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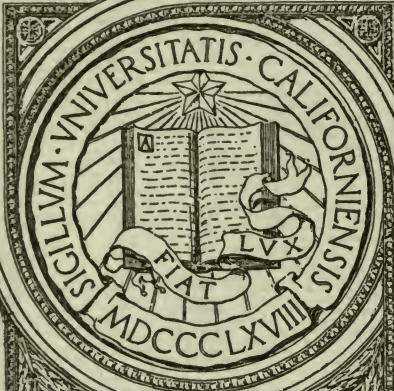
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FLORIAN CAJORI



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ANSWERS
TO
ELEMENTARY ALGEBRA

BY
FLORIAN CAJORI
AND
LETITIA ODELL

New York
THE MACMILLAN COMPANY
1916

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CAJORI

ANSWERS TO EXERCISES AND PROBLEMS IN ELEMENTARY ALGEBRA BY CAJORI AND ODELL

Page 3.—27. 22. 28. 14. 29. 27. 30. 121. 31. 29. 32. 4. 33. 25
34. $2\frac{1}{4}$. 35. 64. 36. 964. 37. 47. 38. 10. 39. 259. 40. 111. 41. 42.
42. 75. 43. 75. 44. 70.

Page 6.—1. 17. 2. 98 lbs. 3. $46\frac{1}{4}$ mi. per hr. 4. 46 mi. per hr.
5. 20 hrs. 6. 33 ft. 8. 45, 30. 9. 80, 46. 10. \$30, \$6. 11. \$84, \$12.
12. \$80, \$44. 13. 5. 14. $1\frac{1}{2}$ oz. 15. 1184. 16. 7. 17. \$6000, 1'';
\$5000, 2''; \$3000, 3''. 18. \$12,000, A's; \$4000, B's; \$8000, C's. 19. 9 oz.
20. 20. 21. 1.20 ft. 22. 19.71. 23. 6.674 ; 4.626 .

Page 10.—16. (1) 32. (2) 64. (3) 96. (4) 896. (5) 35. (6) 246.
(7) 243. (8) 73,255. (9) 3. (10) 1. (11) 1. (12) 6234. (13) 139. (14) 59.
(15) 243. 17. 4; 64; 2500; 5184; 1024; 324; 40,000. 18. 80; 970;
9960; 99,950. 19. $\frac{1}{4}$; $\frac{1}{8}$; 2; $\frac{11}{8}$; $\frac{21}{16}$. 20. 0; 0.

Page 12.—1. 17. 2. 137. 3. 18. 4. 21. 5. 24. 6. 50. 7. 70.
8. 0. 9. 240.

Page 13.—1. 0. 2. 10. 3. 27. 4. 93. 5. 3. 6. 24. 7. 8. 8. 4.

Page 13.—1. $\frac{5}{6}$. 2. 2. 3. 589. 4. $\frac{3}{4}$. 5. $6\frac{4}{11}$. 6. $2\frac{3}{20}$. 7. 156.
8. 56. 9. 82. 10. 4. 11. Yes; No. 12. No; No.

Page 18.—4. - 10. 5. 45. 6. 15. 7. - 70. 8. 80. 9. - 4.
10. 45. 11. 75; - 45. 12. - 20. 13. - 10. 14. 10. 15. - 40.
16. 80. 17. 70. 18. - 65. 19. - 70. 20. - 20. 21. - 45. 22. - 2.
23. 20. 24. - 80. 25. - 95. 26. - 95.

Pages 20-22.—1. \$100. 2. \$180. 3. 5 cts. 4. 19 ft. lower.
5. 8 in. higher. 6. 92 mi. 7. 38° above; 12° below; 112° below; 162°
below; 222° below. 8. 8000 ft. higher; 1000 ft. lower; 5600 ft. lower;
5900 ft. lower; 6100 ft. lower. 9. $51\frac{1}{7}^\circ$. 10. - $1\frac{3}{7}^\circ$. 11. \$140.
12. $33^\circ 11' 30''$. 13. $1^\circ 48' 30''$. 14. $3' 32\frac{1}{2}''$. 16. 43850'. 17. 3 hrs.
18. 10 mi. per hr. 19. 249 lbs. upward.

Page 24.—1. 14 das. 2. 46 ft., 1840 cu. ft.

Page 25.—1. 11. 2. 14. 3. - $48\frac{8}{7}$. 4. - 351. 5. 3. 6. $76\frac{13}{14}$.
7. 12. 8. - 22. 9. 67.

Pages 26-27.—1. $15a$. 2. $-3c$. 3. $5x + 12y + 5z$. 4. $5x$.
 5. $14x + 10y$. 6. $15c - 6d + 39e$. 7. $-8a + 35b + 4e$.
 8. $14(a + b)$. 9. $-7a^2b^2 - 2ab^2 + 7ab^2c$. 10. $9fg - 8gh$.
 11. $5a + 9b + 10c$. 12. $-9ax$. 13. $3mn$. 14. $-18kl$. 15. $-5ac$
 $-3bc - 9cd$. 16. $55st - 9ty$. 17. $10a - x$.

Pages 27-28.—1. $11ac^2 + 3b^2c - 6c^3 + 7ac$. 2. $3a^2 + 9b^2 + 3c^2$.
 3. $22x - y + 5xy$. 4. $12x - 7y - 14z + 7w - 3v$. 5. $4a - b + 6c$.
 6. $5a + 8b + 4c$. 7. $2a + 3b + 14c - 6d + 3f$. 8. $4a^3b + 11ab^3 - 11ab$.
 9. $-a - 2b + 5c + d + 4e$. 10. $7x + 18y - 13z + 5w + v$.
 11. $-7x + 2y + 6z$. 12. $2a - 4d$. 13. $-3m + 16n + 6p$.
 14. $-12f + 6g + 47h$. 15. $3b + 2c - 11d + 3e$. 16. $-17a - 14r$
 $-22s$. 17. $5a - 28b - c$. 18. $4x + y + z + 5w - a + b - 6c + 4d$.
 19. $-2a - 2b - 30c$. 20. $-4a + 21b + 31c$. 21. $4a^4 - 8a$.
 22. 6, -6 , 3, 12, -12 , -9 , 9, -10 . 23. 4, 20, 21. 24. 4, 9, 1, 100, 36.
 25. -60 , 120, $+180$, -60 , -600 . 26. -8 , -27 , -1 , 1000, 216,
 8, -1000 . 27. -4 , 4000, -3000 , -1000 , 1000.

Page 29.—2. $3x^2 - 4x - y$. 3. $3x^2 + 5x - 16y$. 4. $x^2 - 2x - 15y$.
 5. $5a^2 + 5a - 2b$. 6. $5a^2 + a - b$. 7. $-7a^2 + 29a + 14b$.
 8. $3a^3 + 5b^2$. 9. $5a^3 + 2b^3$. 10. $-a^3 - 4b^4$.

Pages 30-31.—1. $4a + 5 - 4c$. 2. $-2c - 3d$. 3. $a + 3b + 3c$.
 4. $-a + b - 7c$. 5. $-4n$. 6. $3d - 7e - 2f + 6g$. 7. $-162 + 12m$
 $-n - 3r - 5t + 9y$. 8. $14x + 6y + w$. 9. $-14a + 5b$. 10. $-4r$.
 11. $6c - 4d - e + 3f$. 12. $4a - 2b - c + 4d + e$. 13. $4a + 2b - 2c$.
 14. $-4a + 3b - 5c$. 15. $6n$. 16. $-11m - 2n + 4p$.

Pages 31-32.—1. $x + (a + b - c + d) + y + (-m + n - s)$. 2. $2x$
 $- (-3a + 4b - 5c) - y - (6k - 8l - 7f + 4g)$. 3. $(3a + 2w - 3e)$
 $+ x + (-4r + 5t) + y + (5t - 6w + 7i) - x + (a + b)$. 4. $-(9m$
 $- 8i + 7w) + 6y - (-5t + 4r - 3e) + x - (-2w - 3a)$. 5. $3y +$
 $(-c + 3a) - 2x + (4b - 2d)$. 6. $-(5b) - x + 3y - (4c - 5d)$.
 7. $(-5m + 6n) + 7x + (-3p) - 4y$. 8. $3y - (3c - 2b + 5a) + 5x$.

Page 36.—1. 4. 2. 5. 3. -2 . 4. 6. 5. $6\frac{1}{2}$. 6. -5 . 7. $7\frac{2}{3}$.
 8. $-1\frac{1}{3}$. 9. 2. 10. -20 . 11. $\frac{7}{8}$. 12. -60 . 13. $(a - b)/2$.
 14. $a - b - c$. 15. $(c - b)/2a$. 16. $(a + b)/6$. 17. $a - b$. 18. $1/a$.
 19. 13. 20. $(3c - 2b)/a$.

Page 37.—1. -22 . 2. $1\frac{5}{6}$. 3. $-6\frac{1}{8}$. 4. $27\frac{1}{3}$. 5. 60. 6. 4.

Pages 37-40.—1. 18 ft.; 8 ft. 2. $70 - 2w$; $(70 - l)/2$. 3. 180 ft.;
 60 ft. 4. 70 yds. 5. 70 lbs.; 30 lbs. 6. $25\frac{5}{7}$ lbs. 7. $66\frac{2}{3}$ lbs.; $33\frac{1}{3}$ lbs.
 8. 126; 80. 9. 258; -42 . 10. $12\frac{1}{2}$; $-12\frac{1}{2}$. 11. 20; -4 .
 13. 22 min. 14. $5\frac{1}{2}$ min. 15. 8 dimes; 11 nickels. 16. 9 dimes;

- 7 quarters. 17. 24 nickels; 79 pennies. 18. 7 dimes; 7 quarters.
 19. 45° ; -10° . 20. 48° . 21. $\$4372\frac{1}{2}$. 22. $\$1500$ at 6% ; $\$1200$ at 5% .
 23. $\$3000$ at 6% ; $\$2000$ at 7% . 24. James 54 words; John 108 words.
 25. 46; 35. 26. $3a/2$; $(5a + 2b)/2$. 27. $(a + b)/2$; $(a - b)/2$.
 28. $c/2$; $-c/2$. 29. a dimes; b quarters. 30. $2T + t$. 31. $(3D + d)/2$.
 32. Father $\$4a/5$; son $\$a/5$. 33. $(p + 2q)/4$; $(p - 2q)/4$. 34. $P/8$; $3P/8$.
 35. 12; 13. 36. 24, 25, 26. 37. $(s - 3)/3$; $s/3$; $(s + 3)/3$. 38. 50; 52.

- Pages 42-43.—1. $6x^2y + 3exy^2 + 18xyz - 15wxy$. 2. $10a^2bc - 20ab^2c$
 $+ 10abc^2e - 40abcd - 10abce$. 3. $9x^2y^2z^2 + 36xy^5z^2 - 45x^2y^3z^3 -$
 $18x^2y^2z$. 4. $-6mn^3o^2 - 10n^4o^2 - 8n^3o^3 + 10n^3o^2p$. 5. $-35 + 14a$
 $- 14b + 21c - 28e$. 6. $-4m + 10n^2 + 120 - 10p$. 7. $4a^2bcd -$
 $4ab^3cd - 8abc^4d - 12abcd^4$. 8. $-18abx^3 - 6ax^4 + 16adx^3 - 2afux^3$
 $+ 2agrx^3$. 9. $12a - 18b - 24c + 30d$. 10. $-10x + 5qy - 15z$.
 11. 72.

- Pages 45-46.—1. $x^2 + 3x + 2$. 2. $2x^2 + 7x + 3$. 3. $2x^2 - 7x + 3$.
 4. $5x^3 + 21x^2 + 6x + 8$. 5. $-6x^3 + 20x^2 - 4x - 6$. 6. $y^4 - 7y^3$
 $+ 10y^2 + 4y - 20$. 7. $y^6 - y^5 - y^4 - y^2 + y + 1$. 8. $z^3 - z^2 - z$
 $+ 1$. 9. $y^4 - 7y^3 + 13y^2 - 16y + 5$. 10. $-2z^4 - 2z^3 + 12z^2 - 20z$
 $- 60$. 11. $6x^5 - 9x^3 + 15x + 2x^4y - 3x^2y + 5y$. 12. $5x^4 + 9x^3$
 $+ 6x^2 + 2x$. 13. $6z^5 - 42z^3 - z^2 + 7$. 14. $2x^3 + 2x^2 - 3x + 2$.
 15. $x^3 - \frac{4}{3}x^2 + \frac{10}{3}x - 1$. 16. $z^6 - 1$. 17. $3x^3 - x^2 - 6x + 4$.
 18. $-z^4 + 8z^3 - 19z^2 + 8z + 12$. 19. $-3y^5 + 15y^4 + 16y^3 + 11y^2 +$
 $7y - 6$. 20. $8x^6 + 10x^5 - x^4 - 24x^3 - 9x^2 + 6x + 10$. 21. $2x^6 + 5x^5$
 $- 7x^4 - 9x^3 + 5x^2 - 8x + 12$. 22. $15x^2 - xy + 2xz + 15x - 2y^2 - 3yz$
 $+ 5y - z^2 + 5z$. 23. $2a^2 + ac - 2b^2 + 5bc - 3c^2$. 24. $x^4 + x^3y + 2x^3$
 $+ 2x^2y - 2x^2y^2 + 2xy^2 + x^2 + xy$. 25. $x^3 + x^2y + xy^2 + x^2z + xz^2 +$
 $y^3 + y^2z + yz^2 + z^3$. 26. $a^2 - 2ae + 6af - 4ag + e^2 - 6ef + 4eg + 9f^2$
 $- 12fg + 4g^2$. 27. $a^2 + 2ab - 2ac + 2ad + 2ae + b^2 - 2bc + 2bd +$
 $2be + c^2 - 2cd - 2ce + d^2 + 2de + e^2$. 28. $a^4 + 2a^3b - 2a^2b^2 - 2ab^3$
 $+ b^4$. 29. $x^3 - 6x^2y + 12xy^2 - 8y^3$. 30. $x^3 - 3x^2y + 3xy^2 - y^3 + 3x^2z$
 $- 6xyz + 3y^2z + 3xz^2 - 3yz^2 + z^3$. 31. $a^3 - 3a^2b + 3ab^2 - b^3 - 3a^2c$
 $+ 6abc - 3b^2c + 3ac^2 - 3bc^2 - c^3$.

- Pages 46-47.—2. -5 . 3. $-\frac{4}{5}$. 4. $-\frac{1}{7}$. 5. $-\frac{3}{4}$. 6. 5. 7. 11.
 8. -5 . 9. -13 . 10. -5 . 11. $\frac{2}{5}$. 12. -2 . 13. $\frac{6}{19}$. 14. $\frac{4}{11}$.
 15. $-\frac{61}{5}$. 16. $-\frac{5}{2}$. 17. $-\frac{1}{14}$. 18. -7 . 19. 5. 20. $\frac{1}{3}$.

- Page 50.—1. $\frac{-31a^3b^5c^{-2}}{3}$. 2. $\frac{-5x^4z^4}{3}$. 3. $\frac{59m^3n^{-3}o^{-3}}{6}$.
 4. $\frac{-5b^{-2}c^{-1}d^{-4}e^3}{6}$. 5. $\frac{-pr^2}{2q^2s^2}$. 6. $\frac{18c^3}{-11a^7t^4d^7}$. 7. $\frac{16l^3m^4}{49v^5}$. 8. 7a ft.
 9. $11\frac{1}{3}xy$ in. 10. $14\frac{3}{5}n^4o^4$ in. 11. $3\frac{5}{9}b^{-2}c^3d$. 12. $25x^3y^2$.

Page 51.—1. $\frac{3b}{5}$. 2. $\frac{17at^4w}{12}$. 3. $\frac{8yz^2}{abcx^2}$. 4. $\frac{x}{8ab}$. 5. $\frac{t^3}{6}$. 6. $\frac{-2bc^2}{21m}$.
 7. $\frac{-5c^2}{4a^2e^2}$. 8. $\frac{3lr^4t}{-4k^6ms}$. 9. $\frac{c^4y^5z^2}{a^2}$. 10. $\frac{-2ft^3y^2}{3w}$. 11. $\frac{-16a^3b^2c^4d^3e}{fg}$.
 12. $\frac{30h^4i^2kw^2}{7xy^2z}$. 13. $\frac{64bd^3ert^5}{c^4}$. 14. $\frac{100h^3j^6k^4}{3no^2}$.

Page 53.—1. $\frac{5d^2y}{2ax}$. 2. $\frac{8a^2de^2r^2l^3}{b^2cy}$. 3. $\frac{7mo^5}{-26k^4lp}$. 4. $\frac{-117dg^2x^2y^2z}{124fh^4}$.

Page 54.—1. $4x - 3y$. 2. $4a + 2$. 3. $3 - 4m$. 4. $bc - 4d/3$.
 5. $1 + 2hl$. 6. $2 - xz^3$. 7. $3x^3/2 - y^3 + 2$. 8. $3r + 4 - 2/r$.
 9. $4/3y^2 - 5/3xy - 4/3$. 10. $3/4 + 5z^4/4 + 7w/4$. 11. $5 + 6ac - 8a$.
 12. $-c + 4e/d - ce^2$. 13. $-5/3 + 2xy - y^5$. 14. $-3/2 + ab^2 - 2ab^3c^2$.

Page 56.—1. $x + 1$. 2. $y + 2$. 3. $x + 2$. 4. $z - 2$. 5. $x^2 - x + 1$.
 6. $w^2 - w + 1$. 8. $c^2 + c + 1$. 8. $x^3 + 2x^2 + 4x + 8$. 9. $6x^2 + 7x^2 - 8x + 30$.
 10. $5x^3 - 8x^2 + 9x + 2$. 11. $y^4 - y^3 - y + 1$. 12. $a + b$.
 13. $x - y$. 14. $x + y$. 15. $x - y$. 16. $m^2 - mn + n^2$. 17. $m^2 + mn + n^2$.
 18. $x^4 + x^3y + x^2y^2 + xy^3 + y^4$. 19. $a^4 + a^2b^2 + b^4$.
 20. $c^3 + d^3$. 21. $a^3 - b^3$. 22. $x^5 + x^4y + x^3y^2 + x^2y^3 + xy^4 + y^5$.
 23. $x^4 - x^3y + x^2y^2 - xy^3 + y^4$.

Page 57.—1. $x^2 + 11x + 106 + \frac{949}{x - 9}$. 2. $y^2 - 4y + 1 + \frac{13y + 8}{y^2 + 4}$.
 3. $z^3 + 4z^2 - 6 + \frac{-21z + 5}{z^2 - 4z}$. 4. $w^6 - w^4 + w^2 - 1 + \frac{2}{w^2 + 1}$.
 5. $a + \frac{3a^2 + 16a - 10}{a^3 - 7}$. 6. $m^2 - 5m - 8 + \frac{-m^2 + 9m + 16}{m^3 + 1}$.
 7. $r^{12} - r^8 + r^4 - 1 + \frac{2}{r^4 + 1}$. 8. $s^{11} + 2s^6 + 4s + \frac{8s - 1}{s^5 - 2}$.

Page 59.—1. 46. 2. $31\frac{2}{3}$. 3. $2\frac{2}{3}$. 4. $-5\frac{5}{7}$. 5. -7 . 6. -14 .
 7. $3a$. 8. $3mn$. 9. $2c$. 10. $12\frac{1}{2}$. 11. $3(c - d)/4$. 12. am/n .
 13. $mt/20$. 14. $rs/-6$. 15. $31\frac{2}{3}$. 16. $-5\frac{5}{7}$. 17. -14 .
 18. $-3.125 mn$. 19. $13\frac{6}{100}$. 20. $am/-n$. 21. $5rs/34$.

Pages 60-63.—4. 92; 115. 5. -75 ; -200 . 6. 62; -279 .
 7. -38 ; 95. 8. \$300; \$350. 9. \$4480. 10. 7 yrs. $\frac{1}{2}$ mo. 11. 120 ft.
 12. 180 ft. 14. 15,750 ft. 15. $128\frac{4}{7}$ cu. ft. cement; $257\frac{1}{7}$ cu. ft. sand;
 $514\frac{2}{7}$ cu. ft. gravel. 16. $262\frac{2}{17}$ cu. ft. cement; $66\frac{3}{17}$ cu. ft. sand; $132\frac{6}{17}$
 cu. ft. gravel. 17. A, $\$207\frac{1}{7}$; B, $\$362\frac{1}{2}$; C, $\$155\frac{5}{14}$. 18. 16.
 19. Tea, 75c; Coffee, 50c; Butter, 30c.

Page 65.—2. 16° . 3. Between 11 A.M. and Noon. 4. 18° .

Pages 72-76.—1. $2\frac{3}{11}$ Kg., $3\frac{2}{11}$ Kg., $4\frac{1}{11}$ Kg; 46.2 lbs., 37.4 lbs.,
 28.6 lbs. 2. 12.1 yds., 9.35 yds., 7.15 yds., 4.4 yds. 5. 86° F., 77° F.,

62 $\frac{3}{5}$ ° F., 32° F., 14° F., - 4° F. 6. 26 $\frac{2}{3}$ ° C., 18 $\frac{1}{3}$ ° C., 11 $\frac{1}{9}$ ° C., 0° C.,
 - 9 $\frac{4}{9}$ ° C., - 13 $\frac{1}{3}$ ° C., - 17 $\frac{7}{9}$ ° C., - 19 $\frac{4}{9}$ ° C. 8. \$8 $\frac{1}{3}$, \$11 $\frac{2}{3}$, \$14 $\frac{1}{6}$,
 \$20, \$23 $\frac{1}{3}$, \$26 $\frac{2}{3}$. 9. \$6, \$18, \$24, \$27 $\frac{2}{5}$, \$30. 11. \$10.54, \$15.80,
 \$26.35, \$39.52. 12. \$94.875, \$75.90, \$28.46.

Pages 77-78.—1. 12. 2. 1. 3. $\frac{5}{8}$. 4. 24. 5. 14. 6. 1. 7. 12.
 8. 6. 9. 3. 10. 10. 11. 2. 12. 5. 13. 6. 14. 3. 15. 41. 16. $\frac{3}{8}$.
 17. 18. 18. 6. 19. 3. 20. 5.

Pages 78-83.—1. 24. 2. 14, 15. 3. 9, 15. 4. 45, 3. 5. 7.
 6. 15 in., 20 in. 7. 108 sq. in. 8. 7 ft., 2 ft. 9. 36 sq. ft. 10. 25, 26.
 11. 24, 26, 28. 12. 15, 16, 17; 3 times; yes. 13. 22, 24, 25, 26.
 14. 15 yrs. 15. 50 yrs., 25 yrs. 16. 42 yrs. 17. 45 yrs., 15 yrs.
 18. 15 yrs. 19. \$150. 20. 50, 2c; 75, 1c. 21. 46 $\frac{2}{3}$ mi. by trolley;
 58 $\frac{1}{3}$ mi. by train. 22. 7, 5c; 5, 25c. 23. 12 quarters, 15 halves.
 24. 2 nickels, 16 quarters, 12 dimes. 25. 1", 60; 2", 50; 3", 40. 26. 15.
 27. 500 mi. 28. 21 mi. 29. \$4800. 30. \$6550. 31. 4 $\frac{1}{2}$ yrs. 32. 4%.
 33. \$5800. 34. \$400. 35. \$3000 @ 5 $\frac{1}{2}$ %; \$680 @ 6%. 36. 9 $\frac{1}{2}$ mills.
 37. 8 $\frac{1}{2}$ mills. 38. 6 $\frac{1}{4}$ mills. 39. 6 $\frac{1}{2}$ mills. 40. 7 $\frac{1}{4}$ mills.
 41. 7 $\frac{3}{4}$ mills. 42. 7 $\frac{1}{2}$ mills. 43. \$7353.54. 44. \$3005.05.
 45. \$9747.74. 46. \$30,050.51. 47. \$17,570. 48. 17,545.
 49. \$22,000. 50. \$34,000. 51. \$45,500. 52. \$52,000. 53. 3 $\frac{1}{2}$ doz.
 54. 9 hrs., 90 mi., 108 mi. 55. 3600. 56. 8.4 in. 57. 88 $\frac{1}{2}$ mi.
 58. 144 sq. yd.

Pages 93-94.—1. 4(a - 2). 2. x²(1 - x). 3. 3a(b - 2c).
 4. 2x²(y - 3z). 5. a²(b + c - d). 6. 2m²n(1 - 3n + 4n²).
 7. 5a²(3a² - 2a - 5). 8. 8c²(2c + d - 8c²d²). 9. x(1 - x + x² + x³).
 10. 6a⁵(2a - 4a² + 1). 11. x(x + 2y - 1 - z). 12. 9d²(2d³ - 9d⁵ + 3 - d).
 13. 17a³(y⁴ - 2ay³ + 4). 14. 3xyz(x + y + z). 15. 11m³(4n² - 5n + 6r).
 16. a²b²c²(ab - ac + bc). 17. 25c²d²(5 + 4d - 6c). 18. bgh(15b²h
 + 17gh - bg - 6). 19. aⁿ(b - c - d). 20. 2x^a(1 - 3b + 4c).
 21. 3aⁿbⁿc(1 - 3d + 2e). 22. y²ⁿ(c - d + g). 23. 5a²bⁿ(1 + 2a - 3a²).
 24. 2y^b(4x^a - 2 - x^{2c}).

Page 95.—1. (x - y)(a + b). 2. (x + 2y)(a - b). 3. (c - a)(x + y).
 4. (c - d)(3 - z). 5. (3c + d)(a - b + c). 6. (a + x)(-2 + a - e).
 7. (a - c)(b + c). 8. (x - y)(r + s - t). 9. (x - y)(a - b).
 10. (x - y)(3 - d). 11. (c + d)(a - b). 12. (y - b)(x - a).
 13. (d + 3)(c - 2). 14. (3s + 2)(2r - 3). 15. (y + 1)(y² + 1).
 16. (a - 1)(a + b). 17. (x - 2y)(6b + 25c). 18. b(3 - 5y³)(1 - 2y).
 19. (7r - 2t)(7a + 3b). 20. (1 + a)(1 + b). 21. (a + b)(x + y + z).
 22. (x - 1)(a - b - c). 23. (x - y)(a + 2b + c). 24. (a - b + c)
 (2 + x + y).

- Page 96.—1. $(m + n)^2$. 2. $(a^2 - 2b)^2$. 3. $(a^2 - 3b^2)^2$. 4. $(x + 12)^2$.
 5. $(b^3 + 4)^2$. 6. $(d + 8)^2$. 7. $(y - 1/2)^2$. 8. $(1/x + 1/4)^2$. 9. $(6a - b^3)^2$.
 10. $(11e^4 - b^2)$. 11. $(3y + 1)^2$. 12. $(10 + h)^2$. (13. $(3w - 3)^2$.
 14. $(1 - 13b)^2$. 15. $(5 + 4a)^2$. 16. $(3c + 9d^3e^3)^2$. 17. $(4n - 7p)^2$.
 18. $(15t - 4y)^2$. 19. $(2m + 16n)^2$. 20. $(15s - 2t^5)^2$. 21. $(a + b - 3)^2$.
 22. $[(x - y)^3 + 4]^2$. 23. $[6(r - s) - 5]^2$. 24. $[3(a + b) - (c + d)]^2$.
 25. $[2 - 3(a - x)]^2$. 26. $(x + y - z)^2$. 27. $(c + d + e)^2$.
 28. $(a - b + 2)^2$. 29. $(2m + n + 1)^2$. 30. $(g + 3h + 1)^2$.

- Page 97.—1. $(x + y)(x - y)$. 2. $(a + 3)(a - 3)$. 3. $(1 + b)(1 - b)$.
 4. $(2 + m^2)(2 - m^2)$. 5. $(y^3 + 5)(y^3 - 5)$. 6. $(8c + z)(8c - z)$.
 7. $(5c^2 + 7d^2)(5c^2 - 7d^2)$. 8. $(9 + 11x^6)(9 - 11x^6)$.
 9. $(3r + 4t)(3r - 4t)$. 10. $(10pq + 9w)(10pq - 9w)$.
 11. $(6x^5 + 7y^6)(6x^5 - 7y^6)$. 12. $(12w + 5x^2)(12w + 5x^2)$.
 13. $(h + 13)(h - 13)$. 14. $(2a + 1)(2a - 1)$. 15. $(4ab + 5c)(4ab - 5c)$.
 16. $(15q + 12z)(15q - 12z)$. 17. $(10w + 16v^2)(10w - 16v^2)$.
 18. $(3xy + 11)(3xy - 11)$. 19. $(7c^3 + 8t^4)(7c^3 - 8t^4)$.
 20. $(17abc + 5d)(17abc - 5d)$. 21. $(x + y + 1)(x + y - 1)$.
 22. $(a + 3b + c)(a + 3b - c)$. 23. $(x - 2y + z)(x - 2y - z)$.
 24. $(m + 6n + 2r)(m + 6n - 2r)$. 25. $(7d - r + 5s)(7d - r - 5s)$.
 26. $(a + b + 2c)(a + b - 2c)$. 27. $(x - y + z)(x - y - z)$.
 28. $(c - 3d + e)(c - 3d - e)$. 29. $(b - 9 + 7s)(b - 9 - 7s)$.
 30. $(d - 6 + 5t)(d - 6 - 5t)$. 31. $(1 + a + b)(1 - a - b)$.
 32. $(4 + x - y)(4 - x + y)$. 33. $(3 + m - 3n)(3 - m + 3n)$.
 34. $(k + h + 10)(k - h - 10)$. 35. $(a + b + c)(a - b - c)$.
 36. $(t + m - n)(t - m + n)$. 37. $(7 + c + 3d)(7 - c - 3d)$.
 38. $(9p + 6q - 1)(9p - 6q + 1)$. 39. $(10s + 4h + 2)(10s - 4h - 2)$.
 41. $(x + 2y + m - n)(x + 2y - m + n)$. 42. $(3c - 3d + 2x - 2y)(3c - 3d - 2x + 2y)$.
 43. $(8h + 8l + 7r - 7t)(8h + 8l - 7r + 7t)$.
 44. $(12m - 12x + 11n + 11y)(12m - 12x - 11n - 11y)$. 45. $(6y - 6z + 14w + 14x)(6y - 6z - 14w - 14x)$.
 46. $(c + d + m - r)(c + d - m + r)$.

- Pages 100-101.—1. $(3x + 2)(2x + 1)$. 2. $(3x + 5)(2x + 1)$.
 3. $(12x - 5)(x + 1)$. 4. $(7x + 4)(x + 1)$. 5. $(3x + 1)(x + 2)$.
 6. $(5x + 7)(4x + 1)$. 7. $(2a - 1)(a - 13)$. 8. $(8m - 15)(m - 2)$.
 9. $(5b - 6)(2b - 5)$. 10. $(3y - 5)(2y - 7)$. 11. $(3t - 2)(2t - 5)$.
 12. $(3s - 2)(s + 5)$. 13. $(8s + 3)(3s - 1)$. 14. $(6y + 5)(5y - 1)$.
 15. $(4m + 3)(2m - 7)$. 16. $(3m + 2)(m - 1)$. 17. $(5m - 2)(3m + 4)$.
 18. $(6a - 1)(3a + 2)$. 19. $(6c - 1)(c + 6)$. 20. $(3d + 1)(2d - 5)$.
 21. $(11g + 1)(g - 2)$. 22. $(2g + 5h)(g + 3h)$. 23. $(3a - b)(a + 4b)$.
 24. $(3a + 2b)(a - 3b)$.

- Page 101.**—1. $(x + y)(x^2 - xy + y^2)$. 2. $(x - y)(x^2 + xy + y^2)$.
 3. $(m + 1)(m^2 - m + 1)$. 4. $(m - 1)(m^2 + m + 1)$.
 5. $(ab + 2)(a^2b^2 - 2ab + 4)$. 6. $(cd - 3)(c^2d^2 + 3cd + 9)$.
 7. $(4a - 1)(16a^2 + 4a + 1)$. 8. $(5b + 6)(25b^2 - 30b + 36)$.
 9. $(2g - 3b)(4g^2 + 6gh + 9h^2)$. 10. $(xy + 7)(x^2y^2 - 7xy + 49)$.
 11. $(x^2 + y^2)(x^4 - x^2y^2 + y^4)$. 12. $(2a^2 - b^2)(4a^4 + 2a^2b^2 + b^4)$.
 13. $(1 - 3a^3)(1 + 3a^3 + 9a^6)$. 14. $(m^4 + n^4)(m^8 - m^4n^4 + n^8)$.
 15. $(3c^5 + 1)(9c^{10} - 3c^5 + 1)$. 16. $(2a^n - 1)(4a^{2n} + 2a^n + 1)$.
 17. $(b^{3n} + c^{2n})(b^{6n} - b^{3n}c^{2n} + c^{4n})$. 18. $(x + y)(x^2 - xy + y^2)(x^6 - x^3y^3 + y^6)$.
 19. $(4a - 5b)(16a^2 + 20ab + 25b^2)$. 20. $27(2 - x^6)(4 + 2x^6 + x^{12})$.

- Pages 102-103.**—1. $a(a + 1)^2$. 2. $2(x^2 + 3)^2$. 3. $y^4(3 - 4y^2)^2$.
 4. $b(b + 1)(b - 1)$. 5. $(x^2 + 4)(x + 2)(x - 2)$. 6. $(a + 7)(a - 1)$.
 7. $(a + 15)(a + 1)$. 8. $(x - y)(a - 2)$. 9. $(m - n)(a + b)(a - b)$.
 10. $(c + 1)^2(c - 1)$. 11. $(x^3 - 7)(x + 1)(x^2 - x + 1)$. 12. $(k^2 - 8)(k + 3)(k - 3)$.
 13. $(2 + x)(4 - 2x + x^2)(2 - x)(4 + 2x + x^2)$. 14. $(h - 7)(h^2 - 2)$.
 15. $(9h^2 + k^2)(3h + k)(3h - k)$. 16. $(x - y + z)(x - y - z)$.
 17. $(3m^2 + 7)(m^2 - 5)$. 18. $(y - 4)(y^2 + 4y + 16)$.
 19. $(L + \frac{1}{2})^2$. 20. $(x + 2)^2(x + 2)$. 21. $(a + b)^3$.
 22. $2(a - 7)(a^2 - 5)$. 23. $(a + b + 1)^2$. 24. $(a - b + 3)(a - b - 3)$.
 25. $(c + a - b)(c - a + b)$. 26. $(1 + x^4)(1 - x^4 + x^8)$.
 27. $(r + 14)(r - 11)$. 28. $(x + 21)(x - 10)$. 29. $(a^2 + b^2)(a^4 - a^2b^2 + b^4)(a + b)(a^2 - ab + b^2)(a - b)(a^2 + ab + b^2)$.
 30. $(2s - 1)(s - 2)$. 31. $7(a - 5)^2$. 32. $6(3 + 2x)(1 - x)$. 33. $(17w - 9)(w + 2)$.
 34. $(3x^a + 5)(3x^a - 5)$. 35. $(a - c)(a + 2b)$. 36. $c^7(c^3 - 6)(c^6 + 6c^3 + 36)$.
 37. $(a + 2b - c)(a - 2b + c)$. 38. $(a - m + n)(a - m - n)$.
 39. $3(x - a)(x + 1)$. 40. $(7c + 13)(c + 1)$. 41. $(e + 8f)(e^2 - 8ef + 64f^2)$.
 42. $(6y - 7z)(y + 8z)$. 43. $(a - 6b + t)(a - 6b - t)$.
 44. $(1 + 3x + 5y)(1 - 3x - 5y)$. 45. $(9c^2 - 7d^2)(c + d)(c - d)$.
 46. $(3m + 2n)(3m - 2n)(m + n)(m - n)$. 47. $(a + b)(a - b - 1)$.
 48. $(a + b)(a^2 - ab + b^2 + a - b)$. 49. $(2a - b + 3c + 4d)(2a - b - 3c - 4d)$.
 50. $(x + y - 3)(x + y - 2)$. 51. $axy(a^2 + b^2)(a + b)(a - b)$.
 52. $x^n(2x^{2n} + 1)(2x^{2n} - 1)$. 53. $(7a^x - 6b^y)^2$. 54. $(25x^3 - 36y^3)(x - y)(x^2 + xy + y^2)$.
 55. $(x^2 + 9y^2)(x^4 - 9x^2y^2 + 81y^4)$. 56. $[14r^3(y - z) + 15s][14r^3(y - z) - 15s]$.
 57. $(2x + y + 1)^2$. 58. $(3c - 2e - 5)(d + 7)$. 59. $(x^2 + y^2 - 2)(x + y)(x - y)$. 60. $(7y - 5z)^2$.

- Page 106.**—1. ± 5 . 2. ± 6 . 3. 0, 4. 4. 0, a. 5. 5, 2. 6. 5, -2.
 7. 0, 7. 8. 0, 3. 9. -9, 8. 10. a, a. 11. 0, $\frac{3}{2}$. 12. 0, a/b. 13. $\pm a$.
 14. $\frac{3}{2}, 2$. 15. $-\frac{3}{4}, \frac{2}{3}$. 16. $\frac{7}{6}, \frac{7}{6}$. 17. $\frac{2}{6}, \frac{3}{6}$. 18. a, b. 19. 0, a + b.
 20. c/3, a/2. 21. 0, 2, -2. 22. 2, 2, -2. 23. 0, 2, 1. 24. 0, 4, 5.
Pages 107-110.—1. -7, 6. 2. 7, -2. 3. -11, 10. 4. 29, 11.

5. - 8, - 5; 5, 8. 7. 6 ft. 8. 3 in. 9. 7 persons; \$12. 10. $2x + 1$; odd. 11. 6, 7; - 7, - 6. 12. - 11, - 9; 9, 11. 13. 8 seats. 14. 3 in. 15. 10 ft. less. 16. 8 in. 17. 6 in. 18. 12 ft. 19. 7 ft., 10 ft. 20. 9 ft., 12 ft., 15 ft. 21. 216 sq. in. 22. 141.4 in. 23. $853\frac{1}{3}$ sq. ft. 24. 10 ft. 25. 15 in. 26. 9 ft., 11 ft., 12 ft. 27. 14 in. 28. $2828\frac{4}{7}$ sq. ft.

Page 111.—1. $6a^4 + 5a^3 - 19a^2 + 13a - 5$. 2. $3a^5 + 2a^4 - 6a^3 + 5a^2 - 14a + 6$. 3. $6x^4 + 7x^3 - 10x^2 + 17x - 20$. 4. $x^3 - y^3$. 5. $4x^3 - 16x^2y + 19xy^2 - 6y^3$. 6. $x^3 + x^4 + 1$. 7. $1 - 3a + a^2 + 3a^3 - a^4 - 2a^5 + a^6$. 8. $c^3 - 2c^2 + c^3 - 2c^5 + 4c^4 - 2c^3 + c^2 - 2c + 1$. 9. $x^5 - y^5$. 10. $-18a^6 + 21a^5 - 11a^4 + 5a^3 + 3a^2 - a + 1$. 11. $m^6 + 3m^5 - 11m^4 - 15m^3 + 50m^2 - 36m + 8$. 12. $15r^7 - r^5 + 35r^4 - 9r^3 + 21r^2 + 2r - 7$. 13. $a^3 - b^3$. 14. $x^3 - 3xyz + y^3 + z^3$. 15. $8x^6 + 10x^5 - 63x^4 + 27x^3 + 49x^2 - 37x + 6$.

Page 113.—1. $x^2 - 7x + 2$. 2. $2a^2 + 3ab + 4b^2$. 3. $2a^2 + 5ab - 3b^2$. 4. $x^2 - x + 3$. 5. $a - b$. 6. $5a^2 - 2a + 1$. 7. $r^4 + r^3 - 1$. 8. $a^2 + ab + b^2$. 9. $x^4 + x^3y + x^2y^2 + xy^3 + y^4$. 10. $a^2 - ab - ac + b^2 - bc + c^2$. 11. $x^3 + 3x^2 + 4x + 2$. 12. $x^4 + x^3y + xy^3 + y^4$. 13. $a^3 + 2a^2b + 2ab^2 + b^3$. 14. $a^3 - a^2b - ab^2 + b^3$. 15. $2y$.

Pages 115-116.—1. $a^2 - 2a + 1$. 2. $x^2 - 3x + 2$. 3. $c^3 + 3c^2 - 4c - 1$. 4. $2x^4 - 3x^2 - 6$. 5. $5x^3 - 2x^2y + 3xy^2 - 2y^3$. 6. $3c^2d - 3cd^2 - 2d^3$. 7. $m^2n^2 - 3mnr - 4r^2$. 8. $x^2 - x/3$. 9. $a/2 - b/3 + 1$. 10. $2x - 5 + 1/2x$.

Pages 117-118.—1. 57. 2. 78. 3. 227. 4. 306. 5. 498. 6. 10.87. 7. 1005. 8. 3.24. 9. .0751. 10. 8.01. 11. .1234. 12. 38.2. 13. 20.506. 14. 2784.53. 15. 1.414. 16. 1.732. 17. 2.236. 18. .816. 19. .894. 20. .942.

Pages 122-123.—1. 11.32 fr. 2. 16.98 fr. 3. 33.96 fr. 4. 31.13 fr. 5. 25.47 fr. 6. 19.81 fr. 7. \$.883. 8. \$1.76. 9. \$2.64. 10. \$3.52. 11. \$4.41. 12. \$4.76.

Page 127.—1. 7, 5. 2. 1, - 3. 3. 20, 10. 4. $1\frac{1}{3}, 1\frac{2}{3}$. 5. $\frac{1}{3}, \frac{1}{4}$. 6. 0, 2. 7. Infinite no. of roots. 8. 3, 2. 9. Inconsistent. 10. 12, 13. 11. - 4, - 7. 12. - 8, 13.

Page 128.—1. 0, 2. 2. 12, 12. 3. 6, 20. 4. 15, 1. 5. 23, - 1. 6. - 3, 4. 7. $\frac{1}{4}, -\frac{3}{5}$. 8. 13, 2. 9. $\frac{1}{3}, 1$. 10. - 1, - $\frac{3}{5}$. 11. Infinite no. of roots. 12. Inconsistent.

Page 129.—1. 1, 2. 2. 8, 9. 3. 13, 25. 4. $\frac{7}{4}, 2$. 5. 14, 6. 6. 0, - $\frac{5}{4}$. 7. 5, 1. 8. 34, 15. 9. 14, 8. 10. 16, 23. 11. 10, 6. 12. 7, - 2. 13. + 6, + 3. 14. - 20, - 30.

- Pages 131-132.—1. $\frac{a+b}{2}, \frac{a-b}{2}$. 2. $\frac{bd+c}{a+b}, \frac{c-ad}{a+b}$.
3. $\frac{cm+dn}{c^2+d^2}, \frac{cn-dm}{c^2+d^2}$. 4. $\frac{abcd}{ab+d}, \frac{bcd}{ab+d}$. 5. $\frac{d+n}{dm+cn}, \frac{c-m}{cn+dm}$.
6. $\frac{m+5n}{5}, \frac{5n-m}{5}$. 7. $\frac{b-a}{2b}, \frac{-b-a}{2b}$. 8. 0, 0. 9. 3, 0.
10. $\frac{a}{ab-1}, \frac{1}{1-ab}$. 11. $\frac{2c+3d}{13b}, \frac{2d-3c}{13a}$. 12. $\frac{ac+ad}{2}, \frac{bc-bd}{2}$.
13. $\frac{ab}{a+b}, \frac{a+b}{ab}$. 14. $\frac{ab(bm-an)}{b^2-a^2}, \frac{ab(am-bn)}{a^2-b^2}$. 15. $\frac{c}{2\pi}$.
16. $\frac{2A}{b}, \frac{2A}{a}$. 17. $\frac{2A-bh}{h}, \frac{2A}{a+b}$. 18. $\frac{d}{t}, \frac{d}{r}$. 19. $\frac{F}{a}$.
20. $\frac{2s-ln}{n}, \frac{2s-an}{n}, \frac{2s}{a+l}$. 21. $\frac{A-P}{Pt}, \frac{A-P}{Pr}$. 22. $\frac{l-a}{n-1}$.
- $\frac{l-a+d}{d}$. 23. $\frac{2}{3}C + 32$. 24. $\frac{AC}{360}, \frac{360s}{C}$.

- Pages 132-133.—1. $-\frac{1}{3}, -\frac{1}{3}$. 2. 2, 2. 3. $\frac{1}{3}, -\frac{1}{3}$. 4. $\frac{2}{3}, \frac{5}{3}$.
5. $\frac{2}{a+b}, \frac{2}{a-b}$. 6. $\frac{a+c}{b+d}, \frac{a+c}{bc-ad}$. 7. $\frac{3m+2n}{bm+an}, \frac{3m+2n}{2b-3a}$.
8. $\frac{a+b}{-ab}, \frac{a+b}{ab}$. 9. $\frac{4}{9a}, \frac{2}{5b}$. 10. $\frac{1}{n}, \frac{1}{m}$.

- Pages 134-135.—1. $3^{5/7}, 0, 3^{1/7}$. 2. 7, -7, 2. 3. Infinite no. of roots.
4. 5, 5, 5. 5. 3, -2, $-2^{1/2}$. 6. 3, -2, 6. 7. 4, 1, -2. 8. 15, 10, 12.
9. 1, $\frac{1}{2}, \frac{1}{3}$. 10. $-\frac{1}{3}, \frac{1}{3}, 1$. 11. $\frac{2}{37}, -\frac{1}{6}, -\frac{2}{33}$. 12. .1, .2, .5, .3.

- Pages 135-138.—1. 41, 37. 2. 51, 25. 3. $28^{1/2}, 16^{1/2}$. 4. $9^{1/2}, 15^{1/2}$.
5. 12, 11. 6. 25, 47. 7. -44, -54. 8. 14, 12. 9. \$85, \$40.
10. \$5750, \$5500. 11. 46 yrs., 25 yrs. 12. 30c, 6c. 13. \$1.25, 30c.
14. 27, 16. 15. $\frac{7}{8}$. 16. 6, 15, 8. 17. \$1, \$1.50, \$1.75. 18. 35, 22.
19. \$20. 20. A, \$25; B \$75. 21. $1^{5/7}$ days. 22. A, $5^{5/7}$ days; B, $13^{1/3}$ days; C 40 days. 23. 15 boys; \$4; \$60. 24. 45. 25. Any number in which the tens' digit exceeds the units' digit by 5. 26. 236. 27. A to B, 50 mi.; B to C, 90 mi.; C to A, 60 mi. 28. 15 mi., 12 in. 29. 10 hrs., 50 mi. per hr., 500 mi. 30. \$5000 @ 4%; \$7000 @ $3\frac{1}{2}\%$. 31. A, \$5000; B, \$3750. 32. \$1050. 33. 88c; 28c.

- Page 142.—1. $\pm \frac{1}{3}\sqrt{5}$. 3. ± 2 . 4. $\pm \sqrt{3}$. 5. $\pm \frac{1}{2}$. 6. $\pm \sqrt{10}$.
7. $\pm \sqrt{6}$. 8. ± 3 . 9. $\pm 2\sqrt{2}$. 10. $\pm \sqrt{10}$. 11. ± 3 .
12. 0, -2.89. 13. 0, 1.5. 14. $\pm \frac{2}{3}$. 15. $\pm \frac{1}{3}\sqrt{55}$. 16. $\pm \sqrt{15}$.
17. 0, 8.

- Pages 144-147.—1. 2, - 8. 2. 2, - 12. 3. $\frac{3}{2}$, - $\frac{9}{2}$. 4. $\frac{3}{5}$, - $\frac{7}{5}$.
 5. $\frac{5}{6}$, - $\frac{3}{2}$. 6. 3, - $\frac{7}{3}$. 8. - $\frac{5}{2} \pm \sqrt{10}$. 9. $\frac{2 \pm \sqrt{14}}{3}$. 10. $\frac{2 \pm 2\sqrt{5}}{7}$.
 11. $5 \pm 2\sqrt{6}$. 12. $\frac{-3 \pm \sqrt{22}}{9}$. 13. $\frac{1}{10}$, - $\frac{21}{10}$. 14. $\frac{1 \pm \sqrt{5}}{4}$.
 15. $\frac{4}{11}$, - $\frac{2}{11}$. 16. $\frac{1}{2}$, - 2. 17. 0, $\frac{3}{2}$. 18. 0, - 2. 19. $\frac{5 \pm \sqrt{17}}{4}$.
 20. $\frac{5}{2} \pm \sqrt{5}$. 21. $\frac{-7 \pm \sqrt{1049}}{50}$. 22. $\frac{6 \pm \sqrt{281}}{32}$. 23. $\frac{1 \pm \sqrt{21}}{6}$.
 24. $\frac{-3 \pm \sqrt{649}}{32}$. 25. $\frac{1}{6}$, - $\frac{5}{6}$. 26. $\frac{-7 \pm \sqrt{101}}{2}$. 27. - 7 $\pm \sqrt{62}$.
 28. $\frac{5 \pm \sqrt{193}}{-4}$. 29. $\frac{-4 \pm \sqrt{22}}{3}$. 30. $\frac{-9 \pm \sqrt{101}}{10}$. 31. $2 \pm \sqrt{3}$.
 32. $\frac{5}{3}$, - 1. 33. $\frac{2}{3}$, $\frac{1}{3}$. 34. $\frac{-11 \pm \sqrt{313}}{6}$. 35. $\frac{-15 \pm \sqrt{369}}{4}$.
 36. $\frac{3 \pm \sqrt{13}}{4}$. 37. $\frac{9 \pm \sqrt{161}}{8}$. 38. - $\frac{4}{5}$, $\frac{6}{5}$. 39. $1\frac{1}{2}$, - $2\frac{1}{2}$.
 40. $1\frac{2}{3}$, - $\frac{1}{3}$. 41. $\frac{3 \pm \sqrt{29}}{2}$. 42. $\frac{5 \pm \sqrt{137}}{8}$. 43. $\frac{5 \pm \sqrt{85}}{6}$.
 45. $\pm 3\sqrt{2}$, $\pm 2\sqrt{2}$, $\pm 2a\sqrt{3}$, $\pm 5ab\sqrt{2}$, $\pm 10x^2\sqrt{3x}$. 46. $2 \pm 2\sqrt{2}$.
 47. $3 \pm 2\sqrt{7}$. 48. $\frac{3 \pm 4\sqrt{2}}{2}$. 49. $\frac{2 \pm 5\sqrt{2}}{3}$. 50. $\frac{5 \pm 10\sqrt{2}}{4}$.
 51. $3 \pm 2\sqrt{5}$. 53. $\frac{1 \pm \sqrt{41}}{2}$. 54. 1, - $\frac{1}{2}$. 55. $\frac{3 \pm \sqrt{17}}{2}$.
 56. 5, - 4. 57. $\pm \sqrt{3}$. 58. 5, $\frac{2}{3}$. 59. 9, $\frac{2}{3}$. 60. $\frac{-1 \pm \sqrt{-7}}{-2}$.
 61. $\pm \sqrt{10}$. 62. 6, 2.

- Pages 147-150.—2. 13, 11. 3. 16 in., 7 in. 4. $\frac{12}{5}$ in., $\frac{6}{5}$ in.
 5. $7\frac{1}{2}$ ft., $11\frac{1}{2}$ ft. 6. $3\frac{1}{2}$ ft., $10\frac{1}{2}$ ft. 7. 10 in. sq. 8. 13 in., 11 in.
 9. $2\frac{1}{2}$ ft. 10. 4 in., 7 in. 11. 40 ft., 50 ft., 30 ft. 12. $6 + 3\sqrt{2}$ in.,
 $3 + 3\sqrt{2}$ in. 13. 59, 60; - 60, - 59. 14. 11 in., 16 in. 15. 27, - 7.
 16. 44 books. 17. 28 days. 18. 2 in. 19. 5 in., 9 in., 4 in.
 20. 7 ft., 27 ft. 21. 175, 176; - 176, - 175. 22. 32, 34; - 34, - 32.
 23. 27, 29; - 29, - 27. 24. 6 ft., 9 ft., 18 ft.

- Page 151.—2. 1, $\frac{2}{5}$. 3. $\frac{-5 \pm \sqrt{130}}{7}$. 4. 2, - $\frac{5}{3}$. 5. $\frac{3 \pm 2\sqrt{6}}{5}$.
 6. $5 \pm \sqrt{22}$. 7. $\frac{1 \pm \sqrt{13}}{3}$. 8. $18 \pm \sqrt{354}$. 9. - 5 $\pm 2\sqrt{7}$.
 10. 1, - $\frac{5}{3}$. 11. $15 \pm 2\sqrt{55}$. 12. $\frac{101 \pm \sqrt{10173}}{2}$.

Pages 151-152.—1. 9, - 2. 2. $3 \pm \sqrt{17}$. 3. - 16, - 2.

4. $-\frac{1}{2}$, - 2. 5. $\frac{-5 \pm \sqrt{35}}{2}$. 6. $\frac{-25 \pm \sqrt{445}}{15}$. 7. 6, 4,

8. 14, - 10. 9. 3, - 6. 10. 0, - 7. 11. 5, - 8. 12. 3, 2.

13. - 15, 3. 14. $\frac{1 \pm \sqrt{401}}{2}$. 15. $\frac{1}{3}$. 16. 5, 3. 17. 2, $-\frac{1}{4}$.

18. 11. 19. $\frac{2}{3}$, - 2. 20. $\frac{2}{13}$. 21. $\frac{1}{2}$, $\frac{2}{3}$. 22. $\frac{1}{3}$. 23. 5, $-\frac{22}{7}$.

24. $\frac{1}{6}$, $-\frac{1}{3}$. 25. $1 \pm \sqrt{2}$. 26. $\frac{-1 \pm \sqrt{5}}{2}$. 27. $\pm \frac{1}{3}\sqrt{3}$.

28. $\frac{-2 \pm \sqrt{10}}{2}$. 29. $\frac{2 \pm \sqrt{6}}{4}$. 30. $\frac{5 \pm \sqrt{21}}{2}$.

Page 153.—1. $\frac{-1 \pm \sqrt{-3}}{2}$. 2. $-1 \pm \sqrt{-5}$. 3. $1 \pm 2\sqrt{-1}$.

4. $\frac{-3 \pm \sqrt{-23}}{4}$.

Page 156.—1. 1, 25; 2, - 10. 2. 3, $\frac{49}{3}$; 2, $-\frac{14}{3}$. 3. 10, - 6;
20, $\frac{25}{6}$. 4. - 45, 10; $\frac{405}{3}$, 10. 5. $\frac{7}{3}$, $\frac{16}{21}$; 1, $-\frac{4}{7}$. 6. 0, $-\frac{8}{3}$;
0, $\frac{16}{9}$. 7. - 3, $-\frac{25}{12}$; 3, $-\frac{5}{2}$. 8. - 2, $-\frac{63}{4}$; 3, - 8. 9. 8, 4;
3, - 1. 10. 5, 1; - 10, - 2.

Page 157.—2. 3, $-\frac{22}{10}$; 30, $\frac{263}{10}$. 3. $\frac{2}{3}$; $\frac{1}{3}$. 4. 30, 50.

Pages 158-160.—2. 12, - 3; - 3, 12. 3. 12, 11; 11, 12. 4. $\frac{1}{2}$, $\frac{1}{3}$;
 $\frac{1}{3}$, $\frac{1}{2}$. 5. $12\frac{1}{2}$, $-1\frac{1}{2}$; $1\frac{1}{2}$, $-12\frac{1}{2}$. 6. 7, - 6; 5, - 8. 7. - 6, 5.
8. $\frac{1}{2}$, $-\frac{1}{3}$; $-\frac{1}{3}$, $\frac{1}{2}$. 9. 3, 2. 11. 3, - 2; 2, - 3. 12. $-\frac{8}{5}$, + 4;
 $-\frac{21}{5}$, + 5. 13. 5, $-\frac{23}{5}$; 2, $-\frac{14}{5}$. 14. $\frac{121}{13}$, 7; $\frac{44}{13}$, 8. 15. - 15, 5;
15, 5. 16. 1, 15; 3, - 11. 17. 2, 6; 4, 0. 18. 13, - 3; 18, 2.
19. 10, - 14; 11, - 5. 20. 1, $\frac{7}{13}$; 1, $-\frac{17}{13}$. 21. $\frac{230}{17}$, 10; $-\frac{70}{17}$, 10.
22. $\frac{119}{25}$, 2; $-\frac{408}{25}$, 3. 23. ± 11 ; ± 11 . 24. ± 1 ; ∓ 1 . 25. 5, - 9;
4, - 10. 26. 2, - 8; 7, 13.

Pages 162-163.—1. No; No. 3. $2''$. 5. $\frac{13}{89}$. 6. x/y . 7. x/my .

8. 1. 9. $\frac{x+y}{x-y}$. 10. $\frac{x+1}{2x(x-1)}$. 11. $\frac{1}{4}$. 12. $\frac{a+b}{x}$. 13. $\frac{x}{y}$.

14. $y-x$. 15. $-x-y$. 16. $\frac{x-y}{x+y}$. 17. $\frac{4x(x+2)}{3y(x+4)}$.

18. $\frac{x^2+y^2}{-x-y}$. 19. $-\frac{1}{2}$. 20. $a+1$. 21. $\frac{a+3b}{5}$. 22. $\frac{a(a-b)}{3}$.

23. $\frac{-1}{m+3}$. 24. $\frac{2y-1}{y-4}$. 25. $\frac{n+3}{4}$. 26. $\frac{a}{x-y}$. 27. - 5.

28. $\frac{m}{n}$. 29. $\frac{a+b}{3ab(a+1)}$. 30. $\frac{y-4}{y(y+1)}$. 31. $\frac{y-2x}{a}$. 32. $\frac{x-3y}{2}$.

- Pages 165-166.—3. $\frac{a-b}{a^2}$. 4. $\frac{2a}{b}$. 5. $\frac{5x^2}{3y}$. 6. $\frac{x(x+y)}{3}$.
7. $2x(1-y)$. 8. 1. 9. $\frac{(a-1)^2}{3}$. 10. $\frac{1}{2}$. 11. $\frac{(x^2+y^2)(x+y)}{x^2}$.
12. $\frac{1}{6}$. 13. $\frac{x(x^2-xy+y^2)}{y}$. 14. $4(x-y)$. 15. $\frac{6(x-y)}{5}$.
16. $\frac{3}{y}$. 17. $\frac{x}{2y(1-2x+4x^2)}$. 18. $\frac{3x^3}{y^3(1+3y+9y^2)}$. 19. $\frac{12x+y}{x+y}$.
20. $\frac{3x+1}{x^2+xy-y^2}$. 21. $(2x+3)^2$. 22. $\frac{x+2}{x(x+5)}$. 23. $\frac{(2y+1)^2}{x^2}$.
24. $(x+y)(x-1)(x^2-x+1)$.

- Page 167.—4. $\frac{14y-5x}{7y+5x}$. 5. $\frac{m^2-n^2}{m^2+n^2}$. 6. $\frac{m+1}{2m-1}$.
7. $\frac{9n-4m}{12(4mn+1)}$. 8. $\frac{m+1}{m}$. 9. $\frac{1}{3}$. 10. $\frac{16}{105}$. 11. $\frac{b}{b-a}$.
12. $\frac{x^2+x-4}{x^2-7}$. 13. $\frac{2+y-x}{x+y}$.

- Pages 168-169.—1. a^2 . 2. xy . 3. $5a^2$. 4. $6a^2bc$. 5. a . 6. $x-y$.
7. x^2+y^2 . 8. $a+b$. 9. $x-y$. 10. $x-1$. 11. $2(a+1)$.
12. $a+b$. 13. $x-y$. 14. $x-2$. 15. $x+y$. 16. $m+3$.
17. $a-1$. 18. $a^2(a+2)$. 19. $(x+y)^2(x-y)^2$. 20. $r-2s$.

- Pages 169-170.—1. xyz . 2. a^3b^3 . 3. $b^2c^2d^2$. 4. $70 cde$.
5. $a^2(a+1)$. 6. $a(a+1)(a-1)$. 7. $cd(c+d)$. 8. $ab(a+b)(a-b)$.
9. $(a+2)(a-2)(a+3)$. 10. $(x-y)^2(x+y)^2$. 11. $(a-b)^2(a+b)(a^2+ab+b^2)$.
12. $(m+n)^2(m^2+n^2)$. 13. $3(m-n)(m^2+mn+n^2)$.
14. $(x+2)(x+3)^2$. 15. $(a-4)(a-2)(a+3)$. 16. $(1+x)(1-x)(1+x+x^2)$.
17. $xyz(x+y)(x-y)$. 18. $(x-3)(x+3)(x+7)$.
19. $(a+1)(a-1)(a^2+1)$. 20. $(x-2y)^2(x+4y)(x+y)$.

- Page 170.—1. 12; 72. 2. 48; 288. 3. 49; 294. 4. 36; 7560.
5. $2xy$; $40x^5y^2z^2$. 6. 25; $300ac^3d^4$. 7. a ; $3a(a-b)$.
8. $4ax$; $4ax^2(a^2-x^2)$. 9. $x+3$; $(x+3)(x-3)(x+2)$.
10. $b+x$; $ab(b+x)$. 11. $x+y$; $(x+y)^2(x-y)(x^2-xy+y^2)$.
12. $3-a$; $4(3-a)^2(9+3a+a^2)$. 13. $a-2b$; $a(a-2b)(a+3b)(a-4b)$.
14. $c+d$; $(c+d)(c-2d)(m-n)$.

- Pages 171-172.—1. $\frac{17}{24}$. 2. $\frac{21x+5y}{75}$. 3. $\frac{45y+25x+4}{15x^2y^2}$.
4. $\frac{10a^2b-2ab^2+3a^2b^2}{50}$. 5. $\frac{x+3y}{10}$. 6. $\frac{x-3y}{(x+y)(x-y)}$.
7. $\frac{2+x-y}{(x-y)^2}$. 8. $\frac{x^2+xy-1}{(x+y)^2}$. 9. $\frac{y}{(x+y)(x-y)}$. 10. $\frac{1}{x}$.

$$\begin{array}{lll}
 11. \frac{5x^2 - 2xy + 5y^2}{6(x+y)(x-y)} & 12. \frac{2x}{(x+y)(x-y)} & 13. \frac{2y}{(x+y)(x-y)} \\
 14. \frac{m+x}{x(m-x)} & 15. \frac{-2xy+y^2}{x(x+y)(x-y)} & 16. \frac{31}{12(2x+5)} \\
 17. \frac{y+4}{30(3y-1)} & 18. \frac{12x+4}{35(x+1)} & 19. \frac{9}{3x-1} \quad 20. 0. \\
 21. \frac{2a+2b+2c}{(a+b)(b+c)(a+c)}
 \end{array}$$

Pages 173-174.—1. $1\frac{1}{7}$. 2. $3\frac{3}{4}$. 3. $1\frac{1}{8}$. 4. 5. 5. $1\frac{4}{17}$. 6. 6.

7. $1\frac{1}{35}$. 8. $\frac{7 \pm \sqrt{73}}{6}$. 9. 0, 9. 10. $-1\frac{1}{26}$. 11. $-1\frac{11}{69}$. 12. $\frac{6}{7}$.

13. 1. 14. $1\frac{1}{6}$. 15. -5. 16. 0, $-\frac{1}{2}$. 17. 3, $\frac{4}{3}$. 18. $\frac{33 \pm \sqrt{409}}{10}$.

19. $1\frac{2}{6}$. 20. 3, -7. 21. $-4 \pm \sqrt{5}$. 22. 0, 5. 23. 6, -3.

24. 2, -1. 25. -6, -6. 26. 2, 2. 27. 11, $\frac{38}{29}$. 28. $1\frac{1}{2}$.

29. $-2\frac{1}{2}$. 30. $\frac{1 \pm \sqrt{10}}{3}$.

Pages 174-176.—1. -12, 6. 2. 182. 3. 17 yrs. 4. 30 yrs.

5. $\frac{2}{9}$. 6. 16 in. by 12 in. 7. 4 in. by 6 in. 8. 35, 49. 9. 120.

10. 40 mi., 50 mi. 11. 4 hrs. 12. $3\frac{3}{7}$ hrs. 13. $13\frac{1}{3}$ hrs. 14. 24.

15. 6000 tons. 16. \$12,000. 17. $5\frac{1}{2}$ yrs. 18. 6 games. 19. 160 cu. ft.

Page 181.—1. $\sqrt[4]{a^3}$. 2. $\sqrt{b^5}$. 3. $\sqrt[3]{x^2y^4}$. 4. $\sqrt{7a}$. 5. $2\sqrt[3]{5x}$.

6. $2\sqrt[3]{a^2}$. 7. $\sqrt[3]{4a^2}$. 8. $2\sqrt{x}\sqrt[3]{y}$. 9. $6\sqrt[4]{a^5}\sqrt[3]{y}$. 10. $7\sqrt[5]{(3m)^4}$.

11. \sqrt{ab} . 12. $3\sqrt[4]{x^5}$. 13. $\sqrt[4]{(x+y)^3}$. 14. $4\sqrt[3]{(c-d)^2}$. 15. $5\sqrt[3]{a^2}\sqrt{x-y}$.

16. $a^m\sqrt[4]{b^m}$.

Pages 182-183.—1. $\frac{1}{8}$. 2. 8. 3. 5. 4. $\frac{1}{2}$. 5. 27. 6. 9. 7. 5.

8. $\frac{1}{4}$. 9. 42. 10. $-\frac{15}{4}$. 11. 9. 12. $\frac{2}{3}$. 13. $-\frac{3}{4}$. 14. $\frac{7}{6}$. 15. $\frac{2}{3}$.

16. $\frac{4}{3}$. 17. 25. 18. $\frac{1}{7}$. 19. 9. 20. 1. 21. $\frac{b}{2}$. 22. $12y^6$.

23. $6xy^3z$. 24. $\frac{5b^3}{16a^2}$. 25. $\frac{a+b}{ab}$. 26. $\frac{b+a}{b-a}$.

Pages 184-185.—1. $2\sqrt{2}$. 2. $2\sqrt{3}$. 3. $2\sqrt{5}$. 4. $2\sqrt{6}$. 5. $2\sqrt{7}$.

6. $2\sqrt{10}$. 7. $6\sqrt{11}$. 8. $12\sqrt{2}$. 9. $-18\sqrt{3}$. 10. $20\sqrt{3}$. 11. $2\sqrt{14}$.

12. 77. 13. $-32\sqrt{10}$. 14. $10\sqrt{5}$. 15. $15\sqrt{5}$. 16. $-90\sqrt{3}$.

17. $27\sqrt{2}$. 18. $16\sqrt{5}$. 19. $-2\sqrt{3}$. 20. $\frac{10}{3}\sqrt{3}$. 21. $2\sqrt[3]{2}$.

22. $6\sqrt[3]{2}$. 23. $10\sqrt[3]{2}$. 24. $14\sqrt[3]{7}$. 25. $6\sqrt[3]{11}$. 26. $3\sqrt[3]{2}$.

27. $100\sqrt[3]{10}$. 28. 2. 29. $6\sqrt[3]{3}$. 30. $14\sqrt[3]{10}$. 31. $2\sqrt[3]{7}$. 32. $x\sqrt{x}$.

33. $c^2\sqrt{c}$. 34. $y^3\sqrt{2y}$. 35. $ac\sqrt{c}$. 36. $bx\sqrt{y}$. 37. $m^3\sqrt{mn}$.
 38. $\frac{5}{3}\sqrt{3}$. 39. $\frac{2}{5}\sqrt{5}$. 40. $\frac{1}{4}\sqrt{14}$. 41. $\frac{1}{6}\sqrt{30}$. 42. $\frac{1}{6}\sqrt{3}$.
 43. $\frac{1}{6}\sqrt{2}$. 44. $\frac{1}{15}\sqrt{5}$. 45. $\frac{1}{8}\sqrt[3]{18}$. 46. $\frac{1}{2}\sqrt[3]{7}$. 47. $\frac{1}{3}\sqrt[3]{2}$. 48. $\sqrt[3]{6}$.
 49. $\frac{1}{2}\sqrt[4]{14}$. 50. $\frac{1}{3}\sqrt[4]{45}$. 51. $\frac{2}{3}$. 52. $\frac{1}{x}\sqrt{x}$. 53. $\frac{1}{b}\sqrt{ab}$. 54. $\frac{1}{a}\sqrt{a}$.
 55. $\frac{1}{x+y}\sqrt{x+y}$. 56. $\frac{x}{y}\sqrt[4]{xy}$. 57. $\sqrt{x^2-y^2}$.
 58. $\frac{m^2n}{m-n}\sqrt{m(m-n)}$. 59. $\frac{1}{a-b}\sqrt{a-b}$. 60. $(x+y)\sqrt{x-y}$.

- Page 186.—1. $-\sqrt{3}$. 2. $7\sqrt{2}$. 3. $3\sqrt{11}$. 4. $7\sqrt{a}$. 5. $(a+b)\sqrt{b}$.
 6. $\frac{1}{2}\sqrt{2}$. 7. $8\sqrt{3}$. 8. $\frac{1}{2}\sqrt{6}$. 9. $-\frac{2}{15}\sqrt{15}$. 10. $\frac{a+b}{ab}\sqrt{ab}$.
 11. $4\sqrt{5}$. 12. $14\sqrt{2}$. 13. $15\sqrt{7}$. 14. 0. 15. $(a+b-3)\sqrt{b}$.
 16. $(2a-c+2)\sqrt{ab}$. 17. $\frac{x^2+x+1}{x^3}\sqrt{x}$. 18. $(a+b)\sqrt{a+b}-\sqrt{a^2-b^2}$.
 19. $\frac{mn+m-1}{mn}\sqrt{mn}$. 20. $(x-y-2xy)\sqrt{x+y}$.
 21. $9\sqrt[3]{2}$. 22. $\frac{6}{5}\sqrt[3]{5}-\sqrt[3]{7}$. 23. $5\sqrt[3]{x-2}$. 24. $4\sqrt{a-3}$.

- Pages 187-188.—1. $3\sqrt{2}-\sqrt{21}-2\sqrt{6}$. 2. $\sqrt{35}+\sqrt{15}-\sqrt{55}$.
 3. $6\sqrt{3}-6\sqrt{2}+\sqrt{30}$. 4. $5\sqrt{2}-8\sqrt{5}+10$. 5. $-27\sqrt{2}+42$.
 6. $21+7\sqrt{2}-3\sqrt{3}-\sqrt{6}$. 7. $8\sqrt{5}-\sqrt{30}-32+4\sqrt{6}$.
 8. $-48-7\sqrt{6}$. 9. -70 . 10. 30. 11. $-5+2\sqrt{42}$.
 12. $10\sqrt{2}-6\sqrt{15}-4\sqrt{70}-10+3\sqrt{30}+4\sqrt{35}-2\sqrt{10}+6\sqrt{3}+4\sqrt{14}$.
 13. $3+\frac{11}{30}\sqrt{30}-\frac{12}{35}\sqrt{35}-\frac{13}{42}\sqrt{42}$. 14. $(x-y)\sqrt{xy}+x\sqrt{y}+y\sqrt{x}$.
 15. $-3-\sqrt[3]{12}+2\sqrt[3]{2}+\sqrt[3]{18}+\sqrt[3]{36}-\sqrt[3]{4}-\sqrt[3]{6}$.

- Page 189.—1. $\frac{1}{5}\sqrt{10}$. 2. $\frac{1}{3}\sqrt{3}$. 3. $4\sqrt{6}$. 4. $\sqrt[3]{4}$. 5. $3\sqrt{3}$.
 6. $12+6\sqrt{3}$. 7. $\frac{a\sqrt{a+b}}{a+b}$. 8. $\frac{\sqrt{x^2-y^2}}{x-y}$. 9. $\frac{5\sqrt{5}-5}{4}$.
 10. $\frac{21+12\sqrt{7}}{-8}$. 11. $-\sqrt{10}-\sqrt{15}+2\sqrt{3}+3\sqrt{2}$.
 12. $\frac{\sqrt{6}+\sqrt{10}+3\sqrt{2}+\sqrt{30}}{-4}$. 13. $\frac{\sqrt{30}-\sqrt{6}+5\sqrt{2}-\sqrt{10}}{-2}$.
 14. $-5\sqrt{3}+\sqrt{15}+3\sqrt{10}-3\sqrt{2}$. 15. $-23+4\sqrt{33}$.
 16. $\frac{35+12\sqrt{6}}{-10}$. 17. $-5+2\sqrt{6}$. 18. $\frac{a+2\sqrt{ab}+b}{a-b}$.
 19. $\frac{a\sqrt{a+b}-a-b}{a+b}$. 20. $\frac{x-\sqrt{x^2-y^2}}{y}$.

Page 191.—1. 9. 2. $19/9$. 3. -1 . 4. 11. 5. $2\frac{1}{2}$. 6. $21/9$. 7. 6.
8. 2. 9. 7. 10. 1. 11. 3. 12. $1/26$. 13. 8. 14. -6 . 15. 3. 16. 7.

Page 192.—1. -5 . 2. 16. 3. 8. 4. $3a + c$.
5. $-3x^2 - 15y^2 + x + 3y$. 6. $9y^2 - 2xy$. 7. $-a + 2b - 2c - 3d$.
8. $-3a + 2b - c + d$. 9. $(a - b + 4c) - (ab - 2ac + 4bc - a^2b)$.
10. $(-x + 5y - 4z) - (-xy + 3xz - 7yz)$. 11. $(2x^2 - 5y^2 + 3z^2) -$
 $(2xz - 2yz - 4xy)$. 12. $(f - d + 2c - 3e) - (4cd + 3de) + cde$.

Page 193.—1. $x^2 + 1$. 2. $4t^2 + 8t + 1$. 3. $4t^2 + 1$. 4. $-4y^2 - 1$.
5. $x^2 + 2xy + y^2$. 6. $m^2 - 8m$. 7. $x + 5y$. 8. $2x^2 + 2y^2$.
9. $2a^2 - 4ab + 2b^2$. 10. $2a^2 - 2ab - b^2$. 11. 64, 81, 4, 1, 1, 1, 5.
12. $a^5, a^5, 4c^7, x^5, y^{10}$. 13. $a^{-5}, b^{-3}, 1/5c^{-2}, x^3, x^{-2}$. 14. $\frac{2b^2}{3a}, 3a^2b^2, \frac{3y^4}{5}, \frac{5}{xy}$.
15. $2a^2 + 2b^2$. 16. $2a^2 - 2ab + 5b^2$. 17. $a^2 + 2ab - 4ac + b^2$
 $- 4bc + 4c^2$. 18. $4ab + 5b^2$. 19. $5a^2 - 6ab + 2b^2$. 20. $-2ab + 5b^2$.
29. $y^2 + y - 2$. 30. $y^2 - 6y + 57$. 31. $4x^2 + 3x + 2 +$
 $\frac{16x^2 - 25x - 22}{x^3 - 2x^2 + 6x + 5}$.

Page 194.—1. $5xy^3(2 - 3x)$. 2. $(2x + y)(a + b)$. 3. $2x(a + b)$.
4. $x^3(x + 1)(x^2 - 6x + 3)$. 5. $x^3(x^2 + 1)(x - 5)$. 6. $(a - b)^2(a + b)$.
7. $(m + n)(x + 1)(x - 1)$. 8. $(3x^2 + 1)(x - 1)$. 9. $(3m - 2n)(a^2 + b^2)$.
10. $(m - n)(m - n - 1)$. 11. $(a + y)(b - x)$. 12. $(a^2 + b^2)(a - b)$.
13. $(y + 5)^2$. 14. $(x + 4)^2$. 15. $(ab + 6)^2$. 16. $(a - b - c)^2$.
17. $(m + 7)(m - 7)$. 18. $(8 + x)(8 - x)$. 19. $(9x^2 + 5y^3)(9x^2 - 5y^3)$.
20. $(a - b + c)(a - b - c)$. 21. $(6x + y)(-4x - y)$. 22. $(a + b$
 $+ c)(a + b - c)$. 23. $(x - 4)(x - 1)$. 24. $(x + 4)(x + 1)$.
25. $(y + 8)(y - 2)$. 26. $(y - 8)(y + 2)$. 27. $(x - 2)(x - 5)$.
28. $(x + 2)(x + 5)$. 29. $(x + 5)(x - 2)$. 30. $(x - 5)(x + 2)$.
31. $(a + 9)(a - 2)$. 32. $(b - 15)(b + 3)$. 33. $(c + 16)(c - 2)$.
34. $(x + 15)(x - 5)$. 35. $(x - 15)(x + 5)$. 36. $(x - 8y)(x + y)$.
37. $x^2(1 + 14y)(1 + y)$. 38. $(10a + 1)(7a + 1)$. 39. $(2x + 3)(x + 3)$.
40. $(2 + 3y)(1 - 2y)$. 41. $(3 - 5m)(2 + 3m)$. 42. $(a + 2b)(a^2 -$
 $2ab + 4b^2)$. 43. $(a - 2b)(a^2 + 2ab + 4b^2)$. 44. $(2x - 3y)(4x^2 + 6xy$
 $+ 9y^2)$. 45. $(2x + 3y)(4x^2 - 6xy + 9y^2)$. 46. $(x^2 + 1)(x + 1)(x - 1)$.

Pages 195-196.—5. 2. 6. $\frac{x + y}{4}$. 7. $1/2$. 8. $\frac{a + b}{a - b}$. 9. $\frac{1}{3 + 2c}$.
10. $\frac{x}{n(a - b)}$. 11. $\frac{5x}{x - y}$. 12. $\frac{x + 3}{(x - 2)^2}$. 13. $\frac{5z^3}{2xy^2}$. 14. $\frac{6xz}{y}$.
15. $\frac{-5}{x + y}$. 16. $\frac{(x - y)^2}{5}$. 17. $\frac{x + 1}{x^2 + 3x + 9}$. 18. $\frac{m^2 - n^2}{c^2 - n^2}$.
19. $\frac{-2m^2}{m^2 + mn + n^2}$. 20. $a(a - x)$. 21. $\frac{a^2 + 2b}{a + b}$. 22. $\frac{x - 2}{x - 7}$.

23. $\frac{1}{a^2}$. 24. $\frac{43x}{24y}$. 25. $\frac{1-x+y}{(x-y)^2}$. 26. $\frac{3}{(x-1)^2}$.
 27. $\frac{5x-y}{(x-y)(x+y)}$. 28. $\frac{-a}{(a-3)(a-4)}$. 29. $\frac{1+7x}{4}$.
 30. $\frac{5x+5y}{4}$. 31. $\frac{a^2+3ab}{a+b}$. 32. $\frac{4-m^2}{3-m}$. 33. $\frac{x^3}{x-y}$. 34. $\frac{x^3}{x+y}$.

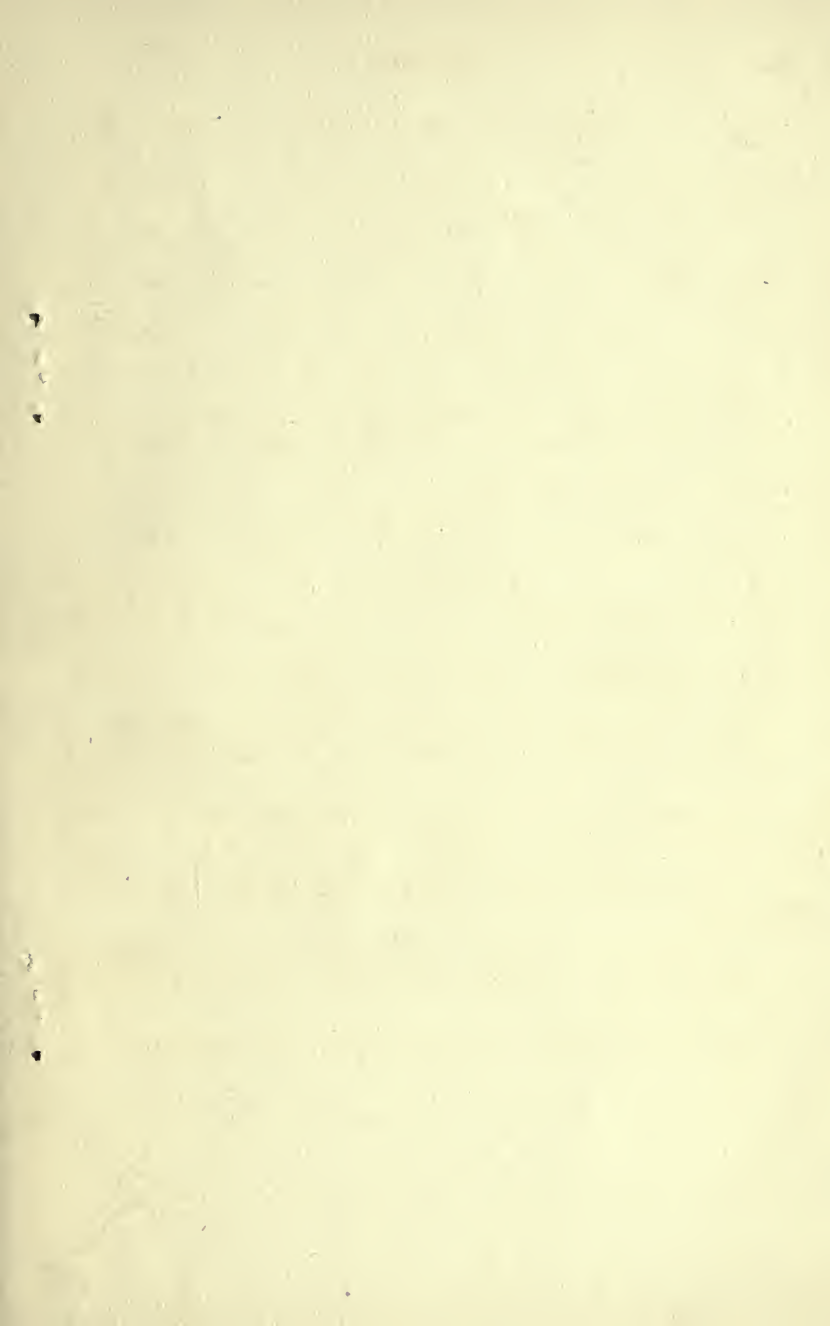
- Pages 196-197.—1. $\frac{5}{12}$. 2. 1. 3. 10. 4. $-1\frac{15}{22}$. 5. $-2\frac{5}{69}$.
 6. $-1\frac{12}{7}$. 7. $\frac{3}{m-n}$. 8. $\frac{c}{a+b}$. 9. $\frac{8+a}{a-b}$. 10. $\frac{d}{a+b-c}$.
 11. $\frac{m+n}{m-n-1}$. 12. $\frac{b-a}{2}$. 13. -7. 14. $2\frac{3}{4}$. 15. 1. 16. 3.
 17. $2\frac{1}{2}$. 18. $\frac{1}{3}$. 19. $-4\frac{1}{5}$. 20. 1. 21. No root. 22. $2\frac{3}{11}$. 23. 4.
 24. 5. 25. $-1\frac{15}{4}$. 26. $5\frac{3}{2}$, $1\frac{7}{2}$. 27. $5\frac{5}{2}$. 19. 28. 2, 5. 29. $2\frac{1}{2}$, $2\frac{1}{2}$.
 30. 6; 5. 31. 1, 1. 32. $\frac{2c^2}{3}$, c.

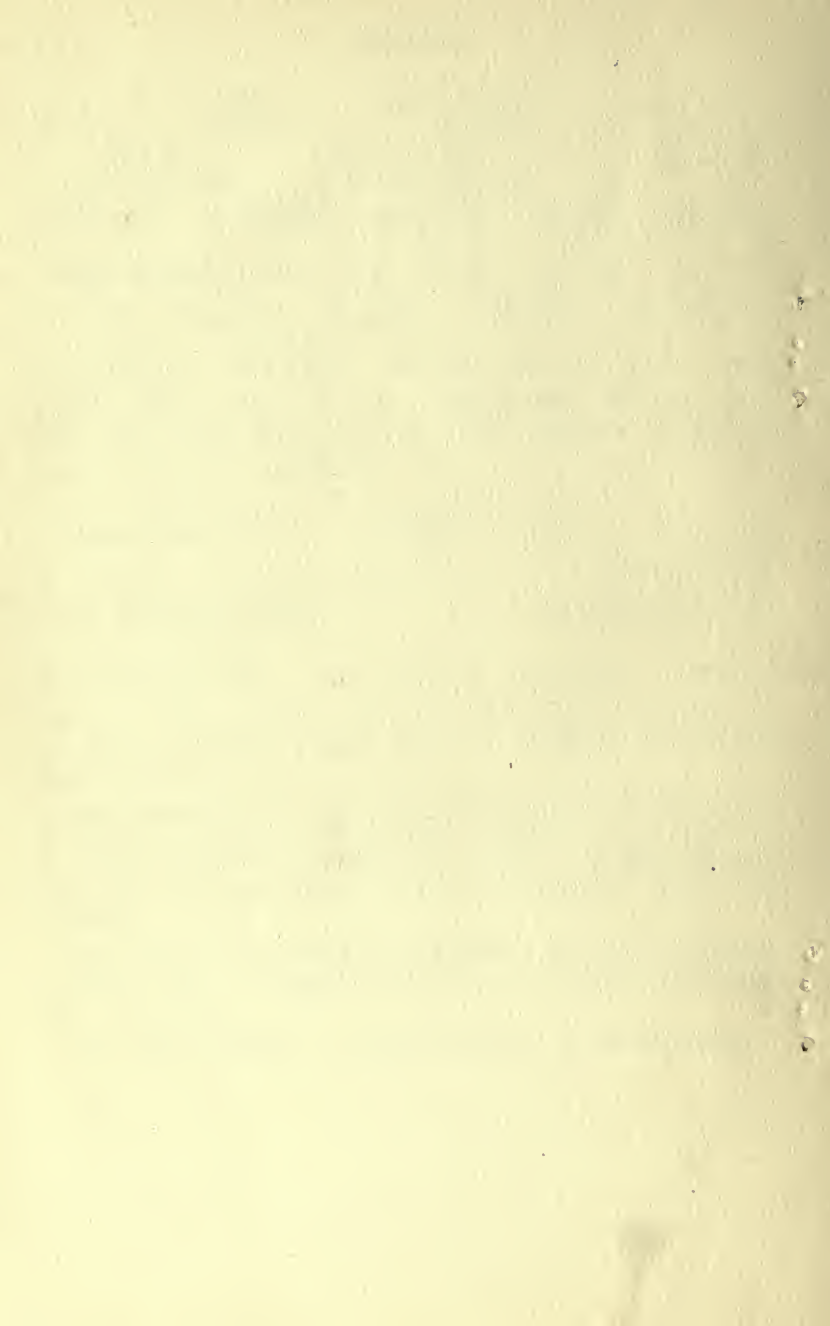
- Pages 197-198.—1. 5, 1. 2. $\frac{5 \pm \sqrt{5}}{2}$. 3. 4, 1. 4. 3, $-4\frac{1}{3}$.
 5. 9, $-2\frac{2}{3}$. 6. $-1\frac{1}{3}$, $-1\frac{1}{2}$. 7. $a \pm \sqrt{a^2 + b^2}$.
 8. $\frac{(a-1) \pm \sqrt{a^2 - 6a + 1}}{2}$. 9. $\frac{-m \pm \sqrt{m^2 - 4n}}{2}$.
 10. $\frac{-q \pm \sqrt{q^2 - 4pr}}{2p}$. 11. $-1\frac{1}{3}$, 2. 12. $2\frac{2}{5}$, $1\frac{1}{3}$. 13. 5, $1\frac{1}{5}$.
 14. $\pm 1\frac{1}{2}$. 15. $\pm \sqrt{cd + 1}$. 16. $\frac{6}{5}$, 3. 17. ± 6 , ± 9 . 18. ± 6 , ± 4 .
 19. $-8\frac{1}{5}$, 1. 20. 25, 9; -10, 6. 21. $\frac{1}{3}$, $\frac{1}{2}$. 22. $\frac{1}{3}$, 2. 23. ± 4 , ± 3 .
 24. 0, 8; 0, 4.

- Pages 198-200.—1. 21. 2. 6 hrs.; 50 mi. per hr. 3. 13 ft., 10 ft.
 4. 150 cows. 5. 13 hrs. 6. 50 in., 37 in. 7. 12 doz. 8. $a = .2$, $b = 1.1$,
 $P = 36.18$. 9. Mule 7 m.; donkey 5 m. 10. 10 ft. 11. 400 ft. by 300 ft.
 12. 15 mi. up, 12 mi. down. 13. \$35. 14. 735 lbs. 15. $4\frac{9}{11}$ gal.
 16. \$416.

- Pages 200-201.—2. 7, 500 lbs. 3. $45\frac{3}{4}$ lbs. 4. $1\frac{1}{23}$ ft. 5. $53\frac{4}{7}$ in.
 6. $128\frac{58}{89}$; $83\frac{22}{89}$. 7. 3910 lbs. 8. $.04 + \text{in.}$ 9. $1\frac{9}{11}$ ft. from heavier
 end. 10. $1\frac{12}{13}$ ft.

- Page 202.—5. 402.5 ft. 6. 253.7 ft. per sec. 7. About 1247 ft.





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