $111) \frac{777}{111} = \frac{7}{1}$,
Ans.
- (15.) G. C. D. of 909 and 2323 = 101: $101) \frac{909}{101} = \frac{9}{1}$,
Ans.
- (16.) $\frac{391}{391}$: G. C. D. = 23: $23) \frac{391}{23} = \frac{17}{1}$, *Ans.*
- (17.) $\frac{585}{1287}$: G. C. D. = 117: $117) \frac{585}{117} = \frac{5}{1}$, *Ans.*
- (18.) $\frac{796}{14129}$: G. C. D. = 199: $199) \frac{796}{199} = \frac{4}{1}$, *Ans.*
- (19.) $\frac{1457}{5521}$: G. C. D. = 31: $31) \frac{1457}{31} = \frac{47}{1}$, *Ans.*

Art. 108.

$$(2.) \frac{2 \quad 3 \quad 4}{\quad \quad \quad}$$

1 3 2; $2 \times 3 \times 2 = 12$, L. C. Denominator.
Each must be changed to twelfths. If there are $\frac{1}{2}$ in 1,
in $\frac{1}{2}$ there are $\frac{1}{2}$ of $\frac{1}{2} = \frac{6}{12}$: $\frac{1}{3}$ of $\frac{1}{2} = \frac{4}{12}$, and $\frac{2}{3} = \frac{8}{12}$:
 $\frac{1}{4}$ of $\frac{1}{2} = \frac{3}{12}$, and $\frac{3}{4} = \frac{9}{12}$.

(3.) L. C. M. of 3, 6, and 9 is 18; $\frac{1}{3} = \frac{6}{18}$, and $\frac{2}{3} = \frac{12}{18}$:
 $\frac{1}{6} = \frac{3}{18}$, and $\frac{5}{6} = \frac{15}{18}$: $\frac{1}{9} = \frac{2}{18}$, and $\frac{7}{9} = \frac{14}{18}$.

(4.) The L. C. M. of 2, 4, and 5 = 20; $\frac{1}{2} = \frac{10}{20}$: $\frac{1}{4} = \frac{5}{20}$,
 and $\frac{3}{4} = \frac{15}{20}$: $\frac{1}{5} = \frac{4}{20}$, and $\frac{4}{5} = \frac{16}{20}$.

(5.) L. C. M. of 8, 5, and 10 = 40: $\frac{1}{8} = \frac{5}{40}$ of $\frac{40}{8} = \frac{5}{1}$,
 and $\frac{3}{8} = \frac{15}{40}$: $\frac{1}{5} = \frac{8}{40}$ of $\frac{40}{5} = \frac{8}{1}$, and $\frac{2}{5} = \frac{16}{40}$: $\frac{1}{10} = \frac{4}{40}$ of
 $\frac{40}{10} = \frac{4}{1}$, and $\frac{9}{10} = \frac{36}{40}$.

(6.) The L. C. M. of 3, 4, and 8 is 24; $\frac{1}{3} = \frac{8}{24}$, and $\frac{2}{3}$
 $= \frac{16}{24}$: $\frac{1}{4} = \frac{6}{24}$, and $\frac{3}{4} = \frac{18}{24}$: $\frac{1}{8} = \frac{3}{24}$, and $\frac{7}{8} = \frac{21}{24}$.

(7.) L. C. M. of 4, 8, and 9 = 72; $\frac{1}{4} = \frac{18}{72}$, and $\frac{3}{4} = \frac{54}{72}$:
 $\frac{1}{8} = \frac{9}{72}$, and $\frac{5}{8} = \frac{45}{72}$: $\frac{1}{9} = \frac{8}{72}$, and $\frac{8}{9} = \frac{64}{72}$.

(12.) L. C. M. of 3, 5, 7, and 8 = 840; $\frac{1}{3} = \frac{280}{840}$, and $\frac{2}{3}$
 $= \frac{560}{840}$: $\frac{1}{5} = \frac{168}{840}$, and $\frac{2}{5} = \frac{336}{840}$: $\frac{1}{7} = \frac{120}{840}$, and $\frac{3}{7} = \frac{360}{840}$:
 $\frac{1}{8} = \frac{105}{840}$, and $\frac{5}{8} = \frac{525}{840}$.

(13.) First reduce $\frac{2}{7}$ to lowest terms = $\frac{2}{7}$. L. C. M.
 of 7, 14, 7, and 28 is 28; $\frac{1}{7} = \frac{4}{28}$, and $\frac{2}{7} = \frac{8}{28}$: $\frac{1}{14} = \frac{2}{28}$,
 and $\frac{5}{14} = \frac{10}{28}$: $\frac{1}{28} = \frac{1}{28}$, and $\frac{3}{28} = \frac{3}{28}$: $\frac{11}{28}$ is already reduced.

(14.) $\frac{2}{3} = \frac{2}{3}$: $\frac{1}{6} = \frac{1}{6}$; the L. C. M. of 5, 4, 3, and 6 is
 60; $\frac{1}{5} = \frac{12}{60}$, and $\frac{2}{5} = \frac{24}{60}$: $\frac{1}{4} = \frac{15}{60}$, and $\frac{3}{4} = \frac{45}{60}$: $\frac{1}{3} = \frac{20}{60}$, and
 $\frac{2}{3} = \frac{40}{60}$: $\frac{1}{6} = \frac{10}{60}$, and $\frac{5}{6} = \frac{50}{60}$.

(15.) The L. C. M. of 4, 9, and 12 = 36; $1 = \frac{36}{36}$, and
 $2 = \frac{72}{36}$: $\frac{1}{4} = \frac{9}{36}$, and $\frac{3}{4} = \frac{27}{36}$: $\frac{1}{9} = \frac{4}{36}$, and $\frac{5}{9} = \frac{20}{36}$: $\frac{1}{12} =$
 $\frac{3}{36}$, and $\frac{7}{12} = \frac{21}{36}$.

(16.) $2\frac{2}{3} = \frac{8}{3}$: $5\frac{5}{6} = \frac{35}{6}$: L. C. M. of 3, 5, and 6 is 30;
 $\frac{1}{3} = \frac{10}{30}$, and $\frac{2}{3} = \frac{20}{30}$: $\frac{1}{5} = \frac{6}{30}$, and $\frac{3}{5} = \frac{18}{30}$: $1 = \frac{30}{30}$, and $4 =$
 $\frac{120}{30}$: $\frac{1}{6} = \frac{5}{30}$, and $\frac{5}{6} = \frac{25}{30}$.

(17.) $2\frac{1}{2} = \frac{5}{2}$: $3\frac{1}{3} = \frac{10}{3}$: $4\frac{1}{4} = \frac{17}{4}$; L. C. M. of 2, 3, and
 4 is 12; $\frac{1}{2} = \frac{6}{12}$, and $\frac{5}{2} = \frac{30}{12}$: $\frac{1}{3} = \frac{4}{12}$, and $\frac{10}{3} = \frac{40}{12}$: $\frac{1}{4} =$
 $\frac{3}{12}$, and $\frac{17}{4} = \frac{51}{12}$: $1 = \frac{12}{12}$, and $5 = \frac{60}{12}$.

(18.) L. C. M. of 16, 18, 24, 36, and 48 is 144; $\frac{1}{16} = \frac{9}{144}$, and $\frac{1}{18} = \frac{8}{144}$; $\frac{1}{24} = \frac{6}{144}$, and $\frac{1}{36} = \frac{4}{144}$; $\frac{1}{48} = \frac{3}{144}$, and $\frac{2}{48} = \frac{7}{144}$.

(19.) L. C. M. of 7, 10, 12, 35, 63, and 28 is 1260: $\frac{1}{7} = \frac{180}{1260}$, and $\frac{1}{10} = \frac{126}{1260}$; $\frac{1}{12} = \frac{105}{1260}$, and $\frac{1}{35} = \frac{36}{1260}$; $\frac{1}{63} = \frac{20}{1260}$, and $\frac{1}{28} = \frac{45}{1260}$.

(20.) L. C. M. of 5, 10, 25, 30, 45, and 60 is 900; $\frac{1}{5} = \frac{180}{900}$, and $\frac{2}{5} = \frac{360}{900}$; $\frac{1}{10} = \frac{90}{900}$, and $\frac{1}{15} = \frac{60}{900}$; $\frac{1}{25} = \frac{36}{900}$, and $\frac{2}{25} = \frac{72}{900}$; $\frac{1}{30} = \frac{30}{900}$, and $\frac{1}{45} = \frac{20}{900}$; and $\frac{1}{60} = \frac{15}{900}$, and $\frac{2}{60} = \frac{30}{900}$.

Art. 110.

$$(6.) \frac{2}{11} + \frac{7}{11} + \frac{8}{11} + \frac{10}{11} = \frac{27}{11} = 2\frac{5}{11}, \text{ Ans.}$$

$$(7.) \frac{5}{18} + \frac{8}{18} + \frac{9}{18} + \frac{11}{18} = \frac{33}{18} = 2\frac{1}{3}, \text{ Ans.}$$

$$(8.) \frac{7}{15} + \frac{8}{15} + \frac{11}{15} + \frac{13}{15} = \frac{39}{15} = 2\frac{13}{5} = 2\frac{2}{5}, \text{ Ans.}$$

$$(9.) \frac{2}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{5}{6} = 2\frac{1}{6} = 2\frac{1}{6}, \text{ Ans.}$$

$$(10.) \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{7}{2} = 2\frac{3}{2} = 2\frac{1}{2}, \text{ Ans.}$$

Art. 111.

(2.) The least common denominator is 6; $\frac{1}{2} = \frac{3}{6}$, $\frac{1}{3} = \frac{2}{6}$: $\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$, Ans.

(4.) The L. C. D. is 10; $\frac{1}{2} = \frac{5}{10}$, $\frac{2}{5} = \frac{4}{10}$: $\frac{5}{10} + \frac{4}{10} = \frac{9}{10}$, Ans.

(9.) L. C. D. = 12; $\frac{2}{3} = \frac{8}{12}$, $\frac{3}{4} = \frac{9}{12}$, $\frac{5}{6} = \frac{10}{12}$: $\frac{8+9+10}{12} = \frac{27}{12} = 2\frac{3}{4} = 2\frac{3}{4}$, Ans.

(10.) L. C. D. = 24; $\frac{1}{2} = \frac{12}{24}$, $\frac{1}{3} = \frac{8}{24}$, $\frac{1}{4} = \frac{6}{24}$: $\frac{12+8+6}{24} = \frac{26}{24} = 2\frac{1}{6}$, Ans.

(11.) L. C. D. = 792; $\frac{1}{2} = \frac{396}{792}$, $\frac{1}{3} = \frac{264}{792}$, $\frac{2}{11} = \frac{144}{792}$:
 $22 + \frac{396}{3} + \frac{144}{2} = \frac{396}{2}$, *Ans.*

(12.) $\frac{1}{2} = \frac{16}{16}$, $\frac{1}{3} = \frac{10}{16}$, $\frac{2}{5} = \frac{6}{16}$; $\frac{16}{16} + \frac{10}{16} + \frac{6}{16} = \frac{32}{16} = 2\frac{1}{2}$:
 $7 + 8 + 2\frac{1}{2} = 17\frac{1}{2}$, *Ans.*

(13.) L. C. D. = 5460; $\frac{1}{12} = \frac{455}{5460}$, $\frac{1}{18} = \frac{303}{5460}$, $\frac{1}{14} = \frac{390}{5460}$,
 $\frac{1}{15} = \frac{364}{5460}$: $\frac{455+303+390+364}{5460} = \frac{1512}{5460} = \frac{54}{198}$, *Ans.*

(14.) L. C. D. = 180; $\frac{1}{3} = \frac{60}{180}$, $\frac{2}{9} = \frac{40}{180}$, $\frac{11}{20} = \frac{99}{180}$,
 $\frac{1}{30} = \frac{6}{180}$: $\frac{60+40+99+6}{180} = \frac{205}{180} = 2\frac{11}{36}$, *Ans.*

(15)

$\frac{7}{12}$	$\frac{7}{12} = \frac{42}{72}$
$2\frac{2}{3}$	$\frac{2}{3} = \frac{50}{72}$
$3\frac{2}{3}$	$\frac{2}{3} = \frac{47}{72}$
$3\frac{1}{3}$	$\frac{1}{3} = \frac{24}{72}$
8	$\frac{161}{72} = 2\frac{1}{2}$
$2\frac{1}{2}$	
$10\frac{1}{2}$	

Ans.

(16)

$16\frac{2}{3}$	$\frac{2}{3} = \frac{40}{60}$
$12\frac{1}{2}$	$\frac{1}{2} = \frac{30}{60}$
$8\frac{1}{3}$	$\frac{1}{3} = \frac{20}{60}$
$2\frac{1}{4}$	$\frac{1}{4} = \frac{15}{60}$
38	$\frac{105}{60} = 2\frac{1}{4}$
$2\frac{1}{4}$	
$40\frac{1}{4}$	

Ans.

(17.) L. C. D. = 60; $\frac{1}{2} = \frac{30}{60}$, $\frac{1}{3} = \frac{20}{60}$, $\frac{1}{4} = \frac{15}{60}$, $\frac{1}{5} = \frac{12}{60}$,
 $\frac{1}{6} = \frac{10}{60}$: $\frac{30+20+15+12+10}{60} = \frac{87}{60} = 1\frac{29}{20}$, *Ans.*

(18.) $\frac{2}{3} = \frac{1120}{2800}$, $\frac{7}{16} = \frac{1225}{2800}$, $\frac{7}{5} = \frac{392}{2800}$, $\frac{3}{140} = \frac{60}{2800}$, $\frac{2}{2800}$:
 $\frac{1120+1225+392+60+2}{2800} = \frac{2800}{2800} = 1$, *Ans.*

(19.) $\frac{1}{20} = \frac{36}{720}$, $\frac{7}{18} = \frac{280}{720}$, $\frac{11}{12} = \frac{660}{720}$, $\frac{2}{15} = \frac{96}{720}$, $\frac{11}{18} = \frac{440}{720}$:
 $\frac{36}{720} + \frac{280}{720} + \frac{660}{720} + \frac{96}{720} + \frac{440}{720} = \frac{1547}{720} = 2\frac{107}{720}$: $1 + 2 + 2\frac{107}{720} = 5\frac{107}{720}$, *Ans.*

(20.) $\frac{2}{3} = \frac{40}{60}$, $\frac{1}{2} = \frac{30}{60}$, $\frac{1}{3} = \frac{20}{60}$, $\frac{1}{4} = \frac{15}{60}$, $\frac{1}{5} = \frac{12}{60}$: $\frac{40}{60} + \frac{30}{60}$
 $+ \frac{20}{60} + \frac{15}{60} + \frac{12}{60} = \frac{117}{60} = 1\frac{57}{60} = 1\frac{19}{20}$: $2 + 4 + 6 + 8 + 1\frac{19}{20}$
 $= 21\frac{19}{20}$, *Ans.*

(21.) $\frac{1}{3} = \frac{35}{105}$, $\frac{2}{7} = \frac{30}{105}$, $\frac{1}{5} = \frac{21}{105}$, $\frac{1}{11} = \frac{10}{105}$: $\frac{35}{105} + \frac{30}{105}$
 $+ \frac{21}{105} + \frac{10}{105} = \frac{96}{105} = \frac{32}{35}$: $1 + 4 + 2 + 2 + \frac{32}{35} = 9\frac{32}{35}$, *Ans.*

Art. 113.

(2.) $\frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$, *Ans.*

(7.) $4\frac{1}{4} - 2\frac{3}{4}$. $\frac{3}{4}$ can not be taken from $\frac{1}{4}$; so borrow 1 from 4. $1 = \frac{4}{4}$; $\frac{4}{4} + \frac{1}{4} = \frac{5}{4}$; $\frac{3}{4}$ from $\frac{5}{4} = \frac{2}{4}$ or $\frac{1}{2}$. Since we took 1 from 4, only 3 remain, and $3 - 2 = 1$. *Ans.* $1\frac{1}{2}$.

$$\begin{array}{r} 8\frac{1}{8} \\ 3\frac{3}{8} \\ \hline 4\frac{2}{8}, \text{ Ans.} \end{array} \quad \begin{array}{l} (8) \\ \frac{1}{8} + \frac{3}{8} = \frac{4}{8} \\ \frac{4}{8} - \frac{2}{8} = \frac{2}{8} \end{array}$$

$$\begin{array}{r} 23\frac{7}{10} \\ 17\frac{11}{10} \\ \hline 5\frac{6}{10}, \text{ Ans.} \end{array} \quad \begin{array}{l} (9) \\ \frac{7}{10} + \frac{20}{10} = \frac{27}{10} \\ \frac{27}{10} - \frac{11}{10} = \frac{16}{10} = \frac{8}{5} \end{array}$$

Art. 114.

(9.) L. C. D. = 30; $\frac{4}{15} = \frac{8}{30}$, $\frac{1}{10} = \frac{3}{30}$; $\frac{8}{30} - \frac{3}{30} = \frac{5}{30} = \frac{1}{6}$, *Ans.*

(10.) L. C. D. = 42; $\frac{16}{21} = \frac{32}{42}$, $\frac{5}{14} = \frac{15}{42}$; $\frac{32}{42} - \frac{15}{42} = \frac{17}{42}$, *Ans.*

(12.) $5 = \frac{15}{3}$; $\frac{15}{3} - \frac{2}{3} = \frac{13}{3} = 4\frac{1}{3}$, *Ans.*

(13.) $5\frac{3}{8} = \frac{17}{8} = \frac{34}{16}$, $4\frac{1}{2} = \frac{9}{2} = \frac{27}{6} = \frac{34}{8} - \frac{27}{8} = \frac{7}{8} = 1\frac{1}{8}$, *Ans.*

(14.) $7\frac{2}{3} = \frac{23}{3} = \frac{46}{6}$, $4\frac{3}{4} = \frac{19}{4} = \frac{57}{12}$; $\frac{46}{12} - \frac{57}{12} = \frac{35}{12} = 2\frac{11}{12}$, *Ans.*

(15.) $14\frac{1}{4} = \frac{57}{4} = \frac{171}{12}$, $12\frac{2}{3} = \frac{38}{3} = \frac{152}{12}$; $\frac{171}{12} - \frac{152}{12} = \frac{19}{12} = 1\frac{7}{12}$, *Ans.*

(16.) $5\frac{3}{14} = \frac{73}{14} = \frac{219}{42}$, $2\frac{1}{2} = \frac{5}{2} = \frac{104}{42}$; $\frac{219}{42} - \frac{104}{42} = \frac{115}{42} = 2\frac{31}{42}$, *Ans.*

(17.) $4\frac{1}{24} = \frac{97}{24} = \frac{194}{48}$, $3\frac{1}{16} = \frac{49}{16} = \frac{147}{48}$; $\frac{194}{48} - \frac{147}{48} = \frac{47}{48}$, *Ans.*

(18.) $56\frac{1}{3} = \frac{169}{3} = \frac{676}{12}$, $42\frac{1}{4} = \frac{169}{4} = \frac{507}{12}$; $\frac{676}{12} - \frac{507}{12} = \frac{169}{12} = 14\frac{1}{12}$, *Ans.*

(19.) $60\frac{2}{3} = \frac{394}{3} = \frac{608}{10}$, $41\frac{3}{10} = \frac{413}{10}$; $\frac{608}{10} - \frac{413}{10} = \frac{195}{10} = 19\frac{1}{2}$, *Ans.*

(20.) $97\frac{1}{2} = \frac{195}{2} = \frac{585}{6}$, $48\frac{5}{6} = \frac{293}{6}$; $\frac{585}{6} - \frac{293}{6} = \frac{292}{6} = 48\frac{2}{3}$, *Ans.*

Art. 115.

- (5.) $\frac{3}{4} \times 3 = \frac{9}{4} = 2\frac{1}{4}$, *Ans.*
- (6.) $8 \times \frac{5}{8} = \frac{40}{8} = 5\frac{1}{2}$, *Ans.*
- (7.) $\frac{3}{4} \times \frac{5}{7} = \frac{15}{28}$, *Ans.*
- (8.) $\frac{2}{3} \times 4 = \frac{8}{3} = 2\frac{2}{3}$, *Ans.*
- (9.) $5 \times \frac{3}{4} = \frac{15}{4} = 3\frac{3}{4}$, *Ans.*
- (11.) $\frac{2}{3} \times 6 = \frac{12}{3} = 4$, *Ans.*
- (12.) $20 \times \frac{3}{4} = \frac{60}{4} = 15$, *Ans.*
- (13.) $\frac{8}{13} \times \frac{11}{10} = \frac{88}{130} = \frac{44}{65}$, *Ans.*
- (14.) $\frac{3}{5} \times 10 = \frac{30}{5} = 6$, *Ans.*
- (15.) $12 \times \frac{2}{3} = \frac{24}{3} = 8$, *Ans.*
- (16.) $\frac{9}{18} \times \frac{3}{7} : \frac{9}{18} \times \frac{3}{7} = \frac{27}{91}$, *Ans.*
- (17.) $\frac{3}{7} \times 6 = \frac{18}{7} = 2\frac{4}{7}$, *Ans.*
- (18.) $7 \times \frac{3}{2} = \frac{21}{2} = 10\frac{1}{2}$, *Ans.*
- (21.) 8 times 3 = 24: 8 times $\frac{3}{8} = \frac{24}{8} = 3$: 24 + 3 = 27, *Ans.*
- (22.) $2\frac{1}{2} = \frac{5}{2}$: $\frac{5}{2} \times \frac{5}{2} = \frac{25}{4} = 6\frac{1}{4}$, *Ans.*
- (23.) $10 \times 7 = 70$: $\frac{7}{5} \times 7 = \frac{49}{5} = 9\frac{4}{5}$: 70 + $9\frac{4}{5} = 79\frac{4}{5}$, *Ans.*
- (24.) $25 \times 8 = 200$: $25 \times \frac{3}{5} = \frac{75}{5} = 15$: 200 + 15 = 215, *Ans.*
- (25.)
- $$17\frac{3}{11} = \frac{190}{11} : \frac{9}{10} \times \frac{190}{11} = \frac{171}{11} = 15\frac{6}{11}$$
- ,
- Ans.*
- (26.) $10 \times 9 = 90$: $\frac{5}{6} \times 9 = \frac{45}{6} = 7\frac{3}{2} = 7\frac{1}{2}$: 90 + $7\frac{1}{2} = 97\frac{1}{2}$, *Ans.*

(27.) 8 times $64 = 512$: $\frac{1}{8}$ of $64 = 8$: $\frac{7}{8} = 56$: $512 + 56 = 568$, *Ans.*

(28.) $8\frac{3}{4} = \frac{35}{4}$: $\frac{1}{7}$ of $\frac{35}{4} = \frac{5}{4}$: $\frac{3}{7} = \frac{15}{4} = 3\frac{3}{4}$, *Ans.*

(29.)
 $2\frac{2}{11} = \frac{24}{11}$: $\frac{5}{12} \times \frac{9}{16} \times \frac{24}{11} = \frac{15}{11}$, *Ans.*

(30.)
 $2\frac{1}{8} = \frac{17}{8}$: $\frac{8}{16} \times \frac{8}{11} \times \frac{16}{9} = 1$, *Ans.*

(31.) $\frac{3}{4} \times \frac{13}{9} \times \frac{21}{1} = \frac{319}{2} = 409\frac{1}{2}$, *Ans.*

(32.)
 $\frac{5}{2} \times \frac{11}{3} \times \frac{19}{4} \times \frac{2}{7} = \frac{1945}{21} = 49\frac{16}{21}$, *Ans.*

(33.)
 $\frac{11}{5} \times \frac{55}{26} \times \frac{13}{4} \times \frac{16}{11} = 22$, *Ans.*

(34.) $\frac{7}{8} \times \frac{8}{10} \times \frac{8}{9} \times \frac{5}{6} \times \frac{2}{3} \times \frac{6}{7} = \frac{1}{3}$, *Ans.*

(35.)
 $\frac{1}{4} \times \frac{9}{7} \times \frac{4}{5} \times \frac{7}{9} \times \frac{5}{4} \times \frac{2}{3} \times \frac{6}{1} = 1$, *Ans.*

$$(36.) \quad \frac{6}{7} \times \frac{4}{9} \times \frac{7}{4} \times \frac{1}{6} \times \frac{3}{4} \times \frac{5}{6} \times \frac{2}{5} \times \frac{20}{1} = \frac{5}{3}, \text{ Ans.}$$

$$(37.) \quad \frac{5}{2} \times \frac{32}{5} \times \frac{13}{4} \times \frac{7}{13} \times \frac{2}{1} \times \frac{3}{7} = 24, \text{ Ans.}$$

Art. 116.

(2.) $\frac{1}{2}$ of 5 = $\frac{5}{2}$; then $\frac{2}{3}$ of 5 = 3 times $\frac{5}{2} = 1\frac{5}{2} = 3\frac{3}{2}$,
Ans.

(3.) $\frac{2}{3}$ of 7 = $1\frac{4}{3} = 2\frac{1}{3}$, *Ans.*

(4.) $\frac{4}{5}$ of 10 = $4\frac{0}{5} = 8$, *Ans.*

(5.) $\frac{1}{5}$ of 12 = 2: $\frac{5}{8} = 2 \times 5 = 10$, *Ans.*

(6.) $\frac{5}{8}$ of 15 = $7\frac{5}{8} = 12\frac{3}{8} = 12\frac{3}{8}$, *Ans.*

(7.) $\frac{3}{8}$ of 21 = $13\frac{3}{8} = 18\frac{3}{8} = 18\frac{3}{8}$, *Ans.*

(8.) $\frac{1}{10}$ of 25 = $2\frac{5}{10} = \frac{5}{2}$: $\frac{7}{10} = \frac{35}{2} = 17\frac{1}{2}$, *Ans.*

(9.) $\frac{5}{12}$ of 27 = $11\frac{3}{2} = 11\frac{1}{2}$, *Ans.*

Art. 117.

(4.) $\frac{1}{2}$ of $\frac{3}{8}$ of $1\frac{1}{4} = \frac{1}{2} \times \frac{3}{8} \times 1\frac{1}{4} = \frac{3}{16}$, *Ans.*

(7.) $\frac{2}{3}$ of $\frac{5}{7}$ of $1\frac{3}{9} = \frac{2}{3} \times \frac{5}{7} \times 1\frac{3}{9} = 1\frac{10}{21}$, *Ans.*

(8.) $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{4}{5} = \frac{2}{3}$, *Ans.*

(9.) $\frac{1}{3}$ of $\frac{3}{4}$ of $\frac{5}{6} = \frac{5}{24}$, *Ans.*

(10.) $\frac{3}{5}$ of $\frac{5}{7}$ of $\frac{7}{8} = \frac{3}{8}$, *Ans.*

$$(11.) \quad \frac{3}{5} \text{ of } \frac{4}{9} \text{ of } \frac{7}{12} \text{ of } \frac{18}{35} = \frac{2}{25}, \text{ Ans.}$$

$$(12.) \quad \frac{1}{3} \text{ of } \frac{3}{4} \text{ of } \frac{4}{9} = \frac{1}{9}, \text{ Ans.}$$

$$(13.) \quad \frac{1}{9} \text{ of } \frac{3}{4} \text{ of } \frac{4}{3} = \frac{1}{9}, \text{ Ans.}$$

$$(14.) \quad \frac{3}{5} \text{ of } \frac{6}{7} \text{ of } \frac{35}{18} = 1, \text{ Ans.}$$

$$(15.) \quad \frac{3}{7} \text{ of } \frac{3}{3} \text{ of } \frac{7}{4} = 2, \text{ Ans.}$$

$$(16.) \quad \frac{9}{18} \text{ of } \frac{7}{18} \text{ of } \frac{18}{7} = \frac{1}{2}, \text{ Ans.}$$

$$(17.) \quad \frac{1}{2} \text{ of } \frac{4}{5} \text{ of } \frac{1}{8} \text{ of } \frac{5}{1} = \frac{1}{4}, \text{ Ans.}$$

$$(18.) \quad \frac{1}{2} \text{ of } \frac{2}{3} \text{ of } \frac{3}{4} \text{ of } \frac{4}{5} \text{ of } \frac{5}{8} \text{ of } \frac{5}{9} \text{ of } \frac{9}{10} = \frac{1}{16}, \text{ Ans.}$$

Art. 118.

$$(1.) \quad 2\frac{1}{2} = \frac{5}{2} : 13\frac{1}{2} = \frac{27}{2} : \frac{5}{2} \times \frac{27}{2} = \frac{243}{2} = 30\frac{3}{2} \text{ ct., Ans.}$$

$$(2.) \quad 6\frac{1}{2} = \frac{13}{2} : \frac{13}{2} \times \frac{3}{4} = \frac{39}{8} = \$4\frac{7}{8}, \text{ Ans.}$$

$$(3.) \quad 3\frac{1}{2} = \frac{7}{2} : 4\frac{3}{4} = \frac{19}{4} : \frac{7}{2} \times \frac{19}{4} = \frac{133}{8} = 16\frac{5}{8} \text{ ct., Ans.}$$

$$(4.) \quad \frac{11}{2} \times \frac{31}{4} = \frac{341}{8} = 42\frac{5}{8} \text{ mi., Ans.}$$

$$(5.) \quad \frac{8}{5} \text{ of } \frac{2}{3} = \frac{16}{15}, \text{ Ans.}$$

$$(6.) \quad \begin{array}{c} 9 \\ 6\frac{3}{4} = \frac{27}{4} : 5\frac{1}{4} = \frac{21}{4} : \frac{27}{4} \times \frac{1}{3} \times \frac{21}{4} = \frac{189}{16} = \$11\frac{13}{16}, \text{ Ans.} \end{array}$$

$$(7.) \quad \begin{array}{c} 11 \qquad 5 \\ \frac{8}{7} \times \frac{5}{9} \times \frac{88}{2} \times \frac{2}{8} \times \frac{7}{8} \times \frac{15}{1} = \frac{275}{2} = 34\frac{3}{8}, \text{ Ans.} \end{array}$$

$$(8.) \quad \frac{3}{8} = \frac{8}{12}, \frac{3}{4} = \frac{9}{12} : \frac{8}{12} + \frac{9}{12} = \frac{17}{12} : \frac{2}{3} \times \frac{3}{4} = \frac{1}{2} : \frac{1}{2} = \frac{6}{12} : \frac{17}{12} + \frac{6}{12} = \frac{23}{12} = 1\frac{11}{12}, \text{ Ans.}$$

Art. 119.

REMARK. — Pupils are often at a loss to understand why it is that the quotient of one proper fraction, divided by another, is sometimes a whole number, or greater than unity. The teacher should be careful to explain the subject, by means of familiar examples, such as may be found in "Ray's Modern Intellectual Arithmetic."

It should also be shown, that if we take any dividend, and divide it by different numbers, that as the divisor becomes less, the quotient becomes greater; so that, by making the divisor sufficiently small, the quotient may be made as large as we please. Thus, the quotient of $\frac{1}{2}$ divided by $\frac{1}{2}$ is 2; by $\frac{1}{3}$, is 4; by $\frac{1}{4}$, is 8; by $\frac{1}{200000}$, is 200000, etc. It is on this principle that mathematicians say, that the quotient of any number divided by 0 is infinitely large.

(6.) 1 yd. will cost $\frac{1}{4}$ of $\$4 = \1 , *Ans.*

(7.) $3 + \frac{1}{2} = 3 \times \frac{2}{2} = 6$, *Ans.*

(8.) $\frac{9}{10} + \frac{1}{5} = \frac{9}{10} \times \frac{2}{2} = \frac{18}{10} = \frac{9}{5} = 4\frac{1}{5}$ yd., *Ans.*

(9.) For \$1 you can ride $\frac{1}{2}$ of the distance: for $\$2$ you can ride $\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{4}$ the distance, *Ans.*

(10.) $6 + \frac{2}{3} = 6 \times \frac{3}{3} = 2\frac{2}{3} = 8$ yd., *Ans.*

(11.) $\frac{3}{4} + \frac{1}{8} = \frac{3}{4} \times \frac{2}{2} = 1\frac{3}{8} = 3\frac{3}{8}$ yd., *Ans.*

(12.) 1 lb. will cost $\frac{1}{7}$ of $\$1\frac{4}{5} = \$2\frac{2}{5}$, *Ans.*

(13.) $3\frac{1}{4} + \frac{1}{2} = 1\frac{3}{4} \times \frac{2}{2} = 1\frac{3}{2} = 6\frac{1}{2}$ yd., *Ans.*

(14.) $2\frac{2}{10} + \frac{3}{5} = \frac{22}{10} \times \frac{2}{2} = 2\frac{2}{5} = 3\frac{2}{5}$ lb., *Ans.*

(15.) $42\frac{1}{2} + 3\frac{3}{4} = \frac{85}{2} + \frac{15}{4} = \frac{85}{2} \times \frac{2}{2} = \frac{170}{2} + \frac{15}{2} = \frac{185}{2} = 92\frac{1}{2}$ yd., *Ans.*

(16.) $10 + \frac{3}{8} = 10 \times \frac{8}{8} = 26\frac{3}{8}$, *Ans.*

(17.) $\frac{3}{7}$ of $1\frac{1}{2} = \frac{3}{7}$ of $\frac{3}{2} = \frac{9}{14}$: $3\frac{3}{7} = \frac{24}{7}$: $\frac{24}{7} + \frac{9}{14} = \frac{24}{7} \times \frac{2}{2} = \frac{48}{7} + \frac{9}{14} = \frac{96}{14} + \frac{9}{14} = \frac{105}{14} = 7\frac{7}{14} = 7\frac{1}{2}$, *Ans.*

(18.) $\frac{4}{11}$ of $27\frac{1}{2} = \frac{4}{11}$ of $\frac{55}{2} = 10$: $\frac{3}{10}$ of $21\frac{1}{4} = \frac{3}{10}$ of $\frac{85}{4} = \frac{255}{40}$: $10 + \frac{255}{40} = 10 \times \frac{8}{8} = \frac{80}{8} + \frac{255}{40} = \frac{160}{40} + \frac{255}{40} = \frac{415}{40} = 10\frac{31}{8}$, *Ans.*

(20.) $2\frac{2}{3} = 1\frac{2}{3}$: $\frac{1}{6}$ of $\frac{12}{5} = \frac{2}{5}$, *Ans.*

(21.) $5\frac{1}{2} = 1\frac{1}{2}$: $\frac{2}{1} \times \frac{2}{11} = 4$, *Ans.*

- (22.) $\frac{5}{2} \times \frac{16}{1} = 40, \text{ Ans.}$
- (23.) $\frac{24}{5} \times \frac{1}{8} = \frac{3}{5}, \text{ Ans.}$
- (24.) $\frac{6}{1} \times \frac{5}{12} = \frac{5}{2} = 2\frac{1}{2}, \text{ Ans.}$
- (25.) $\frac{19}{4} \times \frac{8}{41} = \frac{19}{20.5}, \text{ Ans.}$
- (26.) $\frac{88}{7} \times \frac{1}{11} = \frac{8}{7} = 1\frac{1}{7}, \text{ Ans.}$
- (27.) $\frac{30}{1} \times \frac{4}{15} = 8, \text{ Ans.}$
- (28.) $\frac{9}{4} \times \frac{2}{15} = \frac{3}{10}, \text{ Ans.}$
- (29.) $1\frac{1}{8} \times \frac{1}{7} = \frac{11}{56}, \text{ Ans.}$
- (30.) $\frac{40}{1} \times \frac{7}{31} = \frac{280}{31} = 11\frac{9}{31}, \text{ Ans.}$
- (31.) $\frac{1}{2} \times \frac{50}{1} = 25, \text{ Ans.}$
- (32.) $\frac{237}{8} \times \frac{1}{15} = \frac{237}{120} = 3\frac{1}{4} = 3\frac{1}{4}, \text{ Ans.}$
- (33.) $\frac{56}{1} \times \frac{9}{49} = \frac{504}{49} = 10\frac{2}{7}, \text{ Ans.}$
- (34.) $\frac{14}{15} \times \frac{1}{21} = \frac{2}{45}, \text{ Ans.}$

$$(35.) \frac{322}{8} \times \frac{1}{18} = \frac{322}{144} = \frac{151}{72} = 7\frac{7}{72}, \text{ Ans.}$$

$$(37.) \frac{2}{5} \times \frac{2}{9} \times \frac{7}{6} \times \frac{4}{3} = 1\frac{11}{15}, \text{ Ans.}$$

$$(38.) \frac{1}{3} \times \frac{41}{8} \times \frac{4}{3} \times \frac{2}{35} = \frac{41}{315}, \text{ Ans.}$$

$$(39.) \frac{5}{18} \times \frac{2}{5} \times \frac{123}{10} \times \frac{5}{1} \times \frac{5}{41} = \frac{5}{6}, \text{ Ans.}$$

$$(40.) \frac{2}{7} \times \frac{7}{8} \times \frac{4}{3} \times \frac{3}{1} \times \frac{1}{5} = \frac{1}{5}, \text{ Ans.}$$

$$(41.) \frac{5}{18} \times \frac{2}{5} \times \frac{123}{10} \times \frac{5}{1} \times \frac{10}{41} \times \frac{1}{20} = 1\frac{1}{2}, \text{ Ans.}$$

Art. 120.

$$(6.) \frac{3}{4} \times \frac{1}{8} = \frac{3}{32}, \text{ Ans.}$$

$$(7.) \frac{1}{4} \times \frac{2}{1} = \frac{1}{2}, \text{ Ans.}$$

$$(9.) \frac{15}{4} \times \frac{1}{5} = \frac{3}{4}, \text{ Ans.}$$

$$(8.) \frac{2}{3} \times \frac{5}{5} = \frac{2}{3}, \text{ Ans.}$$

$$(10.) \frac{5}{6} \times \frac{9}{8} = 1\frac{5}{8}, \text{ Ans.}$$

(11.) $7 \frac{77}{9} \times \frac{1}{11} = \frac{7}{9}, \text{ Ans.}$

(12.) $3 \frac{21}{32} \times \frac{3}{5} = \frac{3}{16}, \text{ Ans.}$

(14.) $\frac{3}{7} \times \frac{5}{11} = \frac{15}{77}, \text{ Ans.}$

(15.) $\frac{2}{3} \times \frac{1}{5} = \frac{2}{15}, \text{ Ans.}$

(16.) $\frac{2}{1} \times \frac{3}{11} = \frac{6}{11}, \text{ Ans.}$

(17.) $\frac{25}{8} \times \frac{7}{8} = \frac{175}{64}, \text{ Ans.}$

(18.) $\frac{7}{8} \times \frac{2}{3} = \frac{14}{24}, \text{ Ans.}$

(19.) $\frac{15}{4} \times \frac{8}{45} = \frac{2}{3}, \text{ Ans.}$

Art. 121.

(2.) $120 \div \frac{4}{5} = 120 \times \frac{5}{4} = 150.$

(5.) $418 \div \frac{11}{12} = 418 \times \frac{12}{11} = 456.$

(3.) $180 \div \frac{3}{4} = 180 \times \frac{4}{3} = 240.$

(6.) $625 \div \frac{5}{8} = 625 \times \frac{8}{5} = 800.$

(4.) $392 \div \frac{4}{5} = 392 \times \frac{5}{4} = 882.$

(7.) $136 \div \frac{8}{13} = 136 \times \frac{13}{8} = 221.$

Art. 122.

(3.) $18\frac{3}{8} \text{ ct.} = \$\frac{3}{16}; 20 \times \$\frac{3}{16} = \$\frac{60}{16} = \$3.75, \text{ Ans.}$

(6.) $8000 \times 100 \times \frac{7}{8} = 700000, \text{ Ans.}$

(7.) $600 \times 100 \times \frac{5}{6} = 300000, \text{ Ans.}$

(8.) $2158 \times 100 \times \frac{2}{3} = 431600, \text{ Ans.}$

Art. 113.

(2.) $\frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$, *Ans.*

(7.) $4\frac{1}{4} - 2\frac{3}{4}$. $\frac{3}{4}$ can not be taken from $\frac{1}{4}$; so borrow 1 from 4. $1 = \frac{4}{4}$; $\frac{4}{4} + \frac{1}{4} = \frac{5}{4}$; $\frac{3}{4}$ from $\frac{5}{4} = \frac{2}{4}$ or $\frac{1}{2}$. Since we took 1 from 4, only 3 remain, and $3 - 2 = 1$. *Ans.* $1\frac{1}{2}$.

$$\begin{array}{r} 8\frac{1}{8} \\ 3\frac{3}{8} \\ \hline 4\frac{2}{8}, \text{ Ans.} \end{array} \quad \begin{array}{l} (8) \\ \frac{1}{8} + \frac{3}{8} = \frac{4}{8} \\ \frac{4}{8} - \frac{2}{8} = \frac{2}{8} \end{array}$$

$$\begin{array}{r} 23\frac{7}{10} \\ 17\frac{1}{10} \\ \hline 5\frac{6}{10}, \text{ Ans.} \end{array} \quad \begin{array}{l} (9) \\ \frac{7}{10} + \frac{20}{10} = \frac{27}{10} \\ \frac{27}{10} - \frac{10}{10} = \frac{17}{10} = \frac{1}{10} \end{array}$$

Art. 114.

(9.) L. C. D. = 30; $\frac{4}{15} = \frac{8}{30}$, $\frac{1}{10} = \frac{3}{30}$: $\frac{8}{30} - \frac{3}{30} = \frac{5}{30} = \frac{1}{6}$, *Ans.*

(10.) L. C. D. = 42; $\frac{1}{21} = \frac{2}{42}$, $\frac{5}{14} = \frac{15}{42}$: $\frac{2}{42} - \frac{15}{42} = \frac{17}{42}$, *Ans.*

(12.) $5 = \frac{15}{3}$: $\frac{15}{3} - \frac{2}{3} = \frac{13}{3} = 4\frac{1}{3}$, *Ans.*

(13.) $5\frac{3}{8} = \frac{17}{8} = \frac{84}{36}$, $4\frac{1}{2} = \frac{9}{2} = \frac{27}{6}$: $\frac{84}{36} - \frac{27}{6} = \frac{7}{6} = 1\frac{1}{6}$, *Ans.*

(14.) $7\frac{3}{8} = \frac{28}{8} = \frac{92}{12}$, $4\frac{3}{4} = \frac{12}{4} = \frac{57}{12}$: $\frac{92}{12} - \frac{57}{12} = \frac{35}{12} = 2\frac{11}{12}$, *Ans.*

(15.) $14\frac{1}{4} = \frac{57}{4} = \frac{171}{12}$, $12\frac{2}{3} = \frac{38}{3} = \frac{152}{12}$: $\frac{171}{12} - \frac{152}{12} = \frac{19}{12} = 1\frac{7}{12}$, *Ans.*

(16.) $5\frac{3}{14} = \frac{73}{14} = \frac{219}{42}$, $2\frac{1}{21} = \frac{52}{21} = \frac{104}{42}$: $\frac{219}{42} - \frac{104}{42} = \frac{115}{42} = 2\frac{31}{42}$, *Ans.*

(17.) $4\frac{1}{24} = \frac{97}{24} = \frac{194}{48}$, $3\frac{1}{16} = \frac{49}{16} = \frac{147}{48}$: $\frac{194}{48} - \frac{147}{48} = \frac{47}{48}$, *Ans.*

(18.) $56\frac{1}{8} = \frac{169}{8} = \frac{676}{12}$, $42\frac{1}{4} = \frac{169}{4} = \frac{507}{12}$: $\frac{676}{12} - \frac{507}{12} = \frac{169}{12} = 14\frac{1}{12}$, *Ans.*

(19.) $60\frac{4}{5} = \frac{304}{5} = \frac{608}{10}$, $41\frac{3}{10} = \frac{413}{10}$: $\frac{608}{10} - \frac{413}{10} = \frac{195}{10} = 19\frac{1}{2}$, *Ans.*

(20.) $97\frac{1}{2} = \frac{195}{2} = \frac{585}{6}$, $48\frac{5}{6} = \frac{293}{6}$: $\frac{585}{6} - \frac{293}{6} = \frac{292}{6} = 48\frac{2}{3}$, *Ans.*

Art. 115.

(5.) $\frac{3}{4} \times 3 = \frac{9}{4} = 2\frac{1}{4}$, Ans.

(6.) $8 \times \frac{3}{8} = \frac{1^8}{8} = 5\frac{1}{8}$, Ans.

(7.) $\frac{3}{4} \times \frac{5}{7} = \frac{15}{28}$, Ans.

(8.) $\frac{3}{8} \times 4 = \frac{12}{8} = 2\frac{3}{8}$, Ans.

(9.) $5 \times \frac{3}{4} = \frac{15}{4} = 3\frac{3}{4}$, Ans.

(11.) $\frac{2}{3} \times 6 = \frac{12}{3} = 4$, Ans.

(12.) $20 \times \frac{3}{4} = \frac{60}{4} = 15$, Ans.

(13.) $\frac{8}{13} \times \frac{11}{16} = \frac{11}{26}$, Ans.

(14.) $\frac{3}{5} \times 10 = \frac{30}{5} = 6$, Ans.

(15.) $12 \times \frac{2}{3} = \frac{24}{3} = 8$, Ans.

(16.) $\frac{9}{13} \times \frac{3}{7} : \frac{9}{13} \times \frac{3}{7} = \frac{27}{91}$, Ans.

(17.) $\frac{3}{7} \times 6 = \frac{18}{7} = 2\frac{4}{7}$, Ans.

(18.) $7 \times \frac{3}{8} = \frac{21}{8} = 4\frac{3}{8}$, Ans.

(21.) $8 \text{ times } 3 = 24 : 8 \text{ times } \frac{3}{8} = \frac{1^8}{8} = 5\frac{1}{8} : 24 + 5\frac{1}{8} = 29\frac{1}{8}$, Ans.

(22.) $2\frac{1}{2} = \frac{5}{2} : \frac{5}{2} \times \frac{5}{2} = \frac{25}{4} = 6\frac{1}{4}$, Ans.

(23.) $10 \times 7 = 70 : \frac{7}{9} \times 7 = \frac{49}{9} = 5\frac{4}{9} : 70 + 5\frac{4}{9} = 75\frac{4}{9}$, Ans.

(24.) $25 \times 8 = 200 : 25 \times \frac{3}{8} = \frac{75}{8} = 15 : 200 + 15 = 215$, Ans.

(25.) $17\frac{3}{11} = \frac{190}{11} : \frac{9}{10} \times \frac{190}{11} = \frac{171}{11} = 15\frac{6}{11}$, Ans.

(26.) $10 \times 9 = 90 : \frac{5}{6} \times 9 = \frac{45}{6} = 7\frac{3}{2} = 7\frac{1}{2} : 90 + 7\frac{1}{2} = 97\frac{1}{2}$, Ans.

- (17.) $31\frac{1}{8} = \frac{497}{16}$; $\frac{497}{16} + 7 = \frac{71}{8} = 4\frac{7}{8}$ in., *Ans.*
- (18.) $5 \text{ mi.} \times 320 = 1600 \text{ rd.}$; $1600 \text{ rd.} \times 16\frac{1}{2} = 26400 \text{ ft.}$;
 $26400 \text{ ft.} \times 12 = 316800 \text{ in.}$, *Ans.*
- (19.) $2 \text{ mi.} \times 320 + 2 \text{ rd.} = 642 \text{ rd.}$; $642 \text{ rd.} \times 16\frac{1}{2} + 2 \text{ ft.}$
 $= 10595 \text{ ft.}$, *Ans.*
- (21.) $15875 \text{ ft.} \div 16\frac{1}{2} = 962 \text{ rd.}$ 2 ft.; $962 \text{ rd.} + 320 = 3 \text{ mi.}$
 2 rd. *Ans.* 3 mi. 2 rd. 2 ft.
- (22.) $142634 \text{ in.} + 12 = 11886 \text{ ft.}$ 2 in.; $11886 \text{ ft.} + 3$
 $= 3962 \text{ yd.}$; $3962 \text{ yd.} + 5\frac{1}{2} = 720 \text{ rd.}$ 2 yd.; $720 \text{ rd.} + 320$
 $= 2 \text{ mi.}$ 80 rd. *Ans.* 2 mi. 80 rd. 2 yd. 2 in.
- (23.) $2 \text{ mi.} = 126720 \text{ in.}$; 2 ft. 8 in. = 32 in.; 126720 in.
 $+ 32 \text{ in.} = 3960$, *Ans.*
- (24.) $65 \text{ mi.} = 4118400 \text{ in.}$; 9 ft. 2 in. = 110 in.; 4118400 in.
 $+ 110 \text{ in.} = 37440$, *Ans.*
- (25.) $1 \text{ A.} \times 160 + 136 \text{ sq. rd.} = 296 \text{ sq. rd.}$; 296 sq. rd.
 $\times 30\frac{1}{4} + 25 \text{ sq. yd.} = 8979 \text{ sq. yd.}$, *Ans.*
- (26.) $7506 \text{ sq. yd.} + 30\frac{1}{4} = 248 \text{ sq. rd.}$ 4 sq. yd.; 248 sq. rd.
 $+ 160 = 1 \text{ A.}$ 88 sq. rd. *Ans.* 1 A. 88 sq. rd. 4 sq. yd.
- (27.) 5 ch. 15 l. = 515 l.; $7\frac{22}{100} \text{ in.} = \frac{722}{100} \text{ in.}$; $\frac{722}{100} \text{ in.} \times 515$
 $= \frac{407880}{100} = 4078\frac{8}{10} \text{ in.}$, *Ans.*
- (28.) $40\frac{1}{2} = \frac{81}{2}$; $\frac{81}{2} \times \frac{82}{1} = 81 \times 16 = 1296 \text{ sq. rd.}$; 1296 sq. rd.
 $+ 160 = 8 \text{ A.}$ 16 sq. rd., *Ans.*
- (29.) $365\frac{1}{4} \text{ da.} \times 4 = 1461 \text{ da.}$; $1461 \text{ da.} \times 24 = 35064 \text{ hr.}$,
Ans.
- (30.) $914092 \text{ hr.} \div 24 = 38087 \text{ da.}$ 4 hr.; $38087 \text{ da.} + 365\frac{1}{4}$
 $= 104 \text{ yr.}$ 101 da.; $104 \text{ yr.} + 100 = 1 \text{ cen.}$ 4 yr. *Ans.* 1 cen.
 4 yr. 101 da. 4 hr.
- (31.) $238545 \div 31 = 7695 \text{ da.}$; $7695 + 365\frac{1}{4} = 21 \text{ yr.}$, and
 99 quarter days remaining, which, reduced to days, by divid-
 ing by 4, makes $24\frac{3}{4}$ days. *Ans.* 21 yr. $24\frac{3}{4}$ da.

Art. 124.

(3.) $\frac{1}{28}$ lb. $\times 16 = \frac{16}{28} = \frac{4}{7}$ oz., *Ans.*

(4.) $\frac{1}{20}$ rd. $\times 5\frac{1}{2} = \frac{11}{40}$ yd. $\times 3 = \frac{33}{40}$ ft., *Ans.*

(5.) $\frac{1}{1584}$ da. $\times 24 = \frac{1}{66}$ hr. : $\frac{1}{66}$ hr. $\times 60 = \frac{60}{66} = \frac{10}{11}$ min.,
Ans.

Art. 125.

(2.) $\frac{4}{5}$ mi. $\times 320 = \frac{1280}{5}$ rd. = 256 rd., *Ans.*

(3.) $\$ \frac{2}{3} \times 100 = \frac{200}{3}$ ct. = 60 ct., *Ans.*

(4.) $\frac{4}{5}$ lb. $\times 12 = \frac{48}{5}$ oz. = $9\frac{3}{5}$ oz. : $\frac{3}{5}$ oz. $\times 20 = \frac{60}{5}$ pwt.
= 12 pwt. *Ans.* 9 oz. 12 pwt.

Art. 126.

(2.) $\frac{4}{5} \times \frac{2}{3} = \frac{8}{15}$ rd., *Ans.* ($16\frac{1}{2}$ ft. in a rd. = $\frac{33}{2}$ ft.)

(3.) $\frac{2}{80} \times \frac{1}{16} = \frac{2}{1280}$ lb., *Ans.*

(4.) $\frac{8}{4} \times \frac{1}{12} \times \frac{2}{33} = \frac{2}{264}$ rd., *Ans.*
2 11

(5.) $\frac{8}{9} \times \frac{1}{60} \times \frac{1}{24} = \frac{1}{1620}$ da., *Ans.*
3

Art. 127.

(2.) 2 ft. 6 in. = 30 in. : 6 ft. 8 in. = 80 in. : $\frac{80}{30} = \frac{8}{3}$, *Ans.*

(3.) 2 pk. 4 qt. = 20 qt. : 1 bu. = 32 qt. : $\frac{20}{32} = \frac{5}{8}$, *Ans.*

(4.) 2 yd. 9 in. = 81 in. : 8 yd. 2 ft. 3 in. = 315 in. :
 $\frac{81}{315} = \frac{9}{35}$, *Ans.*

(5.) 13 hr. 30 min. = 810 min. : 1 da. $\times 24 \times 60 = 1440$
min. : $\frac{810}{1440} = \frac{9}{16}$, *Ans.*

(6.) 15 mi. 123 rd. = 4923 rd. : 35 mi. 287 rd. = 11487 rd. :
 $\frac{4923}{11487} = \frac{3}{7}$, *Ans.*

Art. 128.

$$\begin{array}{r}
 (3) \\
 \text{hr. min.} \\
 \frac{2}{3} \text{ da.} = 16 \quad 0 \\
 \frac{2}{4} \text{ hr.} = \quad \quad 45 \\
 \text{Ans. } 16 \quad 45
 \end{array}$$

$$\begin{array}{r}
 (4) \\
 \text{da. hr. min. sec.} \\
 \frac{2}{3} \text{ wk.} = 4 \quad 16 \quad 0 \quad 0 \\
 \frac{5}{8} \text{ da.} = \quad 13 \quad 20 \quad 0 \\
 \frac{2}{3} \text{ hr.} = \quad \quad 40 \quad 0 \\
 \frac{2}{3} \text{ min.} = \quad \quad \quad \quad 40 \\
 \text{Ans. } 5 \quad 6 \quad 0 \quad 40
 \end{array}$$

$$\begin{array}{r}
 (5) \\
 \text{qt. pt. gi.} \\
 \frac{1}{2} \text{ gal.} = 3 \quad 1 \quad 1\frac{1}{2} \\
 \frac{1}{2} \text{ qt.} = \quad \quad 0 \quad \frac{2}{3} \\
 \text{Ans. } 3 \quad 1 \quad 2
 \end{array}$$

$$\begin{array}{r}
 (6) \\
 \text{hr. min. sec.} \\
 \frac{7}{8} \text{ da.} = 18 \quad 40 \quad 0 \\
 \frac{1}{8} \text{ hr.} = \quad \quad 3 \quad 20 \\
 \text{Ans. } 18 \quad 36 \quad 40
 \end{array}$$

$$(7.) \frac{3}{8} \text{ lb.} = 6 \text{ oz.} : 6 \text{ oz.} - \frac{7}{8} \text{ oz.} = 5\frac{1}{8} \text{ oz., Ans.}$$

$$(8.) \frac{1}{4} \text{ da.} = 24 \text{ hr.} : 24 - \frac{3}{4} = 17\frac{3}{4} = 24 \text{ hr.} : \frac{3}{4} \text{ hr.} \times 60 = 240 \text{ or } 34\frac{1}{2} \text{ min.} : \frac{3}{4} \text{ min.} \times 60 = 120 \text{ or } 17\frac{1}{2} \text{ sec.} \text{ Ans. } 2 \text{ hr. } 34 \text{ min. } 17\frac{1}{2} \text{ sec.}$$

MISCELLANEOUS EXAMPLES.

Art. 129.

$$(1.) \frac{2999}{2999} = \frac{2999 \times 11}{2999 \times 19} = \frac{11}{19}, \text{ Ans.}$$

$$(2.) 2 + 3 = 5 : \frac{1}{2} + \frac{2}{3} + \frac{5}{14} + \frac{8}{21} = \frac{21}{42} + \frac{28}{42} + \frac{15}{14} + \frac{16}{21} = \frac{40}{42} = \frac{20}{21} = 1\frac{1}{21} : 5 + 1\frac{1}{21} = 6\frac{1}{21}, \text{ Ans.}$$

$$(3.) 2\frac{5}{7} = 1\frac{25}{5} : \frac{8}{5} = \frac{68}{5} : \frac{125-68}{5} = \frac{57}{5} = 1\frac{27}{5}, \text{ Ans.}$$

$$(4.) 3\frac{5}{8} = 2\frac{2}{8} : \frac{1}{3} \text{ of } 3\frac{1}{2} = \frac{1}{3} \text{ of } \frac{7}{2} = \frac{7}{6} : 2\frac{2}{8} - \frac{7}{6} = \frac{27}{24} - \frac{28}{24} = \frac{59}{24} = 2\frac{11}{24}, \text{ Ans.}$$

$$(5.) \frac{5}{9} \text{ of } \frac{7}{10} = \frac{7}{18} : \frac{2}{5} \text{ of } \frac{7}{12} = \frac{7}{30} : \frac{7}{18} + \frac{7}{30} = \frac{35}{90} + \frac{21}{90} = \frac{56}{90} = \frac{28}{45}, \text{ Ans.}$$

(6.)

$$1\frac{3}{4} + 2\frac{1}{2} = \frac{7}{4} \times \frac{2}{5} = \frac{7}{10}; \quad 5\frac{1}{2} + 3\frac{1}{8} = \frac{11}{2} \times \frac{8}{25} = \frac{44}{5};$$

$$\frac{7}{10} + \frac{44}{5} = \frac{35}{50} + \frac{352}{50} = \frac{387}{50} = 2\frac{23}{50}, \text{ Ans.}$$

$$(7.) 10 \times \frac{3}{5} = \frac{30}{5} = 6, \text{ Ans.}$$

$$(8.) 10 \div \frac{3}{8} = 10 \times \frac{8}{3} = \frac{80}{3} = 16\frac{2}{3}, \text{ Ans.}$$

(9.) Any number less $\frac{3}{7} = \frac{4}{7}$: then 16 is $\frac{4}{7}$ of the number: 4 is $\frac{1}{7}$, and 28 is $\frac{7}{7}$, the number.

(10.) Any number plus $\frac{3}{7} = \frac{1}{7}$: then $20 = \frac{1}{7}$: $\frac{1}{7} = \frac{1}{10}$ of $20 = 2$: $\frac{1}{7} = 14$, the number.

(11.) $\frac{1}{8}$ of $\frac{5}{8} = \frac{5}{64}$, and $\frac{5}{8} - \frac{5}{64} = \frac{35}{64} = \frac{15}{24} - \frac{5}{24} = \frac{10}{24} = \frac{5}{12}$, part left.

Or, the part left may be found thus: If he sell $\frac{1}{8}$ of his share, he has $\frac{7}{8}$ of it left, and $\frac{2}{3}$ of $\frac{7}{8} = \frac{7}{12} = \frac{5}{12}$. $\frac{5}{12}$ of \$900 = $\frac{4500}{12} = \$375$, Ans.

(12.) I sell $\frac{1}{8}$ of $\frac{7}{12}$ of the ship = $\frac{7}{96}$ of the ship for \$1944 $\frac{1}{3}$; at that rate, $\frac{1}{36}$ of the ship is worth $\frac{1}{3}$ of \$1944 $\frac{1}{3}$ = \$277 $\frac{1}{3}$, and $\frac{36}{36}$ is worth 36 times \$277 $\frac{1}{3}$ = \$10000.

$$(13.) \frac{2}{3} \text{ of } 2 = \frac{4}{3} = 1\frac{1}{3}; \quad \frac{1\frac{1}{3}}{3} = \frac{4}{3} \times \frac{1}{3} = \frac{4}{9}, \text{ Ans.}$$

$$(14.) \frac{17\frac{6}{8}}{8\frac{6}{8}} = \frac{16 \times 11}{16 \times 23} = \frac{11}{23}, \text{ Ans.}$$

$$(15.) \frac{1}{8} + \frac{1}{18} + \frac{1}{11} = \frac{333}{2884} + \frac{148}{2884} + \frac{312}{2884} = \frac{793}{2884}; \quad \frac{25}{87} - \frac{793}{2884} = \frac{1800}{2884} - \frac{793}{2884} = \frac{1007}{2884}, \text{ Ans.}$$

(16.)

$$4\frac{9}{14} = \frac{65}{14}; \quad \frac{8}{10} \text{ of } \frac{7}{12} \text{ of } \frac{65}{14} = \frac{13}{2}; \quad 1 - \frac{13}{2} = \frac{1}{2}, \text{ Ans.}$$

$$(17.) \frac{2}{3} \div \frac{5}{7} = \frac{2}{3} \times \frac{7}{5} = \frac{14}{15}; \frac{5}{8} \div \frac{11}{10} = \frac{5}{8} \times \frac{10}{11} = \frac{55}{88}; \frac{14}{15} - \frac{55}{88} = \frac{224}{1320} - \frac{825}{1320} = \frac{59}{440}, \text{ Ans.}$$

(18.) In $\frac{1}{5}$ of an hour he walks $\frac{1}{4}$ of 2044 rd., which is 292 rd.: $1\frac{1}{4} = \frac{5}{4}$; in $\frac{5}{4}$ hr. he will walk 29 times 292 rd. = 8468 rd., *Ans.*

$$(19.) 1\frac{1}{4} \text{ ft.} = 15 \text{ in.} = \frac{3}{8}; 3\frac{1}{8} = \frac{25}{8}; \frac{3}{8} = \frac{3}{8}, \text{ Ans.}$$

$$(20.) 3\frac{1}{5} + 3\frac{2}{8} = \frac{16}{5} + \frac{13}{8} = \frac{48}{8} + \frac{55}{8} = \frac{103}{8}. \text{ Ans. } \frac{48}{8} \text{ and } \frac{55}{8}.$$

(21.) $\frac{5}{8}$ of \$2400 = \$1500; \$1500 + \$500 = \$2000. If $\frac{5}{8}$ of B's money = \$2000, $\frac{1}{8}$ is $\frac{1}{5}$ of \$2000, which is \$400, and the whole will be 4 times \$400, which are \$1600, *Ans.*

(22.) If \$2200 are $\frac{5}{12}$ of the elder one's share, $\frac{1}{12}$ is \$440, and $\frac{1}{2}$, the elder one's share = \$5280; if \$5280 are $\frac{1}{3}$ of the whole estate, $\frac{1}{3}$ is \$330, and $\frac{2}{3}$ = \$11550; \$2200 + \$5280 = \$7480; \$11550 - \$7480 = \$4070; each daughter had $\frac{1}{2}$ of \$4070 = \$1356 $\frac{1}{2}$, *Ans.*

DECIMAL FRACTIONS.

Art. 135.

REMARKS.—Pupils must have a thorough knowledge of common fractions, before they can understand fully the reason of the rules in decimals.

When a pupil is in doubt with regard to the accuracy of the result in any operation involving decimals, let him convert the decimals into common fractions, and then perform the work; the results in both cases ought to be the same.

It is a useful exercise to perform the same operations in equivalent common and decimal fractions. Thus, they may be required to perform the operations indicated in the following examples, by the rules for common fractions; then to convert the common fractions into decimals, and work by the rules for decimals.

(5.) .26	(26.) .00000002
(6.) .35	(27.) .00000907
(7.) .87	(28.) .20020003
(8.) 4.19	(29.) 1.010100
(9.) .005	(30.) .01010001
(10.) .054	(31.) 106.037
(11.) .304	(32.) 1000.001
(12.) 7.293	(33.) .225
(13.) 25.047	(34.) 200.025
(14.) .0205	(35.) .002929
(15.) .4125	(36.) 2900.000029
(16.) .00009	(37.) .001000005
(17.) .900	(38.) .0000000202
(18.) .00605	(39.) 200.0000000002
(19.) .20304	(40.) 65.006005
(20.) .000007	(41.) .3 .7 .09 .17 .23
(21.) .000203	.41 .53
(22.) .300004	(42.) .87 .97 .123 .289
(23.) .0000024	.487 .733
(24.) .0080006	(43.) .003 .0101 .00053
(25.) .000200	.000503

Art. 136.

(4.) Twenty-eight *thousandths*; three hundred forty-one *thousandths*; two and three hundred twenty-seven *thousandths*; fifty and five *thousandths*; one hundred eighty-four and one hundred seventy-three *thousandths*.

(5.) Three *ten-thousandths*; six hundred twenty-five *ten-thousandths*; two thousand three hundred seventy-four *ten-thousandths*; two thousand six *ten-thousandths*; one hundred four *ten-thousandths*.

(6.) Three and two hundred five *ten-thousandths*; eight hundred ten and two thousand four hundred six *ten-thou-*

sandths; ten thousand seven hundred twenty and nine hundred five *ten-thousandths*.

(7.) Four *hundred-thousandths*; one hundred thirty-seven *hundred-thousandths*; two thousand three hundred seventy-six *hundred-thousandths*; one thousand seven *hundred-thousandths*.

(8.) One thousand seven hundred sixty-eight *millionths*; forty thousand thirty-five *millionths*; seventy and three hundred sixty thousand four *millionths*.

(9.) One million ten thousand one hundred one *ten-millionths*; forty thousand five *hundred-millionths*; one hundred thousand three hundred four *hundred-millionths*.

(10.) Thirty-one thousand four hundred fifty-six *hundred-thousandths*; one hundred thirty-three *millionths*; sixty and four *hundredths*; forty-five and one thousand three *ten-thousandths*.

(11.) Three hundred fifty-seven and seventy-five *hundredths*; four thousand nine hundred twenty-eight *ten-thousandths*; five and nine hundred forty-five *thousandths*; six hundred eighty-one and two *ten-thousandths*.

(12.) Seventy and one million two hundred thousand seven hundred sixty-four *ten-millionths*; nine hundred fifty-four and two hundred three *thousandths*; thirty-eight and twenty-seven *thousandths*.

(13.) One thousand seven and three thousand one hundred fifty-four *ten-thousandths*; seven thousand four hundred ninety-six and thirty-five million four hundred ninety-one thousand seven hundred sixty-eight *hundred-millionths*.

(14.) Seven hundred fifteen *hundred-thousandths*; three and five *hundred-thousandths*; twenty-eight and ten million sixty-five thousand seven hundred one *hundred-millionths*.

(15.) Thirteen and eight thousand two hundred forty-one *millionths*.

(16.) $\frac{9}{10}; \frac{18}{100}; \frac{19}{100}; \frac{29}{100}; \frac{37}{100}; \frac{78}{100}$.

(17.) $\frac{91}{100}; \frac{847}{1000}; \frac{518}{1000}; \frac{691}{1000}; \frac{851}{1000}; \frac{917}{1000}$.

(18.) $\frac{7}{1000}; \frac{207}{10000}; \frac{78}{100000}; \frac{1007}{1000000}$.

(19.) $1\frac{88}{100}; \frac{8421}{10000}; \frac{8401}{100000}; \frac{800}{10000}$.

(20.) $\frac{1}{1000}; \frac{5802}{100000}; 8\frac{1}{100}; \frac{53}{1000000}$.

Art. 141.

(2.) $.6 = \frac{6}{10} = \frac{3}{5}$, *Ans.*

(3.) $.25 = \frac{25}{100} = \frac{1}{4}$, *Ans.*

(4.) $.375 = \frac{375}{1000} = \frac{3}{8}$, *Ans.*

(5.) $.035 = \frac{35}{1000} = \frac{7}{200}$, *Ans.*

(6.) $.5625 = \frac{5625}{10000} = \frac{9}{16}$, *Ans.*

(7.) $.34375 = \frac{34375}{100000} = \frac{11}{32}$, *Ans.*

(8.) $4.02 = 4\frac{2}{100} = 4\frac{1}{50}$, *Ans.*

(9.) $8.415 = 8\frac{415}{1000} = 8\frac{83}{200}$, *Ans.*

Art. 142.

(2.) $\frac{4}{5} = \frac{40}{50} = .8$, *Ans.*

(3.) $\frac{5}{8} = \frac{5000}{8000} = .625$, *Ans.*

(4.) $\frac{7}{25} = \frac{700}{2500} = \frac{140}{500} = .28$, *Ans.*

(5.) $\frac{3}{40} = \frac{3000}{4000} = .075$, *Ans.*

(6.) $\frac{15}{16} = \frac{150000}{160000} = .9375$, *Ans.*

(7.) $\frac{1}{1250} = \frac{10000}{12500000} = .0008$, *Ans.*

(8.) $\frac{9}{400} = \frac{90000}{4000000} = .0225$, *Ans.*

(9.) $\frac{1}{256} = \frac{100000000}{25600000000} = .00390625$, *Ans.*

(10.) $\frac{5}{6} = \frac{50000}{60000} = .8333 +$, *Ans.*

(11.) $\frac{1}{11} = \frac{1000000}{11000000} = .090909 +$, *Ans.*

Art. 143.

(2)	(3)	(4)	(5)
37.1065	3.25	4.0004	21.611
432.07	6.4	28.035	6888.32
4.20733	.35	8.07	3.4167
<u>11.706</u>	<u>10.00</u>	<u>.09404</u>	<u>6913.3477</u>
485.08983		40.19944	

(6)	(7)	(8)	(9)
6.61	4.8	45.019	432.432
636.1	43.31	7.00071	61.0793
6516.14	74.019	93.4327	100.07794
67.1234	11.204	6.0401	6.009
<u>5.1233</u>	<u>133.333</u>	<u>151.49251</u>	<u>1000.1001</u>
7231.0967			1599.69834

(10)	(11)	(12)
16.041	204.0009	.0035
9.000094	103.00000009	.00035
33.27	42.009099	.000035
8.969	430.99	.0000035
<u>32.719906</u>	<u>220.0000009</u>	<u>.0038885</u>
100.000000	999.99999999	

Art. 144.

(2)	(3)	(4)	(5)
97.5168	20.014	5.03	24.0042
38.25942	7.0021	2.115	13.7013
<u>59.25738</u>	<u>13.0119</u>	<u>2.915</u>	<u>10.3029</u>

(6)	(7)	(8)	(9)
170.0035	.0142	.05	13.5
68.00181	.005	.0024	8.037
<u>102.00169</u>	<u>.0092</u>	<u>.0476</u>	<u>5.463</u>

$$\begin{array}{r} (10) \\ 3.00000 \\ .00003 \\ \hline 2.99997 \end{array}$$

$$\begin{array}{r} (11) \\ 29.0029 \\ 19.003 \\ \hline 9.9999 \end{array}$$

$$\begin{array}{r} (12) \\ 5.000 \\ .125 \\ \hline 4.875 \end{array}$$

$$\begin{array}{r} (13) \\ 1000.0000 \\ .0001 \\ \hline 999.9999 \end{array}$$

$$\begin{array}{r} (14) \\ 1.000000 \\ .000001 \\ \hline .999999 \end{array}$$

$$\begin{array}{r} (15) \\ .025 \\ .000025 \\ \hline .024975 \end{array}$$

Art. 147.

$$\begin{array}{r} (4) \\ 33.21 \\ 4.41 \\ \hline 3321 \\ 13284 \\ 13284 \\ \hline 146.4561 \end{array}$$

$$\begin{array}{r} (5) \\ 32.16 \\ 22.5 \\ \hline 16080 \\ 6432 \\ 6432 \\ \hline 723.600 \end{array}$$

$$\begin{array}{r} (6) \\ .125 \\ 9 \\ \hline 1.125 \end{array}$$

$$\begin{array}{r} (7) \\ .35 \\ 7 \\ \hline 2.45 \end{array}$$

(10.) $.15 \times .7 = \frac{15}{100} \times \frac{7}{10} = \frac{105}{1000} = .105, \text{ Ans.}$

(13.) $1.035 \times 17 = 17.595, \text{ Ans.}$

$$\begin{array}{r} (14) \\ 19 \\ .125 \\ \hline 95 \\ 38 \\ 19 \\ \hline 2.375 \end{array}$$

$$\begin{array}{r} (15) \\ 4.5 \\ 4 \\ \hline 18.0 \end{array}$$

$$\begin{array}{r} (16) \\ .625 \\ 64 \\ \hline 2500 \\ 3750 \\ \hline 40.000 \end{array}$$

$$\begin{array}{r} (17) \\ 61.76 \\ .0071 \\ \hline 6176 \\ 43232 \\ \hline .438496 \end{array}$$

(18) 1.325 <u>.0716</u> 7950 1325 <u>9275</u> .0948700	(24) .1 <u>.01</u> .001	(25) 100 <u>.0001</u> 00.0100 = .01, <i>Ans.</i>
(26) .043 <u>.0021</u> 43 86 <u>.0000903</u>	(27) 40000 <u>.000001</u> .040000	(28) .09375 <u>1.064</u> 37500 56250 <u>93750</u> .09975000

Art. 150.

SUGGESTIONS TO TEACHERS.—The division of decimals is generally a troublesome subject to pupils; this arises from a want of attention to the rule. Should the pupil be at a loss to understand why, in some cases, when the divisor and dividend are both decimals, the quotient should be a whole number, let him read the remarks on the division of fractions, page 120. When the divisor contains more decimal places than the dividend, it is best, before commencing the division, to reduce them both to the same denomination, that is, to make the number of decimal places the same in both; the quotient will then be a whole number.

(7) .03)1.125 <u>37.5, Ans.</u>	(8) 27.5)86.075(3.13, <i>Ans.</i> <u>825</u> 357 <u>275</u> 825 <u>825</u>	(9) 3.44)24.73704(7.191, <i>Ans.</i> <u>2408</u> 657 <u>344</u> 3130 <u>3096</u> 344 <u>344</u>
---------------------------------------	--	---

$$\begin{array}{r}
 \text{(10)} \\
 4.123)206.166492(50.004, \text{ Ans.} \\
 \underline{20615} \\
 16492 \\
 \underline{16492}
 \end{array}$$

$$\begin{array}{r}
 \text{(13)} \\
 .5)21.0(42, \text{ Ans.} \\
 \underline{20} \\
 10 \\
 \underline{10}
 \end{array}$$

$$\begin{array}{r}
 \text{(14)} \\
 .008)2.000 \\
 \underline{2000} \\
 250, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{(15)} \\
 5)37.20 \\
 \underline{35} \\
 220 \\
 \underline{225} \\
 7.44, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{(16)} \\
 454)100.8788(.2222, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \underline{908} \\
 1007 \\
 \underline{908} \\
 998 \\
 \underline{908} \\
 908 \\
 \underline{908} \\
 908
 \end{array}$$

$$\begin{array}{r}
 \text{(18)} \\
 .108649)9811.004700(90300, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \underline{977841} \\
 325947 \\
 \underline{325947} \\
 00
 \end{array}$$

$$\begin{array}{r}
 \text{(19)} \\
 .19)21318(1.122, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \underline{19} \\
 23 \\
 \underline{19} \\
 41 \\
 \underline{38} \\
 38 \\
 \underline{38}
 \end{array}$$

$$\begin{array}{r}
 \text{(20)} \\
 .3189)102048.0000(320000, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \underline{9567} \\
 6378 \\
 \underline{6378} \\
 0000
 \end{array}$$

$$\begin{array}{r}
 \text{(21)} \\
 3189)102048(.000032, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \underline{9567} \\
 6378 \\
 \underline{6378}
 \end{array}$$

$$\begin{array}{r}
 \text{(22)} \\
 .0225)9.9000(440, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \underline{900} \\
 900 \\
 \underline{900} \\
 0
 \end{array}$$

$$\begin{array}{r} (26) \\ 10 \overline{)10} \end{array}$$

.01, *Ans.*

$$\begin{array}{r} (27) \\ .1 \overline{)1.0} \end{array}$$

10, *Ans.*

$$\begin{array}{r} (28) \\ .01 \overline{)10.00} \end{array}$$

1000, *Ans.*

$$(29.) \frac{1.7}{64} = \frac{1.7000000}{64} = .0265625, \text{ Ans.}$$

$$\begin{array}{r} (30) \\ 80 \overline{)0.080} \\ \underline{001} \\ .001, \text{ Ans.} \end{array}$$

$$\begin{array}{r} (31) \\ 7 \overline{)1.5000000} \\ \underline{2142857} \\ .2142857+, \text{ Ans.} \end{array}$$

$$(32) \quad 32.76 \overline{)11.100000000} (.3388278+ \text{ Ans.})$$

$$\begin{array}{r} \underline{9828} \\ 12720 \\ \underline{9828} \\ 28920 \\ \underline{26208} \\ 27120 \\ \underline{26208} \\ 9120 \\ \underline{6552} \\ 25680 \\ \underline{22932} \\ 27480 \\ \underline{26208} \end{array}$$

$$\begin{array}{r} (33) \\ 3.21 \overline{)0.0123000000} (.00383177+ \text{ Ans.}) \\ \underline{963} \\ 2670 \\ \underline{2568} \\ 1020 \\ \underline{963} \\ 570 \\ \underline{321} \\ 2490 \\ \underline{2247} \\ 2430 \\ \underline{2247} \end{array}$$

Art. 151.

$$(2.) .035 \text{ pk.} \times 8 = .280 \text{ qt.} : .28 \text{ qt.} \times 2 = .56 \text{ pt.}, \text{ Ans.}$$

$$(3.) .0075 \text{ bu.} \times 4 = .0300 \text{ pk.} : .03 \text{ pk.} \times 8 = .24 \text{ qt.},$$

Ans.

$$(4.) .005 \text{ yd.} \times 3 = .015 \text{ ft.}, \times 12 = 0.180 \text{ in.} = .18 \text{ in.},$$

Ans.

Art. 152.

(2.) $.75 \text{ yd.} \times 3 = 2.25 \text{ ft.} : .25 \text{ ft.} \times 12 = 3.00 \text{ in.}$ *Ans.* 2 ft. 3 in.

(3.) $.3375 \text{ A.} \times 160 = 54.0000 \text{ sq. rd.} = 54 \text{ sq. rd.},$ *Ans.*

(4.) $.7 \text{ lb.} \times 12 = 8.4 \text{ oz.} : .4 \text{ oz.} \times 20 = 8.0 \text{ pwt.} = 8 \text{ pwt.}$
Ans. 8 oz. 8 pwt.

Art. 153.

(2.) $.72 \text{ qt.} \div 8 = .09 \text{ pk.}, \div 4 = .0225 \text{ bu.},$ *Ans.*

(3.) $.77 \text{ yd.} \div 5\frac{1}{2} = .14 \text{ rd.}, \div 320 = .0004375 \text{ mi.},$ *Ans.*

(4.) $.25 \text{ pt.} \div 2 = .125 \text{ qt.}, \div 4 = .03125 \text{ gal.},$ *Ans.*

Art. 154.

(1.) $\$0.40 \times 9 = \$3.60 : \$0.75 \times 12 = \$9.00 : \$3.60 + \$9.00 = \$12.60,$ *Ans.*

(2.) $\$0.23 \times 4.5 = \$1.035 : \$0.375 \times 1.5 = \$0.5625 : \$1.035 + \$0.5625 = \$1.5975,$ *Ans.*

(3.) $\$2.68 \times 16\frac{1}{4} = \$43.55,$ *Ans.*

(4.) $35.25 \div .75 = 47 \text{ bu.},$ *Ans.*

(5.) $98.56 \div 2.56 = 38.5 \text{ yd.},$ *Ans.*

(6.) $13 \text{ A.} 115 \text{ sq. rd.} = 13.71875 \text{ A.} : \$17.28 \times 13.71875 = \$237.06,$ *Ans.*

(7.) 1 gal. would cost $\$4\frac{2}{3} = \$\frac{14}{3} = \$0.77\bar{7} : 464 \times \$0.77\bar{7} = \$360.88,$ *Ans.*

	ft.	in.	
(8.) $.34 \text{ yd.} \times 3 = 1.02 \text{ ft.} :$	1	.24	
$.02 \text{ ft.} \times 12 = .24 \text{ in.} :$	1	.84	
$1.07 \text{ ft.} : .07 \text{ ft.} \times 12 = .84 \text{ in.}$		8.92	
	<i>Ans.</i> 2	10.00	

(9.) .625 gal. \times 4 = 2.500 qt. :	qt.	pt.
.5 qt. \times 2 = 1.0 pt. :	2	1
.75 qt. \times 2 = 1.5 pt.		1.5
	Ans. 3	.5

(10.) $365.25 \times .05 = 18.2625$ da. : $.2625$ da. \times 24 = 6.3 hr. :
 6.3 hr. - .5 hr. = 5.8 hr. : .8 hr. \times 60 = 48 min. *Ans.* 18 da.
 5 hr. 48 min.

(11.) .41 da. = 9.84 hr. : 9.84 hr. - .16 hr. = 9.68 hr. :
 .68 hr. \times 60 = 40.8 min. : .8 min. \times 60 = 48 sec. *Ans.* 9 hr.
 40 min. 48 sec.

(12.) 365.25 da. \times .3 = 109.575 da. : .575 da. \times 24 =
 13.8 hr. : .8 hr. \times 60 = 48 min. *Ans.* 109 da. 13 hr. 48 min.

(13.) 3 in. = $\frac{1}{4}$ ft. : $2\frac{1}{4}$ or $\frac{9}{4}$ ft. = $\frac{3}{4}$ yd. : $343\frac{3}{4} \times \$0.16 =$
 \$55.00, *Ans.*

THE METRIC SYSTEM.

Art. 160.

(3.) 20 Km. \times .62138 = 12.4276 mi., *Ans.*

(4.) 160 acres \div 2.471 = 64.75 + Ha., *Ans.*

(5.) 49 m. \times 39.37 = 1929.13 in., + 12 = 160 ft. 9.13 in. :
 160 ft. + 3 = 53 yd. 1 ft. : 53 yd. + $5\frac{1}{2}$ = 9 rd. $3\frac{1}{2}$ yd. :
 $\frac{1}{2}$ yd. = $\frac{3}{4}$ or $1\frac{1}{2}$ ft. ; $\frac{1}{2}$ ft. = 6 in. ; 9.13 in. + 6 in. = 15.13
 in. = 1 ft. 3.13 in. ; 1 + 1 + 1 = 3 ft. = 1 yd. ; 3 yd. + 1 yd.
 = 4 yd. *Ans.* 9 rd. 4 yd. 3.13 in.

(6.) 15 g. \times 15.432 = 231.480 gr. T., + 24 = 9 pwt.
 15.48 gr., *Ans.*

(7.) 42 bu. \div 2.8372 = 14.8 + Hl., *Ans.*

(8.) 500 steres \times .2759 = 137.95 C., *Ans.*

(9.) 9 m. \times 5 m. = 4.5 m², \times 1.196 = 5.382 sq. yd., *Ans.*

(10.) 32 l. \times 1.0567 = 33.8144 qt., + 4 = 8.4536 gal., *Ans.*

(11.) 45 Ha. = 4500 a., @ \$3.32 = \$14940, *Ans.*

(12.) $457.92 \div 3 = 152.64$ m., *Ans.*

(13.) $.72 \times .48 \times .5 = .1728 : \$.8640 \div .1728 = \5 , *Ans.*

(14.) $\frac{1}{8}$ of \$1.80 = 5 ct. per inch at \$1.80 per yd.
 39.37×5 ct. = \$1.9685 cost per meter at \$1.80 per yd.
 \$2.00 - \$1.9685 = \$.03. Therefore it is $3\frac{3}{8}$ ct. per meter
 cheaper to buy at \$1.80 per yd.

(15)

4685
1.6
28110
4685
7496.0

(16.) 1 Hl. = 2.8372×32
 lb. = 90.7904 lb. 90.7904 lb.
 $\div 2.2046$ lb. = 41.18.
 41.18 Kg., *Ans.*

(17)

346.75
194.1800
173375
208050
208050
<i>Ans.</i> \$0.56

Ans. 7496 Hl.

(18.) 1 m. $\times 100 = 100$ cm. : $100 \div 2 = 50$, the number of
 coins : 50×5 g. = 250 g., *Ans.*

(19.) $1.25 \times 6.5 = 8.125$, $\div 1.85 = 4.39 +$ m., *Ans.*

(20.) 60 mi. $\div .62137 = 96.56 +$ Km., *Ans.*

(21.) 29 mm. $\times 22.4$ mm. = 649.6 qmm., *Ans.*

(22.) 13.24 Km. $\times 1000 = 13240$ m., $\div .715$ m. = 18517 +,
 which would, of course, necessitate his taking 18518 steps,
Ans.

(23.) 30 st. = 30 cu. m. : $30 \div (5 \times 2) = 3$ m., *Ans.*

Art. 161.

A. (1.) $\frac{1}{4}$ of $\frac{1}{4} = \frac{1}{16}$ section: $\frac{1}{16}$ of 640 acres = 40 acres, *Ans.*

(2.) $\frac{1}{2}$ of $\frac{1}{4} = \frac{1}{8}$: $\frac{1}{8}$ of 640 acres = 80 acres, *Ans.*

(3.) 23040 A. $\div 360 = 64$ A., *Ans.*

(4.) $\frac{1}{2}$ section = 320 A.: $\$3 \times 320 = \960 : $\$4 \times 160 = \640 :
 $\$5 \times 160 = \800 : $\$640 + 800 = \1440 : $\$1440 - \$960 = \$480$
 gain, *Ans.*

(5.) $\frac{1}{2}$ of $\frac{1}{4} = \frac{1}{8}$: $\frac{1}{8}$ of 640 A. = 80 A.: $\frac{1}{2}$ of 640 A. = 320 A.:
 80 A. + 320 A. = 400 A., *Ans.*

B. (2.) 12 ft. \div 3 ft. = 4 strips of carpet 12 ft. long needed: 4×12 ft. = 48 ft. = 16 yd., *Ans.*

(3.) $\frac{3}{4}$ yd. = $2\frac{1}{4}$ ft.: 17 ft. \div $2\frac{1}{4}$ ft. = $7\frac{1}{2}$; therefore 8 strips each 15 ft. long are needed: 8×15 ft. = 120 ft. = 40 yd., *Ans.*

(4.) 18 ft. = 6 yd.: therefore 6 strips 36 ft. or 12 yd. long are needed: 12 yd. \times 6 = 72 yd.: $72 \times \$1$ = \$72, *Ans.*

(5.) $\frac{3}{4}$ yd. = $2\frac{1}{4}$ ft.: 16 ft. \div $2\frac{1}{4}$ ft. = $7\frac{1}{2}$; therefore 8 strips are needed: 18 ft. = 6 yd.: adding $\frac{1}{2}$ yd. waste, strips are $6\frac{1}{2}$ yd. long: $8 \times 6\frac{1}{2}$ yd. = $49\frac{1}{2}$ yd., *Ans.*

C. (2.) 12 ft. = 4 yd.: 8 yd. \div 4 yd. = 2 strips to a roll: 4×30 ft. = 120 ft. = 40 yd.: 18 in. = $\frac{1}{2}$ yd.: 40 yd. \div $\frac{1}{2}$ yd. = 80 strips needed: $80 \div 2$ = 40 rolls, *Ans.*

(3.) 9 in. = $\frac{3}{4}$ ft.: 10 ft. $-$ $\frac{3}{4}$ ft. = $9\frac{1}{4}$ ft.: 24 ft. \div $9\frac{1}{4}$ ft. = 2+. Therefore 2 strips to a roll: $(2 \times 18$ ft.) + $(2 \times 14$ ft.) = 64 ft. = $21\frac{1}{2}$ yd.: $21\frac{1}{2}$ yd. \div $\frac{1}{2}$ yd. = $42\frac{1}{2}$ strips: therefore 43 strips are needed: $43 \div 2$ = $21\frac{1}{2}$ rolls; therefore 22 rolls are needed: $\$0.40 \times 22$ = \$8.80, *Ans.*

(4.) $8\frac{1}{2}$ ft. $-$ $\frac{3}{4}$ ft. = 8 ft. height to be papered: 24 ft. \div 8 ft. = 3 strips to a roll: $(2 \times 18$ ft.) + $(2 \times 15$ ft.) = 66 ft. = 22 yd.: 22 yd. \div $\frac{1}{2}$ yd. = 44 strips: $44 \div 3$ = $14\frac{2}{3}$ rolls: therefore 15 rolls, *Ans.*

D. (2.)

$$20\frac{1}{2} \times 16\frac{1}{4} = 333\frac{1}{8} \text{ sq. ft., area ceiling.}$$

$$20\frac{1}{2} \times 10\frac{1}{2} \times 2 = 413\frac{5}{2} \text{ sq. ft., area 2 walls.}$$

$$16\frac{1}{4} \times 10\frac{1}{2} \times 2 = 327\frac{1}{4} \text{ sq. ft., area 2 walls.}$$

$$1074\frac{1}{4} \text{ sq. ft., area walls and ceiling.}$$

$$6\frac{1}{4} \times 4\frac{1}{8} = 26\frac{1}{4} \text{ sq. ft.}$$

$$1074\frac{1}{4} \text{ sq. ft.} - 94\frac{5}{4}$$

$$7 \times 4\frac{1}{6} = 29\frac{1}{6} \text{ sq. ft.}$$

$$\text{sq. ft.} = 980\frac{1}{4} \text{ sq. ft.}$$

$$2 \times 6 \times 3\frac{1}{4} = 39 \text{ sq. ft.}$$

$$= 108 \text{ sq. yd. 8 sq. ft.}$$

$$94\frac{5}{4} \text{ sq. ft.}$$

$$6 \text{ sq. in., } \textit{Ans.}$$

(3.) $15\frac{1}{2}$ ft. \times $12\frac{1}{2}$ ft. \times 2 = 387.5 sq. ft. = 43.06 sq. yd.: 43.06 sq. yd. @ 10 ct. = \$4.31, *Ans.*

$$(4.) \quad \begin{array}{l} 21 \text{ yd.} \times 15 \text{ yd.} = 315 \text{ sq. yd.} \\ 5 \text{ ft.} = 1\frac{1}{3} \text{ yd.} \quad 21 \text{ yd.} \times 1\frac{1}{3} \text{ yd.} = \frac{35}{280} \text{ sq. yd.} \end{array}$$

$$\$0.36 \times 35 = \$12.60: \quad \$0.24 \times 280 = \$67.20: \quad \$12.60 + \$67.20 = \$79.80, \text{ Ans.}$$

$$(5.) \quad (6 \text{ ft. } 11 \text{ in.} + 5 \text{ ft. } 4 \text{ in.} + 4 \text{ ft. } 3 \text{ in.}) \times 7 = 115\frac{1}{2} \text{ ft.}, \\ \times 3\frac{1}{2} \text{ ft.} = 404\frac{1}{4} \text{ sq. ft.}, \times 16 \text{ ct.} = \$64.68, \text{ Ans.}$$

$$(6.) \quad \begin{array}{l} 2 \times 18 \times 9 = 324 \text{ sq. ft.} \\ 2 \times 14 \times 9 = 252 \text{ sq. ft.} \\ 18 \times 14 = 252 \text{ sq. ft.} \\ \hline 828 \text{ sq. ft.} = 92 \text{ sq. yd.} \end{array}$$

$$\$0.07 \times 92 \times 2 = \$12.88, \text{ Ans.}$$

$$(7.) \quad 36\frac{1}{2} \text{ ft.} \times 16\frac{1}{2} \text{ ft.} = 598\frac{1}{2} \text{ sq. ft.} = 5.99 \text{ squares: } \$3 \times 5.99 = \$17.97, \text{ Ans.}$$

$$\text{E. (1.) } 4 \times 4 \times 250 \times 6 = 24000 \text{ sq. in.} = 166\frac{2}{3} \text{ sq. ft.}, \text{ Ans.}$$

$$(2.) \quad 4\frac{1}{2} \times 4 \times 250 \times 10 = 45000 \text{ sq. in.} = 312\frac{1}{2} \text{ sq. ft.}, \text{ Ans.}$$

$$(3.) \quad 35 \times 8 = 280 \text{ sq. ft.: } \$0.07 \times 280 = \$19.60, \text{ Ans.}$$

$$(4.) \quad 50 \times 20 \times 2 = 2000 \text{ sq. ft.} = 20 \text{ squares: } \$12.75 \times 20 = \$255, \text{ Ans.}$$

$$(5.) \quad 40 \times 18\frac{1}{2} \text{ ft.} \times 2 = 1480 \text{ sq. ft.} = 14.8 \text{ squares: } 14.8 \times \$3.50 = \$51.80, \text{ Ans.}$$

$$\text{F. (1.) } 53 \text{ ft. } 6 \text{ in.} = 53.5 \text{ ft.: } 12 \text{ ft. } 6 \text{ in.} = 12.5 \text{ ft.: } 53.5 \times 12.5 \times 2 = 1337.5 \text{ cu. ft.} = 54.0404 + \text{P.: } 54.0404 \times \$2.25 = \$121.59+, \text{ Ans.}$$

$$(2.) \quad 48\frac{1}{3} \times 16\frac{1}{2} \times 1\frac{1}{2} = \frac{145}{8} \times \frac{11}{2} \times \frac{3}{2} = \frac{4785}{4} = 1196\frac{1}{4} \text{ cu. ft.: } 1196\frac{1}{4} \times 20 = 23925 \text{ bricks, Ans.}$$

$$(3.) \quad 120 \times 8 \times 1\frac{1}{2} = 1440 \text{ cu. ft.} = 2488320 \text{ cu. in. in wall: } 8 \times 4 \times 2.25 = 72 \text{ cu. in. in each brick: } 2488320 \div 72 = 34560 \text{ bricks, Ans.}$$

$$(4.) \quad 240 \times 6 \times 3 = 4320 \text{ cu. ft.} = 7464960 \text{ cu. in. in wall: } 9 \times 4 \times 2 = 72 \text{ cu. in. in brick: } 7464960 \div 72 = 103680 \text{ bricks: } 103680 \div 1000 = 103.68: \$3.25 \times 103.68 = \$336.96, \text{ Ans.}$$

G. (2.) $16 \times 1\frac{1}{4} = 20$ ft., *Ans.*

(3.) $12\frac{1}{2} \times 2\frac{1}{4} \times 2 = 56\frac{1}{4}$ ft., *Ans.*

(4.) $15 \times \frac{1}{3} \times 3 = 15$ ft., *Ans.*

(5.) $12 \times 2 \times 24 = 576$ ft., *Ans.*

(6.) $17 \times 1\frac{1}{2} \times 3 \times 2 = 93\frac{1}{2}$ ft., *Ans.*

(8.) $(1 \text{ ft. } 3 \text{ in.} + 11 \text{ in.}) \div 2 = 1\frac{1}{2}$ ft., average width
 $12\frac{1}{2} \times 1\frac{1}{2} = 13\frac{1}{4}$ ft., *Ans.*

(9.) $(12 \text{ in.} + 9 \text{ in.}) \div 2 = 10\frac{1}{2}$ in. = $\frac{7}{8}$ ft., average width
 $36 \times 10 \times \frac{7}{8} = 315$ ft., *Ans.*

H. (3.) $\frac{1}{12} \times 4 \times 12 = 4$ ft., *Ans.*

(4.) $\frac{1}{12} \times 18 \times 20 = 30$ ft. $30 - (\frac{1}{3} \text{ of } 30) = 24$ bd. ft.,
Ans.

(5.) $\frac{1}{12} \times 144 \times 40 = 480$ ft. $480 - (\frac{1}{3} \text{ of } 480) = 384$ bd.
 ft., *Ans.*

(6.) $4 \times 4 \times 2 = 32$ cu. ft. : $\frac{32}{128} = \frac{1}{4}$ Cd. : $\frac{1}{4}$ of \$4 = \$1, *Ans.*

(7.) $12 \times 6 \times 4 = 288$ cu. ft. : $\frac{288}{8} = 36$: $\frac{36}{4} \times \$3.50 = \$7.87\frac{1}{2}$,
Ans.

(8.) $16 \text{ ft.} \div 4 \text{ ft.} = 4$: $1\frac{1}{2} \text{ in.} + \frac{3}{8} \text{ in.} = 1\frac{5}{8} \text{ in.} = \frac{15}{8} \text{ in.} = \frac{15}{8} \text{ ft.} :$
 $15 \text{ ft.} \div \frac{15}{8} \text{ ft.} = 96$. $4 \times 96 = 384$ laths = 7 + bundles of 50;
 therefore, 8 bundles, *Ans.*

(9.) $1\frac{1}{2} \text{ in.} + \frac{3}{8} \text{ in.} = 1\frac{5}{8} \text{ in.} = \frac{15}{8} \text{ in.} : 4 \times \frac{15}{8} \times 100 = 62\frac{1}{2} \text{ sq. ft.}$
 $= 6\frac{1}{4} \text{ sq. yd.}$, *Ans.*

(10.) $5 \text{ in.} = \frac{5}{12} \text{ ft.} : 12 \times \frac{5}{12} = 5 \text{ sq. ft.} : 140 \text{ sq. ft.} \div 5 \text{ sq. ft.}$
 $= 28$ clapboards, *Ans.*

I. (1.) $15 \text{ ft.} \times 5 \text{ ft.} \times 4 \text{ ft.} = 300$ cu. ft. = 518400 cu. in. :
 $518400 \div 2150.4 = 241$ + bu., *Ans.*

(2.) $10 \text{ ft.} \times 5 \text{ ft.} \times 4 \text{ ft.} = 200$ cu. ft. = 345600 cu. in. :
 $345600 \div 231 = 1496$ + gal., *Ans.*

(3.) $100 \times 2150.4 \text{ cu. in.} = 215040 \text{ cu. in.} : 215040 \div 1728 =$
 $124.44 \text{ cu. ft.} : 124.44 \div 25 = 4.98 \text{ ft.}$, *Ans.*

(4.) 11 ft. \times 4 ft. \times 5 ft. = 220 cu. ft. = 380160 cu. in. :
 380160 \div 2150.4 = 176.78 bu., *Ans.*

(5.) 4 ft. \times 5 ft. \times 6 ft. = 120 cu. ft. = 207360 cu. in. :
 207360 \div 231 = 897.66 gal., *Ans.*

(6.) 10 ft. \times 5 ft. \times 5 ft. = 250 cu. ft. : $\frac{2}{3}$ of 250 = 200 bu., *Ans.*

(7.) 14 ft. \times 4 ft. \times 2 ft. = 112 cu. ft. : $7\frac{1}{2} \times 112 = 840$ gal.,
Ans.

PERCENTAGE.

Art. 164.

(6.) $240 \times .03\frac{3}{4} = 9$, *Ans.*
 165 (14.) $8\frac{1}{8}\% = \frac{1}{12}$: $\frac{1}{12}$ of 384 = 32, *Ans.*
 $\frac{.03\frac{3}{4}}$ (16.) $12\frac{1}{2}\% = \frac{1}{8}$: $\frac{1}{8}$ of 292 = 36.5, *Ans.*
 495
 $\frac{55}{5.50}$, *Ans.* (19.) $18\frac{3}{4} = \frac{3}{16}$: $\frac{11.2}{1} \times \frac{3}{16} = 2.1$, *Ans.*

1.97
 (20.) $20\% = \frac{1}{5}$: $\frac{9.85}{1} \times \frac{1}{5} = 1.97$, *Ans.*

(21.) $25\% = \frac{1}{4}$: $\frac{1}{4}$ of 43 = 10.75, *Ans.*

(22.) $33\frac{1}{2}\% = \frac{1}{3}$: $\frac{1}{3}$ of 6.93 = 2.31, *Ans.*

(23.) $45 \times 5.7 = 2.565$, *Ans.*

(24.) $50\% = \frac{1}{2}$: $\frac{1}{2}$ of 38.75 = 19.375, *Ans.*

(25.) $\frac{1}{2}\% = \frac{1}{200}$: $\frac{1}{200}$ of 456 = 2.28, *Ans.*

(26.) $\frac{3}{8}\% = .00375$: $464 \times .00375 = 1.74$, *Ans.*

(27.) $\frac{7}{16}\% = .004375$: $144 \times .004375 = .63$, *Ans.*

(28.) $125\% = \frac{5}{4}$: $\frac{5}{4}$ of 36 = 45, *Ans.*

(29.) 208% of 650 = $650 \times 2.08 = 1352$, *Ans.*

(30.) $4\frac{1}{2}$ times 12 = $48 + 6 = 54$, *Ans.*

Art. 165.

(3.) 3 is $\frac{1}{5}$ of 15 : $\frac{1}{5} = 20\%$, *Ans.*

(4.) 6 is $\frac{2}{5}$ of 50 : $\frac{2}{5} = .12 = 12\%$, *Ans.*

(5.) 4.5 is $6\frac{2}{5}\%$ of 75 = $\frac{3}{5} = .6 = 6\%$, *Ans.*

(11)

$$243)8.505(.035 = 3\frac{1}{2}\%, \text{ Ans.}$$

$$\begin{array}{r} 729 \\ 1215 \\ \hline 1215 \end{array}$$

$$(12.) .002 \text{ of } 2 = .002 \div 2 = .001 = \frac{1}{10} \text{ of } 1\%, \text{ Ans.}$$

$$(13.) 13.245 \div 3532 = .00375 = \frac{375}{100000} = \frac{3}{8}\%, \text{ Ans.}$$

$$(14.) \frac{3}{25} \times \frac{5}{4} = \frac{3}{20} = 15\%, \text{ Ans.}$$

$$(15.) \frac{2}{15} \times \frac{3}{2} = \frac{1}{5} = 20\%, \text{ Ans.}$$

$$(16.) \frac{2}{7} \times \frac{3}{16} = \frac{3}{8} = 37\frac{1}{2}\%, \text{ Ans.}$$

$$(17.) \frac{3}{4} \times \frac{3}{5} = \frac{9}{20} = 45\%, \text{ Ans.}$$

$$(18.) \frac{65}{6} \times \frac{3}{520} = \frac{3}{18} = 18\frac{1}{4}\%, \text{ Ans.}$$

Art. 166.

$$(3.) 20\% = \frac{1}{5}: 60 \times 5 = 300, \text{ Ans.}$$

$$(4.) 75\% = \frac{3}{4}. \text{ If } 90 \text{ is } \frac{3}{4}, \frac{1}{4} = 30, \text{ and } \frac{1}{2} = 60, \text{ Ans.}$$

$$(5.) 125\% = \frac{5}{4}. \text{ If } 85 \text{ is } \frac{5}{4}, \frac{1}{4} = 17, \text{ and } \frac{1}{2} = 34, \text{ Ans.}$$

(6.) $7.13 \div .23 = 31$, *Ans.*

(7.) $20.23 \div .34 = 59.5$, *Ans.*

(8.) $23.5 \div .47 = 50$, *Ans.*

(9.) If 45 is $1\frac{1}{2}\%$, $\frac{1}{2}\%$ is $\frac{1}{3}$ of $45 = 15$: $1\% = 2$ times $15 = 30$: 100 times $30 = 3000$, the number.

(10.) $12\frac{1}{2}\% = \frac{1}{8}$: $2.25 \times 8 = 18$, *Ans.*

(11.) 1% is $\frac{1}{2750}$ of $\frac{3}{4} = \frac{3}{10000}$: 100% is 100 times $\frac{3}{10000} = \frac{300}{10000} = \frac{3}{100}$, *Ans.*

(12.) $14\frac{7}{8} = 14.875$: $16\frac{2}{3}\% = \frac{1}{3}$. If $14.875 = \frac{1}{3}$, $\frac{1}{3} = \frac{600}{3} = 85\frac{5}{8}$, *Ans.*

Art. 167.

(3.) $721 \div 1.03 = 700$, *Ans.*

(4.) $100\% - 66\% = 34\%$: $68 \div .34 = 200$, *Ans.*

(5.) If $2125 = \frac{5}{4}$, $\frac{1}{4} = 425$, and $\frac{1}{2} = 850$, *Ans.*

(6.) If $7.52 = \frac{94}{100}$, $\frac{1}{100} = \frac{7.52}{94} = 8$, and the number = 8, *Ans.*

(7.) $37\frac{1}{2}\% = \frac{3}{8}$. If $8250 = \frac{11}{8}$, $\frac{1}{8} = 750$, and $\frac{3}{8} = 6000$, *Ans.*

(8.) $10\% = \frac{1}{10}$, then $\frac{9}{10}$ of the fraction = $\frac{3}{8}$: $\frac{3}{8} \times \frac{10}{9} = \frac{30}{72} = \frac{5}{12}$, *Ans.*

(9.) $20\% = \frac{1}{5}$. If $6.6 = \frac{6}{5}$, $\frac{1}{5} = 1.1$, and $\frac{6}{5} = 5.5$, *Ans.*

Art. 169.

(1.) $800 \times .36 = 288.00$: $\$800 - \$288 = \$512$, *Ans.*

(2.) $300 - 225 = 75 = \frac{1}{4}$ of $300 = 25\%$, *Ans.*

(3.) $100\% - 40\% = 60\% = \frac{6}{10}$. If $\$3000 = \frac{6}{10}$, $\frac{1}{10} = \$500$, and $\frac{4}{10} (40\%) = \$2000$, *Ans.*

(4.) If 56 ct. = 140% of the cost, the cost = $56 \div 1.40 = 40$ ct., *Ans.*

(5.) $12\frac{1}{2}\% = \frac{1}{8}$: $\$175 = \frac{7}{8}$, $\frac{1}{8} = 25$, and $\frac{3}{8} = \$200$, *Ans.*

(6.) $75 \times 4 = 300$: $\frac{1}{3}$ of 300 = $37\frac{1}{2}$: $300 - 37\frac{1}{2} = 262\frac{1}{2}$, $\times 35$ ct. = $\$91.87\frac{1}{2}$, *Ans.*

(7.) $\$500 - \$425 = \$75$: $7500 \div 500 = 15\%$, *Ans.*

(8.) $100\% - 75\% = 25\%$: $\$5000 = 25\% = \frac{1}{4}$; then $\frac{3}{4} = \$20000$, and $\$20000 - \$5000 = \$15000$, *Ans.*

(9.) $12\frac{1}{2}\% = \frac{1}{8}$: 250 A. 86 sq. rd. = 40086 sq. rd. = $\frac{3}{8}$ of neighbor's: $\frac{1}{8} = 4454$, and $\frac{3}{8} = 35632$ sq. rd., $\div 160 = 222$ A. 112 sq. rd., *Ans.*

(10.) $160 \times .35 = 56.00$: $160 + 56 = 216$, *Ans.*

(11.) 5 bu. $\times 32 = 160$ qt.: $6.00 \div 160 = 3\frac{3}{4}\%$, *Ans.*

(12.) $60\% = \frac{6}{10}$: $\frac{6}{10}$ of 45% = $\frac{27}{10} = 27\%$: $540 \div .27 = 2000$ A., *Ans.*

(13.) $371.29 \div 1.07 = \$347$, *Ans.*

(14.) $18 + 15 + 23 + 12 = 68\%$: $100 - 68 = 32\%$: $\$800 \times .32 = \256 , *Ans.*

(15.) $\frac{1}{20} = 5\%$: $\frac{17}{20} = 17 \times 5 = 85\%$, *Ans.*

(16.) $33\frac{1}{3}\% = \frac{1}{3}$: 2 bu. 3 pk. = $\frac{1}{3}$ of 6 bu. 9 pk. = 8 bu. 1 pk., *Ans.*

(17.) 100% less $7\frac{1}{2}\% = 92\frac{1}{2}\%$: $37 \div .925 = 40$, *Ans.*

(18.) $1.25 = \frac{1}{4}$ of 5: $\frac{3}{4}$ remain = 75%, *Ans.*

(19.) $25\% = \frac{1}{4}$. If $\$150 = \frac{1}{4}$, $\frac{1}{4} = \$30$, and $\frac{3}{4} = \$120 =$ cost: $\$200 - \$120 = \$80$: $\frac{80}{120} = \frac{2}{3} = 66\frac{2}{3}\%$, *Ans.*

(20.) $20\% = \frac{1}{5}$: $\frac{1}{5}$ of \$10000 = \$2000, first drawn:
 \$10000 - \$2000 = \$8000: $25\% = \frac{1}{4}$: $\frac{1}{4}$ of \$8000 = \$2000,
 second drawn: \$2000 + \$2000 = \$4000, total drawn.

$5\% = \frac{1}{20}$: $\frac{1}{20}$ of $\overset{200}{\$4000} = \200 deposited: \$10000 - \$4000
 + \$200 = \$6200 in bank, *Ans.*

(21.) From 6 A.M. to 9 A.M. is 3 hr.: 3×35 mi. = 105 mi.

$\frac{\overset{3}{105}}{280} = \frac{3}{8} = 37\frac{1}{2}\%$, *Ans.*

(22.) $25\% = \frac{1}{4}$: therefore \$2560 = $\frac{1}{4}$ of the cost: \$2560
 + $\frac{512}{5} = \overset{512}{\$2560} \times \frac{4}{5} = \2048 , *Ans.*

(23.) $12000 \div 200 = 60$ second factor: $\frac{60}{100} = \frac{3}{5} = 30\%$, *Ans.*

(24.) $87\frac{1}{2}\% = \frac{7}{8}$: $\frac{7}{8}$ of $\overset{6.19}{49.52} = \43.33 , *Ans.*

(25.) $275 - 265 = 10$: $\frac{\overset{2}{10}}{\overset{55}{275}} = \frac{2}{55} = 3\frac{2}{5}\%$ misspelled: $\frac{2}{55}$
 $= \frac{2}{55} = 96 + \%$ spelled correctly.

(26.) $6\frac{1}{4}\% = \frac{1}{16}$: $\frac{1}{16}$ of 48 = 3: 48 - 3 = 45 yd., *Ans.*

(27.) $16\frac{2}{3}\% = \frac{1}{6}$: \$16500 $\times 6 = \$99000$, fortune be-
 fore loss; } *Ans.*
 \$99000 - \$16500 = \$82500, fortune after loss.

(28.) $14\frac{2}{7}\% = \frac{1}{7}$: $16088 \div \frac{1}{7} = \overset{2011}{16088} \times \frac{7}{8} = 14077$, *Ans.*

(29.) $3648 \div \frac{1}{7} = \overset{608}{3648} \times \frac{7}{6} = 4256$, *Ans.*

(30.) $12\frac{1}{2}\% = \frac{1}{8}$: \$1407 $\div \frac{1}{8} = \overset{201}{1407} \times \frac{8}{7} = \1608 , *Ans.*

$$(31.) 16\frac{2}{3}\% = \frac{1}{3}: 14280 + \frac{1}{3} = \frac{2040}{14280} \times \frac{6}{7} = 12240, \text{ Ans.}$$

Art. 172.

- (1.) $\$240 \times .05 = \$12, \text{ Ans.}$
 (2.) $11.50 + 460 = .02\frac{1}{2} = 2\frac{1}{2}\%, \text{ Ans.}$
 (3.) $\$8.12\frac{1}{2} = 2\frac{1}{2}\%$ of the selling price: $\$8.12\frac{1}{2} \div .02\frac{1}{2} = \325 , selling price: 1 barrel sold for $\frac{1}{2}\%$ of $\$325 = \$13, \text{ Ans.}$
 (4.) $210 \div 1.05 = \$200, \text{ Ans.}$
 (5.) $\$180 \times .04 = \$7.20: \$180 - \$7.20 = \$172.80, \text{ Ans.}$
 (6.) If $\$11.25 = \frac{1}{20}$ (5%), $\frac{2}{10} = \$225, \text{ Ans.}$
 (7.) $\$1323.54 + 1.08 = \1225.50 , cost of goods: $\$1323.54 - \$1225.50 = \$98.04$, commission, *Ans.*
 (8.)
$$\left. \begin{array}{l} 250 \times \$15 = \$3750 \\ 350 \times \$3.50 = 1225 \\ 100 \times \$3.64 = 364 \end{array} \right\} = \$5339$$

$$3\% \text{ of } \$5339 = \$160.17: \$5339 - \$160.17 = \$5178.83, \text{ Ans.}$$

Art. 173.

- (1.) $20\% = \frac{1}{5}: \frac{1}{5}$ of $\$225.50 = \$45.10: \$225.50 - \$45.10 = \$180.40, \text{ Ans.}$
 (2.) $\frac{1}{3}$ of $\$725.16 = 241.72: \$725.16 - 241.72 = 483.44, \times .05 = 24.17 +: \$483.44 - \$24.17 = \$459.27, \text{ Ans.}$
 (3.) 35% of $\$500 = \$175: 20\% = \frac{1}{5}: 10\% = \frac{1}{10}: 5\% = \frac{1}{20}: \frac{1}{5}$ of $\$500 = \$100: \frac{1}{10}$ of $\$400 = \$40: \frac{1}{20}$ of $\$360 = \$18: \$100 + \$40 + \$18 = \$158: \$175 - \$158 = \$17, \text{ Ans.}$
 (4.) $100\% - 20\% = 80\%: 5\%$ or $\frac{1}{20}$ of $80\% = 4\%: 20\% + 4\% = 24\%, \text{ Ans.}$
 (5.) 1. $100\% - 20\% = 80\%: 10\%$ of $80\% = 8\%: 80\% - 8\% = 72\%: 5\%$ of $72\% = 3\frac{2}{5}\%: 72\% - 3\frac{2}{5}\% = 68\frac{2}{5}\%:$
 2. $100\% - 5\% = 95\%: 10\%$ of $95\% = 9\frac{1}{2}\%: 95\% - 9\frac{1}{2}\% = 85\frac{1}{2}\%: 20\%$ of $85\frac{1}{2}\% = 17\frac{1}{10}\%: 85\frac{1}{2}\% - 17\frac{1}{10}\% = 68\frac{2}{5}\%:$

$$3. 100\% - 10\% = 90\% : 20\% \text{ of } 90\% = 18\% : 90\% \\ - 18\% = 72\% : 5\% \text{ of } 72\% = 3\frac{3}{4}\% : 72\% - 3\frac{3}{4}\% \\ = 68\frac{1}{4}\%. \text{ No difference, } \textit{Ans.}$$

$$(6.) 100 \text{ doz. @ } 60 \text{ ct.} = \$60.00, \text{ less } \$24 (40\%) = \$36, \\ \text{less } \$3.60 (10\%) = \$32.40, \text{ less } \$2.43 (7\frac{1}{2}\%) = \$29.97, \textit{Ans.}$$

$$(7.) \$50 \text{ less } 50\% = \$25, \text{ less } 10\% = \$22.50, \text{ less } 10\% \\ = \$20.25, \text{ less } 2\% = \$19.845, + 10 = \$1.98 +, \textit{Ans.}$$

Art. 174.

$$(1.) \$40 + 10\% = \$44, \textit{Ans.}$$

$$(2.) 5 \text{ ct.} = \frac{5}{100} \text{ the cost; the loss, therefore, is } \frac{1}{8} = \\ 16\frac{2}{3}\%, \textit{Ans.}$$

$$(3.) 12\frac{1}{2} = \frac{1}{8}; \text{ then } 27 \text{ ct.} = \frac{3}{8} \text{ of the cost, } \frac{1}{8} = 3 \text{ ct., and} \\ \frac{3}{8} \text{ of the cost} = 24 \text{ ct., } \textit{Ans.}$$

$$(4.) \$15.30 \div .04 = \$382.50, \textit{Ans.}$$

$$(5.) 37\frac{1}{2}\% = \frac{3}{8}: \$8 + \text{its } \frac{3}{8} = \$11, \textit{Ans.}$$

$$(6.) 90 - 75 = 15 = \frac{1}{5} \text{ of } 75\frac{1}{2} = 20\%, \textit{Ans.}$$

$$(7.) 6\frac{1}{4}\% = \frac{1}{16}. \text{ If } 5 \text{ ct.} = \frac{1}{16} \text{ of the cost, the cost} = \\ 80 \text{ ct., } \textit{Ans.}$$

$$(8.) 18\frac{3}{4}\% = \frac{3}{16}; \text{ then } \$4.75 = \frac{3}{16}, \frac{1}{16} = \$0.25, \text{ and } \frac{1}{8} \\ = \$0.25 \times 16 = \$4, \textit{Ans.}$$

$$(9.) \$1.35 = \frac{9}{10} \text{ of the cost, } \frac{1}{10} = \$0.15, \text{ and } \frac{1}{10} = \$1.50 \\ = \text{cost: } 16\frac{2}{3}\% = \frac{1}{6}: \frac{1}{6} \text{ of } 1.50 = .25: \$1.50 + \$0.25 = \\ \$1.75, \textit{Ans.}$$

$$(10.) 25\% = \frac{1}{4}: \frac{1}{4} \text{ of } \$874 = \$218.50, \textit{Ans.}$$

$$(11.) \$1.75 - \$0.25 = \$1.50: 25 = \frac{1}{4} \text{ of } 150 = 16\frac{2}{3}\%, \textit{Ans.}$$

$$(12.) \text{ On the first horse } \$150 = \frac{5}{4} \text{ cost, } \frac{1}{4} = \$30, \text{ and the} \\ \text{cost} = \$120: \text{ on the second horse } \$150 = \frac{3}{4} \text{ cost, } \frac{1}{4} = \$50, \text{ and} \\ \text{the cost} = \$200: \$200 + \$120 = \$320, - \$300 = \$20, \textit{Ans.}$$

$$(13.) 5 \text{ ct.} = 10\% - 8\% = 2\% \text{ of the cost per yd. If} \\ 2\% = 5 \text{ ct., } 1\% = 2\frac{1}{2} \text{ ct., and } 100\% = \$2.50, \textit{Ans.}$$

(14.) $60 \text{ ct.} \times 10000 = \6000 , cost of the corn: $65 \text{ ct.} \times 7000 = \4550 : $10000 - 7000 = 3000$: $55 \text{ ct.} \times 3000 = \1650 : $\$4550 + \$1650 = \$6200$, the selling price: $\$6200 - \$6000 = \$200$ gain: $\$200 = \frac{1}{30}$ of $\$6000 = 3\frac{1}{3}\%$, *Ans.*

(15.) $33\frac{1}{3}\% = \frac{1}{3}$; then $\$12000 = \frac{4}{3}$, $\frac{1}{3} = \$3000$, and $\frac{2}{3} = \$9000 =$ cost of house and lot. The profit was $\$3000$. On the city lots he lost $\frac{1}{3}$. $\frac{1}{3}$ of $12000 = 4000$: $\$4000 - \$3000 = \$1000$, *Ans.*

Art. 175.

(1.) $100\% - 20\% = 80\%$, cost price. If he sells at the list price, he will gain $\frac{2}{8} = \frac{1}{4} = 25\%$, *Ans.*

(2.) $74 \times 5 \times 45 = 166.50$, less 3.33 (2%) = $\$163.17$: $12\frac{1}{3}\%$ of this amount = $\$20.12+$, *Ans.*

(3.) $\$45$ less $5\% = \$42.75$, $+ 12 = \$3.56\frac{1}{4} =$ cost per pair: $\$4.25 - \$3.56\frac{1}{4} = \$0.68\frac{3}{4} =$ gain per pair: $5 \times 12 = 60 =$ number of pairs: $60 \times \$0.68\frac{3}{4} = \41.25 , *Ans.*

(4.) The profit on 36 hats equals 36 times $37\frac{1}{2}$ ct. which is $\$13.50$. If $\$13.50 = \frac{1}{8}$ of the cost, $\frac{7}{8}$ are 8 times $\$13.50 = \108 : $\$108 = \frac{9}{10}$ of the list price: $\frac{1}{10} = \$12$, $\frac{1}{8} = \$120$, *Ans.*

(5.) $\$1 \times 100 = \100 : $\$100$ less $60\% = \$40$: $\$40$ less $5\% = \$38$: $\$38$ less $5\% = \$36.10$: $\$36.10 + \$23.90 = \$60$: $\$60 \div (100 \times 12)$ or $1200 = 5 \text{ ct.}$, *Ans.*

(6.) $80 \times \$125 = \10000 : $\$10250 - \$10000 = \$250 = 2\frac{1}{2}\%$ of $\$10000$. *Ans.* $2\frac{1}{2}\%$.

(7.) $60 \times 70 \text{ ct.} = \42.00 : $\$42$ less 50% and 10% and $5\% = \$17.955$: $\$42$ less 20% and 10% and $5\% = \$28.728$: $\$28.728 - \$17.955 = \$10.77$, *Ans.*

(8.) $\$35.91 = 112\%$ of the cost: $\$35.91 + 1.12 = \$32.06\frac{1}{4}$, the cost: $\$32.06\frac{1}{4} + .95 = \33.75 : $\$33.75 + .90 = \37.50 : $\$37.50 \div .75 = \$50 =$ the list price: $\$50 \div 50 = \1 , list price per gross, *Ans.*

Art. 180.

(1.) 1% of \$7500 is \$75, and $\frac{1}{4}\%$ is $\frac{1}{4}$ of \$75 = \$18.75,
Ans.

(2.) 50 shares = \$5000: \$6.25 + \$5000 = .00125 = $\frac{1}{8}\%$,
Ans.

(3.) \$10 = $\frac{1}{4}\%$ of the investment: 1% = 4 times \$10 = \$40: 100% = 100 times \$40 = \$4000 = 40 shares, *Ans.*

(4.) 1% on \$1700 = \$17.00, and $\frac{1}{4}\%$ = \$4.25, *Ans.*

(5.) 95 shares = \$9500: \$11.875 + \$9500 = .00125 = $\frac{1}{8}\%$, *Ans.*

(6.) If \$9.50 = $\frac{1}{4}\%$, 1% = \$38, and 100% = \$3800 = 38 shares, *Ans.*

(7.) 15% on \$8000 = \$1200, *Ans.*

(8.) The dividend will be 3500 times 4 ct. or (\$0.04) = \$140, *Ans.*

(9.) If \$300 is $7\frac{1}{2}\%$ = $\frac{15}{2}\%$, $\frac{1}{2}\%$ is \$20, and 1% is \$40. If \$40 = 1%, then 100% is \$4000 = 40 shares, *Ans.*

(10.) 5% = $\frac{1}{20}$: $\frac{1}{20}$ of 60 = 3: 60 + 3 = 63 shares, *Ans.*

(11.) \$15700 - \$4500 = \$11200: 11200 + 160000 = .07 = 7%, *Ans.*

(12.) 150 shares of \$50 each are equivalent to 75 shares of \$100. $139\frac{3}{4} \times 75 = \10481.25

$\frac{1}{4}\%$ brokerage on \$7500 = $\frac{18.75}{\$10500.00}$, *Ans.*

(13.) \$8000 \times 1.10 = \$8800

$\frac{1}{8}\%$ brokerage on \$8000 = $\frac{10}{\$8810}$, *Ans.*

(14.) $\frac{1}{4}\%$ brokerage on 50 shares = \$12.50: \$2475 + \$12.50 = \$2487.50: 2487.50 + 50 = 49 $\frac{3}{4}\%$, *Ans.*

(15.) $1.06\frac{1}{4} + .00\frac{1}{8} = 1.06\frac{3}{8}$: \$2500 \times $1.06\frac{3}{8}$ = \$2659.375, *Ans.*

(16.) $19\frac{1}{4} + \frac{1}{4} = 19\frac{1}{2}$ or 19.5: \$1560 + 19.5 = 80, *Ans.*

(17.) $\$104\frac{7}{8} + \$\frac{1}{8} = \$105$, price per share: $\$4200 \div \$105 = 40$ shares, *Ans.*

(18.) $\$26\frac{7}{8} + \$\frac{1}{8} = \$27$, paid per share.
 $100 \times \$27 = \2700 , paid for 100 shares.
 $\$30\frac{1}{8} - \$\frac{1}{8} = \$30$, received per share.
 $100 \times \$30 = \3000 , received for 100 shares.
 $\$3000 - \$2700 = \$300$, gain, *Ans.*

(19.) $\$46\frac{7}{8} + \$\frac{1}{8} = \$47$, paid per share.
 $100 \times \$47 = \4700 , paid for 100 shares.
 $\$32\frac{1}{8} - \$\frac{1}{8} = \$32$, received per share.
 $100 \times \$32 = \3200 , received per 100 shares.
 $\$4700 - \$3200 = \$1500$ loss, *Ans.*

(20.) $\$39900 \times .06 = \2394 , *Ans.*

(21.) $\$39900 \div 1.05 = \38000 : $\$38000 \times .06 = \2280 ,
Ans.

(22.) $\$39900 \div .95 = \42000 : $42000 \times .06 = \$2520$, *Ans.*

(23.) $95\frac{1}{4} + \frac{1}{4} = 95\frac{1}{2}$: $105 - \frac{1}{4} = 104\frac{3}{4}$: $104\frac{3}{4} - 95\frac{1}{2} = 9\frac{1}{4}\%$
 $= .0925$: $\$925 \div .0925 = \$10000 = 100$ shares, *Ans.*

(24.) $6 = \frac{3}{4}$ of 8: $\frac{3}{4} = 75\%$, *Ans.*

(25.) $7 \div .87\frac{1}{2} = .08 = 8\%$, *Ans.*

(26.) $.07 \div .06 = 116\frac{2}{3}$, *Ans.*

(27.) $5 \div 115 = .04\frac{2}{5} = 4\frac{2}{5}\%$, *Ans.*

(28.) $.05 \div .06 = 83\frac{1}{3}$, *Ans.*

(29.) $.04 \div .05 = 80$, *Ans.*

(30.) $6 \div 105 = .05\frac{2}{7} = 5\frac{2}{7}\%$, *Ans.*

(31.) $\$3720 \div .05 = \74400 , par value.
 $.98\frac{7}{8} + .00\frac{1}{8} = .99$, cost 1 share.
 $\$74400 \times .99 = \73656 , sum invested, *Ans.*

(32.) $6 \div 58 = .10\frac{3}{19} = 10\frac{3}{19}\%$, *Ans.*

(33.) $6 \div 110 = .05\frac{3}{11} = 5\frac{3}{11}\%$, *Ans.*

(34.) $3\frac{1}{2} \div 6 = 58\frac{1}{3}\%$. $58\frac{1}{3}\%$, *Ans.*

INTEREST.

SIMPLE INTEREST.

Art. 183. (10.) $\$45 \times .08 = \3.60 : $\$3.60 \times 2 = \7.20 :
 $\$7.20 + \$45 = \$52.20$, *Ans.*

(11.) $\$80 \times .07 = \5.60 : $\$5.60 \times 4 = \22.40 : $\$80 +$
 $\$22.40 = \102.40 , *Ans.*

(12.) $3\frac{3}{4}\% \times 2 = 7\frac{1}{2}\%$: $\$237.16 \times .07\frac{1}{2} = \17.79 : $\$237.16$
 $+ \$17.79 = \254.95 , *Ans.*

(13.) $4\% \times 5 = 20\% = \frac{1}{5}$: $\$74.75 \div 5 = \14.95 : $\$74.75$
 $+ \$14.95 = \89.70 , *Ans.*

(14.) $\$85.45 \times .06 = \5.127 : $\$5.127 \times 4 = \20.51 :
 $\$20.51 + \$85.45 = \$105.96$, *Ans.*

(15.) $\$325 \times .05\frac{2}{3} = \17.55 : $\$17.55 \times 3 = \52.65 : $\$52.65$
 $+ \$325 = \377.65 , *Ans.*

(16.) $\$129.36 \times .04\frac{2}{3} = \5.6595 : $\$5.6595 \times 4 = \22.638 :
 $\$22.64 + \$129.36 = \$152$, *Ans.*

(17.) $\$8745 \times .16 = \1399.20 , $+ \$8745 = \10144.20 , *Ans.*

(18.) $\$300 @ 6\%$, 1 yr. = $\$18$: 1 mo. = $\frac{1}{12}$ yr.: $\$18 \div$
 $12 = \$1.50$, *Ans.*

(19.) $\$240 \times .08 = \19.20 : 2 mo. = $\frac{1}{6}$ yr.: $\$19.20 \div 6 =$
 $\$3.20$, *Ans.*

(20.) $\$50 \times .06 = \3.00 : 5 mo. = $\frac{5}{12}$ yr.: $\frac{5}{12}$ of $\$3.00$
 $= \$1.25$, *Ans.*

(21.) $\$86 \times .06 = \5.16 : 3 mo. = $\frac{1}{4}$ yr.: $\frac{1}{4}$ of $\$5.16 =$
 1.29 , *Ans.*

(22.) $\$50 \times .08 = \4.00 : 4 mo. = $\frac{1}{3}$ yr.: $\frac{1}{3}$ of $\$4.00 =$
 $\$1.33$, *Ans.*

(23.) $\$150.25 \times .08 = \12.02 : 6 mo. = $\frac{1}{2}$ yr.: $\frac{1}{2}$ of $\$12.02$
 $= \$6.01$: $\$150.25 + \$6.01 = \$156.26$, *Ans.*

(24.) $\$360 \times .05 = \18 : 7 mo. = $\frac{7}{12}$ yr.: $\frac{7}{12}$ of $\$18 =$
 $\$10.50$: $\$360 + \$10.50 = \$370.50$, *Ans.*

(25.) $\$204 \times .07 = \14.28 : 11 mo. = $\frac{11}{12}$ yr.: $\frac{11}{12}$ of $\$14.28$
 $= \$13.09$: $\$13.09 + \$204 = \$217.09$, *Ans.*

(26.) $\$228 \times .06 = \13.68 : 9 mo. = $\frac{3}{4}$ yr.: $\frac{3}{4}$ of $\$13.68 = \10.26 : $\$10.26 + \$228 = \$238.26$, *Ans.*

(27.) $\$137.50 \times .06 = \8.25 : 8 mo. = $\frac{2}{3}$ yr.: $\frac{2}{3}$ of $\$8.25 = \5.50 : $\$137.50 + \$5.50 = \$143$, *Ans.*

(28.) $\$7596 \times .08 = \607.68 : 10 mo. = $\frac{5}{6}$ yr.: $\frac{5}{6}$ of $\$607.68 = \506.40 : $\$7596 + \$506.40 = \$8102.40$, *Ans.*

(29.) $\$360 \times .06 = 21.60$: 20 da. = $\frac{20}{360}$ yr. = $\frac{1}{18}$ yr.: $\frac{1}{18}$ of $\$21.60 = \1.20 , *Ans.*

(30.) $\$726 \times .06 = \43.56 : 10 da. = $\frac{10}{360} = \frac{1}{36}$ yr.: $\frac{1}{36}$ of $\$43.56 = \1.21 , *Ans.*

(31.) $\$1200 \times .06 = \72 : 15 da. = $\frac{15}{360} = \frac{1}{24}$ yr.: $\frac{1}{24}$ of $\$72 = \3 , *Ans.*

(32.) $\$180 \times .08 = \14.40 : 19 da. = $\frac{19}{360}$ yr.: $\frac{19}{360}$ of $\$14.40 = 76$ ct., *Ans.*

(33.) $\$240 \times .07 = \16.80 : 27 da. = $\frac{27}{360} = \frac{3}{40}$ yr.: $\frac{3}{40}$ of $\$16.80 = \1.26 , *Ans.*

(34.) $\$320 \times .05 = \16.00 : 21 da. = $\frac{20}{360} = \frac{7}{120}$ yr.: $\frac{7}{120}$ of $\$16 = 93$ ct., *Ans.*

(35.) $\$450 \times .10 = \45 : 25 da. = $\frac{25}{360} = \frac{5}{72}$ yr.: $\frac{5}{72}$ of $\$45 = \3.13 , *Ans.*

(36.) $\$100.80 \times .05 = \50.4 : 28 da. = $\frac{28}{360} = \frac{7}{90}$ yr.: $\frac{7}{90}$ of $\$50.4 = \0.39 : $\$0.39 + \$100.80 = \$101.19$, *Ans.*

(37.) $\$150 \times .05 = \7.50 : 18 da. = $\frac{18}{360} = \frac{1}{20}$ yr.: $\frac{1}{20}$ of $\$7.50 = \0.375 : $\$150 + \$0.375 = \$150.38$, *Ans.*

(38.) $\$360 \times .06 = \21.60 : 11 da. = $\frac{11}{360}$ yr.: $\frac{11}{360}$ of $\$21.60 = \0.66 : $\$0.66 + \$360 = \$360.66$, *Ans.*

(39.) $\$264 \times .06 = \15.84 : 9 da. = $\frac{9}{360} = \frac{1}{40}$ yr.: $\frac{1}{40}$ of $\$15.84 = \$0.396 = \$0.40$: $\$0.40 + \$264 = \$264.40$, *Ans.*

(40.) $\$900 \times .07 = \63 : 14 da. = $\frac{14}{360} = \frac{7}{180}$ yr.: $\frac{7}{180}$ of $\$63 = \2.45 : $\$2.45 + \$900 = \$902.45$, *Ans.*

(41.) $\$430 \times .04\frac{1}{2} = \19.35 : 19 da. = $\frac{19}{360}$ yr.: $\frac{19}{360}$ of $\$19.35 = \1.02 : $\$1.02 + \$430 = \$431.02$, *Ans.*

(42.) $\$150 \times .06 = \9 : 4 yr. 2 mo. = $4\frac{1}{6}$ yr. = $\frac{25}{6}$ yr.: $\frac{25}{6}$ of $\$9 = \37.50 , *Ans.*

(43.) $\$375.40 \times .06 = \22.524 8 mo. = $\frac{2}{3}$ yr.
 $\frac{2}{3}$ of $\$22.524 = \frac{15.016}{\$37.54}$, *Ans.*

(44.) $\$92.75 \times .06 = \5.565 : 3 yr. 5 mo. = $3\frac{5}{12}$ yr. = $4\frac{1}{2}$ yr.:
 $\frac{1}{2}$ of $\$5.565 = \19.01 , *Ans.*

(45.) $\$500 \times .06 = \$30.00 = \text{int. 1 yr.}$
 1 yr. 1 mo. 18 da. = $1\frac{2}{3}$ yr. = $\frac{17}{9}$ yr.
 $\frac{17}{9}$ of $\$30 = \34 , *Ans.*

(46.) $\$560 \times .08 = \44.80 .
 2 yr. 4 mo. 15 da. = $2\frac{3}{8}$ yr. = $\frac{19}{8}$ yr.
 $\frac{19}{8}$ of $\$44.80 = \106.40 , *Ans.*

(47.) $\$750 \times .06 = \45 .
 4 yr. 3 mo. 6 da. = $4\frac{4}{15}$ yr. = $\frac{64}{15}$ yr.
 $\frac{64}{15}$ of $\$45 = \192 , *Ans.*

(48.) $\$456 \times .05 = \22.80 .
 3 yr. 5 mo. 18 da. = $3\frac{7}{15}$ yr. = $\frac{52}{15}$ yr.
 $\frac{52}{15}$ of $\$22.80 = 79.04$, *Ans.*

(49.) $\$216 \times .10 = \21.60 .
 5 yr. 7 mo. 27 da. = $5\frac{79}{120}$ yr. = $\frac{619}{120}$ yr.
 $\frac{619}{120}$ of $\$21.60 = \122.22 , *Ans.*

(50.) $\$380 \times .15 = \57.00 .
 3 yr. 9 mo. 9 da. = $3\frac{31}{40}$ yr. = $\frac{151}{40}$ yr.
 $\frac{151}{40}$ of $\$57 = \215.18 , *Ans.*

(51.) $\$300 \times .06 = \18 .
 3 yr. 8 mo. = $3\frac{2}{3}$ yr. = $\frac{11}{3}$ yr.
 $\frac{11}{3}$ of $\$18 = \66 int.;
 $\$300 + \$66 = \$366$, *Ans.*

- (52.) $\$250 \times .06 = \$15.00 = \text{int. } 1 \text{ yr.}$
 $1 \text{ yr. } 7 \text{ mo.} = 1\frac{7}{12} \text{ yr.} = 1\frac{1}{2} \text{ yr.}$
 $\frac{1}{2} \text{ of } \$15 = \$7.50.$
 $\$250 + \$7.50 = \$257.50, \text{ Ans.}$
- (53.) $\$205.25 \times .06 = \$12.315.$
 $2 \text{ yr. } 8 \text{ mo. } 15 \text{ da.} = 2\frac{17}{24} \text{ yr.} = \frac{5}{4} \text{ yr.}$
 $\frac{5}{4} \text{ of } \$12.315 = \$30.7875 \text{ int.}$
 $\$205.25 + \$30.7875 = \$236.0375, \text{ Ans.}$
- (54.) $\$150.62 \times .05 = \$7.5310.$
 $3 \text{ yr. } 5 \text{ mo. } 12 \text{ da.} = 3\frac{9}{20} \text{ yr.} = \frac{69}{20} \text{ yr.}$
 $\frac{9}{20} \text{ of } \$7.531 = \$6.75275.$
 $\$150.62 + \$6.75275 = \$157.37275, \text{ Ans.}$
- (55.) $\$210.25 \times .07 = \$14.7175.$
 $2 \text{ yr. } 7 \text{ mo. } 20 \text{ da.} = 2\frac{23}{30} \text{ yr.} = \frac{62}{15} \text{ yr.}$
 $\frac{23}{30} \text{ of } \$14.7175 = \$11.2525.$
 $\$210.25 + \$11.2525 = \$221.5025, \text{ Ans.}$
- (56.) $\$57.85 \times .05 = \$2.8925.$
 $2 \text{ yr. } 3 \text{ mo. } 23 \text{ da.} = 2\frac{11}{12} \text{ yr.} = \frac{25}{6} \text{ yr.}$
 $\frac{11}{12} \text{ of } \$2.8925 = \$2.645833.$
 $\$57.85 + \$2.645833 = \$60.495833, \text{ Ans.}$
- (57.)

yr.	mo.	da.	
1902	4	19	
1900	1	9	
2	3	10	

 $\$150 \times .06 = \$9.00.$
 $2 \text{ yr. } 3 \text{ mo. } 10 \text{ da.} = 2\frac{5}{12} \text{ yr.} = 2\frac{1}{4} \text{ yr.}$
 $\frac{1}{4} \text{ of } \$9 = \$2.25, \text{ Ans.}$
- (58.)

yr.	mo.	da.	
1903	4	27	
1902	2	15	
1	2	12	

 $\$240 \times .08 = \$19.20 = \text{int. } 1 \text{ yr.}$
 $1 \text{ yr. } 2 \text{ mo. } 12 \text{ da.} = 1\frac{1}{3} \text{ yr.} = \frac{4}{3} \text{ yr.}$
 $\frac{1}{3} \text{ of } \$19.20 = \$6.40, \text{ Ans.}$

(59.) yr. mo. da.

1903 8 28

1901 5 14

2 3 14

$$\$180 \times .07 = \$12.60 = \text{int. 1 yr.}$$

$$2 \text{ yr. } 3 \text{ mo. } 14 \text{ da.} = 2\frac{1}{4}\frac{3}{8} \text{ yr.} = 2\frac{10}{8} \text{ yr.}$$

$$2\frac{10}{8} \text{ of } \$12.60 = \$28.84, \text{ Ans.}$$

(60.) mo. da.

11 27

7 3

4 24

$$\$137.50 \times .09 = \$12.375 = \text{int. 1 yr.}$$

$$4 \text{ mo. } 24 \text{ da.} = \frac{2}{3} \text{ yr.}$$

$$\frac{2}{3} \text{ of } \$12.375 = \$4.95, \text{ Ans.}$$

(61.) mo. da.

8 28

3 1

5 27

$$\$125.40 \times .08\frac{1}{2} = \$10.659 = \text{int. 1 yr.}$$

$$5 \text{ mo. } 27 \text{ da.} = \frac{5}{12}\frac{9}{10} \text{ yr.}$$

$$\frac{5}{12}\frac{9}{10} \text{ of } \$10.659 = \$5.24.$$

$$\$125.40 + \$5.24 = \$130.64, \text{ Ans.}$$

(62.) yr. mo. da.

1903 3 9

1902 8 2

7 7

$$\$234.60 \times .05\frac{1}{4} = \$12.3165 = \text{int. 1 yr.}$$

$$7 \text{ mo. } 7 \text{ da.} = \frac{2}{8}\frac{1}{8}\frac{7}{10} \text{ yr.}$$

$$\frac{2}{8}\frac{1}{8}\frac{7}{10} \text{ of } \$12.3165 = \$7.42.$$

$$\$234.60 + \$7.42 = \$242.02, \text{ Ans.}$$

(63.) yr. mo. da.

1905 7 24

1904 10 25

8 29

$$\$153.80 \times .05 = \$7.69 = \text{int. 1 yr.}$$

$$8 \text{ mo. } 29 \text{ da.} = \frac{2}{3}\frac{8}{10} \text{ yr.}$$

$$\frac{2}{3}\frac{8}{10} \text{ of } \$7.69 = \$5.75;$$

$$\$153.80 + \$5.75 = \$159.55, \text{ Ans.}$$

Art. 184.

- (3.) Int. on \$1 for 7 mo. @ 6% = \$.035
 Int. on \$1 for 24 da. @ 6% = .004
 Int. on \$1 for 7 mo. 24 da @ 6% = \$.039, *Ans.*
- (4.) Int. on \$1 for 10 mo. @ 6% = \$.05
 Int. on \$1 for 15 da. @ 6% = .0025
 Int. on \$1 for 10 mo. 15 da. @ 6% = \$.0525
 5% = $\frac{5}{6}$ of 6% ; $\frac{5}{6}$ of \$.0525 = \$.043 $\frac{1}{2}$, *Ans.*
- (5.) Int. on \$1 for 11 mo. @ 6% = \$.055
 Int. on \$1 for 18 da. @ 6% = .003
 Int. on \$1 for 11 mo. 18 da. @ 6% = \$.058
 9% = $\frac{3}{2}$ of 6% ; $\frac{3}{2}$ of \$.058 = \$.087, *Ans.*
- (6.) Int. on \$1 for 1 yr. 2 mo. = 14 mo. @ 6% = \$.07
 Int. on \$1 for 9 da. @ 6% = .001 $\frac{1}{2}$
 Int. on \$1 for 1 yr. 2 mo. 9 da. @ 6% = \$.071 $\frac{1}{2}$, *Ans.*
- (7.) Int. on \$1 for 2 yr. 5 mo. = 29 mo. @ 6% = \$.145
 Int. on \$1 for 12 da. @ 6% = .002
 Int. on \$1 for 2 yr. 5 mo. 12 da. @ 6% = \$.147
 8% = $\frac{4}{5}$ of 6% ; $\frac{4}{5}$ of \$.147 = \$.196, *Ans.*
- (8.) Int. on \$1 for 3 yr. 10 mo. = 46 mo. @ 6% = \$.23
 Int. on \$1 for 17 da. @ 6% = .002 $\frac{5}{8}$
 Int. on \$1 for 3 yr. 10 mo. 17 da. @ 6% = \$.232 $\frac{5}{8}$
 10% = $\frac{5}{3}$ of 6% ; $\frac{5}{3}$ of \$.232 $\frac{5}{8}$ = \$.388 $\frac{1}{8}$, *Ans.*
- (9.) Int. on \$1 for 4 yr. 3 mo. = 51 mo. @ 6% = \$.255
 Int. on \$1 for 11 da. @ 6% = .001 $\frac{5}{8}$
 Int. on \$1 for 4 yr. 3 mo. 11 da. @ 6% = \$.256 $\frac{5}{8}$
 7% = $\frac{7}{6}$ of 6% ; $\frac{7}{6}$ of \$.256 $\frac{5}{8}$ = \$.299 $\frac{3}{8}$, *Ans.*

(10.)

Int. on \$1 for 5 yr. 7 mo. = 67 mo. @ 6% = \$.335

Int. on \$1 for 24 da. @ 6% = .004

Int. on \$1 for 5 yr. 7 mo. 24 da. @ 6% = \$.339

 $4\% = \frac{2}{5}$ of 6%; $\frac{2}{5}$ of \$.339 = \$.226, *Ans.*

(11.) Int. on \$1 for 6 mo. 21 da. @ 6% = \$.0335

 $$.0335 \times 40 = $1.34, \text{ Ans.}$ (12.) Int. \$1 for 8 mo. 24 da. @ 6% = \$.044: int. \$1 for 8 mo. 24 da. @ 9% = $\frac{3}{2}$ of \$.044 = \$.066: $$.066 \times 50 = $3.30, \text{ Ans.}$ (13.) Int. \$1 for 10 mo. 12 da. @ 6% = \$.052: Int. \$1 for 10 mo. 12 da. @ 7% = $\frac{7}{6}$ of \$.052 = \$.060 $\frac{1}{3}$: $$.060\frac{1}{3} \times 120 = $7.28, \text{ Ans.}$ (14.) Int. \$1 for 11 mo. 15 da. @ 6% = \$.0575: $$.0575 \times 200 = $11.50, \text{ Ans.}$ (15.) 1 yr. 3 mo. = 15 mo.: int. \$1 for 15 mo. 6 da. @ 6% = \$.076: @ 3% = $\frac{1}{2}$ of \$.076 = \$.038: $$.038 \times 500 = $19, \text{ Ans.}$ (16.) 1 yr. 5 mo. = 17 mo.: int. \$1 for 17 mo. 27 da. @ 6% = \$.0895: @ 8% = $\frac{4}{3}$ of \$.0895 = \$.119 $\frac{1}{3}$: $$.119\frac{1}{3} \times 750 = $89.50, \text{ Ans.}$ (17.) 1 yr. 9 mo. = 21 mo.: int. \$1 for 21 mo. 3 da. @ 6% = \$.105 $\frac{1}{2}$: $$.105\frac{1}{2} \times 48.75 = $5.14, \text{ Ans.}$ (18.) 1 yr. 10 mo. = 22 mo.: int. \$1 for 22 mo. 25 da. @ 6% = \$.114 $\frac{1}{3}$: @ 4% = $\frac{2}{3}$ of \$.114 $\frac{1}{3}$ = \$.076 $\frac{1}{3}$: $$.076\frac{1}{3} \times 76.32 = $5.81, \text{ Ans.}$ (19.) 2 yr. 1 mo. = 25 mo.: int. \$1 for 25 mo. 9 da. @ 6% = \$.126 $\frac{1}{2}$: @ 5% = $\frac{5}{6}$ of \$.126 $\frac{1}{2}$ = \$.105 $\frac{5}{12}$: $$.105\frac{5}{12} \times 600 = $63.25: $600 + $63.25 = $663.25, \text{ Ans.}$

(20.) 2 yr. 4 mo. = 28 mo.: int. \$1 @ 6% for 28 mo. 10 da.
= \$0.141 $\frac{2}{3}$: \$0.141 $\frac{2}{3}$ \times 900 = \$127.50: \$900 + \$127.50 =
\$1027.50, *Ans.*

(21.) 2 yr. 7 mo. = 31 mo.: int. \$1 @ 6% for 31 mo. 17 da.
= \$0.157 $\frac{1}{3}$: @ 9% = $\frac{3}{4}$ of \$0.157 $\frac{1}{3}$ = \$0.236 $\frac{1}{4}$: \$0.236 $\frac{1}{4}$ \times
86.25 = \$20.419 +: \$86.25 + \$20.42 = \$106.67, *Ans.*

(22.) 3 yr. 2 mo. = 38 mo.: int. \$1 for 38 mo. 13 da. @
6% = \$0.192 $\frac{1}{2}$: @ 8% = $\frac{4}{5}$ of \$0.192 $\frac{1}{2}$ = \$0.256 $\frac{2}{5}$: \$0.256 $\frac{2}{5}$
 \times 450 = \$115.30: \$450 + \$115.30 = \$565.30, *Ans.*

(23.) 3 yr. 5 mo. = 41 mo.: int. \$1 for 41 mo. 22 da. @
6% = \$0.208 $\frac{2}{3}$: @ 4% = $\frac{2}{3}$ of \$0.208 $\frac{2}{3}$ = \$0.139 $\frac{1}{3}$: \$0.139 $\frac{1}{3}$
 \times 534.78 = \$74.39 +: \$534.78 + \$74.39 = \$609.17, *Ans.*

(24.) 3 yr. 11 mo. = 47 mo.: int. \$1 @ 6% for 47 mo. 15
da. = \$0.237 $\frac{1}{2}$: @ 10% = $\frac{5}{8}$ of \$0.237 $\frac{1}{2}$ = \$0.395 $\frac{5}{8}$: \$0.395 $\frac{5}{8}$
 \times 1200 = \$475: \$1200 + \$475 = \$1675, *Ans.*

Art. 185.

(4.) Int. on \$200 for 1 yr. @ 6% = \$12.00: 36 + 12 = 3.
Ans. 3 yr.

(5.) Int. on \$60 for 1 yr. @ 5% = \$3.00: \$72 - \$60 =
\$12: 12 + 3 = 4. *Ans.* 4 yr.

(6.) If the principal is doubled, the int. will equal 100%.
100% \div 6% = 16 $\frac{2}{3}$: $\frac{2}{3}$ yr. = 8 mo. *Ans.* 16 yr. 8 mo.

(7.) Int. on \$375 for 1 yr. @ 8% = \$30: 90 + 30 = 3.
Ans. 3 yr.

(8.) Int. on \$600 @ 9% for 1 yr. = \$54: \$798 - \$600
= \$198: 198 + 54 = 3 $\frac{3}{4}$ = 3 yr. 8 mo., *Ans.*

(9.) $100(\%) \div 10(\%) = 10$. *Ans.* 10 yr.

(10.) Int. on \$250 for 1 yr. @ 6% = \$15: $34.50 \div 15 = 2.30$ or $2\frac{3}{10}$ yr.: $\frac{3}{10}$ yr. = $3\frac{3}{8}$ mo.: $\frac{3}{8}$ mo. = 18 da.
Ans. 2 yr. 3 mo. 18 da.

(11.) The int. on \$60 for 1 yr. @ 6% = \$3.60: \$73.77 - \$60 = \$13.77: $13.77 \div 3.60 = 3.825$ or $3\frac{33}{40}$ yr.: $\frac{33}{40}$ yr. = $9\frac{9}{10}$ mo.: $\frac{9}{10}$ mo. = 27 da. *Ans.* 3 yr. 9 mo. 27 da.

(12.) If the principal is trebled, the int. will equal 200%. $200(\%) \div 6(\%) = 33\frac{1}{3}$: $\frac{1}{3}$ yr. = 4 mo. *Ans.* 33 yr. 4 mo.

(13.) Int. on \$400 for 1 yr. @ 7% = \$28: $68.60 \div 28 = 2.45$ or $2\frac{9}{20}$ yr.: $\frac{9}{20}$ yr. = $5\frac{4}{10}$ mo.: $\frac{4}{10}$ mo. = 12 da.
Ans. 2 yr. 5 mo. 12 da.

(14.) Int. on \$700 for 1 yr. @ 9% = \$63: \$924.70 - \$700 = \$224.70: $224.70 \div 63 = 3.566+$ or $3\frac{57}{100}$ yr.: $\frac{57}{100}$ yr. = $6\frac{7}{100}$ mo.: $\frac{7}{100}$ mo. = $23\frac{9}{10}$ da. *Ans.* 3 yr. 6 mo. 24 da.

(15.) If the principal is increased one half, the int. will equal 50%. $50(\%) \div 8(\%) = 6\frac{1}{4}$: $\frac{1}{4}$ yr. = 3 mo. *Ans.* 6 yr. 3 mo.

(16.) Int. on \$1200 for 1 yr. @ 10% = \$120: \$1675 - \$1200 = \$475: $475 \div 120 = 3.959+$ or $3\frac{96}{100}$ yr.: $\frac{96}{100}$ yr. = $11\frac{52}{100}$ mo.: $\frac{52}{100}$ mo. = 15 + da. *Ans.* 3 yr. 11 mo. 15 da.

(17.) $100(\%) \div 4(\%) = 25$. *Ans.* 25 yr.

Art. 186.

(3.) $\$48 \div 2 = \$24 = \text{int. 1 yr.}$: $24 \div 600 = .04 = 4\%$, *Ans.*

(4.) 2 yr. 6 mo. = $2\frac{1}{2}$ or $\frac{5}{2}$ yr. If int. for $\frac{5}{2}$ yr. = \$200, for $\frac{1}{2}$ yr. = \$40, and for 1 yr. = \$80: $80 \div 1000 = .08 = 8\%$, *Ans.*

(5.) 2 yr. 4 mo. 24 da. = $2\frac{2}{3}$ or $1\frac{2}{3}$ yr.: $\$310 - \$250 = \$60$. If int. for $1\frac{2}{3}$ yr. = $\$60$, for $\frac{1}{3}$ yr. = $\$5$, and for 1 yr. = $\$25$: $25 \div 250 = .10 = 10\%$, *Ans.*

(6.) $\$23.40 \div 2 = \$11.70 = \text{int. 1 yr.}$: $11.70 \div 260 = .04\frac{1}{2} = 4\frac{1}{2}\%$, *Ans.*

(7.) Since the int. for $12\frac{1}{2}$ or $2\frac{1}{2}$ yr. is 100%, for $\frac{1}{2}$ yr. it is $\frac{100}{25} = 4\%$, and for 1 yr. = 8% , *Ans.*

(8.) $\$250.25 - \$175 = \$75.25$: 3 yr. 7 mo. = $3\frac{7}{12}$ or $4\frac{1}{2}$ yr. Since $\$75.25 = \text{int. for } 4\frac{1}{2} \text{ yr.}$, for $1\frac{1}{2}$ yr. = $\$75.25 \div 3 = \$25.08\bar{3}$, and for 1 yr. = $\$25.08\bar{3} \times 12 = \301 : $301 \div 2500 = .1204 = 12\%$, *Ans.*

(9.) 1 yr. 8 mo. 12 da. = $1\frac{7}{10}$ or $1\frac{7}{10}$ yr.: $\$61.20 \div 17 = \3.60 , $\times 10 = \$36 = \text{int. 1 yr.}$: $36 \div 450 = 0.08 = 8\%$, *Ans.*

(10.) 11 yr. 1 mo. 10 da. = $11\frac{1}{12}$ or $11\frac{1}{12}$ yr. Since the int. for $11\frac{1}{12}$ yr. = 100%, for $\frac{1}{12}$ yr. = 1% , and for 1 yr. = 12% , *Ans.*

(11.) $\$746.20 - \$650 = \$96.20$: 2 yr. 5 mo. 18 da. = $2\frac{7}{12}$ or $2\frac{7}{12}$ yr.: $\$96.20 \div 37 = \2.60 , $\times 15 = \$39 = \text{int. 1 yr.}$: $39 \div 650 = .06 = 6\%$, *Ans.*

(12.) $\$110.40 \div 6 = \$18.40 = \text{int. 1 yr.}$: $18.40 \div 640 = .027\bar{5} = 2\frac{3}{4}\%$, *Ans.*

Art. 187.

(3.) The int. of $\$1$ for 3 yr. at 5% is 15 ct. It will take as many dollars to gain $\$8.25$ int. as 15 ct. are contained times in $\$8.25 = 55$ times. *Ans.* $\$55$.

(4.) Int. of $\$1$ for 3 yr. at $5\% = 15$ ct.: $\$341.25 \div .15 = \2275 , *Ans.*

(5.) 1 yr. 4 mo. = $1\frac{1}{3}$ yr.: 6% for 1 yr. = $.06$, and for $1\frac{1}{3}$ yr. = $.08$: $\$226 \div .08 = \2825 , *Ans.*

(6.) Int. of \$1 = 5 ct.: $\$1023.75 \div .05 = \20475 , *Ans.*

(7.) The int. of \$1 for 1 yr. 6 mo. 27 da. at 12% = \$0.189: at 8% the int. is $\frac{2}{3}$ of \$0.189 = \$0.126: $\$30.24 \div .126 = \240 , *Ans.*

(8.) Int. of \$1 for 12 yr. 3 mo. 20 da. at 12% = \$1.476 $\frac{2}{3}$: at 9% = $\frac{3}{4}$ of \$1.476 $\frac{2}{3}$ = \$1.1075: $\$525.40 \div 1.1075 = \474.40 , *Ans.*

(9.) Int. at 12% on \$1 for 2 yr. 7 mo. 11 da. is \$0.313 $\frac{3}{8}$: at 4% it is $\frac{1}{3}$ of \$0.313 $\frac{3}{8}$ = \$0.104 $\frac{5}{8}$: $\$9.41 \div .104 $\frac{5}{8}$ = 90 , *Ans.*

(10.) The int. of \$1 for 5 yr. 8 mo. 24 da. at 12% is \$0.688: at 6% it is $\frac{1}{2}$ of \$0.688 = \$0.344: $\$28.38 \div .344 = \82.50 , *Ans.*

Art. 188.

(2.) 9 yr. $\times .05 = .45$: $\$435 \div 1.45 = \300 , *Ans.*

(3.) 4 yr. $\times .05 = .20$: $\$571.20 \div 1.20 = \$476 =$ principal: $\$571.20 - \$476 = \$95.20$, *Ans.*

(4.) 6 yr. $\times .07 = 0.42$: $\$532.50 \div 1.42 = \375 : $\$532.50 - \$375 = \$157.50$, *Ans.*

(5.) 2 yr. 9 mo. = 2 $\frac{3}{4}$ yr.: $2\frac{3}{4} \times .08 = 0.22$: $\$285.48 \div 1.22 = \234 , *Ans.*

(6.) 2 $\frac{1}{2}$ yr. $\times .06 = 0.15$: $\$690 \div 1.15 = \600 : $\$690 - \$600 = \$90$, *Ans.*

(7.) 3 yr. 4 mo. 24 da. = 3 $\frac{3}{8}$ yr.: $3\frac{3}{8} \times .07 = 0.238$: $\$643.760 \div 1.238 = \520 , *Ans.*

(8.) 4 yr. 3 mo. 27 da. = $4\frac{11}{16}$ yr.: $4\frac{11}{16} \times .04 = 0.173$: $\$914.940 \div 1.173 = \$780 =$ principal: $\$914.94 - \$780 = \$134.94$, *Ans.*

COMPOUND INTEREST.

Art. 190.

(2)	\$500	530	561.80
	<u>.06</u>	<u>.06</u>	<u>.06</u>
	30.00	31.80	33.7080
	<u>500</u>	<u>530</u>	<u>561.80</u>
	\$530, 1st yr.	\$561.80, 2d yr.	Ans. \$595.51

(3)	\$800	848	898.88	952.81
	<u>.06</u>	<u>.06</u>	<u>.06</u>	<u>.06</u>
	48.00	50.88	53.9328	57.1686
	<u>800</u>	<u>848</u>	<u>898.88</u>	<u>952.81</u>
	\$848, 1st yr.	\$898.88, 2d yr.	\$952.81, 3d yr.	\$1009.98, Ans.

(4)	\$250	15.90
	<u>.06</u>	<u>265</u>
	\$15.00 = 1st yr.	\$280.90
	<u>250</u>	<u>.06</u>
	265	\$16.8540 = 3d yr.
	<u>.06</u>	
	\$15.90 = 2d yr.	\$15 + \$15.90 + \$16.85 = \$47.75, Ans.

(5)	\$300	330.75
	<u>.05</u>	<u>.05</u>
	\$15.00 = 1st yr.	\$16.5375 = 3d yr.
	<u>300</u>	<u>330.75</u>
	315	347.29
	<u>.05</u>	<u>.05</u>
	\$15.75 = 2d yr.	\$17.3645 = 4th yr.
	<u>315</u>	
	\$330.75	\$15 + \$15.75 + \$16.54 + \$17.36 = \$64.65, Ans.

<p>(6.) \$200</p> <p style="padding-left: 2em;"><u>.03</u></p> <p> \$6.00 = 1st hf.-yr.</p> <p> 200</p> <p style="padding-left: 2em;"><u>206</u></p> <p> .03</p> <p> \$6.18 = 2d hf.-yr.</p> <p> 206</p> <p style="border-top: 1px solid black;">\$212.18</p>	<p>212.18</p> <p style="padding-left: 2em;"><u>.03</u></p> <p> \$6.3654 = 3d hf.-yr.</p> <p> 212.18</p> <p style="padding-left: 2em;"><u>218.55</u></p> <p> .03</p> <p> \$6.5565 = 4th hf.-yr.</p> <p> 206</p> <p style="border-top: 1px solid black;">\$6 + \$6.18 + \$6.36 + 6.56 = \$25.10, <i>Ans.</i></p>
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(7.) 20% annually = 5% quarterly.

1st qr., \$500 × .05 = \$25, + \$500 = \$525:

2d qr., \$525 × .05 = 26.25, + \$525 = \$551.25:

3d qr., \$551.25 × .05 = \$27.56, + 551.25 = \$578.81:

4th qr., \$578.81 × .05 = \$28.94, + \$578.81 = \$607.75:

5th qr., \$607.75 × .05 = \$30.39, + \$607.75 = \$638.14:

6th qr., \$638.14 × .05 = \$31.91, + \$638.14 = \$670.05:

7th qr., \$670.05 × .05 = \$33.50, + \$670.05 = \$703.55:

8th qr., \$703.55 × .05 = \$35.18, + \$703.55 = \$738.73, *Ans.*

(8.) Int. on \$300, 1 yr. @ 6% = \$18, + \$300 = \$318:

int. on \$318 for 1 yr. @ 6% = \$19.08, + \$318 = \$337.08:

int. on \$337.08, ½ yr. @ 6% = \$10.11, + \$337.08 = \$347.19:

\$347.19 - \$300 = \$47.19, *Ans.*

(9.) 6% int. annually = 3% semi-annually.

Int. 6 mo. on \$620 @ 3% = \$18.60, + \$ 620 = \$638.60:

int. 6 mo. on \$638.60 @ 3% = \$19.16, + \$638.60 = \$657.76:

int. 6 mo. on \$657.76 @ 3% = \$19.73, + \$657.76 = \$677.49:

int. 6 mo. on \$677.49 @ 3% = \$20.32, + \$677.49 = \$697.81:

int. 6 mo. on \$697.81 @ 3% = \$20.93, + \$697.81 = \$718.74:

int. 6 mo. on \$718.74 @ 3% = \$21.56, + \$718.74 = \$740.31:

int. 6 mo. on \$740.31 @ 3% = \$22.21, + \$740.30 = \$762.52,

Ans.

(1st. — Compound Interest.)

∴ (10.) 1st yr., int. on \$500 @ 6% = \$30, + \$500 = \$530:
 2d yr., int. on \$530 @ 6% = \$31.80, + \$530 = \$561.80:
 3d yr., int. on \$561.80 @ 6% = \$33.71, + \$561.80 = \$595.51:
 4th yr., int. on \$595.51 @ 6% = \$35.73, + \$595.51 = \$631.24:
 8 mo. = $\frac{2}{3}$ yr., int. on \$631.24 @ 6% = \$25.25, + \$631.24
 = \$656.49: \$656.49 - \$500 = \$156.49.

(2d. — Simple Interest.)

Int. on \$500 for 1 yr. @ 6% = \$30: int. on \$500 for $4\frac{2}{3}$
 yr. = \$140. \$156.49 - \$140 = \$16.49, *Ans.*

ANNUAL INTEREST.

Art. 191.

(2.) Int. @ 8% on \$800 for 3 yr. = \$192.00
 Int. @ 8% on \$800 for 1 yr. = \$64
 Int. on annual int. 1 yr. = \$5.12
 Int. on annual int. 3 yr. = \$15.36 .. 15.36
 Total interest, \$207.36
 Add principal, 800.00
Ans. \$1007.36

(3.) Int. on \$10000 for 4 yr. @ 5% = \$2000
 Annual int. = \$500
 Int. on annual int. = 25
 Int. on an. int. 3 + 2 + 1, or 6, yr. = 150
Ans. \$2150

(4.) yr. mo. da.
 1903 9 1
 1901 6 1
 —————
 2 3 = $2\frac{1}{4}$ yr.

Int. on \$500 for 1 yr. @ 6% = \$30.00	
Int. on \$500 for 2½ yr. @ 6% = 67.50 .. \$67.50	
Each semi-annual int. = 15.00	
Int. on int. each half-yr. = .45	
Interest on int. 3½ + 2½ + 1½ + ½, or 8, half-yr. . .	3.60
	Total interest, \$71.10
	Add principal, 500.00
	Ans. \$571.10

(5.)	yr.	mo.	da.	
	1907	9	20	
	1903	5	12	
	4	4	8	= 4¼ yr.

Int. on \$1200 for 1 yr. @ 6% = \$72.00	
Int. on \$1200 for 4¼ yr. @ 6% = 313.60 .. \$313.60	
Int. on annual int. 1 yr. = \$4.32	
Int. on an. int. 3¼ + 2¼ + 1¼ + ¼, or 7¼, yr. =	32.06
	Total interest, \$345.66
	Add principal, 1200.00
	Ans. \$1545.66

(6.)	yr.	mo.	da.	
	1901	5	1	
	1896	10	10	
	4	6	21	= 4¾ yr.

Int. on \$1500 for 1 yr. @ 5% = \$75.00	
Int. on \$1500 for 4¾ yr. @ 5% = 341.88 .. \$341.88	
Int. on an. int. 1 yr. = 3.75	
Int. on an. int. 3¾ + 2¾ + 1¾ + ¾, or 8¾, yr. =	30.87
	Total interest, \$372.75
	Add principal, 1500.00
	Ans. \$1872.75

(7.) Simple int. 1 yr. on \$1000 @ 6% = \$60; 5 yr. = \$300; int. on int. 1 yr. = \$3.60; for 4 + 3 + 2 + 1, or 10, yr. = \$36.00; annual int. = \$336; simple int. = \$300; difference = \$36,
Ans.

Art. 192.

yr.	mo.	da.		(2)
1902	3	1	.. \$44	\$350
1901	7	1		<u>14 = int. 8 mo.</u>
	8 mo.			\$364
1902	10	1	.. \$10	<u>44</u>
1902	3	1		\$320
	7 mo.			<u>16 = int. 7 + 3 = 10 mo.</u>
				\$336
1903	1	1	.. \$26	<u>36</u>
1902	10	1	.. \$36 ..	\$300
	3 mo.			<u>21.75 = int. 11 + 3½ = 14½ mo.</u>
				\$321.75
1903	12	1	.. \$15	<u>15.00</u>
1903	1	1		\$306.75, <i>Ans.</i>
	11 mo.			
1904	3	16		
1903	12	1		
	3	15	= 3½ mo.	

(3.) Amt. of \$200, 1 yr. @ 6% = \$212: \$212 - \$70 = \$142:
amt. of \$142, 1 yr. @ 6% = \$150.52, *Ans.*

			(4)	
1902	1	1	.. \$109	6% per yr. = 3% per ½ yr.
1901	7	1		\$300 \$6.00
	6 mo.			<u>.03</u> <u>200</u>
				9.00 206
1902	7	1		<u>300</u> <u>100</u>
1902	1	1		<u>309</u> <u>106</u>
	6 mo.			<u>109</u> <u>.03</u>
				200 3.18
1903	1	1		<u>200</u> <u>3.18</u>
1902	7	1		<u>.03</u> <u>106</u>
	6 mo.			6.00 \$109.18, <i>Ans.</i>

<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">1903</td> <td style="width: 10%;">9</td> <td style="width: 10%;">10</td> <td style="width: 10%;">..</td> <td style="width: 10%;">\$32</td> </tr> <tr> <td>1902</td> <td>5</td> <td>10</td> <td></td> <td></td> </tr> <tr> <td colspan="5" style="text-align: center; border-top: 1px solid black;">1 yr. 4 mo.</td> </tr> <tr> <td>1904</td> <td>9</td> <td>10</td> <td>..</td> <td>\$6.80</td> </tr> <tr> <td>1903</td> <td>9</td> <td>10</td> <td></td> <td></td> </tr> <tr> <td colspan="5" style="text-align: center; border-top: 1px solid black;">1 yr.</td> </tr> <tr> <td>1904</td> <td>11</td> <td>10</td> <td></td> <td></td> </tr> <tr> <td>1904</td> <td>9</td> <td>10</td> <td></td> <td></td> </tr> <tr> <td colspan="5" style="text-align: center; border-top: 1px solid black;">2 mo.</td> </tr> </table>	1903	9	10	..	\$32	1902	5	10			1 yr. 4 mo.					1904	9	10	..	\$6.80	1903	9	10			1 yr.					1904	11	10			1904	9	10			2 mo.					<p>(5)</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td>\$150</td> </tr> <tr> <td style="border-top: 1px solid black;">12 = int. for 1 yr. 4 mo.</td> </tr> <tr> <td>162</td> </tr> <tr> <td style="border-top: 1px solid black;">32</td> </tr> <tr> <td>130</td> </tr> <tr> <td style="border-top: 1px solid black;">9.10 = int. 1 yr. 2 mo.</td> </tr> <tr> <td>139.10</td> </tr> <tr> <td style="border-top: 1px solid black;">6.80</td> </tr> <tr> <td>\$132.30, <i>Ans.</i></td> </tr> </table>	\$150	12 = int. for 1 yr. 4 mo.	162	32	130	9.10 = int. 1 yr. 2 mo.	139.10	6.80	\$132.30, <i>Ans.</i>
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(8)

1901	2	1	..	\$25.40
1900	8	1		

6 mo.

1901	8	1	..	\$4.30
1901	2	1		

6 mo.

1902	1	1	..	\$30
1901	8	1		\$34.30

5 mo.

1902	7	1		
1902	1	1		

6 mo.

\$180

5.40 = int. 6 mo.

185.40

25.40

160

8.80 = int. 11 mo.

168.80

34.30

134.50

4.035 = int. 6 mo.

\$138.54, *Ans.*

(9)

1897	9	1	..	\$10
1897	3	1		

6 mo.

1898	1	1	..	\$30
1897	9	1		\$40.

4 mo.

1898	7	1	..	\$11
1898	1	1		

6 mo.

1898	9	1	..	\$80
1898	7	1		\$91.

2 mo.

1899 3 1

1898 9 1

6 mo.

\$400

20 = int. 10 mo. (6 + 4.)

420

40

380

15.10 = int. 8 mo. (6 + 2.)

395.20

91

304.20

9.126 = int. 6 mo.

\$313.33, *Ans.*

(10.) Days remaining in Jan., 19, + 29 (Feb., leap yr.) + 31 (Mar.) = 79: $90 - 79 =$ Apr. 11: int. on \$1, 90 da. @ 6% = \$0.015: $\$1780 \times .015 = \26.70 : $\$1780 - \$26.70 = \$1753.30$.
Ans. Apr. 11, \$26.70, \$1753.30.

(11.) Due 1 yr. after Sept. 15, 1904 = Sept. 15, 1905: number of days from May 18 to Sept. 15 = May, 13, June, 30, July, 31, Aug., 31, Sept., 15 = 120: int. on \$600 for 120 da. (4 mo.) at 10% = \$20: $\$600 - \$20 = \$580$.
Ans. Sept. 15, 1905, 120 da., \$20, \$580.

(12.) Due 3 mo. after May 6 = Aug. 6: June 19 to Aug. 6 = 48 da.: int. on \$1000, 48 da. at 6% = \$8: $\$1000 - \$8 = \$992$.
Ans. Aug. 6, 48 da., \$8, \$992.

2d. *When the note bears interest.*

(2.) 6 mo. from May 20, 1902 = Nov. 20: amt. of \$150 @ 6% int., 6 mo. = \$154.50: Sept. 6 to Nov. 20 = 75 da.: discount on \$154.50, 75 da. @ 8% = \$2.58: $\$154.50 - \$2.58 = \$151.92$.
Ans. Nov. 20, 1902, 75 da., \$2.58, \$151.92.

(3.) 1 yr. from Aug. 5, 1904 = Aug. 5, 1905: amt of \$300, 1 yr. @ 8% int. = \$324: Apr. 13 to Aug. 5 = 114 da.: discount on \$324, 114 da. @ 6% = \$6.16: $\$324 - \$6.16 = \$317.84 =$ proceeds.
Ans. Aug. 5, 1905, 114 da., \$6.16, \$317.84.

(4.) 10 mo. from Mar. 2, 1902 = Jan. 2, 1903: amt. of \$450, 10 mo. @ 6% = \$472.50: Aug. 11, 1902, to Jan. 2, 1903 = 144 da.: discount on \$472.50 for 144 da. @ 10% = \$18.90: $\$472.50 - \$18.90 = \$453.60 =$ proceeds.
Ans. Jan. 2, 1903, 144 da., \$18.90, \$453.60.

(5.) 2 yr. 4 mo. from May 1, 1896 = Sept. 1, 1898: amt. of \$650 for 2 yr. 4 mo. @ 9% = \$786.50: April 22, 1898,

to Sept. 1, 1898 = 132 da.: discount on \$786.50, for 132 da. at 6% = \$17.30: \$786.50 - \$17.30 = \$769.20 = proceeds.

Ans. Sept. 1, 1898, 132 da., \$17.30, \$769.20.

(6.) 6 mo. from Sept. 1, 1903 = Mar. 1, 1904: amt. of \$840, 6 mo. @ 10% = \$882: Dec. 17, 1903, to Mar. 1, 1904 = 75 da.: discount on \$882, 75 da. @ 8% = \$14.70: \$882 - \$14.70 = \$867.30 = proceeds.

Ans. Mar. 1, 1904, 75 da., \$14.70, \$867.30.

(7.) 9 mo. from Aug. 1, 1903 = May 1, 1904: amt. of \$1400 for 9 mo. @ 6% = \$1463: Jan. 17, 1904, to May 1, 1904 = 105 da.: discount on \$1463 for 105 da. @ 10% = \$42.67: \$1463 - \$42.67 = \$1420.33 = proceeds.

Ans. May 1, 1904, 105 da., \$42.67, \$1420.33.

(8.) 1 yr. 3 mo. from Oct. 4, 1896 = Jan. 4, 1898: amt. of \$2400 for 1 yr. 3 mo. @ 8% = \$2640: July 26, 1897 to Jan. 4, 1898 = 162 da.: discount on \$2640 for 162 da. @ 10% = \$118.80: \$2640 - \$118.80 = \$2521.20 = proceeds.

Ans. Jan. 4, 1898, 162 da., \$118.80, \$2521.20.

(9.) 1 yr. from Oct. 16, 1900 = Oct. 16, 1901: amt. of \$3500 @ 6%, 1 yr. = \$3710: May 13 to Oct. 16, 1901 = 156 da.: discount on \$3710, 156 da. @ 9% = \$144.69: \$3710 - \$144.69 = \$3565.31 = proceeds.

Ans. Oct. 16, 1901, 156 da., \$144.69, \$3565.31.

(10.) 1 yr. from May 11, 1895 = May 11, 1896: amt. of \$6000, 1 yr. @ 8% = 6480: Nov. 19, 1895, to May 11, 1896 = 174 da.: discount on \$6480, 174 da. @ 10% = \$313.20: \$6480 - \$313.20 = \$6166.80 = proceeds.

Ans. May 11, 1896, 174 da., \$313.20, \$6166.80.

Art. 197.

(2.) Bank discount on \$1, 60 da. @ 6% = \$0.01: \$1 - \$0.01 = \$0.99: \$198 ÷ .99 = \$200, *Ans.*

(3.) Discount on \$1, 90 da. @ 6% = \$0.015: \$1 - \$0.015 = \$0.985: \$394 ÷ .985 = \$400, *Ans.*

(4.) Discount on \$1, 5 mo. @ 8% = \$0.033½: \$1 - \$0.033½ = \$0.966½: \$217.50 ÷ .966½ = \$225, *Ans.*

(5.) Discount on \$1, 4 mo. @ 6% = \$0.02: \$1 - \$0.02 = \$0.98: \$352.80 ÷ .98 = \$360, *Ans.*

(6.) Discount on \$1, 30 da. @ 6% = \$0.005: \$1 - \$0.005 = \$0.995: \$400 ÷ .995 = \$402.02 (nearly), *Ans.*

(7.) Discount on \$1, 2 mo. @ 8% = \$0.01½: \$1 - \$0.01½ = \$0.98½: \$500 ÷ .98½ = \$506.76 (nearly), *Ans.*

(8.) Discount on \$1, 6 mo. @ 10% = \$0.05: \$1 - \$0.05 = 0.95: \$1500 ÷ .95 = \$1578.95 (nearly), *Ans.*

Art. 199.

(3.) Amt. of \$1, 2 yr. @ 6% = \$1.12: \$224 ÷ 1.12 = \$200 = present worth.

(4.) Amt. of \$300 for 2 yr. @ 8% = \$348: amt. of \$1 for 2 yr. @ 6% = \$1.12: \$348 ÷ 1.12 = \$310.71 = present worth.

(5.) Amt. of \$1, 5 yr. 10 mo. @ 6% = \$1.35: \$675 ÷ 1.35 = \$500 = present worth.

(6.) Amt. of \$1, 5 mo. @ 10% = \$1.04166+: \$368.75 ÷ 1.04166 = \$354 = present worth.

(7.) Amt. of \$1, 4 mo. @ 10% = \$1.03½: \$775 ÷ 1.03½ = \$750, *Ans.*

(8.) Amt. of \$1, 8 mo. @ 6% = \$1.04: \$260 ÷ 1.04 = \$250, *Ans.*

(9.) \$2480 - its 5% (\$124) = \$2356 = cash cost. Amt. of \$1, 4 mo. @ 10% = \$1.03½: \$2480 ÷ 1.03½ = \$2400, present worth: \$2400 - \$2356 = \$44, *Ans.*

$$(10.) \frac{1}{3} \text{ of } \$956.34 = \$318.78$$

$$\text{Amt. of } \$1, 1 \text{ yr. @ } 5\% = \$1.05: \$318.78 \div 1.05 = \$303.60$$

$$\text{Amt. of } \$1, 2 \text{ yr. @ } 5\% = \$1.10: \$318.78 \div 1.10 = \$289.80$$

$$\text{Amt. of } \$1, 3 \text{ yr. @ } 5\% = \$1.15: \$318.78 \div 1.15 = \$277.20$$

$$\text{Ans. } \$870.60$$

$$(11.) \$750 - (\$750 \times .04) = \$720, \text{ cash cost. Amt. of } \$1 \text{ for 3 mo. @ } 8\% = \$1.02: \$750 \div 1.02 = \$735.29, \text{ present worth: } \$735.29 - \$720 = \$15.29, \text{ Ans.}$$

EXCHANGE.

Art. 201.

$$(1.) 1\% \text{ of } \$1400 = \$14: \frac{1}{2}\% = \$\frac{1}{2} = \$7: \$1400 \div \$7 = \$1407, \text{ Ans.}$$

$$(2.) \frac{1}{2}\% \text{ of } \$2580 = \$12.90: \$2580 - \$12.90 = \$2567.10, \text{ Ans.}$$

$$(3.) \$375.87 = 100\% + \frac{1}{8}\% \text{ of the face: } \$375.87 \div 100\frac{1}{8}\% = \$375.40, \text{ Ans.}$$

$$(4.) \frac{1}{4}\% \text{ of } \$2785 = \$6.96: \$2785 - \$6.96 = \$2778.04, \text{ Ans.}$$

$$(5.) 100\% - 1\frac{1}{4}\% = 98\frac{3}{4}\% = .9875: \$1852.55 \div .9875 = \$1876, \text{ Ans.}$$

$$(6.) \text{Int. of } \$5680 \text{ for 60 da. @ } 6\% = \$56.80: \frac{1}{2}\% \text{ prem. on } \$5680 = \$28.40: \$56.80 - \$28.40 = \$28.40: \$5680 - \$28.40 = \$5651.60, \text{ Ans.}$$

$$(7.) \text{Int. of } \$1575 \text{ for 30 da. @ } 6\% = \$7.875: \frac{3}{4}\% \text{ prem. on } \$1575 = \$11.81: \$11.81 - \$7.875 = 3.935: \$1575 + \$3.935 = \$1578.94, \text{ Ans.}$$

$$(8.) \text{Int. of } \$2625 \text{ for 60 da. @ } 6\% = \$26.25: 1\frac{1}{2}\% \text{ prem. on } \$2625 = \$39.37: \$39.37 - \$26.25 = \$13.12: \$2625 + \$13.12 = \$2638.12, \text{ Ans.}$$

Art. 203.

(3.) $8s. = \frac{4}{10}\text{£} : \text{£}890.4 \times 4.86 (\$)= \$4327.34, \text{ Ans.}$

(4.) $\$2130.12 \div 4.88 = 436, \text{ with } 244 \text{ rem.} : 244 \times 20s. + 4.88 = 10. \text{ Ans. } \text{£}436 \text{ } 10s.$

(5.) $5 \text{ fr. } 15 \text{ centimes} = 5\frac{3}{20} \text{ fr.} : 1290 + 5\frac{3}{20} = \$250.49, \text{ Ans.}$

(6.) $\$1657.60 \times 5\frac{16}{100} = 8553 \text{ fr. } 22 \text{ centimes, Ans.}$

(7.) $\$12680 \div 4 = 3170, \times .97 = \$3074.90, \text{ Ans.}$

(8.) If 4 marks = \$.98, 1 m. = \$.245: $\$1470 + .245 = 6000 \text{ m., Ans.}$

INSURANCE.

Art. 205.

(2.) $\frac{1}{4}$ of \$5000 = \$3750: $\frac{1}{2}\%$ of \$3750 = \$18.75, *Ans.*

(3.) $\frac{2}{3}$ of \$12600 = \$8400, @ $\frac{3}{4}\%$ = \$63.00

$\frac{1}{4}$ of \$14400 = \$7200, @ 2% = 144.00

Ans. \$207.00

(4.) $\frac{3}{4}$ of \$5600 = \$4200, $\times .01\frac{1}{2}$ = \$63, $\times 20$ (yr.) = \$1260: $\$4200 - \$1260 = \$2940, \text{ Ans.}$

(5.) $\$3600 + \$1600 + \$800 = \$6000: \frac{1}{4}\%$ of \$6000 = \$52.50, *Ans.*

(6.) $\$150 = 1\frac{1}{2}\%$ of $\frac{2}{3}$ value: $\$100 = 1\%$ of $\frac{2}{3}$ value: $\$10000 = 100\%$ of $\frac{2}{3}$ value: $\frac{3}{2}$, or the whole value, = \$15000, *Ans.*

(7.) $\frac{1}{4}$ of \$4500 = \$3600: $\$31.50 \div 3600 = 0087\frac{1}{2} = \frac{1}{8}\%$, *Ans.*

(8.) $\$1000 + \$1500 = \$2500: \$12.50 \div 2500 = \frac{1}{2}\%$, *Ans.*

Art. 206.

(2.) $\$105.53 \times 10 = \$1055.30 = \text{amount paid yearly: } \$1055.30 \times 10 = \$10553, \text{ Ans.}$

(3.) $\$47.18 \times 8 \times 20 = \7548.80 : $\$60.45 \times 8 \times 20 = \9672.00 : $\$9672 - \$7548.80 = \$2123.20$, *Ans.*

(4.) 75 yr. - 21 yr. = 54 yr.: $\$19.89 \times 5 \times 54 = \5370.30 ,
Ans.

(5.) $\$36.46 \times 12 \times 5 = \2187.60 : $\$12000 - \$2187.60 = \$9812.40$, *Ans.*

(6.) $\$26.30 \times 3 \times 30 = \2367 : $100\% - 15\% = 85\%$:
 85% of $\$2367 = \2011.95 , *Ans.*

(7.) $.55 - .35 = .20$ yr.: $\$63.10 \times 6 \times 20 = \7572 , *Ans.*

(8.) $\$104.58 \times 10$ (yr.) = $\$1045.80$. There will be int. @
 6% on $\$104.58$, $10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1$, or
55, yr. = $\$345.11$: $\$1045.80 + \$345.11 = \$1390.91$, *Ans.*

(9.) $\$29.15 \times 6 = \174.90 , $\times 15 = \$2623.50$: int. @ 6%
on $\$174.90$ for $15 + 14 + 13 + 12 + 11 + 10 + 9 + 8 + 7 + 6$
 $+ 5 + 4 + 3 + 2 + 1$, or 120, yr. = $\$1259.28$, + $\$2623.50$
= $\$3882.78$, *Ans.*

TAXES.

Art. 209.

(2.) $\$2500 - \$28 = \$2472$: $2472 + 618000 = .004$. *Ans.*
4 mills on $\$1$, or $\frac{2}{5}\%$.

(3.) $18409.44 \div 2876475 = .0064 = 6.4$ mills = *Ans.*

(4.) $656491.61 \div 421285359 = .00156 = 1.56$ mills = *Ans.*

Art. 210.

[I.] $\$1.25 \times 57 = \71.25 : $\$1373.64 - \$71.25 = \$1302.39$:
 $1302.39 \div 748500 = .00174 =$ rate 1.74 mills on $\$1$.

(2.) $\$2576 \times .00174 = \4.48 , + $\$1.25$ (poll-tax) = $\$5.73$,
Ans.

(3.) $\$9265 \times .00174 = \16.12 , + $\$3.75$ (3 poll-taxes) =
 $\$19.87$, *Ans.*

(4.) $\$4759 \times .00174 = \8.28 , + $\$1.25 = \9.53 , *Ans.*

(5.) $\$8367 \times .00174 = \14.56 , *Ans.*

[II.] $64375 \div 16869758 = .003816$. Rate 3.816 mills on \$1.

TAX TABLE.—Rate, 3.816 mills on \$1.

PROP.	TAX.	PROP.	TAX.	PROP.	TAX.	PROP.	TAX.
\$1	\$0.004	\$10	\$0.038	\$100	\$0.382	\$1000	\$3.816
2	.008	20	.076	200	.763	2000	7.632
3	.011	30	.114	300	1.145	3000	11.448
4	.015	40	.153	400	1.526	4000	15.264
5	.019	50	.191	500	1.908	5000	19.080
6	.023	60	.229	600	2.290	6000	22.896
7	.027	70	.267	700	2.671	7000	26.712
8	.030	80	.305	800	3.053	8000	30.528
9	.034	90	.343	900	3.434	9000	34.344

(1.) $\$56875 \times .003816 = \217.04 , *Ans.*

(2.) $\$27543 \times .003816 = \105.10 , *Ans.*

(3.) $\$83612 \times .003816 = \319.06 , *Ans.*

(4.) $\$72968 \times .003816 = \278.45 , *Ans.*

(5.) $\$69547 \times .003816 = \265.39 , *Ans.*

Art. 212.

(1.) 36 sq. mi. contain 23040 A.: 23040 A. @ \$1.25 per acre = \$28800, *Ans.*

(2.) The charge will be the same as for 2 ounces. 2 times 2 = 4 ct., *Ans.*

(3.) 1 lb. 5 oz. = 21 oz.: postage same as for 22 oz.: $22 \div 2 = 11$: 11 times 1 ct. = 11 ct., *Ans.*

(4.) $\$1.60 \times 5 = \8.00 , *Ans.*

(5.) $\$3 = 300$ ct.: $\frac{300}{1000}$ ct. = $\frac{3}{10}$ ct.

Art. 213.

(1.) $12\frac{1}{2}\% = \frac{1}{8}$: 1760 lb. — its $\frac{1}{8} = 1540$ lb.: 1540 times
 $\$0.0095 = \14.63 , *Ans.*

(2.) 40 bales of 400 lb. each = 16000 lb.: 5% tare = 800 lb.:
 16000 — 800 = 15200: 15200 lb. @ 11 ct. duty = \$1672, *Ans.*

(3.) 365.15 fr. + 57.15 fr. = 422.30 fr., to which add 5%
 com. (21.1150 fr.) = 443.4150 fr.: $443.4150 \times 19\frac{3}{10}$ ct. =
 $\$85.58$: 60% of \$86 = \$51.60, *Ans.*

(4.) £8 4s. 6d. = $\text{£}8\frac{9}{10}$ or $\text{£}8.225$: $\text{£}500 + \text{£}8.225 =$
 $\text{£}508.225$: add $2\frac{1}{2}\%$ com. ($\text{£}12.705 +$) = $\text{£}520.93$: $\text{£}520.93$
 $\times 4.8665$ (\$) = $\$2535.11$: 50% of \$2535 = \$1267.50: 1500
 $\times 44$ ct. = \$660: $\$1267.50 + \$660 = \$1927.50$, *Ans.*

RATIO.**Art. 217.**

(22.) $\frac{7}{7} \times \frac{4}{3} = \frac{14}{9} = 1\frac{5}{9}$, *Ans.*

(23.) $\frac{25}{6} \times \frac{3}{7} = \frac{5}{2} = 2\frac{1}{2}$, *Ans.*

(24.) $\frac{98}{16} \times \frac{5}{28} = \frac{3}{2} = 1\frac{1}{2}$, *Ans.*

(30.) 5 yd. 1 ft. = 192 in.: 5 ft. 4 in. = 64 in.: $\frac{192}{64} = 3$, *Ans.*

(37.) 4 lb. 8 oz. = 72 oz.: $\frac{7}{8}$ of 72 oz. = 63 oz.: 63 oz. = 3 lb.
 15 oz., *Ans.*

(38.) $\$4.00 \times 2.6 = \10.40 , *Ans.*

(40.) $42 \times 1\frac{1}{2} = 60$, *Ans.*

(41.) $23\frac{3}{8} = \frac{187}{8}$: $\frac{187}{8} \times \frac{4}{11} = \frac{17}{2} = 8\frac{1}{2}$, *Ans.*

(42.) $7\frac{5}{8} = \frac{58}{8}$: $\$27.20 \times \frac{9}{8} = \$0.40 \times 9 = \$3.60$, *Ans.*

PROPORTION.

Art. 223.

$$(3.) \frac{8 \times 6}{2} = 24, \text{ Ans.} \quad (4.) \frac{7 \times 10}{5} = 14, \text{ Ans.}$$

$$(5.) \frac{8 \times 6}{16} = 3, \text{ Ans.} \quad (6.) \frac{5 \times 12}{6} = 10, \text{ Ans.}$$

$$(7.) \frac{3 \times 14}{7} = 6, \text{ Ans.} \quad (8.) \frac{14 \times 9}{7} = 18, \text{ Ans.}$$

$$(9.) \frac{3}{4} \times \frac{4}{5} = \frac{3}{5}: \frac{3}{5} \times \frac{3}{2} = \frac{9}{10}, \text{ Ans.}$$

$$(10.) \frac{3}{5} \times \frac{5}{4} = \frac{3}{4}: \frac{3}{4} \times \frac{10}{9} = \frac{5}{3}, \text{ Ans.}$$

$$(11.) \frac{14}{5} \times \frac{15}{2} = 35: \frac{35}{1} \times \frac{2}{21} = \frac{10}{3} = 3\frac{1}{3}, \text{ Ans.}$$

$$(12.) \frac{6 \times 6}{4} = 9, \text{ Ans.}$$

Art. 226.

$$(3.) 6:12::3:? \quad \frac{12 \times 3}{6} = 6, \text{ Ans.}$$

$$(4.) 3:6::\$8:? \quad \frac{6 \times 8}{3} = \$16, \text{ Ans.}$$

$$(5.) 5 : 3 :: \$30 : ? \quad \frac{3 \times \overset{6}{30}}{\cancel{5}} = \$18, \text{ Ans.}$$

$$(6.) 3 \text{ lb. } 12 \text{ oz.} = 60 \text{ oz.} : 11 \text{ lb. } 4 \text{ oz.} = 180 \text{ oz.}$$

$$60 : 180 :: \$3.50 : ? \quad \frac{\overset{3}{180} \times 3.50}{\cancel{60}} = \$10.50, \text{ Ans.}$$

$$(7.) 2 \text{ lb. } 8 \text{ oz.} = 40 \text{ oz.} \quad \$2 : \$5 :: 40 \text{ oz.} : ?$$

$$\frac{\overset{20}{5} \times 40}{\cancel{2}} = 100 \text{ oz.} = 6 \text{ lb. } 4 \text{ oz.}, \text{ Ans.}$$

$$(8.) 4 : 10 :: \$14 : ? \quad \frac{\overset{5}{10} \times \overset{7}{14}}{\cancel{4}} = \$35, \text{ Ans.}$$

$$(9.) 3 : 11 :: 69 \text{ ct.} : ? \quad \frac{\overset{23}{11} \times \cancel{69}}{\cancel{3}} = \$2.53, \text{ Ans.}$$

$$(10.) 4 : 9 :: \$7 : ? \quad \frac{\cancel{9} \times 7}{\cancel{4}} = \frac{63}{4} = \$15.75, \text{ Ans.}$$

$$(11.) 8 : 12 :: \$32 : ? \quad \frac{\overset{4}{12} \times \cancel{32}}{\cancel{8}} = \$48, \text{ Ans.}$$

$$(12.) 12 : 8 :: \$48 : ? \quad \frac{\overset{4}{48} \times 8}{\cancel{12}} = \$32, \text{ Ans.}$$

$$(13.) \$32 : \$48 :: 8 : ? \quad \frac{\overset{12}{48} \times 8}{\cancel{32}} = 12 \text{ yd.}, \text{ Ans.}$$

$$(14.) \quad \$48 : \$32 :: 12 : ? \quad \frac{\overset{8}{\cancel{32}} \times \overset{12}{\cancel{12}}}{\underset{4}{\cancel{48}}} = 8 \text{ yd., Ans.}$$

$$(15.) \quad 19 : 4 :: \$152 : ? \quad \frac{4 \times \overset{8}{\cancel{152}}}{\cancel{19}} = \$32, \text{ Ans.}$$

$$(16.) \quad 12 : 8 :: 24 : ? \quad \frac{8 \times \overset{2}{\cancel{24}}}{\cancel{12}} = 16 \text{ da., Ans.}$$

$$(17.) \quad 2 : 8 :: 60 : ? \quad \frac{\overset{4}{\cancel{8}} \times \overset{60}{\cancel{60}}}{\cancel{2}} = 240 \text{ men, Ans.}$$

$$(18.) \quad 6 \text{ lb.} = 96 \text{ oz.} \quad 15 : 96 :: 25 \text{ ct.} : ?$$

$$\frac{\overset{32}{\cancel{96}} \times \overset{5}{\cancel{25}}}{\cancel{15}} = \$1.60, \text{ Ans.}$$

$$(19.) \quad 6 : 26 :: \$2.70 : ? \quad \frac{26 \times \overset{.45}{\cancel{2.70}}}{\cancel{6}} = \$11.70, \text{ Ans.}$$

$$(20.) \quad 585 \text{ lb.} : 3525 \text{ lb.} :: \$21.06 : ?$$

$$\frac{\overset{705}{\cancel{3525}} \times \overset{.18}{\cancel{21.06}}}{\cancel{117}} = \$126.90, \text{ Ans.}$$

$$(21.) \quad \frac{2}{3} : \frac{3}{8} :: \$2.50 : ? \quad \frac{\overset{3}{\cancel{9}} \times \overset{\cancel{2.50}}{\cancel{8}} \times \frac{2}{\cancel{3}}}{\cancel{4}} = \$1.87\frac{1}{2}, \text{ Ans.}$$

$$(22.) \quad 90 : 450 :: 6 : ? \quad \frac{450 \times 6}{90} = 30 \text{ da., Ans.}$$

$$(23.) \quad 5 : 15 :: 6 : ? \quad \frac{15 \times 6}{5} = 18 \text{ men, Ans.}$$

$$(24.) \quad 30 : 140 :: 15 : ? \quad \frac{140 \times 15}{30} = 70 \text{ bu., Ans.}$$

$$(25.) \quad 325 \text{ lb.} : 1625 \text{ lb.} :: \$11.30 : ?$$

$$\frac{1625 \times 11.30}{325} = \$56.50, \text{ Ans.}$$

$$(26.) \quad 4\frac{1}{2} \text{ ft.} : 180 \text{ ft.} :: 3 \text{ ft.} : ?$$

$$180 \times 3 = 540; \quad \frac{540}{1} \times \frac{2}{9} = 120 \text{ ft., Ans.}$$

$$(27.) \quad 12 : 9 :: 60 : ? \quad \frac{9 \times 60}{12} = 45 \text{ da., Ans.}$$

$$(28.) \quad \begin{array}{l} 100 : 60 :: 2200 : ? \\ 100 : 60 :: 1800 : ? \end{array} \quad \left. \begin{array}{l} \frac{2200 \times 60}{100} = \$1320, \text{ A's.} \\ \frac{1800 \times 60}{100} = \$1080, \text{ B's.} \end{array} \right\} \text{ Ans.}$$

$$(29.) \quad \$800.30 + \$250 + \$375.10 + \$500 + \$115 = \\ \$2040.40. \quad \$2040.40 : \$612.12 :: \$1.00 : ? \\ \$612.12 \div 2040.40 = \$0.30, \text{ Ans.}$$

(30.) \$4 : \$5 :: 9 oz. : ? $\frac{5 \times 9}{4} = 4\frac{5}{4} = 11\frac{1}{4}$ oz., *Ans.*

(31.) \$300 : \$250 :: 6 mo. : ? $\frac{250 \times 6}{300} = 5$ mo., *Ans.*

(32.) $27 \times 7 = 189$; $36 - 27 = 9$.
9 mi. : 189 mi. :: 1 da. : ? $1\frac{1}{3}^2 = 21$ da., *Ans.*

(33.) 9 hr. : 12 hr. :: \$15 $\frac{2}{3}$: ? = \$20.88 $\frac{2}{3}$, or 1 mo.'s services when he works 12 hr. a day.

$\$20.88\frac{2}{3} \times 4\frac{2}{3} = \$91.91\frac{1}{3}$, *Ans.*

(34.) 5 lb. : $\frac{3}{4}$ lb. :: \$ $\frac{5}{8}$: \$ $\frac{3}{32}$, *Ans.*

(35.) 6 yd. : 7 $\frac{3}{8}$ yd. :: \$5 $\frac{3}{8}$: \$6 $\frac{5}{8}$, *Ans.*

(36.) $\frac{1}{8}$ bu. : $\frac{1}{2}$ bu. :: \$ $\frac{1}{8}$: \$ $\frac{1}{2}$, *Ans.*

(37.) 1 $\frac{3}{4}$ yd. : 2 yd. :: \$ $\frac{7}{4}$: \$ $\frac{1}{8}$, *Ans.* ($\frac{4}{7} \times \frac{7}{4} \times \frac{7}{4} = \frac{1}{8}$)

(38.) \$29 $\frac{1}{4}$: \$31 $\frac{1}{4}$:: 59 $\frac{1}{2}$ yd. : ? By cancellation, $1\frac{1}{18} \times 1\frac{2}{5} = 1\frac{2}{5} = 62\frac{1}{2}$ yd., *Ans.*

(39.) .85 : .25 :: 1.36 : .40, *Ans.*

(40.) 61.3 : 1.08 :: 44.9942 : .79, *Ans.*

(41.) 26 cogs : 35 cogs :: 1 rev. : 1 $\frac{9}{8}$ rev. Hence, the smaller wheel gains $\frac{9}{8}$ of a revolution in each revolution of the larger wheel: Then, $\frac{9}{8}$ rev. : 10 rev. :: 1 rev. of larger : 28 $\frac{3}{8}$ revolutions of larger, *Ans.*

(42.) 1 gal. = 32 gills; $32 - 1 = 31$. $32 : 31 :: 100$ gal. : 96 $\frac{2}{3}$ gal., *Ans.*

(43.) 70 p. : 20 p. :: 60 sec. : 17 $\frac{1}{2}$ sec.
 1142 ft. $\times 17\frac{1}{2} = 19577\frac{1}{2}$ ft. = 3 mi. 226 rd. 2 yd. 2 $\frac{1}{2}$ ft., *Ans.*

(44.) 25 ft. : 25 ft. 5.25 in. :: 643 ft. 8 in. : 654 ft. 11.17 in., *Ans.*

Art. 229.

(2.) $\frac{300}{300} = \frac{3}{3}$; $\frac{3}{3}$ of \$232 = \$87, A's share.

$\frac{500}{500} = \frac{5}{5}$; $\frac{5}{5}$ of \$232 = \$145, B's share.

(3.) \$70 + \$150 + \$80 = \$300, whole stock.

$\frac{70}{300} = \frac{7}{30}$; $\frac{7}{30}$ of \$120 = \$28, A's share.

$\frac{150}{300} = \frac{1}{2}$; $\frac{1}{2}$ of \$120 = \$60, B's share.

$\frac{80}{300} = \frac{4}{15}$; $\frac{4}{15}$ of \$120 = \$32, C's share.

(4.) \$200 + \$400 + \$600 = \$1200, whole stock. $\frac{200}{1200} = \frac{1}{6}$,
 $\frac{400}{1200} = \frac{1}{3}$, $\frac{600}{1200} = \frac{1}{2}$. $\frac{1}{6}$ of \$427.26 = \$71.21, A's share; $\frac{1}{3}$ of
\$427.26 = \$142.42, B's share; and $\frac{1}{2}$ of \$427.26 = \$213.63,
C's share.

(5.) $1 + 3 + 5 = 9$. $\frac{1}{9}$ of \$90 = \$10; $\frac{3}{9} = \frac{1}{3}$ of \$90 = \$30;
 $\frac{5}{9}$ of \$90 = \$50, *Ans.*

(6.) $2 + 3 + 5 + 7 = 17$. $\frac{2}{17}$ of \$735.93 = \$86.58; $\frac{3}{17}$ of
\$735.93 = \$129.87; $\frac{5}{17}$ of \$735.93 = \$216.45; $\frac{7}{17}$ of \$735.93
= \$303.03, *Ans.*

(7.) $3 + 6 + 9 + 11 + 13 + 17 = 59$.

$\frac{3}{59}$ of \$22361 = \$1137; $\frac{6}{59}$ of \$22361 = \$2274;

$\frac{9}{59}$ of \$22361 = \$3411; $\frac{11}{59}$ of \$22361 = \$4169;

$\frac{13}{59}$ of \$22361 = \$4927; $\frac{17}{59}$ of \$22361 = \$6443, *Ans.*

(8.) $\frac{1}{8}, \frac{3}{8}, \frac{7}{8} = \frac{40}{120}, \frac{72}{120}, \frac{105}{120}$. Since the denominators are
the same, the fractions are to each other as their numerators.
 $40 + 72 + 105 = 217$. $\frac{40}{217}$ of \$692.23 = \$127.60; $\frac{72}{217}$ of
\$692.23 = \$229.68; $\frac{105}{217}$ of \$692.23 = \$334.95, *Ans.*

(9.) \$175 + \$500 + \$600 + \$210 + \$42.50 + \$20 + \$10
= \$1557.50.

\$1557.50 : \$175 :: \$934.50 : \$105.00, A's share.

\$1557.50 : \$500 :: \$934.50 : \$300.00, B's share.

\$1557.50 : \$600 :: \$934.50 : \$360.00, C's share.

\$1557.50 : \$210 :: \$934.50 : \$126.00, D's share.

\$1557.50 : \$42.50 :: \$934.50 : \$25.50, E's share.

\$1557.50 : \$20 :: \$934.50 : \$12.00, F's share.

\$1557.50 : \$10 :: \$934.50 : \$6.00, G's share.

(10.) $\$234 + \$175 + \$326 = \735 ; $\$492.45 + \$735 = \$0.67 =$ sum paid on each dollar of indebtedness. $\$234 \times .67 = \156.78 , A; $\$175 \times .67 = \117.25 , B; $\$326 \times .67 = \218.42 , C.

(11.) $\$25000 - \$4650 = \$20350$.

$37000 : 20350 :: \$1 : \0.55 , Ans.

Art. 230.

(3.) $23 \times 27 = 621$; $21 \times 39 = 819$; $621 + 819 = 1440$.
 $\frac{621}{1440} = \frac{69}{160}$; $\frac{819}{1440} = \frac{91}{160}$; $\frac{69}{160}$ of $\$54 = \$23.28\frac{3}{4}$, A pays;
 $\frac{91}{160}$ of $\$54 = \$30.71\frac{1}{4}$, B pays.

(4.) $\$300 \times 5 = \1500 ; $\$400 \times 8 = \3200 ; $\$500 \times 3 = \1500 .
 $\$1500 + \$3200 + \$1500 = \6200 . $\frac{1500}{6200} = \frac{15}{62}$;
 $\frac{3200}{6200} = \frac{32}{62}$. $\frac{15}{62}$ of $\$100 = \$24.19\frac{1}{11}$, A's and C's loss; $\frac{32}{62}$ of $\$100 = \$51.61\frac{9}{11}$, B's loss.

(5.) $6 \times 30 = 180$; $5 \times 40 = 200$; $8 \times 28 = 224$. $180 + 200 + 224 = 604$;
 $\frac{180}{604} = \frac{45}{151}$; $\frac{200}{604} = \frac{50}{151}$; $\frac{224}{604} = \frac{56}{151}$.
 $\frac{45}{151}$ of $\$18.12 = \5.40 , A; $\frac{50}{151}$ of $\$18.12 = \6 , B; $\frac{56}{151}$ of $\$18.12 = \6.72 , C.

(6.) A, $\$300 \times 8 = \2400 ; $\$300 + \$100 = \$400$;
 $\$400 \times 8 = \3200 . $\$2400 + \$3200 = \$5600$
 B, $\$600 \times 10 = \6000 ; $\$600 - \$300 = \$300$;
 $\$300 \times 6 = \1800 . $\$6000 + \$1800 = \underline{\$7800}$
 $\$13400$

$\$13400 : \$5600 :: \$442.20 : \184.80 , A's.

$\$13400 : \$7800 :: \$442.20 : \257.40 , B's.

(7.) $\$800 \times 12 = \9600 ; $\$500 \times 12 = \6000 ;
 $12 \text{ mo.} - 7 \text{ mo.} = 5 \text{ mo.}$ $\$9600 - \$6000 = \$3600$; $\$3600 \div 5 = \720 , Ans.

(8.) $\$2800 \times 10 = \28000
 $\$3200 \times 12 = 38400$
 $\$4000 \times 8 = \underline{32000}$
 $\$98400$

$$\frac{\$3500}{\$1230} = \frac{35}{123} \text{ of } \$1230 = \$350, \text{ A's gain.}$$

$$\frac{\$480}{\$1230} = \frac{48}{123} \text{ of } \$1230 = \$480, \text{ B's gain.}$$

$$\frac{\$400}{\$1230} = \frac{40}{123} \text{ of } \$1230 = \$400, \text{ C's gain.}$$

$$(9.) \quad \$11000 \times 3 = \$33000$$

$$\quad \$9900 \times 5 = 49500$$

$$\quad \$7700 \times 5 = 38500$$

$$\quad \underline{\quad \quad \quad} \\ \quad \quad \quad \$121000$$

$$\frac{\$1500}{\$5500} = \frac{3}{11} \text{ of } \$5500 = \$1500, \text{ A's gain.}$$

$$\frac{\$2250}{\$5500} = \frac{9}{22} \text{ of } \$5500 = \$2250, \text{ B's gain.}$$

$$\frac{\$1750}{\$5500} = \frac{7}{22} \text{ of } \$5500 = \$1750, \text{ C's gain.}$$

INVOLUTION.

Art. 234.

$$(2.) \quad 65 \times 65 = 4225, \text{ Ans.}$$

$$(3.) \quad 25 \times 25 \times 25 = 15625, \text{ Ans.}$$

$$(4.) \quad 12 \times 12 \times 12 \times 12 = 20736, \text{ Ans.}$$

$$(5.) \quad 10 \times 10 \times 10 \times 10 \times 10 = 100000, \text{ Ans.}$$

$$(6.) \quad 9 \times 9 \times 9 \times 9 \times 9 \times 9 = 531441, \text{ Ans.}$$

$$(7.) \quad 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 256, \text{ Ans.}$$

$$(8.) \quad \frac{2}{3} \times \frac{2}{3} = \frac{4}{9}, \text{ Ans.} \quad (9.) \quad \frac{3}{4} \times \frac{3}{4} \times \frac{3}{4} = \frac{27}{64}, \text{ Ans.}$$

$$(10.) \quad \frac{4}{5} \times \frac{4}{5} \times \frac{4}{5} \times \frac{4}{5} = \frac{256}{625}, \text{ Ans.}$$

$$(11.) \quad \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} = \frac{32}{243}, \text{ Ans.}$$

$$(12.) \quad 16\frac{1}{2} = \frac{33}{2}. \quad \frac{33}{2} \times \frac{33}{2} = \frac{1089}{4} = 272\frac{1}{4}, \text{ Ans.}$$

$$(13.) \quad 12\frac{1}{2} = \frac{25}{2}. \quad \frac{25}{2} \times \frac{25}{2} \times \frac{25}{2} = \frac{15625}{8} = 1953\frac{1}{8}, \text{ Ans.}$$

$$(14.) \quad .25 \times .25 \times .25 \times .25 = .00390625, \text{ Ans.}$$

$$(15.) \quad 14 \times 14 \times 14 = 2744, \text{ Ans.}$$

(16.) $19 \times 19 \times 19 \times 19 = 130321$, *Ans.*

(17.) $2\frac{1}{3} = \frac{7}{3}$. $\frac{7}{3} \times \frac{7}{3} \times \frac{7}{3} \times \frac{7}{3} \times \frac{7}{3} = \frac{16807}{243} = 69\frac{40}{243}$, *Ans.*

Art. 238.

EVOLUTION.

<p>(5)</p> $\begin{array}{r} \overset{\cdot}{5}29(20 + 3 = 23, \text{ Ans.} \\ \underline{400} \\ 20 \overline{)129} \\ \underline{2} \\ 40 \\ \underline{3} \\ 43 \overline{)129} \end{array}$	<p>(7)</p> $\begin{array}{r} \overset{\cdot}{6}561(81, \text{ Ans.} \\ \underline{64} \\ 161 \overline{)161} \\ \underline{161} \end{array}$	<p>(6)</p> $\begin{array}{r} \overset{\cdot}{6}25(25, \text{ Ans.} \\ \underline{4} \\ 45 \overline{)225} \\ \underline{225} \end{array}$
<p>(8)</p> $\begin{array}{r} \overset{\cdot}{5}6644(238, \text{ Ans.} \\ \underline{4} \\ 43 \overline{)166} \\ \underline{129} \\ 468 \overline{)3744} \\ \underline{3744} \end{array}$	<p>(9)</p> $\begin{array}{r} \overset{\cdot}{3}90625(625, \text{ Ans.} \\ \underline{36} \\ 122 \overline{)306} \\ \underline{244} \\ 1245 \overline{)6225} \\ \underline{6225} \end{array}$	<p>(10)</p> $\begin{array}{r} \overset{\cdot}{1}679616(1296, \text{ Ans.} \\ \underline{1} \\ 22 \overline{)67} \\ \underline{44} \\ 249 \overline{)2396} \\ \underline{2241} \\ 2586 \overline{)15516} \\ \underline{15516} \end{array}$
<p>(12)</p> $\begin{array}{r} \overset{\cdot}{4}3046721(6561, \text{ Ans.} \\ \underline{36} \\ 125 \overline{)704} \\ \underline{625} \\ 1306 \overline{)7967} \\ \underline{7836} \\ 13121 \overline{)13121} \\ \underline{13121} \end{array}$	<p>(11)</p> $\begin{array}{r} \overset{\cdot}{5}764801(2401, \text{ Ans.} \\ \underline{4} \\ 44 \overline{)176} \\ \underline{176} \\ 4801 \overline{)4801} \\ \underline{4801} \end{array}$	<p>(13)</p> $\begin{array}{r} \overset{\cdot}{9}87656329(31427, \text{ Ans.} \\ \underline{9} \\ 61 \overline{)87} \\ \underline{61} \\ 624 \overline{)2665} \\ \underline{2496} \\ 6282 \overline{)16963} \\ \underline{12564} \\ 62847 \overline{)439929} \\ \underline{439929} \end{array}$

$$\begin{array}{r}
 \text{(24)} \\
 \dot{1}0(3.162277+, \\
 \underline{9} \quad \text{Ans.} \\
 61)100 \\
 \underline{61} \\
 626)3900 \\
 \underline{3756} \\
 6322)14400 \\
 \underline{12644} \\
 63242)175600 \\
 \underline{126484} \\
 632447)4911600 \\
 \underline{4427129} \\
 6324547)48447100 \\
 \underline{44271829}
 \end{array}$$

$$\begin{array}{r}
 \text{(25)} \\
 \dot{2}(1.41421+, \\
 \underline{1} \quad \text{Ans.} \\
 24)100 \\
 \underline{96} \\
 281)400 \\
 \underline{281} \\
 2824)11900 \\
 \underline{11296} \\
 28282)60400 \\
 \underline{56564} \\
 282841)383600 \\
 \underline{282841}
 \end{array}$$

$$\begin{array}{r}
 \text{(27)} \\
 6\frac{2}{3} = 6.4(2.5298+, \\
 \underline{4} \quad \text{Ans.} \\
 45)240 \\
 \underline{225} \\
 502)1500 \\
 \underline{1004} \\
 5049)49600 \\
 \underline{45441} \\
 50588)415900 \\
 \underline{404704}
 \end{array}$$

$$\begin{array}{r}
 \text{(28)} \\
 384\dot{4} = 384.5714285714(19.61049+, \text{ Ans.} \\
 \underline{1}
 \end{array}$$

$$\begin{array}{r}
 \underline{1} \\
 29)284 \\
 \underline{261} \\
 386)2357 \\
 \underline{2316} \\
 3921)4114 \\
 \underline{3921} \\
 392204)1932857 \\
 \underline{1568816} \\
 3922089)36404114 \\
 \underline{35298801}
 \end{array}$$

$$\begin{array}{r}
 \text{(26)} \\
 \frac{2}{3} = .666666+(.81649+, \text{ Ans.} \\
 \underline{64} \\
 161)266 \\
 \underline{161} \\
 1626)10566 \\
 \underline{9756} \\
 16324)81066 \\
 \underline{65296} \\
 163289)1577066 \\
 \underline{1469601}
 \end{array}$$

Art. 239.

(2.) $16 = 2 \times 2 \times 2 \times 2: \sqrt{16} = 2 \times 2 = 4, \text{ Ans.}$

(3.) $36 = 2 \times 2 \times 3 \times 3: \sqrt{36} = 2 \times 3 = 6, \text{ Ans.}$

$$(4.) 100 = 2 \times 2 \times 5 \times 5 : \sqrt{100} = 2 \times 5 = 10, \text{ Ans.}$$

$$(5.) 225 = 3 \times 3 \times 5 \times 5 : \sqrt{225} = 3 \times 5 = 15, \text{ Ans.}$$

$$(6.) \sqrt{(16 \times 25)} = 4 \times 5 = 20, \text{ Ans.}$$

$$(7.) \sqrt{(36 \times 49)} = 6 \times 7 = 42, \text{ Ans.}$$

$$(8.) \sqrt{(64 \times 81)} = 8 \times 9 = 72, \text{ Ans.}$$

$$(9.) \sqrt{(121 \times 25)} = 11 \times 5 = 55, \text{ Ans.}$$

Art. 240.

(1)	(2)	(3)
$30^2 = 900$	$100^2 = 10000$	$45^2 = 2025$
$40^2 = 1600$	$60^2 = 3600$	$60^2 = 3600$
$\sqrt{2500} = 50, \text{ Ans.}$	$\sqrt{6400} = 80, \text{ Ans.}$	$\sqrt{5625} = 75, \text{ Ans.}$

(4.) $60^2 = 3600$, $37^2 = 1369$; $3600 - 1369 = 2231$;
 $\sqrt{2231} = 47.2334 + =$ width of street from foot of ladder
 on one side. $60^2 = 3600$, $23^2 = 529$; $3600 - 529 = 3071$;
 $\sqrt{3071} = 55.4166 + =$ width of street from foot of ladder
 on the other side. $47.2334 + 55.4166 = 102.65, \text{ Ans.}$

(5.) $600^2 = 360000$, $140^2 = 19600$; $360000 - 19600 =$
 340400 ; $\sqrt{340400} = 583.43 +$; $100 \div 2 = 50$; $583.43 -$
 $50. = 533.43 +, \text{ Ans.}$

(6)

$20^2 = 400$	The square root of 656, will give the length of the diagonal line joining opposite corners of the floor of the room: this is the base of the triangle, of which the hypotenuse is required.
$16^2 = 256$	
<u>656</u>	

Square of base = 656

$12^2 = \text{perpendicular}^2 = 144$; $656 + 144 = 800$; $\sqrt{800}$
 $= 28.28 +, \text{ Ans.}$

Art. 241.

<p>(1)</p> $\begin{array}{r} 624\dot{1}(79 \text{ rd., } \textit{Ans.}) \\ 49 \\ \hline 149)1341 \\ 1341 \\ \hline \end{array}$	<p>(2)</p> $\begin{array}{r} 8 \text{ sq. ft. } 4 \text{ sq. in.} = 1156 \text{ sq. in.} \\ 115\dot{6}(34 \text{ in.} = 2 \text{ ft. } 10 \text{ in., } \textit{Ans.}) \\ 9 \\ \hline 64)256 \\ 256 \\ \hline \end{array}$
---	--

(3.) $\sqrt{4096} = 64 \text{ yd., } \textit{Ans.}$

(4.) $4 \times 4 = 16$; $16 \times 9 = 144$; $\sqrt{144} = 12$, *Ans.*

Or, $\sqrt{(16 \times 9)} = 4 \times 3 = 12 \text{ rd., } \textit{Ans.}$

(5.) There are 43560 sq. ft. in 1 acre.

$\sqrt{43560} = 208.71 + \text{ft., side of acre.}$

Art. 244.

<p>(3)</p> $\begin{array}{r} 219\dot{7}(13) \\ 1 \\ \hline 3 \times 10^2 = 300 \\ 3 \times 10 \times 3 = 90 \\ 3 \times 3 = 9 \\ \hline 399 \quad 1197 \end{array}$	$\begin{array}{r} 13824\dot{2}(24) \\ 8 \\ \hline 3 \times 20^2 = 1200 \\ 3 \times 20 \times 4 = 240 \\ 4 \times 4 = 16 \\ \hline 1456 \quad 5824 \\ \hline \frac{1}{2}, \textit{Ans.} \end{array}$
---	---

(4)

$800000000(.928, \textit{Ans.})$	
$\begin{array}{r} 729 \\ \hline 3 \times 90^2 = 24300 \\ 3 \times 90 \times 2 = 540 \\ 2 \times 2 = 4 \\ \hline 24844 \\ \hline 3 \times 920^2 = 2539200 \\ 3 \times 920 \times 8 = 22080 \\ 8 \times 8 = 64 \\ \hline 2561344 \end{array}$	$\begin{array}{r} 71000 \\ \hline 49688 \\ \hline 21312000 \\ \hline 20490752 \end{array}$

(5)

91125(45, *Ans.*)
$$\begin{array}{r} 64 \\ \hline 27125 \end{array}$$

$3 \times 40^2 = 4800$

$3 \times 40 \times 5 = 600$

$5 \times 5 = 25$

$$\begin{array}{r} 5425 \\ \hline 27125 \end{array}$$

(6)

195112(58,

$$\begin{array}{r} 125 \text{ } \textit{Ans.} \\ \hline 70112 \end{array}$$

$3 \times 50^2 = 7500$

$3 \times 50 \times 8 = 1200$

$8 \times 8 = 64$

$$\begin{array}{r} 8764 \\ \hline 70112 \end{array}$$

(7)

912673(97, *Ans.*)
$$\begin{array}{r} 729 \\ \hline 183673 \end{array}$$

$3 \times 90^2 = 24300$

$3 \times 90 \times 7 = 1890$

$7 \times 7 = 49$

$$\begin{array}{r} 26239 \\ \hline 183673 \end{array}$$

$3 \times 10^2 = 300$

$3 \times 100^2 = 30000$

$3 \times 100 \times 7 = 2100$

$7 \times 7 = 49$

$$\begin{array}{r} 300 \\ \hline 225 \\ \hline 225043 \\ \hline 32149 \\ \hline 225043 \end{array}$$

(8)

1225043(107,

$$\begin{array}{r} 1 \text{ } \textit{Ans.} \\ \hline 225 \\ \hline 225043 \end{array}$$

(9)

13312053(237, *Ans.*)
$$\begin{array}{r} 8 \\ \hline 5312 \end{array}$$

$3 \times 20^2 = 1200$

$3 \times 20 \times 3 = 180$

$3 \times 3 = 9$

$$\begin{array}{r} 1389 \\ \hline 4167 \end{array}$$

$3 \times 230^2 = 158700$

$3 \times 230 \times 7 = 4830$

$7 \times 7 = 49$

$$\begin{array}{r} 1389 \\ \hline 163579 \\ \hline 1145053 \end{array}$$

(10)

102503232(468, *Ans.*)

	64	38503
$3 \times 40^2 = 4800$		
$3 \times 40 \times 6 = 720$		
$6 \times 6 = 36$		
	5556	33336
$3 \times 460^2 = 634800$		5167232
$3 \times 460 \times 8 = 11040$		
$8 \times 8 = 64$		
	645904	5167232

(11)

529475129(809, *Ans.*)

	512	17475
$3 \times 80^2 = 19200$		
$3 \times 800^2 = 1920000$		17475129
$3 \times 800 \times 9 = 21600$		
$9 \times 9 = 81$		
	1941681	17475129

(12)

958585256(986, *Ans.*)

	729	229585
$3 \times 90^2 = 24300$		
$3 \times 90 \times 8 = 2160$		
$8 \times 8 = 64$		
	26524	212192
$3 \times 980^2 = 2881200$		17393256
$3 \times 980 \times 6 = 17640$		
$6 \times 6 = 36$		
	2898876	17393256

(13)

14760213677 (2453, *Ans.*)

8

$3 \times 20^2 = 1200$	6760
$3 \times 20 \times 4 = 240$	
$4 \times 4 = 16$	
<u>1456</u>	5824
$3 \times 240^2 = 172800$	936213
$3 \times 240 \times 5 = 3600$	
$5 \times 5 = 25$	
<u>176425</u>	882125
$3 \times 2450^2 = 18007500$	54088677
$3 \times 2450 \times 3 = 22050$	
$3 \times 3 = 9$	
<u>18029559</u>	54088677

(14)

128100283921 (5041, *Ans.*)

125

$3 \times 50^2 = 7500$	3100
$3 \times 500^2 = 750000$	3100283
$3 \times 500 \times 4 = 6000$	
$4 \times 4 = 16$	
<u>756016</u>	3024064
$3 \times 5040^2 = 76204800$	76219921
$3 \times 5040 \times 1 = 15120$	
$1 \times 1 = 1$	
<u>76219921</u>	76219921

(15) $53.157376(3.76, \text{Ans.})$

	27	
$3 \times 30^2 = 2700$	26157	
$3 \times 30 \times 7 = 630$		
$7 \times 7 = 49$	3379	
		23653
$3 \times 370^2 = 410700$		2504376
$3 \times 370 \times 6 = 6660$		
$6 \times 6 = 36$	417396	
		2504376

(16) $.199176704(.584, \text{Ans.})$

	125	
$3 \times 50^2 = 7500$	74176	
$3 \times 50 \times 8 = 1200$		
$8 \times 8 = 64$	8764	
		70112
$3 \times 580^2 = 1009200$		4064704
$3 \times 580 \times 4 = 6960$		
$4 \times 4 = 16$	1016176	
		4064704

(17.) $\sqrt[3]{216} = 6.$ *Ans. $\frac{2}{3}$.* (18.) $\sqrt[3]{2744} = 14.$ *Ans. $1\frac{4}{5}$.*
 $\sqrt[3]{343} = 7.$

(19.) $\frac{48778}{118638} = \frac{24389}{59319}$ $\sqrt[3]{24389} = 29.$ *Ans. $\frac{29}{88}$.*
 $\sqrt[3]{59319} = 39.$

(20.) $51\frac{9}{125} = 7\frac{2}{5}$ $\sqrt[3]{729} = 9.$ *Ans. $\frac{9}{5} = 1\frac{4}{5}$.*
 $\sqrt[3]{125} = 5.$

(21) $2(1.259 +, \text{Ans.})$

	1
$3 \times 10^3 = 300$	1000
$3 \times 10 \times 2 = 60$	728
$2 \times 2 = 4$	
<u>364</u>	
$3 \times 120^2 = 43200$	272000
$3 \times 120 \times 5 = 1800$	
$5 \times 5 = 25$	
<u>45025</u>	225125
$3 \times 1250^2 = 4687500$	46875000
$3 \times 1250 \times 9 = 33750$	
$9 \times 9 = 81$	
<u>4721331</u>	42491979

(22) $9(2.080 +, \text{Ans.})$

	8
$3 \times 20^2 = 1200$	1000
$3 \times 200^2 = 120000$	1000000
$3 \times 200 \times 8 = 4800$	
$8 \times 8 = 64$	
<u>124864</u>	998912
$3 \times 2080^2 = 12979200$	1088000

(23) $200(5.848 +, \text{Ans.})$

	125
$3 \times 50^2 = 7500$	75000
$3 \times 50 \times 8 = 1200$	
$8 \times 8 = 64$	
<u>8764</u>	70112
$3 \times 580^2 = 1009200$	4888000
$3 \times 580 \times 4 = 6960$	
$4 \times 4 = 16$	
<u>1016176</u>	4064704
$3 \times 5840^2 = 102316800$	823296000
$3 \times 5840 \times 8 = 140160$	
$8 \times 8 = 64$	
<u>102316864</u>	819656192

(24) $9\frac{1}{8} = 9.166666 + (2.092 +, \text{Ans.})$

$3 \times 20^2 = 1200$	8	1166
$3 \times 200^2 = 120000$		1166666
$3 \times 200 \times 9 = 5400$		
$9 \times 9 = 81$		
	125481	1129329
$3 \times 2090^2 = 13104300$		37337666
$3 \times 2090 \times 2 = 12540$		
$2 \times 2 = 4$		
	13116844	26233688

Art. 245.

- (1.) $\sqrt[3]{1953.125} = 12.5 \text{ ft.}, \text{Ans.}$
- (2.) $64 \times 3 \times 3 \times 3 = 1728 \text{ cu. in.} = 1 \text{ cu. ft.},$ one side of which = 1 ft., *Ans.*
- (3.) $\sqrt[3]{512} = 8 \text{ half in.} = 4 \text{ in.}, \text{Ans.}$
- (4.) $450 \text{ cu. yd. } 17 \text{ cu. ft.} = 12167 \text{ cu. ft.}; \sqrt[3]{12167} = 23 \text{ ft.},$
Ans.
- (5.) $288 \times 216 \times 48 = 2985984, \sqrt[3]{2985984} = 144 \text{ ft.}, \text{Ans.}$
- (6.) $1728 \times 3 = 5184, \sqrt[3]{5184} = 17.306 + \text{ in.}, \text{Ans.}$
- (7.) $\sqrt[3]{1331} = 11 \text{ ft.}, \text{Ans.}$
- (8.) $\sqrt[3]{474552} = 78 \text{ in.} = 6\frac{1}{2} \text{ ft.},$ length of one side.
 $6\frac{1}{2} \text{ ft.} \times 6\frac{1}{2} \text{ ft.} = 42\frac{1}{4} \text{ sq. ft.}, \text{Ans.}$
- (9.) $\sqrt[3]{1728} = 12 \text{ ft.},$ length of one side.
 $12 \text{ ft.} \times 12 \text{ ft.} \times 5 = 720 \text{ sq. ft.},$ area of 5 sides, *Ans.*
- (10.) $\sqrt[3]{373248} = 72 \text{ in.} = 6 \text{ ft.}, \text{Ans.}$

MENSURATION.

Art. 247.

- (1.) $17 \text{ ft.} \times 15 \text{ ft.} = 255 \text{ sq. ft.}, \text{Ans.}$
- (2.) $120 \text{ rd.} \times 84 \text{ rd.} = 10080 \text{ sq. rd.} = 63 \text{ A.}, \text{Ans.}$

$$(3.) 65 \text{ rd.} \times 65 \text{ rd.} = 4225 \text{ sq. rd.} = 26 \text{ A. } 65 \text{ sq. rd.}$$

$$(4.) 35 \text{ rd.} \times 16 \text{ rd.} = 560 \text{ sq. rd.} = 3 \text{ A. } 80 \text{ sq. rd., } \textit{Ans.}$$

$$(5.) 30 \text{ ft.} \times 30 \text{ ft.} = 900 \text{ sq. ft.} = 100 \text{ sq. yd.}$$

$$15 \text{ ft.} \times 15 \text{ ft.} = 225 \text{ sq. ft.,} \times 2 = 450 \text{ sq. ft.} = \frac{50 \text{ sq. yd.}}{\text{Diff.} = 50 \text{ sq. yd.}}$$

$$(7.) 5 \text{ ft. } 6 \text{ in.} = 5\frac{1}{2} \text{ ft.; } 1 \text{ ft. } 8 \text{ in.} = 1\frac{2}{3} \text{ ft.; } 1\frac{1}{2} \text{ ft.} \times \frac{5}{8} \text{ ft.}$$

$$= \frac{5}{8} \text{ sq. ft.} = 9\frac{1}{8} \text{ sq. ft., } \textit{Ans.}$$

$$(8.) 25 \text{ ft. } 9 \text{ in.} = 25\frac{3}{4} \text{ ft.} = 10\frac{3}{4} \text{ ft.; } 21 \text{ ft. } 3 \text{ in.} = 21\frac{1}{4} \text{ ft.}$$

$$= \frac{85}{4} \text{ ft.; } 10\frac{3}{4} \times \frac{85}{4} = \frac{875}{8} \text{ sq. ft.} = 547\frac{3}{8} \text{ sq. ft.} = 60 \text{ sq. yd.}$$

$$7 \text{ sq. ft. } 27 \text{ sq. in., } \textit{Ans.}$$

$$(9.) 80 \text{ sq. ft.} \div 10 \text{ ft.} = 8 \text{ ft., } \textit{Ans.}$$

$$(10.) 18 \text{ ft.} \times 15 \text{ ft.} = 270 \text{ sq. ft.} = 30 \text{ sq. yd.; } 30 \text{ sq. yd.}$$

$$+ 1\frac{1}{2} \text{ yd.} = 20 \text{ yd., } \textit{Ans.}$$

$$(11.) 3 \text{ yd.} \times 1\frac{1}{2} \text{ yd.} = 4\frac{1}{2} \text{ sq. yd.; } 4\frac{1}{2} + \frac{3}{2} = \frac{9}{2} \times \frac{4}{3} = 6 \text{ yd.,}$$

$$\textit{Ans.}$$

$$(12.) 21 \text{ ft. } 3 \text{ in.} = 21.25 \text{ ft.; } 13 \text{ ft. } 6 \text{ in.} = 13.5 \text{ ft.; } 21.25 \text{ ft.}$$

$$\times 13.5 \text{ ft.} = 286.875 \text{ sq. ft.; } 1\frac{1}{4} \text{ yd.} = 3\frac{3}{4} = 3.75 \text{ ft.; } 286.875 \text{ sq.}$$

$$\text{ft.} + 3.75 \text{ ft.} = 76.5 \text{ ft.} = 25.5 \text{ yd.} = 25\frac{1}{2} \text{ yd.}$$

$$(13.) 160 \text{ sq. rd. in } 1 \text{ A. } 160 \div 15 = 10\frac{2}{3} \text{ rd., } \textit{Ans.}$$

Art. 248.

$$(1.) \begin{array}{r} \text{ft.} \quad \text{in.} \\ 61 \text{ in.} \div 2 = 30\frac{1}{2} \text{ in.,} \times 11 \text{ in.} = 335\frac{1}{2} \\ 2 \quad 2 \quad \text{sq. in.} : 335\frac{1}{2} \text{ sq. in.} + 144 = 2 \text{ sq. ft.} \\ 2 \quad 11 \quad 47\frac{1}{2} \text{ sq. in., } \textit{Ans.} \\ \hline 5 \quad 1 = 61 \text{ in.} \end{array}$$

$$(2.) 25 \text{ rd.} + 19 \text{ rd.} = 44 \text{ rd.; } 44 \text{ rd.} \div 2 = 22 \text{ rd.,} \times 32 \text{ rd.}$$

$$= 704 \text{ sq. rd.,} + 160 = 4 \text{ A. } 64 \text{ sq. rd., } \textit{Ans.}$$

$$(3.) 10 \text{ ft. } 8 \text{ in.} = 128 \text{ in.; } 6 \text{ ft. } 2 \text{ in.} = 74 \text{ in.; } 128 + 74$$

$$= 202 \text{ in.,} \div 2 = 101 \text{ in.; } 12 \text{ ft.} = 144 \text{ in.; } 101 \times 144 =$$

$$14544 \text{ sq. in.} = 101 \text{ sq. ft.} = 11 \text{ sq. yd. } 2 \text{ sq. ft., } \textit{Ans.}$$

Art. 249.

(1.) $15 \text{ ft.} \times 12 \text{ ft.} = 180 \text{ sq. ft.}, + 2 = 90 \text{ sq. ft.}, \textit{Ans.}$

(2.) $44 \text{ rd.} \times 18 \text{ rd.} = 792 \text{ sq. rd.}, + 2 = 396 \text{ sq. rd.} :$
 $396 \text{ sq. rd.} + 160 = 2 \text{ A. } 76 \text{ sq. rd.}, \textit{Ans.}$

(3.) $12\frac{1}{2} \text{ ft.} \times 16\frac{3}{4} \text{ ft.} = 1\frac{675}{8} \text{ sq. ft.} = 209\frac{3}{8} \text{ sq. ft.};$
 $209\frac{3}{8} + 2 = 104\frac{11}{8} \text{ sq. ft.} = 11 \text{ sq. yd. } 5 \text{ sq. ft. } 99 \text{ sq. in.}, \textit{Ans.}$

(4.) $13 + 14 + 15 = 42, + 2 = 21. \quad 21 - 13 = 8, 21 - 14 = 7,$
 $21 - 15 = 6. \quad 21 \times 8 \times 7 \times 6 = 7056 :$ its square root
 $= 84 \text{ sq. ft.}, \textit{Ans.}$

(5.) $30 + 40 + 50 = 120, + 2 = 60. \quad 60 - 30 = 30, 60 - 40 = 20,$
 $60 - 50 = 10. \quad 60 \times 30 \times 20 \times 10 = 360000 :$
 $\sqrt{360000} = 600 \text{ sq. ft.} : 600 \text{ sq. ft.} = 66 \text{ sq. yd. } 6 \text{ sq. ft.}, \textit{Ans.}$

Art. 250.

(1.) $50 \text{ rd.} \times 30 \text{ rd.} = 1500 \text{ sq. rd.}, + 2 = 750 \text{ sq. rd.} :$
 $50 \text{ rd.} \times 20 \text{ rd.} = 1000 \text{ sq. rd.}, + 2 = 500 \text{ sq. rd.};$
 $750 \text{ sq. rd.} + 500 \text{ sq. rd.} = 1250 \text{ sq. rd.} = 7 \text{ A. } 130 \text{ sq. rd.}, \textit{Ans.}$

Art. 251.

(1.) $5 \times 8 \text{ in.} = 40 \text{ in.} : 40 \times \frac{5.44}{2} = 108.8 \text{ sq. in.}, \textit{Ans.}$

(2.) $6 \times 3 \text{ in.} = 18 \text{ in.} : 18 \times \frac{2.6}{2} = 23.4 \text{ sq. in.}, \textit{Ans.}$

Art. 252.

(1.) $48 \text{ ft.} \times 3.1416 = 150.7968 \text{ ft.} = 150 \text{ ft. } 9.56 \text{ in.}$

(2.) $15 \text{ ft.} + 3.1416 = 4.7746 \text{ ft.} = 4 \text{ ft. } 9.3 \text{ in. nearly.}$

(3.) $4 \times 3.1416 = 12.5664 \text{ ft.} = 12 \text{ ft. } 6.8 \text{ in. nearly.}$

(4.) $12 \text{ ft. } 5 \text{ in.} = 12.4166 + \text{ ft.};$
 $12.4166 \text{ ft.} + 3.1416 = 3.952338 \text{ ft.} = 3 \text{ ft. } 11.43 \text{ in. nearly}, \textit{Ans.}$

(5.) $7912 \text{ mi.} \times 3.1416 = 24856 + \text{ mi.}, \textit{Ans.}$

Art. 253.

(1.) $21 \times 21 = 441 : 3.1416 \times 441 = 1385.4456 \text{ sq. ft.}$
 $= 153 \text{ sq. yd. } 8 \text{ sq. ft. } 64 \text{ sq. in.}, \textit{Ans.}$

NOTE. — To find the diameter when the area is given, divide the area by .7854; the square root of the quotient will be the diameter.

(2.) 6 sq. ft. 98.115 sq. in. = 962.115 sq. in.; $962.115 \div .7854 = 1225$; $\sqrt{1225} = 35$ in., = 2 ft. 11 in. = diameter. 35 in. $\times 3.1416 = 109.956$ in. = 9 ft. 1.9 + in. = circum.

(3.) 160 rd. + .7854 = 203.71785077 +; $\sqrt{203.71785077} = 14.2729$; $14.2729 + 2 = 7.1364$ rd. = 7 rd. 2 ft. 3 in., *Ans.*

(4.) $10 + 2 = 5 =$ one radius; $5^2 = 25$; $16 + 2 = 8 =$ one radius; $8^2 = 64$. $25 \times 3.1416 = 78.5400$; $64 \times 3.1416 = 201.0624$; $201.0624 - 78.5400 = 122.5224$ sq. ft.; $.5224 \times 144 = 75$ sq. in. *Ans.* 122 sq. ft. 75 sq. in.

(5.) 1 sq. ft. = 144 sq. in. $144 + .7854 = 183.3460$ sq. in.; $\sqrt{183.3460} = 13.54$ in., *Ans.*

Art. 254.

(3.) $3 : 1 :: 75^2 : ?$ $\frac{5625 \times 1}{3} = 1875$ sq. ft., square of diameter $\sqrt{1875}$ sq. ft. = 43.3 ft. diam., *Ans.*

(4.) $2 : 3 :: (63.39)^2 : ?$ $\frac{4018.2921 \times 3}{2} = 6027.43815$ sq. rods, square of circumference $\sqrt{6027.43815}$ sq. rd. = 77.63 + rods, *Ans.*

(5.) $1^2 : 4^2 :: 1 : ?$ $\frac{16 \times 1}{1} = 16$ sq. ft., *Ans.*

(6.) $6 : 30 = 1 : 5$; $1^2 : 5^2 :: 1 : ?$ $\frac{25 \times 1}{1} = 25$ times, *Ans.*

(7.) $10 : 30 = 1 : 3$; $1 : 3 :: 40^2 : ?$ $\frac{1600 \times 3}{1} = 4800$ sq. rd., sq. of side $\sqrt{4800} = 69.28$ rd., *Ans.*

(8.) $\sqrt{9} : \sqrt{16} :: 112 : ?$ $\frac{112 \times 4}{3} = 149\frac{1}{3}$ ft., *Ans.*

(9.) $19.635 : 78.54 :: 1 : 4$; $\sqrt{4} : \sqrt{1} :: 5 : ?$ $\frac{5 \times 1}{2} = 2\frac{1}{2}$ ft., *Ans.*

Art. 256.

(1.) $37 \times 37 \times 6 = 8214$ sq. in. = 6 sq. yd. 3 sq. ft. 6 sq. in., *Ans.*

(2.) $4 + 4 + 4 = 12$ ft., $\times 5$ ft. = 60 sq. ft. = convex surface.

$$\left. \begin{array}{l} 6 - 4 = 2 \\ 4 + \frac{4}{2} + 4 = 6. \quad 6 - 4 = 2 \\ 6 - 4 = 2 \end{array} \right\} 6 \times 2 \times 2 \times 2 = 48.$$

$\sqrt{48} = 6.92+$; $6.92+ \times 2 = 13.85$ sq. ft. = area of 2 bases.
60 sq. ft. + 13.85 sq. ft. = 73.85 + sq. ft., *Ans.*

(3.) 3 ft. 6 in. = $3\frac{1}{2}$ ft. = $\frac{7}{2}$; $\frac{7}{2} \times 2 = 7$ } = $12\frac{1}{2}$ or $\frac{25}{2}$.
2 ft. 9 in. = $2\frac{3}{4}$ ft. = $\frac{11}{4}$; $\frac{11}{4} \times 2 = 5\frac{1}{2}$ }
1 ft. 10 in. = $1\frac{5}{8}$ ft. = $\frac{13}{8}$.

$\frac{25}{2} \times \frac{13}{8} = \frac{275}{16} =$ convex surface; $\frac{7}{2} \times \frac{11}{4} \times 2 = \frac{77}{4}$ or $\frac{231}{12} =$ areas of 2 bases: $\frac{275}{16} + \frac{231}{12} = \frac{506}{12} = 42\frac{1}{6}$ sq. ft., *Ans.*

(4.) 3.1416×4 ft. (diameter) = 12.5664 = circumference.

$12.5664 \times 5 = 62.8320 =$ convex surface.

$2 \times 2 \times 3.1416 \times 2 = \frac{25.1328}{87.96+}$ = areas of 2 bases.

sq. ft., *Ans.*

Art. 257.

(2.) 24 ft. $\times 18\frac{1}{2}$ ft. $\times 10\frac{7}{12}$ ft. = 4699 cu. ft. = 174 cu. yd. 1 cu. ft., *Ans.*

(3.) Area of base = 1.73+ sq. ft.; 1.73 sq. ft. $\times 14$ ft. = $24\frac{1}{4}$ cu. ft. (nearly), *Ans.*

(4.) $2 \times 2 \times 3.1416 \times 12 = 150.8$ cu. ft., *Ans.*

(5.) $9\frac{1}{4}$ in. = $\frac{37}{4}$; $\frac{1}{2}$ of $\frac{37}{4} = \frac{37}{8}$; $(\frac{37}{8})^2 \times 3.1416 \times 8 = 537.6$ cu. in., *Ans.*

Art. 258.

(1.) 5 ft. 4 in. = $5\frac{1}{3}$ ft.; $5\frac{1}{3}$ ft. $\times 3 = 16$ ft. = perimeter of base. $7\frac{1}{2}$ ft. $\times 16 = 120$ sq. ft.; 120 sq. ft. $\div 2 = 60$ sq. ft. = area of 3 sides. $5\frac{1}{3} \times 3 = 16$. $16 \div 2 = 8$; $8 - 5\frac{1}{3} = 2\frac{2}{3}$; $2\frac{2}{3} = \frac{8}{3}$; $8 \times \frac{8}{3} \times \frac{8}{3} \times \frac{8}{3} = \frac{4096}{27} = 151.70+$. $\sqrt{151.70} = 12.3+$ sq. ft. = area of base. 60 sq. ft. + $12.3+$ sq. ft. = $72.3+$ sq. ft., *Ans.*

(2.) $8\frac{1}{2}$ ft. \times 3.1416 = 26.7036 ft. = circum. of base. $26.7036 \times 25 \div 2 = 333.8$ sq. ft. (nearly), *Ans.*

(3.) $21\frac{1}{2}$ ft. \times 3.1416 \times $4\frac{7}{8}$ ft. $\div 2 = 21.008$ sq. ft. = convex surface. $21\frac{1}{2}$ ft. = $\frac{43}{2}$, $\div 2 = \frac{43}{4}$; $(\frac{43}{4})^2 \times 3.1416 = 6.68$ sq. ft. = area of base. $21.008 + 6.68 = 27.68$ sq. ft., *Ans.*

Art. 259.

(1.) 5 ft. \times 5 ft. = 25 sq. ft. = area of base. 25 sq. ft. \times 21 ft. $\div 3 = 175$ cu. ft., *Ans.*

(2.) $(5)^2 \times 3.1416 \times 15 \div 3 = 392.7$ cu. ft., *Ans.*

(3.) 720 ft. = 240 yd.; 477 ft. = 159 yd.; $(240 \text{ yd.})^2 \times 159 \text{ yd.} \div 3 = 3052800$ cu. yd., *Ans.*

(4.) $37\frac{3}{8}$ ft. = $\frac{111}{8}$, $\div 2 = \frac{111}{16}$; $(\frac{111}{16})^2 \times 3.1416 = 1114.3$ + sq. ft. = area of base. 1114.3 + sq. ft. \times $79\frac{3}{4}$ ft., $\div 3 = 29622$ + cu. ft., *Ans.*

Art. 260.

(2.) $(4\frac{1}{2} \text{ ft.})^2 \times 3.1416 = 63.6$ + sq. ft., *Ans.*

(3.) $(7912)^2 \times 3.1416 = 196663355.75$ sq. mi., *Ans.*

Art. 261.

(1.) $13 \times 13 \times 13 \times .5236 = 1150.3$ + cu. ft., *Ans.*

(2.) 1 cu. ft. = 1728 cu. in.; $1728 \div .5236 = 3300.229$; $\sqrt[3]{3300.229} = 14.9$ in. nearly, *Ans.*

Art. 262.

(3.) $\sqrt[3]{512} : \sqrt[3]{64} :: 16 : ?$ $\frac{\sqrt[3]{64} \times 16}{\sqrt[3]{512}} = \frac{4 \times 16}{8} = 8$ in., *Ans.*

(4.) $8 : 12 = 2 : 3$ $2^3 : 3^3 :: 50.2656 : ?$

$$\frac{6.2832}{\cancel{50.2656} \times 27} = 169.6464 \text{ cu. in., } \textit{Ans.}$$

(5.) $2^3 : 1^3 :: 32 : ?$ $\frac{32 \times 1}{8} = 4$ lb., *Ans.*

EXAMPLES FOR REVIEW.

Art. 263.

(1.) $\$1275 + \$1350 + (\$1350 + \$2580)$
 $+ (\$1275 + \$1350) = \$9180, \text{ Ans.}$

(2.) $2324 + 1570 + 450 + 175 = 4519;$
 $6784 - 4519 = 2265 \text{ miles, Ans.}$

(3.) $38 \text{ mi.} - 30 \text{ mi.} = 8 \text{ mi.}$ $8 \text{ mi.} \times 48 = 384 \text{ mi., Ans.}$

(4.) $16150 + 17050 + 17364 + 17500 + 18008 + 18169 =$
 $104241 + 104241 + 9000 = 217482, \text{ Ans.}$

(5.) $50 \text{ cu. ft.} \times 60 \times 560 = 1680000 \text{ cu. ft., Ans.}$

(6.) $\$356195298 - \$313390075 = \$42805223.$

(7.) $5800 + 4600 + 3189 + 3182 + 1700$
 $+ 890 = 19361 \text{ T., Ans.}$

(8.) $3000 \div 15 = 200;$ $3000 - 200 = 2800, \text{ Ans.}$

(9.) $\$65 \times 116 \times 128 = \$965120.$

(10.) $\begin{array}{r} 12.75 \\ 18.4 \\ 9 \\ \hline 24.125 \\ 4.8125 \\ 8.9 \\ \hline 15.65 \\ \hline 93.6375 \text{ A., Ans.} \end{array}$

(11.)
$$\frac{3 \times \overset{3}{\cancel{33}} \times \overset{5}{\cancel{25}}}{\underset{5}{\cancel{55}}} = 45 \text{ bu., Ans.}$$

(12.) $\frac{1}{5} + \frac{1}{4} = \frac{9}{20}.$ Therefore $77 =$
 $\frac{1}{\frac{9}{20}}$ of whole number.

$$77 \div \frac{9}{20} = \frac{\overset{7}{\cancel{77}} \times 20}{\underset{11}{\cancel{11}}} = 140 \text{ sheep, Ans.}$$

(13.) $\frac{\overset{4}{\cancel{240}} \times \overset{5}{\cancel{15}}}{\underset{3}{\cancel{180}}} = 20 \text{ horses, Ans.}$

(14.) $33\frac{1}{3} \text{¢} = \$\frac{1}{3};$ $\frac{1}{3} \times \overset{321}{\cancel{963}} = \$321, \text{ Ans.}$

$$(15.) \quad \$36 \times 50 = \$1800; \quad \$1576 + (\$17 \times 50) = \$2426.$$

$$\$2426 - \$1800 = \$626, \text{ gain, } \textit{Ans.}$$

$$(16.) \quad 5\frac{1}{2} \text{ bu.} = 4\frac{3}{8} \text{ bu.}; \quad 4\frac{3}{8} \div \frac{3}{8} = 14 \text{ da., } \textit{Ans.}$$

$$(17.) \quad \$2000 \div \frac{1}{10} = \$2222\frac{2}{3}, \textit{ Ans.}$$

$$(18.) \quad \frac{\frac{3}{18} \times \frac{5}{35} \times 10}{\frac{66}{6} \times \frac{3}{3}} = 50 \text{¢, } \textit{Ans.}$$

$$(19.) \quad \frac{1}{3} + \frac{2}{3} = \frac{3}{3}; \quad \frac{3}{4} - \frac{1}{4} = \frac{2}{4}; \quad \frac{7}{4} \times 271\frac{1}{2} = 79.1875 \text{ A.};$$

$$\$57 \times 79.1875 = \$4513.6875.$$

$$(20.) \quad \$4000 \div .15 = \frac{800}{4000} \times \frac{100}{1\frac{2}{3}} = \frac{80000}{3} = \$26666\frac{2}{3}, \textit{ Ans.}$$

$$(21.) \quad 4 : 6\frac{2}{3} :: 36\frac{1}{3} : ? \quad \frac{20}{3} \times 2\frac{2}{3} \times \frac{1}{4} = 1\frac{4}{4} = 60\frac{5}{4} \text{ ft., } \textit{Ans.}$$

$$(22.) \quad .6 = \frac{3}{5}, \text{ and } .42\frac{2}{3} = \frac{3}{4}.$$

Since he had \$60 less than $\frac{3}{4}$ of his money left, he must have spent \$60 more than $\frac{3}{4}$ of it. Therefore

$$\frac{3}{4} \text{ of his money} + \$40 = \frac{3}{4} \text{ of it} + \$60;$$

or, $\frac{3}{4} \text{ of his money} = \frac{3}{4} \text{ of it} + \$20.$

Hence $(\frac{3}{4} - \frac{3}{4})$, or $\frac{1}{35}$, of his money = \$20; and his money = $\$20 \times 35 = \700 , *Ans.*

$$(23.) \quad \frac{1}{3} + \frac{1}{10} + \frac{1}{3} + \frac{1}{4} = \frac{27}{60}; \quad \frac{48}{60} - \frac{27}{60} = \frac{21}{60}, \text{ left}; \quad 260 \div \frac{21}{60} =$$

$$\frac{20}{260} \times \frac{40}{13} = 800 \text{ lb., } \textit{Ans.}$$

$$(24.) \quad 87\frac{1}{2} \text{¢} = \$\frac{7}{8}; \quad \$\frac{7}{8} \times 1250 = \$1093.75, \textit{ Ans.}$$

$$(25.) \quad \begin{array}{r} \$11578.40 \times 23 = \$266303.20 \\ 13357.82 \times 12 = 160293.84 \\ 19125.26 \times \underline{12.95} = \underline{247672.117} \\ 47.95 \quad \$674269.157 \end{array}$$

$\$674269.15 \div 47.95 = \$14061.92 +$, the average per mile.

(26.) $\frac{20}{9} \times \frac{5}{3} = 100$, number of sq. yd. $\$1.25 \times 100 = \125 ,
cost.

- (27.) A can do $\frac{1}{12}$ of the work in 1 day;
B can do $\frac{1}{15}$ of the work in 1 day;
C can do $\frac{1}{18}$ of the work in 1 day.

All working together can do $\frac{1}{12} + \frac{1}{15} + \frac{1}{18}$, or $\frac{37}{180}$, of the work in 1 day. They can, therefore, do the work in $\frac{1}{\frac{37}{180}}$ of 180 da., or $4\frac{2}{3}$ da.

(28.) $16\frac{2}{3}\% = \frac{1}{3}$; $\frac{1}{6} \times 1995 = \322.50 , *Ans.*

(29.) $12\frac{1}{2}\% = \frac{1}{8}$; $59.75 \times 8 = \$478$, *Ans.*

(30.) $1710 \text{ ft.} \times 3.1416 = 5372.136 \text{ ft.}$, *Ans.*

(31.) 15 lb. = 240 oz.; 5 lb. 10 oz. = 90 oz.;
 $90 \div 240 = .375 = 37\frac{1}{2}\%$, *Ans.*

(32.) $.00125 \times \$25875 = \$32.34+$, *Ans.*

(33.) $42 = 3 \times 14$; $56 = 4 \times 14$. G.C.D. = 14.

$(42 + 56) \div 14 = 7$. *Ans.* 14 ft. 7 pieces.

(34.) $8 \times \$.60 = \$ 4.80$
 $6 \times .70 = 4.20$
 $2 \times 1.10 = 2.20$
 $4 \times 1.20 = 4.80$
 $20 \text{ lb.} \quad \underline{\$16.00}$
 $\$16 + 20 = \36 , *Ans.*

(35.) $(8\frac{1}{2} \times 12) \div 8\frac{1}{2} = \frac{17}{2} \times 12 \times \frac{6}{8\frac{1}{2}} = \frac{408}{8\frac{1}{2}} = 11\frac{2}{3}$ hr., *Ans.*

(36.) $75\% - 33\frac{1}{3}\% = 41\frac{2}{3}\%$. $\$2760 \times 41\frac{2}{3}\% = \1150 , *Ans.*

(37.) 8 hr. 30 min. + 9 hr. 10 min. + 7 hr. 40 min. + 8 hr. 30 min. + 7 hr. 50 min. + 4 hr. 30 min. = $46\frac{1}{2}$ hr. = $4.6\frac{1}{2}$ times 10 hr. $\$2 \times 4.6\frac{1}{2} = \9.23 , *Ans.*

$$(38.) 4500 \text{ l.} = 4.5 \text{ cu. m.} \quad \frac{4.5}{1 \times 1} = 4.5 \text{ m., } \textit{Ans.}$$

(39.) 220 qt. @ 6¢ = \$13.20. Each quart lacked $\frac{1}{4}$ of a gill of being full; therefore in 220 quarts there was a lack of 44 gills, or $5\frac{1}{2}$ quarts. $5\frac{1}{2}$ qt. @ 6¢ = 33¢. The actual worth was 33¢ less than \$13.20, or \$12.87.

$$(40.) \text{Discount of } \$1 \text{ for 90 da. at } 6\% = .015.$$

$$\text{Proceeds} = 1.00 - .015 = .985.$$

$$\$368 \times .985 = \$362.48, \textit{Ans.}$$

$$(41.) \$2400 + \$2700 + \$4200 = \$9300, \text{ list price of the shipment.}$$

$$\$9300 - (60\% \text{ of } \$9300) = \$3720.$$

$$\$3720 - (10\% \text{ of } \$3720) = \$3348.$$

$$\$3348 - (5\% \text{ of } \$3348) = \$3180.60, \text{ cost of shipment, } \textit{Ans.}$$

$$(42.) \text{Interest of } \$500 \text{ for 3 yr. @ } 1\% = \$15;$$

$$\$45 \div \$15 = 3\%, \textit{Ans.}$$

(43.) $\frac{1}{3}$ of \$12520 = \$4173 $\frac{1}{3}$, the value of the brothers' shares. Since A owns $\frac{2}{3}$ as much as B, the share of B + $\frac{2}{3}$ of that amount, or $\frac{1}{3}$ of B's share, is equal to the shares of both. Therefore

$$\begin{aligned} \frac{1}{3} \text{ of B's share} &= \$4173\frac{1}{3}; \\ \frac{1}{3} \text{ of B's share} &= \$417\frac{1}{3}; \\ \frac{2}{3} \text{ of B's share} &= \$2921\frac{1}{3}, \text{ B's share;} \\ \frac{2}{3} \text{ of } \$2921\frac{1}{3} &= \$1252, \text{ A's share.} \end{aligned} \quad \left. \vphantom{\begin{aligned} \frac{1}{3} \text{ of B's share} &= \$4173\frac{1}{3}; \\ \frac{1}{3} \text{ of B's share} &= \$417\frac{1}{3}; \\ \frac{2}{3} \text{ of B's share} &= \$2921\frac{1}{3}, \text{ B's share;} \\ \frac{2}{3} \text{ of } \$2921\frac{1}{3} &= \$1252, \text{ A's share.} \end{aligned}} \right\} \textit{Ans.}$$

$$(44.) \$.32 \times 26750 = \$8560; \$8560 \times .02\frac{3}{4} = \$235.40, \textit{Ans.}$$

$$(45.) 12 \text{ mo.} - 3 \text{ mo.} = 9 \text{ mo., time during which the house was rented.}$$

$$\$25 \times 9 = \$225, \text{ amount received from rent.}$$

$$\$36.75 + \$8 = \$44.75, \text{ expenses.}$$

$$\$225 - \$44.75 = \$180.25, \text{ net income.}$$

- (46.) $.06 + .03 = .09$;
 $\$2870 \times .09 = \258.30 , interest @ 6% ;
 $\$258.30 + (\$258.30 \times \frac{1}{12}) = \279.825 , interest @ $6\frac{1}{2}$ % ;
 $\$2870 + \$279.825 = \$3149.825$, amount, *Ans.*
- (47.) $\$420.65 - 25\%$ of $\$420.65 = \$315.48\frac{1}{2}$;
 $\$315.48\frac{1}{2} - 10\%$ of $\$315.48\frac{1}{2} = \$283.93\frac{1}{2}$
 $= \$283.94$, *Ans.*

$$(48.) 13\frac{3}{7} = \frac{94}{7}; 8\frac{1}{8} = \frac{65}{8}; \frac{94}{7} \times \frac{49}{6} = \frac{232}{3} = 109\frac{1}{3}.$$

- (49.) Since $\$.75 = 150\%$ or $\frac{3}{2}$ of the cost,
the cost = $\frac{2}{3}$ of $\$.75 = \$.50$, *Ans.*
Since $\$.75 = 75\%$ or $\frac{3}{4}$ of the marked price,
the marked price = $\frac{4}{3}$ of $\$.75 = \1.00 , *Ans.*

- (50.) $800 \times 2 = 1600$, the sum ; and
 $200 \times 2 = 400$, the difference.

The greater of any two numbers is equal to the less + the difference ; and the greater and the less, or the sum of the numbers, must be composed of twice the less and the difference. Hence

$$\begin{array}{l} 1600 - 400 = 1200, \text{ twice the less ;} \\ 1200 \div 2 = 600, \text{ the less ;} \\ 600 + 400 = 1000, \text{ the greater.} \end{array} \left. \vphantom{\begin{array}{l} 1600 - 400 = 1200, \\ 1200 \div 2 = 600, \\ 600 + 400 = 1000, \end{array}} \right\} \textit{Ans.}$$

- (51.) $25\% = \frac{1}{4}$ 720
 $3600 \div \frac{1}{4} = 3600 \times \frac{4}{1} = \2880 , cost of first.

$$3600 \div \frac{1}{4} = 3600 \times \frac{4}{1} = \frac{1200}{3} = \frac{4800}{3}, \text{ cost of second.}$$

$$2 \times \$3600 = 7200, \text{ selling price of both.}$$

$$\frac{7200}{3} = \frac{2400}{1}, \text{ loss, } \textit{Ans.}$$

- (52.) The least common multiple of 8, 9, 15, 16, and 48,
which is 720, *Ans.*

(53.) Interest of \$1200 for 1 yr. @ 6% = \$72. \$720
 + \$72 = 10 yr., *Ans.*

(54.) $45^2 = 2025$ sq. yd., square of perpendicular;
 $60^2 = 3600$ sq. yd., square of base;
 5625 sq. yd., square of hypotenuse;
 $\sqrt{5625}$ sq. yd., = 75 yards, *Ans.*

(55.) \$ 8000 $\frac{80000}{400000} = \frac{1}{5}$, A's fraction;
 12000 $\frac{120000}{100000} = \frac{2}{10}$, B's fraction;
 20000 $\frac{200000}{400000} = \frac{1}{2}$, C's fraction;
 \$40000

\$1680 $\times \frac{1}{5} =$ \$336, A's; \$1680 $\times \frac{2}{10} =$ \$504, B's;

\$1680 $\times \frac{1}{2} =$ \$840, C's.

A's \$336; B's \$504; C's \$840, *Ans.*

(56.) 1 ft. 6 in. : 75 ft. :: 3 ft. 8 in. : ()
 $1\frac{1}{2}$ ft. : 75 ft. :: $3\frac{2}{3}$ ft. : ()

25
 $7\cancel{5} \times \frac{11}{\cancel{5}}$ ft. $\times \frac{2}{3} = 183\frac{1}{3}$ ft. = 183 ft. 4 in., *Ans.*

(57.) \$2 \times 2981 = \$5962, poll tax;
 \$13662 - \$5962 = \$7700, property tax;
 \$7700 \div \$1400000 = .0055, rate of taxation;
 \$12450 \times .0055 = \$68.475, C's property tax;
 4 C's poll tax;
 \$72.475, C's tax.
 \$.0055, tax on a dollar; } *Ans.*
 \$72.475, C's tax.

(58.) 36 Km. $\times 3\frac{1}{2} =$ 126 Km., distance passed over in
 3 hr. 30 min., *Ans.*

(59.) $6.125 \div 25 = .245$, *Ans.*

(60.) $6 \div 87 = .06\frac{2}{3} = 6\frac{2}{3}\%$, *Ans.*

(61.) $66\frac{2}{3}\% = \frac{2}{3}$; $\frac{2}{3} - \frac{2}{3} = \frac{1}{3}$; $\frac{1}{3}$ of 360 = 120, left after loss.

$87\frac{1}{2}\% = \frac{7}{8}$; $\frac{2}{3} - \frac{7}{8} = \frac{1}{24}$; $\frac{1}{24}$ of 120 = 5, left after sale.

$$\frac{15}{360} = \frac{1}{24} = 4\frac{1}{3}\%, \text{ Ans.}$$

(62.) $77\frac{1}{2} + 40\frac{1}{2} + 1\frac{1}{2} + 29\frac{1}{2} + 10\frac{1}{2} = 159\frac{1}{2} \text{ A., Ans.}$

(63.) 6 lb. 4 oz. 10 pwt. = 1530 pwt. 2 oz. 5 pwt. = 45 pwt.,
Ans. $1530 \div 45 = 34$, the number of spoons, *Ans.*

(64.) 8% at par pays $10\frac{8}{100}$; $10\frac{8}{100} = \frac{4}{5}$. *Ans.* 50.

(65.) $\$1950 \div \$4.86\frac{2}{3} = 400.6849$;

therefore $\$1950 = \text{£}400.6849$, or $\text{£}400$ 13s. 8 + *d.*,
 face of draft.

(66.) $\$13000 + \$28000 = \$41000 = \1000×41 ; $\$16 \times 41$
 $= \$656$, *Ans.*

(67.) A and B can do $\frac{1}{2}$ of the work in 1 day;

B and C can do $\frac{1}{2}$ of the work in 1 day;

A and C can do $\frac{1}{2}$ of the work in 1 day;

$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{307}{2912}$, twice the part that all can do in 1 day;

$\frac{1}{2}$ of $\frac{307}{2912} = \frac{307}{5824}$, the part that all can do in 1 day;

$\frac{5824}{5824} \div \frac{307}{5824} = 18\frac{23}{307}$ days, the time in which all can do it, *Ans.*;

$\frac{307}{5824} - \frac{1}{28} = \frac{99}{5824}$, the part A can do in 1 day;

$\frac{5824}{5824} \div \frac{99}{5824} = 58\frac{2}{9}$ days, the time in which A can do it, *Ans.*;

$\frac{307}{5824} - \frac{1}{28} = \frac{99}{5824}$, the part B can do in 1 day;

$\frac{5824}{5824} \div \frac{99}{5824} = 70\frac{1}{9}$ days, the time in which B can do it, *Ans.*;

$\frac{307}{5824} - \frac{1}{32} = \frac{125}{5824}$, the part C can do in 1 day;

$\frac{5824}{5824} \div \frac{125}{5824} = 46\frac{74}{125}$ days, the time in which C can do it, *Ans.*

(68.) $\$225 \div .015 = \15000 , *Ans.*

(69.) Int. on $\$1$ for 3 yr. @ 8% = $\$.24$.

$\$605.70 \times .24 = \145.368 int. $\$605.70 + \145.368
 $= \$751.07$ amt., *Ans.*

(70.) 200 yd. 2 ft. = 602 ft. $2.87\frac{1}{2}$ ft. + $3.12\frac{1}{2}$ ft. = 6 ft.
 602 ft. - 6 ft. = 596 ft., *Ans.*

- (71.) $\$217.09 - \$204 = \$13.09$, interest;
 Interest of $\$204$ for 1 yr. @ 7% = $\$14.28$;
 $\$13.09 \div \$14.28 = \frac{1}{2}$ yr. = 11 mo., *Ans.*
- (72.) $\frac{22 + 16}{2} = 19$ in. = $1\frac{7}{8}$ ft., the average width;
 $20 \times 1\frac{7}{8} \times 1\frac{1}{2} = 47\frac{1}{2}$ board ft. ;
 $47\frac{1}{2}$ board ft. @ $\$25$ per M = $\$1.19$, the cost.
- (73.) $128^2 = 16384$; $72^2 = 5184$; $16384 + 5184 = 21568$.
 $\sqrt{21568} = 146.86 +$ miles, *Ans.*

(74.) Since $\$4.50$ was the net cost after the last discount, $\$4.50$ must have been 90% , or $\frac{9}{10}$, of the price before that deduction; the price before the last deduction was, therefore, $\$5.00$. Since $\$5.00$ was the price after the first discount, $\$5.00$ must have been 60% , or $\frac{6}{10}$, of the list price; therefore the list price was 10 times $\frac{1}{6}$ of $\$5.00$, or $\$8.33\frac{1}{3}$.

(75.) $3\frac{1}{2}\%$ of $\$1260 = \$1260 \times .035 = \$44.10$, commission, *Ans.*

(76.) Since 15 men can do the work in 36 da., in what time can 24 men do it?

$$24 \text{ men} : 15 \text{ men} :: 36 \text{ da.} : ?$$

$$\frac{36 \times 15}{24} = 22\frac{1}{2} \text{ da., } \textit{Ans.}$$

- | | |
|---|---|
| <p>(77.) $\\$500$
 $\underline{.06}$
 $\\$30.00$, int. for 1 yr.
 $\underline{500}$
 $\\$530$, amt. for 1 yr.
 $\underline{.06}$
 $\\$31.80$, int. for 2d yr.
 $\underline{530.00}$
 $\\$561.80$, amt. for 2 yr.</p> | <p>$\\$561.80$, amt. for 2 yr.
 $\underline{.03}$
 $\\$16.8540$, int. for 6 mo.
 $\underline{561.80}$
 $\\$578.654$, amt. for 2 yr. 6 mo.
 $\underline{500.00}$
 $\\$78.654$, compound int., <i>Ans.</i></p> |
|---|---|

(78.) $1 + \frac{1}{2} + \frac{1}{3} = 1\frac{5}{6}$. That is, if a number is increased by $\frac{1}{2}$ and $\frac{1}{3}$ of itself, the result will be $1\frac{5}{6}$ times the number. Hence by the conditions, $1\frac{5}{6}$ times the number, plus 18, is equal to 2 times the number; consequently, 18 is $2 - 1\frac{5}{6}$ or $\frac{1}{6}$ of the number, and $18 \times 6 = 108$, the number, *Ans.*

(79.) $1.00 - .08 = .92$; $\$23 \div .92 = \25 , cost of the tables and chairs sold. Since 3 tables cost $3 \times \$3 = \9 , $\frac{2}{3}$ of the chairs cost $\$25 - \$9 = \$16$; all the chairs cost $\frac{5}{2} \times \$16 = \40 ; $\$76 - \$40 = \$36$, cost of all the tables.

$$\left. \begin{array}{l} \$40 \div \$2 = 20 \text{ chairs;} \\ \$36 \div \$3 = 12 \text{ tables.} \end{array} \right\} \text{Ans.}$$

(80.) $18 \text{ in.} : 40 \text{ in.} :: 42 \text{ ft.} : ?$ $\frac{40 \times 504}{18} = 1120 \text{ in.} = 93\frac{1}{3} \text{ ft.}$
Ans.

(81.) 1 mi. = 320 rd., length of one side of the park.
 $320^2 = 102400$ sq. rd.; 2×102400 sq. rd. = 204800 sq. rd.
 $\sqrt{204800}$ sq. rd. = 452.5 + rd., diagonal:
 2×320 rd. = 640 rd., distance around the park to the opposite corner:
 $640 \text{ rd.} - 452.5 \text{ rd.} = 187.5 \text{ rd.}$, distance between A and B, when A arrives at the opposite corner:
 $187.5 \text{ rd.} \div 2 = 93.7 + \text{rd.}$, *Ans.*

(82.) $21 \text{ rd.} \times 4 \times 3 = 252 \text{ rd.} = 4158 \text{ ft.}$, length of wire required.
 $\$.02 \times 4158 = \83.16 , cost of fencing.
 $\$83.16 \times .05 = \4.16 , deduction for cash.
 $\$83.16 - \$4.16 = \$79$, actual cost.

(83.) $\$8840 \div \$1360000 = .0065$, the rate.

(84.) $\$900 \div \$4 = 225$, the number of shares;
 $\$121\frac{2}{3} \times 225 = \27309.38 , cost of stock.

(85.) $\$867 \div 1.02 = \850 , stock purchased;
 $.06 \times \$850 = \51 , income, *Ans.*

(86.) A hectare = 100 ares = 10000 square meters. If 10000 sq. m. are disposed in the form of a square, each side is 100 m. long. $100 \text{ m.} \times 4 = 400 \text{ m.}$, *Ans.*

(87.) $16 \text{ oz.} : 12 \text{ oz.} :: \$28 : ()$

$$\begin{array}{r} 3 \quad 7 \\ 12 \times 28 = \$21, \text{ Ans.} \\ \underline{16} \\ A \end{array}$$

(88.) $\$50 \times 75 = \3750 ;
 8% of $\$3750 = \300 , the amount of the dividend;
 $\$300 \div \$50 = 6$, the number of shares the dividend would buy;
 $75 \text{ shares} + 6 \text{ shares} = 81 \text{ shares}$, *Ans.*

(89.) $13 : 39 :: 1 : 3$; $1^3 : 3^3 :: 1150.3 : ?$
 $\frac{27 \times 1150.3}{1} = 31058.1 \text{ cu. ft.}$, *Ans.*

(90.) Since A's stock = $\frac{1}{3}$ of B's, $\frac{1}{3}$ of B's stock = $\$5600$, and B's stock is $\$4200$.
 Since B's stock = $\frac{2}{3}$ of C's, $\frac{2}{3}$ of C's stock = $\$4200$, and C's stock is $\$3500$.

$$\begin{array}{r} \text{A's stock} = \$5600 \\ \text{B's stock} = 4200 \\ \text{C's stock} = 3500 \\ \hline \text{Entire stock} = \$13300 \end{array}$$

$$\left. \begin{array}{l} \frac{5600}{13300}, \text{ or } \frac{56}{133}, \text{ of } \$3192 = \$1344, \text{ A's gain;} \\ \frac{4200}{13300}, \text{ or } \frac{42}{133}, \text{ of } \$3192 = \$1008, \text{ B's gain;} \\ \frac{3500}{13300}, \text{ or } \frac{35}{133}, \text{ of } \$3192 = \$840, \text{ C's gain.} \end{array} \right\} \text{Ans.}$$

(91.) Since a Km. = $\frac{5}{8}$ of a mile, a mile = $\frac{8}{5}$ of a Km.
 $\frac{8}{5} \text{ Km.} \times 235 = 376 \text{ Km.}$, *Ans.*

(92.) Since the bin is twice as long as it is wide, or high, it is equal to two cubical bins each containing 250 bu. of grain.

$$2150.4 \text{ cu. in.} \times 250 = 537600 \text{ cu. in.};$$

$$537600 \div 1728 = 311.111+, \text{ the number of cubic feet};$$

$$\sqrt[3]{311.111} = 6.776, \text{ the number of feet in width, or depth, of bin};$$

$$6.776 \text{ ft.} \times 2 = 13.55, \text{ the number of feet in the length of bin.}$$

(93.) $\$10777.375 \div 98.875 = 109$, the number of shares;
 10% of $\$10900 = \1090 , annual income.

(94.) $440 \text{ lb.} \div 2\frac{1}{2} \text{ lb.} = 200$, number of kilograms.

$$\$.10 \times 440 = \$44, \text{ cost.}$$

$$\$.22 \times 200 = \$44, \text{ selling price.}$$

$$\$44 - \$44 = \$0, \text{ gain.}$$

(95.) $\$53500 \div 1.07 = \50000 , *Ans.*

(96.) $50^2 = 2500$; $40^2 = 1600$; $2500 - 1600 = 900$;

$$\sqrt{900} = 30 \text{ ft.}, \text{ } \textit{Ans.}$$

(97.) $.10 \div 1.06 = .09\frac{2}{3} = 9\frac{2}{3}\%$, *Ans.*

(98.) Amount of $\$1$ for 3 yr. @ 7% = $\$1.21$;

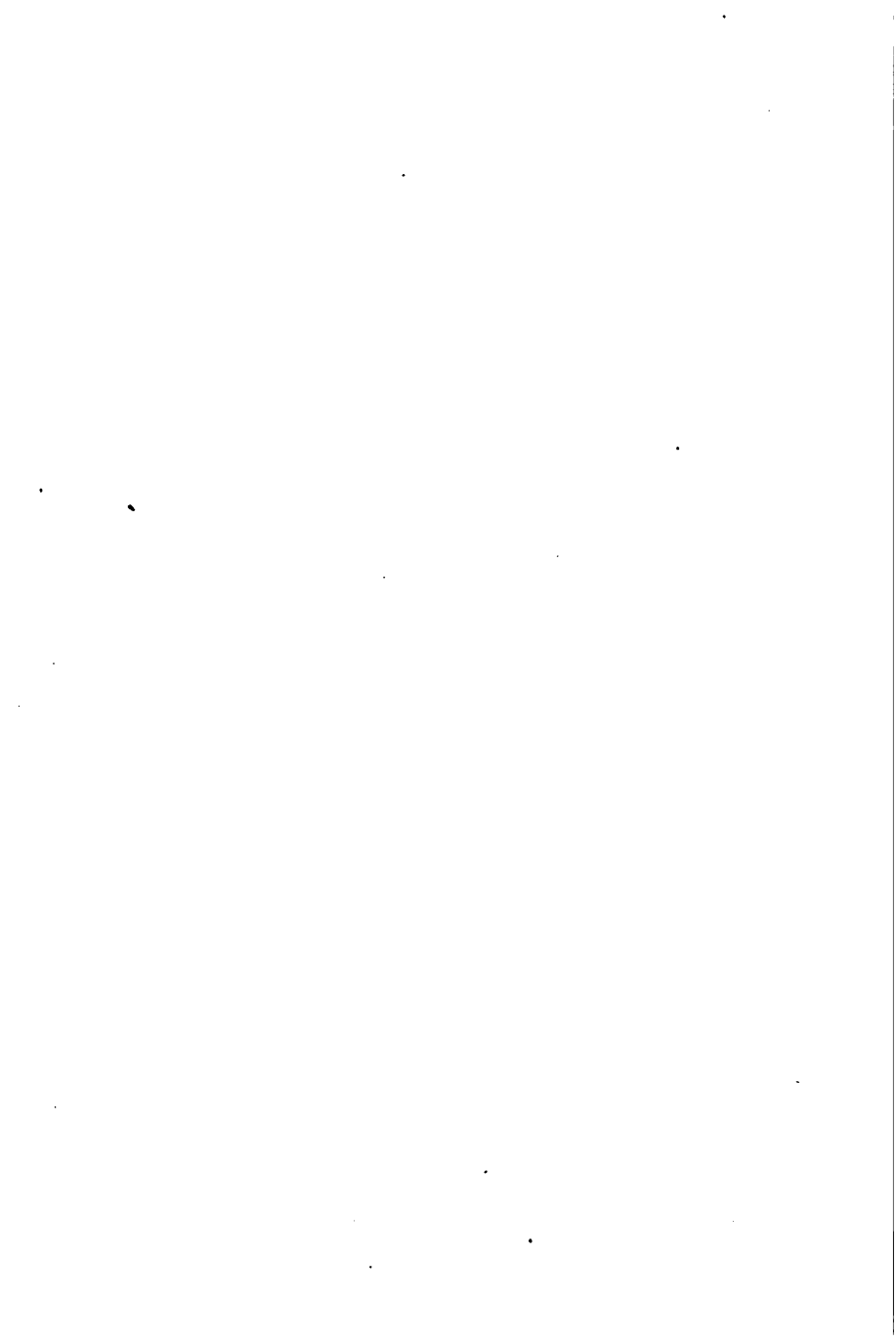
$\$3675$, cash offer;

$$\$4235 \div \$1.21 = \frac{3500}{175}, \text{ cash value of note};$$

$\$175$, loss, *Ans.*

(99.) $6 \div .05 = 120$, *Ans.*

(100.) Since one pipe will fill the cistern of 200 gal. in 15 min., $13\frac{1}{3}$ gal. must run in every minute; and since it can be emptied in 40 minutes, 5 gal. must run out every minute. Both pipes being turned on, the cistern will be filled at the rate of $13\frac{1}{3} - 5 = 8\frac{1}{3}$ gal. per minute. $200 \text{ gal.} \div 8\frac{1}{3} \text{ gal.} = 24$, the number of minutes it will take to fill it, *Ans.*



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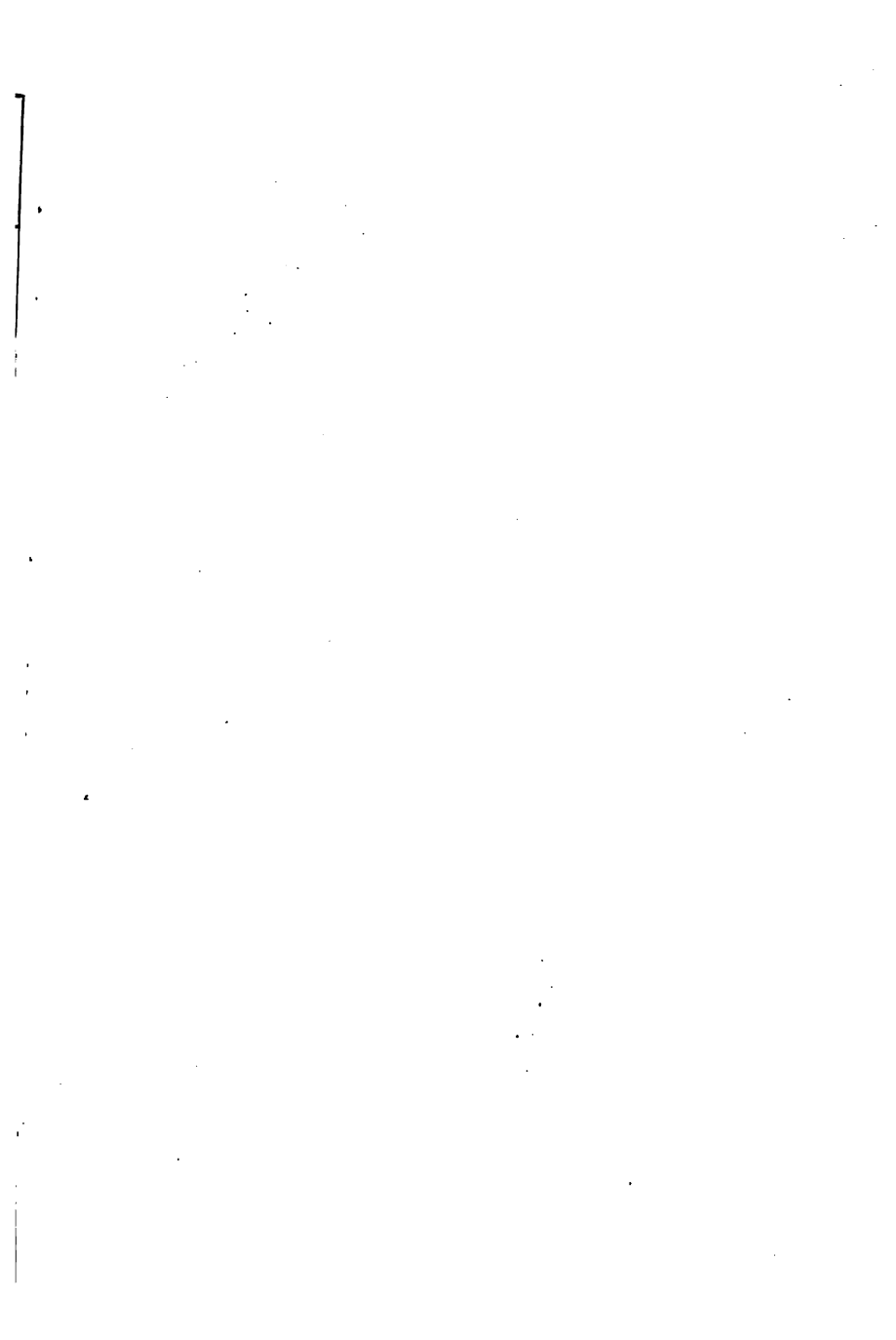
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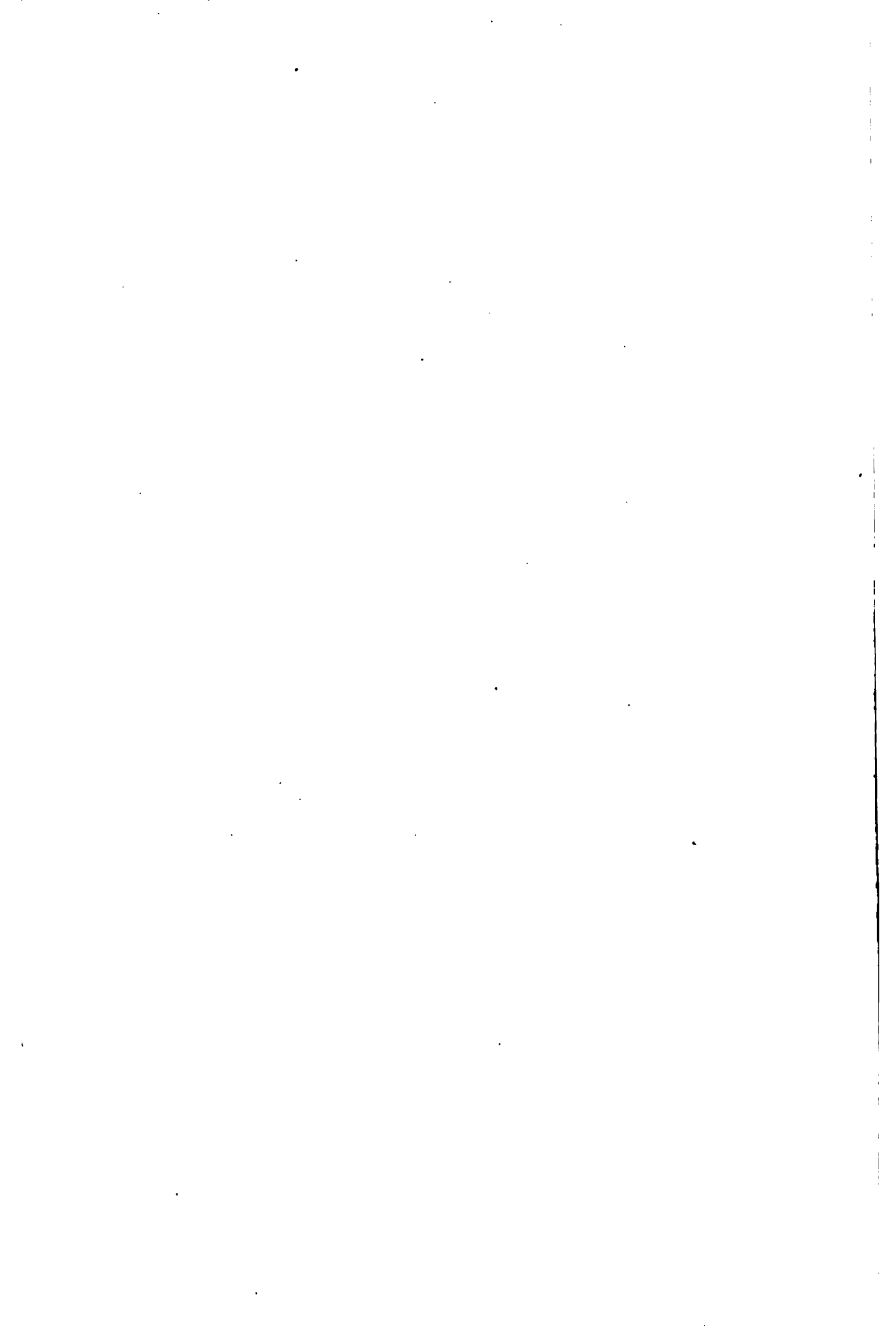
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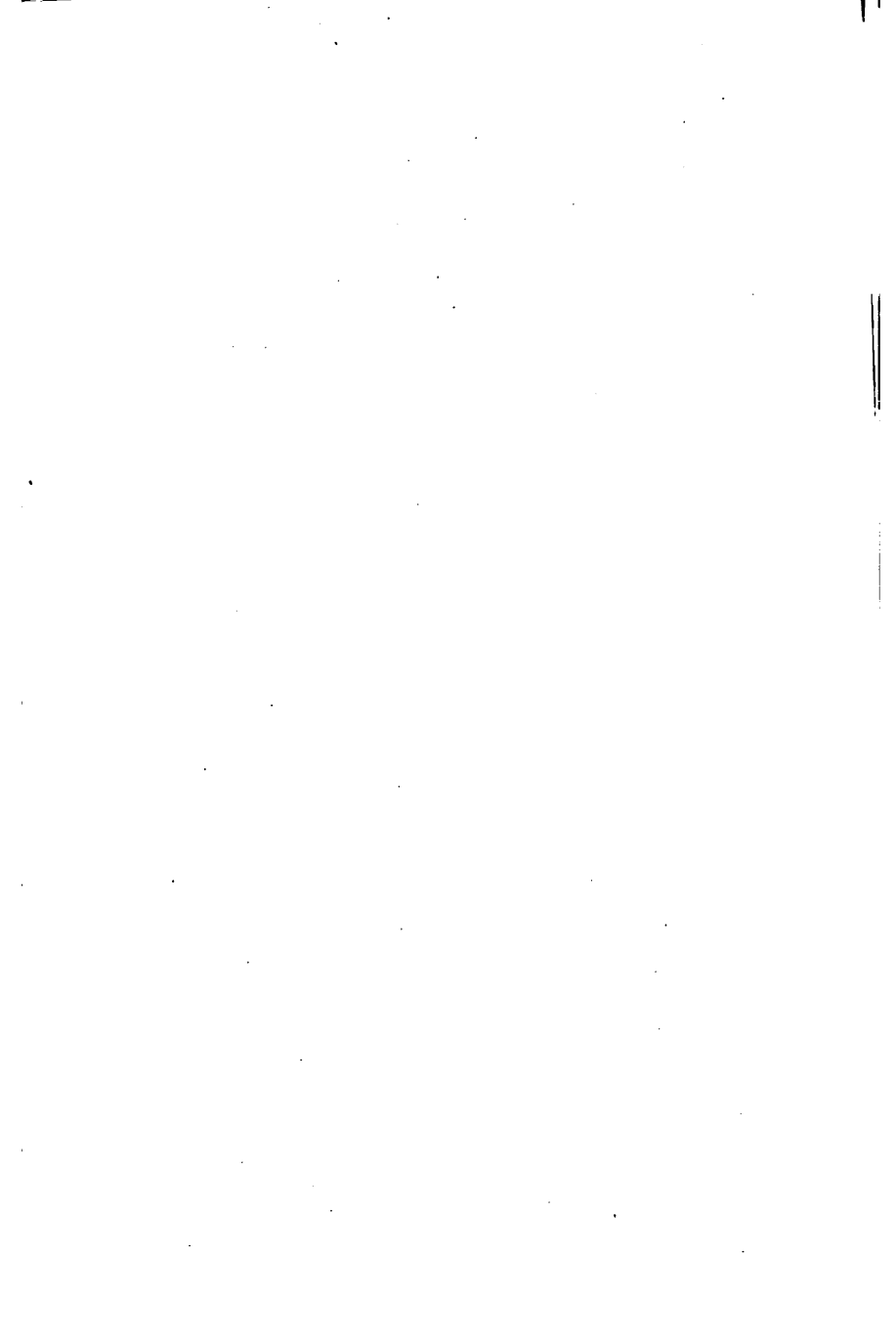
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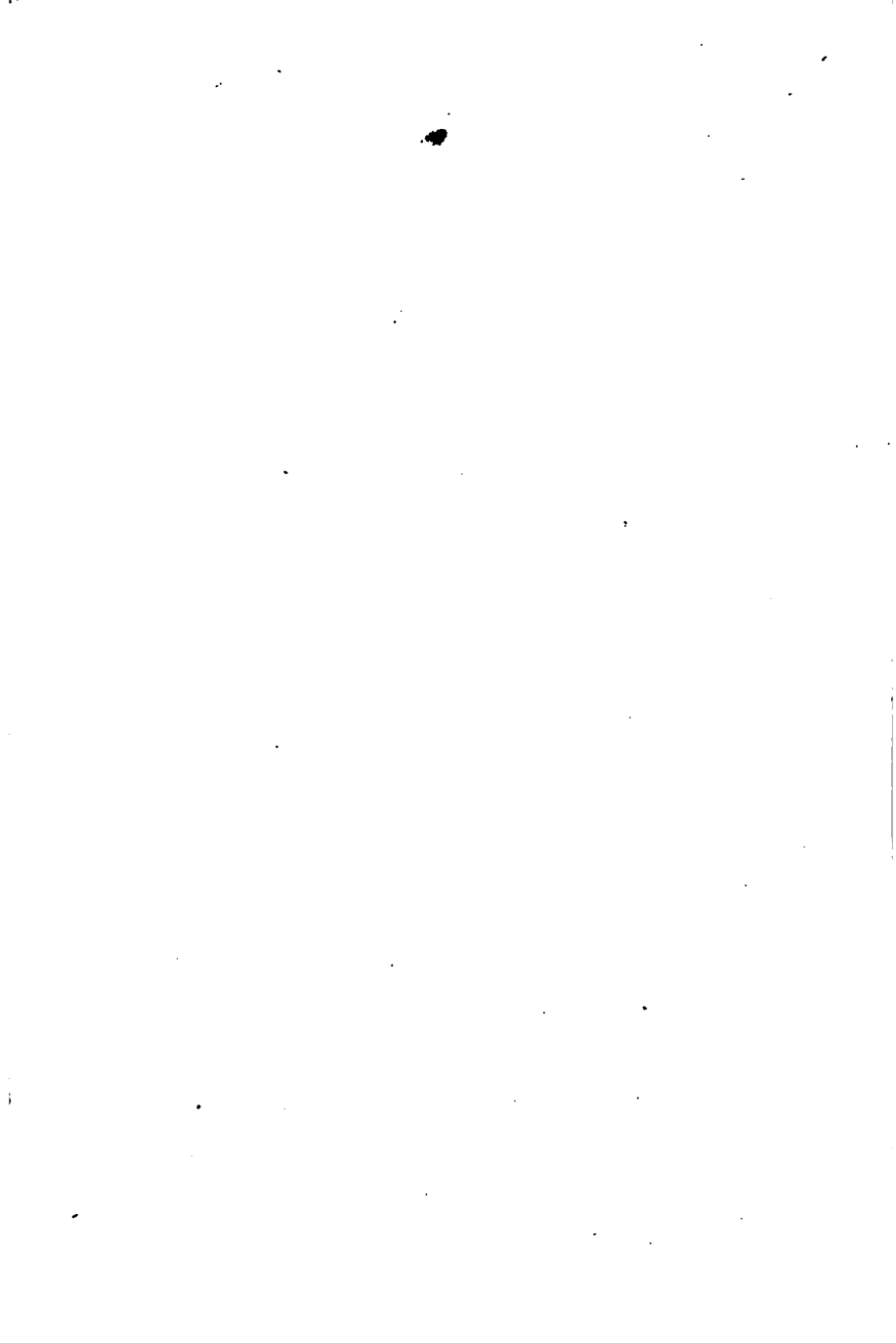
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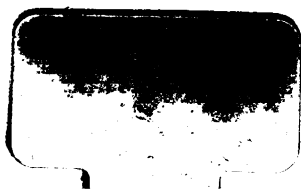
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