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松本安藏著

航海術
卷之二

試驗問題解答

44. 8. 16

航海術卷之二

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航海術卷之貳

試驗問題解答

第一試驗問題. 633 頁

1.

$$\begin{array}{r}
 167.5008 \dots 2.224017 \\
 8.9625 \dots 0.952429 \\
 \hline
 1501.0241 \dots 3.176446
 \end{array}$$

$$\begin{array}{r}
 381 \\
 65 \\
 58 \\
 7 \\
 0 \\
 \hline
 70 \\
 58 \\
 \hline
 120 \\
 115 \\
 \hline
 50 \\
 29 \\
 \hline
 21
 \end{array}$$

答

$$1501.0241$$

2.

$$\begin{array}{r}
 .387 \dots 1.587711 \\
 .00032 \dots 4.505150 \\
 \hline
 1209.375 \dots 3.082561
 \end{array}$$

$$\begin{array}{r}
 426 \\
 135 \\
 108 \\
 \hline
 270 \\
 252 \\
 \hline
 180 \\
 180 \\
 \hline
 0
 \end{array}$$

答

$$1209.375$$

3.

(1)	(2)	(3)
6 1 L.S.	0 3 L.N.	0 1 L.S.
3 R.	1 1 L.	1 0 R.
5 2 L.S.	2 0 L.N.	0 3 R.S.
61 52 L.S.	22 30 L.N.	8 26 R.S.
18 0 L.	22 0 R.	8 0 R.
79 52 L.S.	0 30 L.N.	16 26 R.S.
<u>S. 80 E. 43.</u>	<u>N. 42.</u>	<u>S. 16 W. 42.</u>
(4)	(5)	(6)
3 3 R.N.	0 0 R.N.	4 1 R.S.
3 L.	2 L.	1 0 L.
3 0 R.N.	0 2 L.N.	3 1 R.S.
33 45 R.N.	5 37 L.N.	36 34 R.S.
10 30 L.	3 10 R.	37 0 R.
23 15 R.N.	2 27 L.N.	73 34 R.S.
<u>N. 23 E. 43.</u>	<u>N. 2 W. 42.</u>	<u>S. 73 W. 43.</u>

(C)

0 2 L.N.
5 37 L.N.
10 0 R.
4 23 R.N.
<u>N. 4 E. 36.</u>

Nos.	T. Co.	Dist.	D. lat.		Dep.	
			N.	S.	E.	W.
1	S. 80 E.	43	—	7.5	42.3	—
2	N.	42	42.0	—	—	—
3	S. 16 W.	42	—	40.4	—	11.6
4	N. 23 E.	43	39.6	—	16.8	—
5	N. 2 W.	42	42.0	—	—	1.5
6	S. 73 W.	43	—	12.6	—	41.1
C	N. 4 E.	36	35.9	—	2.5	—
			159.5	60.5	61.6	54.2
			60.5		54.2	
			99.0		7.4	

Lat. from 32 14.0 S. Long. from 152 33.0 E.
 D. lat. 1 39.0 N. D. long. 9.0 E.
 Lat. in 30 35.0 S. Long. in 152 42.0 E.
 Lat. from 32 14.0 S.
 2) 62 49.0
 Mean mid. lat 31 24.5

答

T. Co. N. 4° E., Distance 100 miles.

Lat. 30° 35' S., Long. 152° 42' E.

4.

G.A.T. Jan. 30^h 0^m 0^s

N. Alm. Jan. 30th.

17° 56' 48".1 S. *h. v.* 40".33; *Scm.* 16' 16"

Orig. alt. @ 72 6 20
 I. E. 1 10+
 Obs. alt. @ 72 7 30
 10 20+ 表 576 頁
 72 17 50
 16+

T. alt. ... 72 18 6
 90
 T. Z. ... 17 41 54 N.
 Decl. ... 17 56 48 S.
 Lat. ... 0 14 54 S.

答

Lat. at noon 0° 14' 54" S.

5.

Dec. 11 ^d 6 ^h	每時ノ速力	12.5
” 7 21	一晝夜開...	24
3 9 = 3 ^d 375 表 6 頁		500
	300	250
全航程	<u>1012.500</u>	一日開ノ航程 <u>300.0</u>

$$\frac{\text{Dep.}}{\text{D. long.}} = \cos. \text{ lat.}$$

$$\text{Dep.} = \text{D. long.} \times \cos. \text{ lat.}$$

$$\text{D. long.} = \text{Dep.} \times \sec. \text{ lat.}$$

Dep. 1012.5	... log.	3.005394
Lat. 5030	... sec.	0.196490
		3.201884
D. long. <u>1591.8 E.</u>	... ..	670
		214

Long. from 150	10.0W.
D. long.	26 31.8 E.
Long. in	<u>123 38.2W.</u>

答

D. long. 26°31'.8 E., Long. in 123°38'.2 W.

6.

漸長緯度法

Lat. from 5°29'S.	Mer. parts	329.50
Lat. in <u>28 24 S.</u>	”	1778.39
22 55 S.	M. D. Lat.	<u>1448.89 S.</u>
	60	
D. lat.	<u>1375 S.</u>	

Long. from 35°17'W.
Long. in <u>13 5 W.</u>
22 12 E.
60
D. long. <u>1332 E.</u>

$$\frac{\text{D. long.}}{\text{M. D. lat.}} = \tan. \text{ Co.}$$

$$\frac{\text{Dist.}}{\text{D. lat.}} = \sec. \text{ Co.}; \text{ Dist.} = \text{D. lat.} \sec. \text{ Co.}$$

D. long. 1332	... ..	log.	3.124504
M. D. lat. 1448.9	... ..	”	3.161039
T. Co. <u>S. 42°35'34" E.</u>	tan.	9.963465	
		47	
		+4" =	18

D. lat. 1375	... ..	log.	3.138303
T. Co. <u>S. 42 35 34 E.</u>	... sec.	0.133015	
Distance <u>1867.7</u>	log.	3.271318	
		144	
		174	
		163	
		11	

T. Co. 42°35' L.S.
C. Er. 16 30 R.
C. Co. 26 5 L.S.
C. Co. <u>S. 26 5 E.</u>

答

T. Co. S. 42°35'34" E., C. Co. S. 26°5' E.,

Distance 1867.7 miles.

中分緯度法

$$\frac{\text{Dep.}}{\text{D. long.}} = \cos. \text{ mid. lat.}$$

$$\frac{\text{Dep.}}{\text{D. lat.}} = \tan. \text{Co.}$$

$$\frac{\text{Dist.}}{\text{D. lat.}} = \sec. \text{Co.}$$

Lat. from $5^{\circ}29' \text{S.}$	Lat. from $5^{\circ}29' \text{S.}$
Lat. in $28 \ 24 \ \text{S.}$	Lat. in $28 \ 24 \ \text{S.}$
2) $33 \ 53$	D. lat. $22 \ 53 \ \text{S.}$
Mean lat. $16 \ 56\frac{1}{2}$	" $1375 \ \text{S.}$
Cor. $1 \ 8$ 新表2頁	
Mid. lat. $18 \ 4\frac{1}{2}$	

Long. from $35^{\circ}17' \text{W.}$	
Long. in $13 \ 5 \ \text{W.}$	
D. long. $22 \ 12 \ \text{E.}$	
"	$1332 \ \text{E.}$

D. long. $1332 \dots \dots \dots$	log. 3.124504
True mid. lat. $18 \ 4 \ 30 \dots \dots$	cos. 9.978021
	dep. 3.102525
D. lat. $1375 \dots \dots \dots$	log. 3.138303
T. Co. $\text{S. } 42 \ 38 \ 33 \ \text{E.} \dots \dots$	tan. 9.964222
C. Er. $16 \ 30 \ \text{O.R.}$	08
C. Co. $\text{S. } 26 \ 8 \ 33 \ \text{E.}$	$+3'' = 14$

D. lat. $1375 \dots \dots \dots$	log. 3.138303
T. Co. $\text{S. } 42 \ 38 \ 33 \ \text{E.} \dots \dots$	sec. 0.133362
Distance $1869.3 \dots \dots \dots$	log. 3.271665
	09
	56

答

T. Co. $\text{S. } 42^{\circ}38'33'' \text{E.}$, C. Co. $\text{S. } 26^{\circ}8' \text{E.}$,

Distance 1869.3 miles.

7.

S.A.T. July 7^d $8^{\text{h}}20^{\text{m}}0^{\text{s}}$

L. T. $3 \ 2 \ 0 +$

G.A.T. July 7 $11 \ 22 \ 0 = 11.3 +$

N. Alm. July 7th.

Decl. $22 \ 36 \ 44.7 -$	$\mu. v. 15.92 +$
$2 \ 59.9 +$	$11.3 +$
R ^d $22 \ 33 \ 44.8 \ \text{N.}$	4776
	1592
	1592
	$179.896 +$
	$259.9 +$

$754 \ 20 \ 0 \dots \dots \dots$	log. sec. 0.234280
$d22 \ 33 \ 45 \dots \dots \dots$	sin. 9.583982
T.A. $\text{W. } 41 \ 9 \ 6 \ \text{N.}$	sin. 9.818262
C.A. $\text{W. } 106 \ 52 \ 30 \ \text{N.}$	47
C. E. $65 \ 43 \ 24 \ \text{W.}$	$+6'' = 15$
V. $41 \ 0 \ 0 \ \text{E.}$	
D. $24 \ 43 \ 24 \ \text{W.}$	

答

T.A. $\text{W. } 41^{\circ}9'6'' \text{N.}$, C.E. $65^{\circ}43'24'' \text{W.}$,

Dev. $24^{\circ}43'24'' \text{W.}$

8.

答

(a) T. Co. $\text{N. } 67^{\circ} \text{W.}$, C. Co. $\text{N. } 36^{\circ} \text{W.}$, Dev. 1°W. ,

Distance 88 miles.

(b) Lat. $47^{\circ}13'40'' \text{N.}$, Long. $17^{\circ}4'0'' \text{W.}$

(c) Lat. 47°18'15" N., Long. 17°18'50" W.

Distance 15 miles.

9.

Lat. 34°15' S.	} +A .895	T. Az. N. 70 W.	
l 2 ^h 28 ^m		-B .455	C. ,, N. 62 W.
d 15°21' S.		+C .440	C. E. 8 W.
		V. 27½ E.	
		D. 19½ E.	

答

T. Az. N. 70°W., C.E. 8°W., Dev. 19½°E.

10.

S.M.T. Feb. 4^d 3^h 0^m 0^s

L. T. 5 0 16-

Approx. G.M.T. Feb. 3 21 59 44

C. T. Feb. 3 ^d 21 ^h 57 ^m 14 ^s .0	30
Orig. Error 11 50.0-	6
21 45 24.0	Nov. 24
Accum. Rate 19.2+	Dec. 31
21 45 43.2=.9	Jan. 10
0.7+	65 days.

G.M.T. Feb. 3 21 45 43.9	12 ^m 42 ^s
21.8+ = 2.2-	11 50
	65) 52.0

.8 Losing.

31	24	.9
10	.8	.8
Jan. 21	19.2	.72+
Feb. 3		
	24	days.

N. Alm. Feb. 4th.

16°32' 27'.8-	44'.11+	14 ^m 0'.91+	0°.262+
1 37.0-	22-	0.58-	2.2-
<u>16 34 4.8 S.</u>	8822	<u>14 0.33+</u> A.T.	524
	8822		524
90	97.042-	Sem.	<u>.5764-</u>
<u>73 25 55</u>	<u>1'37'.0-</u>	<u>16'15''</u>	

T. Co. and dist. N. 74°E. 36
 D. lat. 9'.9 N., Dep. 34'.6 E = D. long. 35'.7 E.
 Lat. at noon 14°28' 30" S.
 D. lat. ... 9 54 N.
 Lat. at obs. 14 18 36 S.

Orig. alt. @ 49°50' 50"
I. E. ... 0 52+
Obs. alt. @ 49 51 42
Cor. ... 9 33+
15+

T. alt. ... 50 1 30
90

T. Z. ... 39 58 30

l 14 18 36 S.	l 14 18 36 S.
d 16 34 5 S.	a 50 1 30
s 39 58 30	p 73 25 55
2 15 29	35 42 54
S. 42 13 59	S. 109 8 49
D. 37 43 1	D. 37 43 1
½ S. 21 6 59	½ S. 54 34 24
½ D. 18 51 30	½ D. 18 51 30

0.013688	0.013688
0.018416	0.192158
9.556621	9.911082
9.509511	9.509511
<u>9.098236</u>	<u>9.626439</u>
20	18
<u>+ .2 = 16</u>	<u>+ 12 = 21</u>

S.A.T. Feb. 4 ^d 2 ^h 45 ^m 54 ^s .2	T. Az. S. 81° 9' 12" W.
Eq. T. 14 0.3+	C. Az. S. 95 0 0 W.
S.M.T. Feb. 4 2 59 54.5	C. Er. 13 50 48 W.
G.M.T. Feb. 3 21 45 43.9	V. ... 3 30 0 E.
L. T. 5 14 10.6	D. ... 10 20 8 W.
Sight long. 78°32' 39" E.	
D. long. 35 42 W.	
Noon long. 77 56 57 E.	

答

Obs. long. 78°32' 39" **E.**, Noon long. 77°56' 57" **E.**,

T. Az. S. 81 9 12 W., **C. Error 13 50 48 W.**

Compass Dev. 10°20'8" **W.**

11.

N. Alm. Sth. April.

Moon's Upper meridian pass 8^d 17^h 58^m.1

„ Lower „ 8 5 32.4

Eq. of time 2^m Subtract from **M.T.**

Moon's Semid. at noon 14'51"

„ midnight 14'49"

西部標準時東經 120° 卷ノ二 471 頁

中央標準時東經 135° „

April 8 ^d 17 ^h 58 ^m .1	8 ^d 5 ^h 32 ^m .4
T. 28, p. 50 ... 16.5-	16.5-
17 41.6	5 15.9
T. 29, p. 50 ... 1 0.0-	1 2.0-
16 41.6	4 13.9
C. T. 10 15.0+	10 15.0+
Local M.T. 9 2 56.6	8 14 28.9
5.7-	5.7-
W.S.T. 9 2 50.9	8 14 23.2
1 0.0+	1 0.0+
C.S.T. 9 3 50.9	8 15 23.2
9 th 3 50.9 P.M.	9 th 3 23.2 A.M.

答

西部標準時 Western Standard time

April 9th. 2^h 50^m 9 **P.M.**

„ 2 23.2 **A.M.**

中央標準時 Central Standard time

April 9th. 3^h 50^m 9 **P.M.**

„ 3 23.2 **A.M.**

第二試驗問題. 637 頁.

1.

7.3695 ... 0.867438
.0265 ... 2.423246
.1952 ... 1.290684
480
204

答

.1952

2.

.000468 ... 4.670246
 .0117 ... 2.068186 答 .04
.04 ... 2.602060

3.

(D)	(1)	(2)
4 3 <u>L.S.</u>	4 3 <u>R.N.</u>	6 3 <u>L.S.</u>
53 26 <u>L.S.</u>	1 0 <u>R.</u>	3 <u>L.</u>
12 0 <u>L.</u>	5 3 <u>R.N.</u>	7 2 <u>L.S.</u>
65 26 <u>L.S.</u>	64 41 <u>R.N.</u>	84 22 <u>L.S.</u>
<u>S. 65 E. 10.</u>	12 0 <u>L.</u>	18 30 <u>L.</u>
	52 41 <u>R.N.</u>	102 52 <u>L.S.</u>
	<u>N. 53 E. 39.</u>	180
		77 8 <u>R.N.</u>
		<u>N. 77 E. 42.</u>
(3)	(4)	(5)
5 1 <u>R.S.</u>	0 0 <u>R.N.</u>	3 2 <u>L.S.</u>
3 <u>R.</u>	1 0 <u>R.</u>	1 0 <u>L.</u>
6 0 <u>R.S.</u>	1 0 <u>R.N.</u>	4 2 <u>L.S.</u>
67 30 <u>R.S.</u>	11 15 <u>R.N.</u>	50 37 <u>L.S.</u>
75 0 <u>L.</u>	34 0 <u>L.</u>	35 0 <u>L.</u>
7 30 <u>L.S.</u>	22 45 <u>L.N.</u>	85 37 <u>L.S.</u>
<u>S. 7 E. 41.</u>	<u>N. 23 W. 40.</u>	<u>S. 86 E. 40.</u>
	(6)	
	5 0 <u>R.N.</u>	
	3 <u>R.</u>	
	5 3 <u>R.N.</u>	
	64 41 <u>R.N.</u>	
	16 0 <u>L.</u>	
	48 41 <u>R.N.</u>	
	<u>N. 49 E. 46.</u>	

Nos.	T. Co.	Dist.	D. lat.		Dep.	
			N.	S.	E.	W.
D	S. 65 E.	10	—	4.2	9.1	—
1	N. 53 E.	39	23.5	—	31.1	—
2	N. 77 E.	42	9.4	40.7	40.9	—
3	S. 7 E.	41	—	—	5.0	—
4	N. 23 W.	40	36.8	2.8	—	15.6
5	S. 86 E.	40	—	—	39.9	—
6	N. 49 E.	46	30.2	—	34.7	—
			99.9	47.7	160.7	15.6
	N. 70 E.	155	47.7	—	15.6	—
			<u>52.2</u>	—	<u>145.1</u>	—

Lat. from 59 50.0 N. Long. from 43 20.0 W.
 D. lat. 52.2 N. D. long. 4 52.2 E.
 Lat. in 60 42.2 N. Long. in 38 27.8 W.

59 50
 60 42
 2) 120 32
 M. mid. lat. 60 16

Lat. D. R. 60 42.2 N. Long. D. R. 38 27.8 W.
 Lat. Obs. 61 48.0 N. " Obs. 38 32.5 W.
 1 5.8 D. Long. ... 4.7 W.
 D. Lat. ... 65.8 N.

D. long. = tan. Co.
 M. D. lat.

M. P. 4612.95 4.7 ... 0.672098
 4749.51 136.6 ... 2.135451
 M. D. lat. 136.56 N. 1° 58' 14" W. ... 8.536647

Dist. = sec. Co.
 T. D. lat.

65.8 ... 1.818226
 1°58'14" ... 0.000256
65.84 ... 1.818482

答

Lat. 60°42'12"N., Long. 38°27'48"W.,
 T. Co. N. 70° E., Distance 155 miles,
 Current set N. 2° W., drift 65.8 miles.

4.

141°20' = L.T. 9^h25^m20^s = 9^h4+

N. Alm. 28th. March.

Decl. 2°57'34".8 +	<i>h. v.</i> 58'.55
Cor. 9 10.4 +	9.4 +
R ^d Decl. <u>3 6 45.2 N.</u>	23420
	52695
	<u>550.370</u>
Semid. <u>16'2"</u>	Cor. <u>9'10".4</u>

Orig. alt. ⊙ 48°24'30"	
	2 30 +
Obs. alt. ⊙ 48 27 0	
Cor. 10 25 +	
	2 +
T. alt. ⊙ 48 37 27	
T. Z. 41 22 33 N.	
Decl. 3 6 45 N.	
Lat. <u>44 29 18 N.</u>	

答

Noon Lat. 44°29'18" N.

5.

Lat. <u>50°20' N.</u>	6 0 W.
	49 30 W.
	43 30 W.
	60
D. long.	<u>2610 W.</u>

Dep. = cos. lat.
 D. long.

∴ Dep. = D. long. × cos. lat.

2610 log. 3.416640	
50°20' cos. 9.805038	
Dep. <u>1666.01 W.</u> log. 3.221678	
	5
T. Co. W. ... 90 0 L.N.	3
	0
	36 0 R.
	30
	54 0 L.N.
	26
C. Co. <u>N. 54° W.</u>	<u>4</u>

答

C. Co. N. 54° W., Distance 1666 miles.

6.

漸長緯度航法

Lat. from 3 47 N.	M. P.	227.16
Lat. in 6 40 N.	„	400.91
	2 53	M. D. lat. <u>173.75 N.</u>
	60	
T. D. lat.	<u>173 N.</u>	

Long. from. 8 57 **E.**
 Long. in 61 22 **W.**
 70 19
 60
4219 **W.**

$\frac{\text{D. long.}}{\text{M. D. lat.}} = \tan. \text{Co.}$

D. long. 4219 ... log. 3.625209
 M. D. lat. 173.75 „ 2.239925
 T. Co. **N. 87 38 30 **W.**** tan. 11.385284
 C. Er. 3 0 0 **W.** 72
 C. Co. **N. 90 38 30 **W.**** 12
 Or, **S. 89 21 30 **W.****

$\frac{\text{Dist.}}{\text{D. lat.}} = \sec. \text{Co.}$

D. lat. 173 log. 2.238046
 T. Co. **N. 87 38 30 **W.**** sec. 1.385640
 Dist. 4204.2 ... log. 3.623686
 63
 23
 21
 2

中分緯度航法

Lat. from 3 47 **N.** Long. from 8 57 **E.**
 Lat. in 6 40 **N.** Long. in 61 22 **W.**
 2) 10 27 70 19 **W.**
 Mid. lat. 5 13½ 60
 4219 **W.**

$\frac{\text{Dep.}}{\text{D. long.}} = \cos. \text{lat.}$

D. long. 4219 **W.** ... log. 3.625209
 Mid. lat. 5 13 30 ... cos. 9.998192
 Dep. 4201.4 3.623401
 353
 48
 $\frac{\text{Dep.}}{\text{D. lat.}} = \tan. \text{Co.}$ 41
 7

Dep. 4201.4 ... log. 3.623401
 D. lat. 173 „ 2.238046
 T. Co. **N. 87 38 31 **W.**** ... tan. 11.385355
 C. Er. 3 0 0 **W.** 272
 C. Co. **N. 90 38 31 **W.**** +1''=83
 Or, **S. 89 21 29 **W.****

7.

G.A.T. Sept. 20^d 0^h 26^m 42^s = 0^h 4 +

N. Alm. 20th. Sept.

Decl. 1° 8' 21.5" - h. v. 58° 29'
 23.3 + 0.4 +
 R^d 1 7 58.2 23.316

L. sin. 1° 7' 58" **N.** ... 8.295994
 L. sec. 28 35 0 **S.** ... 0.056445
 T.A. ... **W. 1 17 24 **N.**** ... 8.352439
 C.A. ... **W. 0 0 0 **N.****
 C. Er. 1 17 24 **E.**
 V. ... 10 45 0 **E.**
 D. ... 12 2 24 **E.**

答

T.A. **W. 1° 17' 24" **N.****, C. Error 1° 17' 24" **E.**,

Dev. 12° 2' 24" **E.**

8.

答

(a) T. Co. S. 5°E., C. Co. S. 38°30'W.,

Distance 59½ miles.

(b) Lat. 46°24' 15"S., Long. 29°27' 10"W.

(c) Lat. 46 32 10 S., Long. 29 25 10 W.

Distance 10 miles.

9.

C. T. Nov. 24^d 12^h 3^m 5^s
 Orig. Error 7 8+
 G.M.T. Nov. 24 12 10 13
 L.T. 4 37 20-
 S.M.T. Nov. 24 7 32 53.0
 Eq. T. 13 6.9+
 S.A.T. Nov. 24 7 45 59.9
 h 7 45 59.9

N. Alm. Nov. 24th. +M.T.

Decl. 20°32' 45.0+	h. v. 30.42	Eq. T. 13 ^m 15:71-	h. v. 0:725
6 11.1+	12.2+	12.2+	
R ^d 20 38 56.1	6084	1450	
	6084	1450	
	3042	725	
	371.124	8.8450+	
	6'11'.1+		

h 7^h 46^m & Lat. 56°37' S. ... -A .725
 " decl 20 40 S. ... -B .398
 -C 1.123

T. azimuth ... S. 58°30'W.
 Comp. azimuth ... S. 45 0 W.
 Comp. Error ... 13 30 E.
 Var. ... 20 0 W.
 Dev. ... 6 30 W.

10.

C. T. Dec. 24^d 20^h 6^m54.0
 29 12.0+
 " 24^d 20 36 6.0=.8
 53.4-
 G.M.T. 24^d 20 35 12.6=20.6=3.4-

Chro. Error slow Sept. 11th., 30^m56^s
 " " Nov. 19th., 29 12
 1 44
 30 60
 11 69)104
 Sept. 19 1.5 gaining daily.
 Oct. 31
 Nov. 19
 69 days 35.8
 30 1.5
 19 1790
 Nov. 11.0 358
 Dec. 24.8 53.40
 35.8 days.

N. Alm. Dec. 25th. +A.T.

23°24' 36".0-	3.8 9+	0 ^m 8 ^s .51+	1.24 1+
13.2-	3.4-	4.22-	3.4-
23 24 49.2S.	1556	0 4.29	4964
90	1167		3723
66 35 11	13.226-		4.2194-

R^d Decl. 23°24'49".2 S., p 66°35'11" R^d Eq. T. 0^m4".3

Orig. alt. @ 43°56' 15"
 I. E. 2 10+
 Obs. alt. @ 43 58 25
 10 11+
 17+
 T. alt. 44 8 53
 T. Z. 45 51 7

l 39 50 OS.	39 50 OS.
d 23 24 49 S.	44 8 53
s 45 51 7	p 66 35 11
16 25 11	4 18 53
62 16 18	70 54 4
29 25 56	62 16 18
31 8 9	35 27 2
14 42 58	31 8 9
0.114689	0.114689
0.037318	0.144153
9.713548	9.763428
9.404885	9.713548
9.270440	9.735818
14	1
-4=26	+3''=7

S.A.T. 24^h 20^m 35^s 22^o.6 T. Az. ... S. 95° 4' 48'' E.
 Eq. T. 0 4.3+ C. „ ... S. 90 0 0 E.
 S.M.T. 24 20 35 26.9 C. Error 5 4 48 W.
 G.M.T. 24 20 35 12.6 V. 26 45 0 E.
 L. T. ... 0 0 14.3 D. 21 40 12 E.
 Long. ... 0 3 34 E.

答

Long. 0°3'34''E., Dev. 21°40'12''E.

11.

N. Alm. July 9th.

Eq. T. 5^m - M.T.

(Sem. Noon 15'44'' ; Midnight 15'52''

9 ^d 19 ^h 54 ^m 5	... 9 ^d 7 ^h 28 ^m 7	20 ^h 50 ^m 7
22.0-	22.0-	19 54.5
9 19 32.5	9 7 6.7	Var. 56.2
15.0-	28.0-	19 32.5
9 19 17.5	9 6 38.7	5.0-
5 30.0+	5 30.0+	19 27.5
10 ^d 0 47.5	9 12 8.7	7 28.7
18.7-	18.7-	5.0-
10 ^d 0 28.8	9 11 50.0	7 23.7
10 ^h 0 ^m 28.8 P.M.	No A.M. Tide.	139°40
		135 0
		4 40
		4
		18 ^m 40 ^s

第三試驗問題. 640 頁.

1.

答

275.569

2.

答

1320.33

3.

(D)	(1)	(2)
78 45 R.S.	81 34 R.S.	2 49 R.S.
27 0 R.	11 0 R.	8 0 L.
<u>105 45 R.S.</u>	<u>92 34 R.S.</u>	<u>5 11 L.S.</u>
17 30 L.	9 30 R.	13 0 L.
<u>88 15 R.S.</u>	<u>102 4 R.S.</u>	<u>18 11 L.S.</u>
<u>S. 88 W. 7.</u>	<u>77 56 L.N.</u>	<u>17 30 L.</u>
	<u>N. 78 W. 44.</u>	<u>35 41 L.S.</u>
		<u>S. 36 E. 43.</u>

(3)	(4)	(5)
90 0 L.N.	73 7 L.N.	45 0 L.S.
8 0 L.	6 0 L.	8 0 R.
<u>98 0 L.N.</u>	<u>79 7 L.N.</u>	<u>37 0 L.S.</u>
27 0 R.	27 0 R.	27 0 L.
<u>71 0 L.N.</u>	<u>52 7 L.N.</u>	<u>64 0 L.S.</u>
17 30 L.	17 30 L.	17 30 L.
<u>88 30 L.N.</u>	<u>69 37 L.N.</u>	<u>81 30 L.S.</u>
<u>N. 88 W. 44.</u>	<u>N. 70 W. 45.</u>	<u>S. 81 E. 46.</u>

(6)	(C)
14 4 R.S.	0 0 R.S.
8 0 R.	17 30 L.
<u>22 4 R.S.</u>	<u>17 30 L.S.</u>
5 0 L.	<u>S. 17 E. 33.</u>
<u>17 4 R.S.</u>	
17 30 L.	
<u>0 26 L.S.</u>	
<u>South 43.</u>	

No.	T. Co.	Dist.	D. lat.		Dep.	
			N.	S.	E.	W.
D	S. 88 W.	7	—	0.2	—	7.0
1	N. 78 W.	44	9.1	—	—	43.0
2	S. 36 E.	43	—	34.8	25.3	—
3	N. 88 W.	44	1.5	—	—	44.0
4	N. 70 W.	45	15.4	—	—	42.3
5	S. 81 E.	46	—	7.2	45.4	—
6	S.	43	—	43.0	—	—
C	S. 17 E.	33	—	31.6	9.6	—
			26.0	116.8	80.3	136.3
	S. 32 W.	107		26.0		80.3
				90.8		56.0

Lat. from 14°43'0 N. Long. from 17°31'W.
 D. lat. 1 30.8 S. D. long. 58 W.
 Lat. in 13 12.2 N. Long. in 18 29 W.
 Mid. lat. 13 59.6

答

T. Co. Made good S. 32° W., Dist. 107 miles,

Distance 107 miles.

Lat. in 13°12'12" N., Long. in 18°29' W.

4.

Long. 67°30' E. = 4^h30^m = 4^h5 —

N. Alm. Oct. 17th.

Decl. 9°13' 10".9 + h. v. 54".97

	4 7.4 —	4.5 —
R ^d Decl. <u>9 9 3.5 S.</u>		27485
		21988

Semid. <u>16'5"</u>	247.365 —
	<u>4'7.4 —</u>

Orig. alt. \odot $59^{\circ}17'30''$
 $\quad\quad\quad 0\ 24+$ (本題ノ測器差 $0^{\circ}24'$
 $\quad\quad\quad 59\ 17\ 54$ ($0^{\circ}24''$ ノ誤ナリ)
 $\quad\quad\quad 10\ 17+$
 $\quad\quad\quad 5+$
T. alt. \odot $59\ 28\ 16$
 $\quad\quad\quad 90$
T. Z. " $30\ 31\ 44\ S.$
Decl. " $9\ 9\ 3\ S.$
Lat. " $39\ 40\ 47\ S.$

答

Noon Lat. $39^{\circ}40'47''S.$

5.

May $18^d\ 3^h$
 " $9\ 21$
 $S\ 6 = 8^d\ 25$ 新表 6 頁

24 ^h	8.25
15	360
120	49500
24	2475
<u>360</u>	<u>2970.00 E.</u> Dep. made.

Long. from $30^{\circ}\ 0'W.$
 " in $35\ 15\ E.$ $\frac{Dep.}{D. long.} = \cos. lat.$
 $65\ 15\ E.$
 60

D. long. $3915\ E.$

Dep. 2970 ... log. 3.472756
 D. long. 3915 3.592732
 Lat. $40^{\circ}39'26''S.$... cos. 9.880024
 18

答

$-4'' = 6$

Lat. $40^{\circ}39'26''S.$

6.

Lat. from $18^{\circ}56'N.$ **M. P.** 1157.26
 " to $12\ 30\ N.$ " 756.02
 $6\ 26\ S.$ **M. D. lat.** 401.24
 60
T. D. lat. 386 S.

Long from $72^{\circ}54'E.$ $\frac{D. long.}{T. D. lat.} = \tan. Co.$
 " to $54\ 3\ E.$ **M. D. lat.**
 $18\ 51\ W.$
 60
1131 W.
 $\frac{Dep.}{D. long.} = \cos. lat.$
 $\frac{Dist.}{T. D. lat.} = \sec. Co.$

D. long. 1131 W. ... log. 3.053463
M. D. lat. 401.24 S. 2.603443
T. Co. S. $70^{\circ}27'56''W.$... tan. 10.450020
 Dev. $16\ 50\ 0\ E. (L.)$ 049
C. Co. S. $53\ 37\ 56\ W.$ $-4'' = 29$

T. Co. S. $70\ 27\ 56\ W.$... L. sec. 0.475768
T. D. lat. 386 ... Log. 2.586587
 Distance 1154.4 miles 3.062355
 206
 149
 150
 -1

答

T. Co. S. $70^{\circ}27'56''W.$, Dist. 1154.4 miles,

C. Co. S. $53^{\circ}37'56''W.$

7.

S.M.T. Dec.	25 ^d 7 ^h 37 ^m 0 ^s	
Long. 164° 50' E. ...	10 59 20	-
G.M.T. Dec.	24 20 37 40	
	20.6	+
	3.4	-

N. Alm. 25th Dec.

Decl. 23 24 36.0 S. -;	<i>h. v.</i> 1'.241	+
	4.2	-
R ^d Decl. <u>23 24 40.2 S.</u>	4964	
	3723	
	4.2194	-

Lat. 43° 30' 0"	sec. 0.139438	
Dec. 23 24 40	sin. 9.599147	
T. A. ... W. 33 12 47 S.	sin. 9.738585	
C. A. ... W. 28 7 30 S.	79	
C. Error 5 5 17 W.	+ 2" = 6	
Var. ... 15 0 0 W. (E. ヲ反スベシ)		
Dev. ... 20 5 17 W.		

答

T. A. ... W. 33° 12' 47" S., C. Er. 5° 5' 17" W.,

Dev. 20° 5' 17" W.

8.

答

(a) T. Co. S. 22° 30' W., C. Co. S. 40° 4' W.,

Dev. 40° 34' W., Distance 55½ miles.

(b) Lat. 47° 7' 15" S., Long. 80° 33' 20" W.

(c) Lat. 47 37 30 S., Long. 80 57 0 W.

Distance 11½ miles.

9.

S.M.T. Aug.	12 ^d 23 ^h 13 ^m 48 ^s	
L. T.	3 13 4+	
G.M.T. Aug.	13 2 26 52 = 2.4+	

Decl.	Eq. T.
45.65	0.434
2.4+	2.4+
18260	1736
9130	868
109.560+	1.0416+
1'49'.6+	4 44.85-
	1.04+
14 43 1.3 N. -	4 43.81 - M.T.
1 49.6 +	
R ^d 14 41 11.7 N.	

S.M.T. Aug.	12 ^d 23 ^h 13 ^m 48 ^s	
	4 44-	

S.A.T. „	12 23 9 4	
	24	

Ely. *h.* ... 0 50 56

<i>h</i> 0 ^h 51 ^m & <i>l</i> 31° 30'	... + A 2.709
„ <i>d</i> 14 41	... + B 1.188
	+ C 3.897

T. Az. ...	N. 16° 46' E.
C. Az. ...	N. 5 0 W.
C. Er. ...	21 46 E.
V. ...	0 0
Dev. ...	21 46 E.

T. Az....N. 16°46' E., C. Error 21°46' E., Dev. 2146 E.

10.

Approximate S.M.T. July 28^d 20^h 42^m 0^s

L. T. 3 10 12+

" G.M.T. July 28 23 52 12

C. T. July 28^d 23^h 31 38.0

Original Error... 20 42.0+

23 52 20.0=.99

52.2+

Correct G.M.T. ... July 28^d 23 53 12.2

23.9+ = 0.1-

31
3
May 28
June 30
July 29

87 days.

.6

Accum. Rate 52.2 Losing.

N. Alm. July 29th

Table with columns: Decl., Semid., Eq. T. + A.T.
Rows: h. v. 35''40, .1-, 3.540-, 18°47'33''0-, 3.5-, R^d 18 47 36.5N., p 108 47 36

N. E. b. N. 52 miles, Orig. alt. 20 18 40
D. lat. 43.2 N., 8 13+
Dep. 28.9 E. 13-
D. long. 33'23'' E. T. alt. 20 26 40
Lat at Noon 29 44 0 S. 90
D. lat. 43 12 S. T. Z. 69 33 20
Lat. at Obs. 30 27 12 S.

l 30 27 12 S. l 30 27 12 S.
d 18 47 36 N. a 20 26 40
z 69 33 20 p 108 47 36
49 14 48 10 0 32
118 48 8 118 48 8
20 18 32 98 47 4
59 24 4 59 24 4
10 9 16 49 23 32
0.064471 0.064471
0.023793 0.028255
9.934878 9.934878
9.246258 9.880347
9.269400 9.907951
424
+.3=24

S.A.T. 28^d 20^h 35^m 38^s.3 T. Az. S. 128°10' 15'' E.
Eq. T. 6 16.8+ C. ,, S. 106 52 30 E.
S.M.T. 28 20 41 55.1 C. Error 21 17 45 W.
G.M.T. 28 23 53 12.2 Var. 0 30 0 E.
L. T. 3 11 17.1 Dev. 20 47 45 W.

Sight long. 47°49' 16'' W.
D. long. 33 23 E.
Noon long. 47 15 53 W.

答

Sight long. 47°49'16''W., Noon long. 47°15'53''W.,
Truc Az. S. 128°10'15''E., Error 21°17'45''W.,
Deviation 20°47'45''W.

11.

11 ^d 0 ^h 31 ^m 4	10 ^d 12 ^h 6 ^m 9	9 ^d 23 ^h 42 ^m 6
17.0+	17.0+	11 24 31.4
11 0 48.4	10 12 23.9	Daily var. 48.8
15.0-	9.0-	
11 0 33.4	10 12 14.9	Eq. T. 13 ^m + M.T.
7 15.0+	7 15.0+	
11 7 48.4	10 19 29.9	Noon Semid
20.6+	20.6+	Longs. 129° 51'
8 9.0	19 50.5	16' 11" 135 0
		5 9
11 th 8 ^h 9 ^m 0 P.M.	11 th 7 ^h 50 ^m 5 A.M.	Mid Semid 4
		16' 6" 20 ^m 36 ^s +

答

11th 8^h 9^m 0 P.M., & 11th 7^h 50^m 5 A.M.

第四試驗問題. 643. 頁

1.

答

.734973

2.

答

.048694

3.

(D)	(1)	(2)
2 49 L.S.	53 26 L.N.	70 19 L.N.
0 0	23 0 L.	24 0 L.
2 49 L.S.	76 26 L.N.	94 19 L.N.
23 0 R.	23 0 R.	26 0 R.
20 11 R.S.	53 26 L.N.	68 19 L.N.
25 0 R.	25 0 R.	25 0 R.
45 11 R.S.	28 26 L.N.	43 19 L.N.
S. 45 W. 12.	N. 28 W. 41.	N. 43 W. 43.

(3)	(4)	(5)
53 26 R.S.	61 52 L.N.	90 0 L.N.
24 0 R.	22 0 L.	21 0 L.
77 26 R.S.	83 52 L.N.	111 0 L.N.
27 0 R.	23 0 R.	29 0 R.
104 26 R.S.	60 52 L.N.	82 0 L.N.
25 0 R.	25 0 R.	25 0 R.
129 26 R.S.	35 52 L.N.	57 0 L.N.
50 34 L.N.	N. 36 W. 31.	N. 57 W. 43.
N. 50 W. 67.		

(6)

(C)

36 34 L.N.	N. 62° E. 22.
20 0 L.	
56 34 L.N.	
20 0 R.	
36 34 L.N.	
25 0 R.	
11 34 L.N.	
N. 11 W. 35.	

Nos.	T. Co.	Dist.	D. lat.		Dep.	
			N.	S.	E.	W.
D	S. 45 W.	12	—	8.5	—	8.5
1	N. 28 W.	41	36.2	—	—	19.2
2	N. 43 W.	43	31.4	—	—	29.3
3	N. 50 W.	67	43.1	—	—	51.3
4	N. 36 W.	31	25.1	—	—	18.2
5	N. 57 W.	43	23.4	—	—	36.1
6	N. 11 W.	35	34.4	—	—	6.7
C	N. 62 E.	22	10.3	—	19.4	—
			203.9	8.5	19.4	169.3
	N. 37 W.	246	8.5			19.4
			195.4			149.9

Lat. from 52 2 30N. Long. from 121 5 45 W.
 D. lat. 3 15 24N. D. long. 4 13 13 W.
 Lat. in 55 17 54N. Long. in 125 18 58 W.

2) 107 20 24
 Mean mid. lat. 53 40 12
 Cor. 2 0+
 True mid. lat. 53 42 12

$\frac{\text{Dep.}}{\text{D. long.}} = \cos. \text{ T. M. lat. } \therefore \text{ D. long.} = \text{Dep. sec. T. M. lat.}$

$\frac{\text{Dep.}}{\text{T. D. lat.}} = \tan. \text{ Co. } \frac{\text{Dist.}}{\text{T. D. lat.}} = \sec. \text{ Co.}$

0.227703	2.175802	2.290925
<u>2.175802</u>	<u>2.290925</u>	<u>0.100495</u>
2.403505	9.884877	2.391420
<u>464</u>	<u>50</u>	
41	27	Dist. <u>246.3</u>

D. long. 253.22 N. 37°29'36" W.

答

T. Co. N. 37° W., Dist. 246 miles, Lat. 55°17'54" N.,
 Longitude 125°18'58" W.

4.

L. T. 0^h11^m0^s = 0^h2-

N. Alm. 24th May.

Decl.
 27.90
.2-
5.580-

20 45 18.1 N. +
 5.6 -

R^d 20 45 12.5

Orig. alt. \odot 47 15 20
 3 45-
 47 11 35
 10 30+
 11-
 T. alt. \odot 47 21 54
 90
 T. Z. 42 38 6 S.
 Decl. 20 45 12 N.
 Lat. 21 52 54 S.

答

Noon Lat. 21°52'54" S.

5.

$\frac{\text{Dep.}}{\text{D. long.}} = \cos. \text{ lat.}$

700 log. 2.845098
 1200 „ 3.079181
 cos. 9.765917
 896
54°18'53" - 7" = 21

答

54°18'53"

6.

Lat. from 23 8 0 N.
 „ to 55 59 0 S.
 79 7 0 S.
 60
 T. D. lat. 4747 S.

M. parts 1427.32
 „ 4072.12
 M. D. lat. 5499.44 S.

Long. from 113 14 0 E.
 Long. to 67 12 0 W.
 180 26 0 W.
 360
 179 34 0 E.
 60
10774 E.

$$\frac{D. \text{ long.}}{M.D. \text{ lat.}} = \tan. Co.$$

D. long. 10774 E.	log. 4.032378
M.D. lat. 5499.44 S.	„ 3.740319
T. Co. S. 62 57 31 E.L.	tan. 10.292059
C. Er. 9 40 0 W.R.	4
C. Co. S. 53 17 31 E.	+ 1'' = 5

$$\frac{Dist.}{T.D. \text{ long.}} = \sec. Co.$$

T.D. lat. 4747 S.	log. 3.676419
T. Co. 62 57 31	sec. 0.342338
Distance 10441.4	log. 4.018757
	00
	57
	42
	150
	125
	250
	250

答

T. Co. S. 62°57'31" E., Distance 10,441.4 miles,

C. Co. S. 53°17'31" E.

7.

Approximate S.M.T. Nov. 27 ^d 18 ^h 45 ^m 0 ^s
L. T. 8 24 48 +
G.M.T. Nov. 28 3 9 48

Chronometer time Nov. 28 ^d 3 12 20
Orig. Er. 10 28 +
Correct G.M.T. Nov. 28 3 22 48
3.4 +

N. Alm. 28th. Nov.

Decl.

26.5 1

3.4

10604

7953

90.134 +

1 30.1 +

21 18 17.8 S. +

R^d 21 19 47.9 S.

d 21 19 48 S. sin. 9.560790

l 33 20 0 N. sec. 0.078060

T.A. E. 25 48 30 S. sin. 9.638850

C.A. E. 19 41 15 S.

C. Er. 6 7 15 E.

Var. 14 20 0 W.

Dev. 8 12 45 W.

答

True Amplitude E. 25°48'30" S., Error 6°7'15" E.,

Deviation 8°12'45" W.

8.

答

(a) True Co. N. 56° E., Comp. Co. N. 16°30' E.,

Dev. 36°30' E., Distance 82½ miles.

(b) Lat. 47°20' N., Long. 150°18' E.

(c) Lat. 47°23' N., Long. 150°45' E.,

Distance 20 miles.

9.

S.M.T. Sept. 1^d 3^h 19^m 42^s
 L. T. 11 18 40-
 G.M.T. Aug. 31^d 16 1 2=8^h 0-
 S.M.T. Sept. 1 3 19 42
 Eq. T. 0 2+
 S.A.T. „ 1^d 3 19 44

N. Alm. 1st. Sept.

Decl.
 54.38
 8-
435.04-
 8 19 50.7- **N.**
 7 15.0-
8 27 5.7N.

l 41°34' S. & 1/2 3^h 20^m ... +A.742
d 8 30 N. „ ... +B.195
 T. Az. **N. 55 0W.** ... +C.937
 C. Az. **N. 50 37W.**
 C. Er. 4 23W.
 Var. 14 30W.
 Dev. 18 53W.

答

T. Az. **N. 55°0'W.**, C. Error 4°23'W., Dev. 18°53'W.

10.

Appr. S.M.T. June 13^d 20 50 0
 5 14 40+
 Appr. G.M.T. „ 14 2 4 40

Chronometer. T. June 14^d 2 13 38
 5 18-
 2 8 20.0=.1
 3 38.9-
 Correct G.M.T. June 14^d 2 4 41.1
 2.1+
 94) 486
 5.2 Gaining

S.E.b.E. 38.

D. lat. 21.1 S. & Dep. 31.6 E.

Noon Lat. 21 14 0 S. 10.71
 D. lat. 21 6 N. 3
 Sight Lat. 20 52 54 S. 32.13
 2) 42 6 54 1.07
 M. M. lat. 21 3 27 0.64
 D. long. 33.84E.

N. Alm. 14th. June.

Decl.	Semi.	Eq. T.
7.54	<u>15'46"</u>	.528
2.1+		<u>2.1+</u>
754		528
1508		1056
15.834+		1.1088+
23 16 9.5 +		0 1.69 -
<u>R^d 23 16 25.3N.</u>		<u>R^d 0 0.59-A.T.</u>

Obs. alt. ⊙ 25 54 50
 8 43+
 14-
 T. alt. ⊙ 26 3 19
 90
 T. Z. 63 56 41

l 20 52 54 S.	l 20 52 54 S.
d 23 16 25 N.	a 26 3 19
s 63 56 41	p 113 16 25
44 9 19	5 10 25
108 6 0	118 26 50
19 47 22	108 6 0
54 3 0	59 13 25
9 53 41	54 3 0
0.029505	0.029505
0.036860	0.046544
9.908233	9.934080
9.235121	9.908233
9.209719	9.918362
05	2
<u>- .2 = 14</u>	<u>0 = 0</u>

S.A.T. 13 ^d 20 ^h 50 ^m 4 ^s	T. Az. S. 131 5 30 E.
Eq.T. 0.6-	C. Az. S. 135 0 0 E.
S.M.T. 13 20 50 4.2	C. Er. 3 54 30 E.
G.M.T. 14 2 4 41.1	Var. 13 0 0 W.
5 14 36.9	Dev. 9 5 30 W.

Sight long. 78°39' 14" W.
D. long. 33 49 E.
Noon long. 78 5 25 W.

答

Sight Long. 78°40'16" W., Noon Long. 78°6'27" W.,

T. Az. S. 131°5'30" E., Dev. 9°5'30" W.

11.

28 ^d 13 ^h 40 ^m 8	29 ^d 2 ^h 4 ^m 4	29 ^d 14 ^h 29 ^m 1
18.0-	18.0-	28 13 40.8
28 13 22.8	29 1 46.4	Daily Var. 48.3
28.0-	33.0-	Eq. T. 9 ^m + M.T.
28 12 54.8	29 1 13.4	28th Noon Semid.
6 38.0+	6 38.0+	15'20"
28 19 32.8	29 7 51.4	28th Mid. Semid.
29 th 7 ^h 32 ^m 8 A.M.	29 th 7 ^h 51 ^m 4 P.M.	15'24"

答

29th 7^h 32.8 A.M. & 29th 7^h 51^m 4 P.M.

第五試驗問題. 646 頁.

1.

答

.006702323.

2.

答

.03048958.

3.

(D)

53 26 R.S.
51 30 L.
S. 1 56 W. 7.

(1)

47 49 R.S.
65 30 L.
S. 17 41 E. 38.

(2)

81 34 L.N.
70 0 L.
151 34 L.N.
S. 28 26 W. 38.

(3)

0 0 R.N.
0 30 R.
N. 0 30 E. 42.

(4)

25 19 R.S.
58 0 L.
S. 32 41 E. 40.

(5)

42 11 L.N.
27 30 L.
N. 69 41 W. 39.

(6)

2 49 R.S.
47 30 L.
S. 44 41 E. 42.

Nos.	T. Co.	Dist.	D. lat.		Dep.	
			N.	S.	E.	W.
D	S. 2 W.	7	—	7.0	—	0.2
1	S. 18 E.	38	—	36.1	11.7	—
2	S. 28 W.	38	—	33.6	—	17.8
3	N.	42	42.0	—	—	—
4	S. 33 E.	40	—	33.5	21.8	—
5	N. 70 W.	39	13.3	—	—	36.6
6	S. 45 E.	42	—	29.7	29.7	—
			55.3	139.9	63.2	54.6
	S. 6 E.	85		55.3	54.6	
				84.6	8.6	

Lat. from 51 25 0N. Long. from 9 29 0W.
 D. lat. 1 24 36 S. D. long. 14 0 E.
 Lat. in 50 0 24N. Long. in 9 15 0W.

答

Lat. 50°0'24"N., Long. 9°15'0"W., Co. S. 6° E.,

Distance 85 miles.

4.

L. T. 1^h5^m20^s = 1^h1+

N. Alm. 28th. Jan.

Decl.	
33.7 0	Semi.
1.1 +	
3870	16'16"
3870	
42.570 +	
18 28 25.1 S. -	
R ^d 18 27 42.5 S.	

Orig. alt. ⊙ 77 22 40
 I. Error 2 15 -
 Obs. alt. ⊙ 77 20 25
 10 31 +
 16 +
 T. alt. ⊙ 77 31 12
 90
 T. Z. 12 28 48 N.
 Decl. 18 27 42 S.
 Noon lat. 5 58 54 S.

答

Noon Lat. 5°58'54" S.

5.

Jan. 15 ^d 16 ^h	Long. 56° E.
" 12 8	" 30 E.
3 8 = 3 ^d 3333	26 E.
	60
	<u>1560 E.</u>

Dep. = cos. lat. 40°
 D. long.

D. long. 1560 E.	log. 3.193125
Lat. 40°0' S.	cos. 9.884254
Dep. 1195.0303	log. 3.077379
	68
3.3333) 1195.0303 (358.51	11
999 99	00
195040	110
166665	109
283753	10
266664	00
170890	100
166665	73
42250	270
33333	254
8917	16

24) 358.51 (14.94 miles per hour.

24
118
 96
225
 216
91
 96

答

14.94 miles per hour.

6.

46 30 N.	3158.93	58 11 W.
47 20 N.	3232.13	8 53 W.
<u>50 N.</u>	<u>73.20</u>	49 18 E.
		60
		<u>2958 E.</u>

$\frac{D. \text{ long.}}{M. D. \text{ lat.}} = \tan. Co.$

D. long. 2958 E.	log. 3.470998
M. D. lat. 73.2 N.	,, 1.864511
T. Co. N. 88°34' 56" E.	tan. 11.606487
C. Er. 9 0 0 E.	766
<u>N. 97 34 56 E.</u>	<u>-3" = 279</u>
180	
C. Co. <u>S. 82 25 4 E.</u>	

本問題ニ於テ此地方ノ偏差 21° E. ハ誤ナ
 リ。此地方ノ偏差 30° W. ニシテ自差 21° E.
 ト改ムベシ。

$\frac{Dist.}{D. \text{ lat.}} = \sec. Co.$

D. lat. 50	log. 1.698970
T. Co. N. 88 34 56 E.	sec. 1.606557
Distance <u>2020.8</u>	log. 3.305527
	<u>351</u>
	176
	<u>172</u>
	4

答

T. Co. N. 88°34'56" E., C. Co. S. 82°25'4" E.,

Distance 2020.8 miles.

7.

C. T. Aug. 12^d 6^h 38^m 9^s
 18 29-
 G.M.T. Aug. 12 6 19 40 = 6.3+

N. Alm. Aug. 12th

Decl.

45.0 6
 6.3+
13518
 27036
283.878+
 4 43.9+
 15 1 10.0-
 R^d 14 56 26.1 N.

d 14 56 26 N.	sin. 9.411311
l 40 25 0 N.	sec. 0.118416
T. A. E. 19 47 37 N.	sin. 9.529727
C. A. E. 11 15 0 N.	688
C. Er. 8 32 37 W.	<u>+7" = 39</u>
Var. 5 0 0 W.	
Dev. <u>13 32 37 W.</u>	

8.

答

- (a) T. Co. N., C. Co. N. 14° 45' W., Dist. 63½ miles.
- (b) Lat. 47° 29' 0" S., Long. 40° 18' 0" W.
- (c) Lat. 47° 24' 0" S., Long. 40° 41' 0" W., Dist. 26 miles.

9.

S.M.T. Nov. 5^d 20^h 42^m 0^s
 L. T. 5 21 36-
 G.M.T. Nov. 5 15 20 24 = 15.3+ = 8.7-

N. Alm. Nov. 6th.

Decl.	Eq. T.
45.08	.109
8.7-	8.7-
<u>31556</u>	763
36064	872
<u>392,196-</u>	0.9483-
6 32.2-	16 18.12 -
15 57 55.4+	R ^d 16 19.07+ M.T.
R ^d <u>15 51 23.2S.</u>	

S.M.T. Nov. 5^d 20^h 42^m 0^s
 Eq. T. 16 19.1+

S.A.T. Nov. 5 20 58 19.1
 24
 h...3 1 40.9

h 3^h 2^m & l 35° 9' S. ... A + .693
 l 15 51 S. ... B - .398

T.A. N. 76° 0' E. C + .295

C.A. N. 90 0 E.

C. Er. 14 0 W.

Var. 18 0 E.

Dev. 4 0 E.

10.

		31 9
C. T. June 30 ^d 19 ^h 26 ^m 23 ^s 0		May 22
Orig. Error	5 4.0+	June 30.8
	<u>19 31 27.0 = .8</u>	52.8
	2 24.7-	2.74
G.M.T. June 30 ^d 19 29 2.3		<u>2112</u>
	19.5+ = 4.5-	3696
		1056
		<u>144,672</u>

N. Alm. July 1st.

Decl.	Sem.	Eq. T. - M.T.
9.94	15' 45"	0.481
4.5-		4.5-
<u>4970</u>		2405
3976		1924
<u>44,730-</u>		2,1645-
23 7 49.2 -		3 33.58 +
R ^d 23 8 33.9 N.		R ^d 3 31.42
p <u>66 51 26</u>		

Orig. alt. ⊙ 24 20 50

3 30-

Obs. alt. ⊙ 24 17 20

9 11+

15-

T. alt. ⊙ 24 26 16

90

T. Z. ... 65 33 44

l 0 0 0 **N.** l 0 0 0

l 23 8 34 **N.** a 24 26 16

z 65 33 44 p 66 51 26

23 8 34 24 26 16

88 42 18 91 17 42

42 25 10 42 25 10

44 21 9 45 38 51

21 12 35 21 12 35

0.036435	0.040763
9.844521	9.854338
9.558448	9.558448
9.439404	9.453549
9	54
<u>-1=5</u>	<u>-2'=5</u>

S.A.T. 1 ^d 4 13 2.9	T. Az. N. 64 25 28W.
3 31.4+	C. Az. N. 64 0 0W.
S.M.T. 1 ^d 4 16 34.3	C. Er. 0 25 28W.
G.M.T. 30 ^d 19 29 2.3	Var. 1 30 0W.
8 47 32.0	Dev. 1 55 28W.
Sight Long. <u>131°53'0" E.</u>	

答

Sight Long. 131°53'0"E., T. Az. N. 64°25'28"W.,
Error 0°25'28"W., Deviation 1°55'28"W.

11.

9 ^d 19 ^h 41 ^m 3	9 ^d 7 ^h 19 ^m 9	9 ^d 19 ^h 41.3
15.0-	15.0-	10 20 26.2
9 19 26.3	9 7 4.9	Daily Var. <u>44.9</u>
15.0-	30.0-	Semid.
9 19 11.3	9 6 34.9	9 ^h Mid. 15'24"
10 15.0+	10 15.0+	9 ^h Noon 15 17
9 ^d 29 26.3	9 ^d 16 49.9	Eq. T. + M.T.
10 ^d 5 26.3	5.7-	1 ^m
5.7-	9 ^d 16 44.2	120 0
<u>10th 5 20.6 P.M.</u>	<u>10th 4 44.2 A.M.</u>	121 25
		<u>1 25 = 5^m40^s</u>

答

西部標準時 10th 5^h 20^m 6 P.M., 10th 4^h 44^m 2 A.M.

第六試驗問題. 649 頁.

1.

答

.000000365194.

2.

答

.0501448.

3.

(D)	(1)	(2)
90 0 R.N.	36 34 L.S.	78 45 L.S.
0 0	17 0 L.	16 0 L.
90 0 R.N.	53 34 L.S.	94 45 L.S.
21 0 L.	21 0 L.	36 0 L.
69 0 R.N.	74 34 L.S.	130 45 L.S.
14 0 R.	14 0 R.	14 0 R.
83 0 R.N.	60 34 L.S.	116 45 L.S.
<u>N. 83 E. 10.</u>	<u>S. 60 E. 33.</u>	<u>63 15 R.N.</u>
		<u>N. 63 E. 36.</u>
(3)	(4)	(5)
81 34 R.N.	64 41 R.N.	28 7 L.S.
16 0 R.	17 0 L.	16 0 L.
97 34 R.N.	47 41 R.N.	44 7 L.S.
38 0 L.	35 0 L.	15 0 L.
59 34 R.N.	12 41 R.N.	59 7 L.S.
14 0 R.	14 0 R.	14 0 R.
73 34 R.N.	26 41 R.N.	45 7 L.S.
<u>N. 73 E. 41.</u>	<u>N. 27 E. 36.</u>	<u>S. 45 E. 34.</u>

(6)	(C)
73 7 L.S.	<u>W. 72.</u>
16 0 R.	
57 7 L.S.	
35 0 L.	
92 7 L.S.	
14 0 R.	
78 7 L.S.	
<u>S. 78 E. 39.</u>	

Nos.	T. Co.	Dist.	D. lat.		Dep.	
			N.	S.	E.	W.
D	N. 83 E.	10	1.2	—	9.9	—
1	S. 60 E.	33	—	16.5	28.6	—
2	N. 63 E.	36	16.3	—	32.1	—
3	N. 73 E.	41	12.0	—	39.2	—
4	N. 27 E.	36	32.1	—	16.3	—
5	S. 45 E.	34	—	24.0	24.0	—
6	S. 78 E.	39	—	8.1	38.1	—
C	W.	72	—	—	—	72.0
	N. 84 E.	117	61.6	48.6	188.2	72.0
			48.6		72.0	
			<u>13.0</u>		<u>116.2</u>	

Lat. from 37 45 0 **S.** Long. from 178 42 0 **E.**
 D. lat. 13 0 **N.** D. long. 2 28 0 **E.**
 Lat. in 37 32 0 **S.** Long. in 181 10 0 **E.**
 37 45 0 **S.** Long. in 178 50 0 **W.**
 2) 75 17 0
 M. Mid. lat. 37 38 30

答

Lat. 37°32'0" **S.**, Long. 178°50'0" **W.**, T. Co. made
 good **N. 84°E.**, Distance 117 miles.

4.

$$166^{\circ}18' \text{ E.} = 11^{\text{h}}5^{\text{m}}12^{\text{s}} = \underline{11.1-}$$

N. Alm. Aug. 15th

Decl. Sem.

46.80 15'49"

11.1—

4680

4680

4680

519.480—

8'39"5—

14 5 58.5—

R^d 14 14 38.0 N.

Orig. alt. ⊙ 45 37 50

4 10—

Obs. alt. ⊙ 45 33 40

10 52+

11—

T. alt ⊙ 45 44 21

90

T. z. ... 44 15 39 **N.**

Decl. ... 14 14 38 **N.**

Lat. ... 58 30 17 **N.**

Noon Lat. 58°30'17" **N.**

5.

Var. 17 30 **L.**

Dev. 8 30 **R.**

C. Er. 9 0 **L.**

C. Co. 81 0 **L.N.**

T. Co. 90 0 **L.N.**

W.

$$\frac{\text{Dep.}}{\text{D. long.}} = \cos. \text{ lat.}$$

$$\text{Dep.} = \text{D. long.} \cos. \text{ lat.}$$

$$\therefore \text{D. long.} = \text{Dep.} \sec. \text{ lat.}$$

$$\begin{array}{ll} \text{Dep. } 426.5\text{W.} & \log. 2.629919 \\ \text{Lat. } 30^{\circ}50'\text{N.} & \sec. 0.066178 \\ \text{D. long. } 496.7\text{W.} & \log. 2.696097 \end{array}$$

$$\begin{array}{ll} \text{D. long.} & 8\ 16\ 42\ \text{W.} \\ \text{Long. from} & \underline{22\ 36\ 0\ \text{W.}} \\ \text{Long. in} & 30\ 52\ 42\ \text{W.} \end{array}$$

答

$$\text{Long. } 30^{\circ}52'42''\ \text{W.}$$

6.

$$\begin{array}{ll} \text{Lat. from } 44\ 37\ \text{N.} \dots 2997.52 & \text{Long. from } 59^{\circ}23'\ \text{W.} \\ \text{Lat. in } 0\ 0\ \text{N.} \dots 0.00 & \text{,, in } 7\ 40\ \text{W.} \\ \underline{44\ 37\ \text{S.}} & \underline{2997.52\ \text{S.}} & \underline{51\ 43\ \text{E.}} \\ \underline{60} & & \underline{60} \\ \underline{2677\ \text{S.}} & & \underline{3103\ \text{E.}} \end{array}$$

$$\begin{array}{ll} \text{D. long.} = \tan. \text{ Co.} & \text{Var. } 20\ \text{R.} \\ \text{M. D. lat.} & \text{Dev. } 9\ \text{L.} \\ \text{Dist.} = \sec. \text{ Co.} & \text{C. Er. } 11\ \text{R.} \\ \text{D. lat.} & \end{array}$$

$$\begin{array}{ll} \text{D. long. } 3103\ \text{E.} & \log. 3.491782 \\ \text{M. D. lat. } 2997.5\ \text{S.} & \text{,, } 3.476759 \\ \text{T. Co. } \underline{\text{S. } 45\ 59\ 27\ \text{E. L.}} & \tan. 10.015023 \\ \text{C. Er. } 11\ 0\ 0\ \text{R.} & 036 \\ \text{C. Co. } \underline{\underline{\text{S. } 34\ 59\ 27\ \text{E.}}} & -3=13 \end{array}$$

$$\begin{array}{ll} \text{D. lat. } 2677\ \text{S.} & \log. 3.427648 \\ \text{T. Co. } \underline{\text{S. } 45\ 59\ 27\ \text{E.}} & \sec. 0.158156 \\ \text{Dist. } \underline{3853.0\ \text{miles}} & \log. 3.585804 \\ & \underline{799} \\ & 5 \end{array}$$

答

$$\begin{array}{l} \text{T. Co. } \text{S. } 45^{\circ}59'27''\ \text{E., C. Co. } \text{S. } 34^{\circ}59'27''\ \text{E.,} \\ \text{C. Error } 11^{\circ}\ \text{E., Distance } 3853\ \text{miles.} \end{array}$$

7.

$$\begin{array}{l} \text{S.M.T. Sept. } 29^{\text{d}}\ 6^{\text{h}}\ 2^{\text{m}}\ 0^{\text{s}} \\ \text{L. T. } 9\ 25\ 0- \\ \text{G.M.T. Sept. } 28\ 20\ 37\ 0 = 20.6 + = \underline{3.4-} \end{array}$$

此ノ問題ノ如ク單ニ日附ノミヲ與ヘテ眞時或ハ平時ヲ書セザル場合ニ於テハ常ニ平時ナリト知ルベシ。平時ハ省略スルコトアルモ眞時ハ決シテ之ヲ省クコトナシ。

$$\text{N. Alm. Sept. } 29^{\text{th}}$$

$$\begin{array}{ll} & \text{Decl.} \\ & 58.38 \\ & \underline{3.4-} \\ & 23352 \\ & 17514 \\ & \underline{198.492-} \\ & 3\ 18.5- \\ & \underline{2\ 22\ 7.9+} \\ & \text{R}^{\text{d}}\ \underline{2\ 18\ 49.4\ \text{S.}} \\ & d\ 2\ 18\ 49\ \text{S.} \quad \sin. 8.606050 \\ & l\ 10\ 30\ 6 \quad \sec. 0.007334 \\ \text{T.A. } \underline{\text{W. } 2\ 21\ 11\ \text{S.}} & \sin. 8.613384 \\ \text{C.A. } \underline{\text{W. } 15\ 0\ 0\ \text{N.}} & \\ \text{C. Er. } 17\ 21\ 11\ \text{W.} & \\ \text{Var. } 4\ 0\ 0\ \text{W.} & \\ \text{Dev. } \underline{\underline{21\ 21\ 11\ \text{W.}}} & \end{array}$$

答

T.A. W. $2^{\circ}21'11''$ S., C. Error $17^{\circ}21'11''$ W.,
Dev. $21^{\circ}21'11''$ W.

8.

答

- (a) T. Co. S. 76° W., C. Co. N. 86° W., C. Error 18° W.,
Dev. 30° W., Distance $84\frac{3}{4}$ miles.
(b) Lat. $48^{\circ}21'0''$ S., Long. $62^{\circ}12'30''$ W.
(c) Lat. $49^{\circ}0'30''$ S., Long. $63^{\circ}9'0''$ W.,
Distance $16\frac{1}{2}$ miles.

9.

G.M.T. April $18^d 10^h 40^m 12^s = 10.7 +$
Eq. T. $0 43 +$
G.A.T. " $18 10 40 55$
L.T. $11 27 28 +$
S.A.T. " $18 22 8 23$
/ $1 51 37$

N. Alm. 18^{th} April.

Decl.	Eq. T. + M.T.
52.38	.568
10.7 +	10.7 +
36666	3976
5238	568
560.466 +	6.0776 +
9 20.5 +	0 36.84 +
10 47 50.6 +	R ^d 0 42.92
R ^d <u>10 57 11.1</u>	

$\frac{1}{2}$ $1^h 51^m 37^s$ & $144^{\circ}50'$ N. A + 1.881
" " " $d 10 57$ N. B - 0.395
C + 1.486

T. Az. S. 44° E.
C. Az. S. 16 E.
C. Er. 28 W.
Var. 8 W.
Dev. 36 W.

10.

Approx. S.M.T. May $24^d 21^h 10^m 0^s$	Feb. 24^{th} Slow $7^m 28^s$
L.T. $6 1 4 -$	Ap. 8^{th} Slow $6 4$
" G.M.T. " $24 15 8 56$	<u>1 24</u>
	60
	90) 84.0
	Gaining <u>0.93</u>
Chron. T. May $24^d 15^h 4^m 6^s$	Feb. 5
Second Error $6 4 +$	Mar. 31
<u>24 15 10 10 = .6</u>	Ap. 30
Accumulated Rate $43.3 -$	May 24
Correct G.M.T. May $24 15 9 26.7$	<u>90 days.</u>
<u>15.1 + = 8.9 -</u>	30 46.6
	8 .93
	Ap. <u>22</u> 1398
	May 24.6 4194
	<u>46.6</u> <u>43.338</u>

N. Alm. May 25^{th}

Decl.	Sem.	Eq. T. - A.T.
27.00	<u>15'49''</u>	.239
8.9 -		8.9 -
243		2151
216		1912
<u>240.3 -</u>		2,1271 -
4 0.3 -		3 16.59 -
20 56 18.5 +		R ^d <u>3 18.72 - A.T.</u>
R ^d <u>20 52 18.2 N.</u>		
ϕ <u>110 52 18</u>		

S. 20°W., 37=D. lat. 34.8 S., and Dep. 12.7 W.

Dep. 12.7 W.=D. Long. 12.85 W.=12°51'W.

Noon lat. 9 48 30 S.	Orig. alt. ⊙ 39 6 0
D. lat. ... 34 48 N.	2 6-
Sight lat. <u>9 13 42 S.</u>	Obs. alt. ⊙ 39 3 54
	9 26+
Mean mid. lat. <u>9½°</u>	11-

T. alt. ⊙	39 13 9
T. z. ...	<u>50 46 51</u>

l 9 13 42 S.	l 9 13 42 S.
a 20 52 18 N.	a 39 13 9
z 50 46 51	p 110 52 18
30 6 0	29 59 27
80 52 51	140 51 45
20 40 51	80 52 51
40 26 25	70 25 52
10 20 25	40 26 25

0.005658	0.005658
0.029476	0.110848
9.812014	9.974161
9.254050	9.812014
9.101198	9.902681
34	2
-S=64	-I=1

S.A.T. May 24 ^d 21 13 30.2	T. Az. S. 126 45 45 E.
Eq. T. 3 18.7-	C. Az. S. 123 45 0 E.
S.M.T. ,, 24 21 10 11.5	C. Er. 3 0 45 W.
G.M.T. ,, 24 15 8 56.0	Var. 0 0 0
L. T. 6 1 15.5	Dev. <u>3 0 45 W.</u>
Sight Long. 90 18 52 E.	
D. long. 12 51 W.	
Noon Long. <u>90 6 1 E.</u>	

答

Sight Long. 90°18'52"E., Noon Long. 90°6'1"E.,

T. Az. S. 126°45'45"E., Dev. 3°0'45"W.

11.

16 ^d 23 ^h 59 ^m 5	16 ^d 11 ^h 36 ^m 4	17 ^d 12 ^h 23 ^m 4
17.0-	17.0-	16 11 36.4
16 23 42.5	16 11 19.4	Daily Var. 47.0
6.0+	10.0+	Eq. T. + M.T.
16 23 48.5	16 11 29.4	0 ^m 23 ^s 01
9 22.0+	9 22.0+	Semid.
16 33 10.5	16 20 51.4	16 th Mid. 15'40"
17 9 10.5	16.2+	16 th Noon 15 34
16.2+	16 21 7.6	135° 0'E.
17 th 9 26.7 P.M.	17 th 9 7.6 A.M.	130 57 E.
		4 3 = <u>16^m 12^s</u>

答

中央標準時 17th 9^h 26^m 7 P.M., 17th 9^h 7^m 6 A.M.

第七試驗問題. 652 頁.

1.

答

3766321.7.

2.

答

51.28.

3.

(D)	(1)	(2)
75 56 <u>L.S.</u>	90 0 <u>R.N.</u>	70 19 <u>L.S.</u>
36 30 <u>L.</u>	11 0 <u>R.</u>	11 0 <u>R.</u>
112 26 <u>L.S.</u>	101 0 <u>R.N.</u>	59 19 <u>L.S.</u>
180	36 30 <u>L.</u>	35 30 <u>L.</u>
67 34 <u>R.N.</u>	64 30 <u>R.N.</u>	94 49 <u>L.S.</u>
<u>N. 67 E. 5.</u>	<u>N. 64 E. 30.</u>	85 11 <u>R.N.</u>
		<u>N. 85 E. 27.</u>
(3)	(4)	(5)
47 49 <u>L.S.</u>	42 11 <u>R.N.</u>	53 26 <u>R.N.</u>
13 0 <u>R.</u>	14 0 <u>L.</u>	14 <u>L.</u>
34 49 <u>L.S.</u>	28 11 <u>R.N.</u>	39 26 <u>R.N.</u>
32 30 <u>L.</u>	31 0 <u>L.</u>	33 30 <u>L.</u>
67 19 <u>L.S.</u>	2 49 <u>L.N.</u>	5 56 <u>R.N.</u>
<u>S. 67 E. 29.</u>	<u>N. 3 W. 34.</u>	<u>N. 6 E. 31.</u>
	(6)	
	0 0 <u>R.S.</u>	
	13 0 <u>R.</u>	
	13 0 <u>R.S.</u>	
	3 0 <u>L.</u>	
	10 0 <u>R.S.</u>	
	<u>S. 10 W. 34.</u>	

Nos.	T. Co.	Dist.	D. lat.		Dep.	
			N.	S.	E.	W.
D	N. 67 E.	5	2.0	—	4.6	—
1	N. 64 E.	30	13.2	—	27.0	—
2	N. 85 E.	27	2.4	—	26.9	—
3	S. 67 E.	29	—	11.3	26.7	—
4	N. 3 W.	34	34.0	—	—	1.8
5	N. 6 E.	31	30.8	—	3.2	—
6	S. 10 W.	34	—	33.5	—	5.9
	N. 65 E.	89	82.4	44.8	88.4	7.7
			44.8		7.7	
			<u>37.6</u>		<u>80.7</u>	

Lat. from 12 56 0 S. Long. from 40 28 0 E.
 D. lat. 37 36 N. D. long. 1 23 0 E.
 Lat. in 12 18 24 S. Long. in 41 51 0 E.
 12 56 0 S.
2) 25 14 24

Mean Mid. lat. 12 37 12
 Lat. by Obs. 11 47 0 S. Long. by Obs. 42 7 30 E.
 „ „ D. R. 12 18 24 S. „ „ D. R. 41 51 0 E.
31 24 16 30
31.4 16.5

Mer. parts 712.04
 „ 744.14
M. D. lat. 32.10

$\frac{D. \text{ long.}}{M.D. \text{ lat.}} = \tan. \text{ Co.}$ $\frac{Dist.}{T.D. \text{ lat.}} = \sec. \text{ Co.}$

D. long. 16.5 log. 1.217484 T.D. lat. 31.4 log. 1.494711
 M.D. lat. 32.1 „ 1.506505 T.Co. 27°12'15" sec. 0.050911
 T. Co. N. 27°12'15" E. tan. 9.710979 Dist. 35.13 log. 1.545622
82
0=3

答

Noon Position by **D. R.** in Lat. $12^{\circ}18'24''S.$, Long. $41^{\circ}51'0''E.$,**T. Co.** made good **N. $65^{\circ}E.$** , Distance 89 miles,Current set **N. $27^{\circ}E.$** , 35 miles.

4.

 $74^{\circ}22'W. = L. T. 4^h 57^m 28S. = 4.9 +$ N. Alm. 30^{th} Oct. $h. v. 49.28$ $\frac{4.9 +}{44352} \text{ Scm. } 16'8''$ $\frac{19712}{241.472 +}$ Correction $4' 1.5 +$ Decl. $13 45 24.6 +$ R^d Decl. $13 49 26.1S.$ Orig. alt. $\odot 36 37 10$ I. Error $0 50 -$ Obs. alt. $\odot 36 36 20$ Cor. in alt. $9 42 +$ $8 +$ **T. alt.** $\odot 36 46 10$ **T. z.** $53 13 50N.$ Decl. $13 49 26 S.$ Lat. $39 24 24N.$

答

Noon Lat. $39^{\circ}24'24''N.$

5.

 $\frac{Dep.}{D. long.} = \text{Cos. lat.} \therefore Dep. = D. long. \cos. lat.$ Long. from $150^{\circ}E.$ Long. to $150^{\circ}W.$ $300^{\circ}W.$ 360 $60^{\circ}E.$ 60 $3600^{\circ}E.$ Lat. $29^{\circ}45'N.$ Log. cos. 9.938619D. long. $3600^{\circ}E.$ Log. 3.556302Distance 3125.5 3.494921 850 71 69 2

答

Distance 3125.5 miles.

6.

 $5 20N. 320.46N. 78 20W.$ $7 53 S. 474.50 S. 141 40 E.$ $13 13 S. 794.96 S. 220 0 E.$ 60 360 $793S.$ 140 W. 60 $8400 W.$ $\frac{D. long.}{M.D. lat.} = \text{tan. Co.} \quad \frac{Dist.}{T.D. lat.} = \text{sec. Co.}$ D. long. $8400 W.$ log. 3.924279M. D. lat. $794.96 S.$ „ 2.900345T. Co. $S. 84^{\circ}35'37''W.(R.)$ tan. 11.023934C. Er. $4 30 0 W.(R.)$ 767C. Co. $S. 89 537 W.$ $+7'' = 167$

T. D. lat. 793 S.	Log. 2.899273
T. Co. S. 84°35'37" W.	sec. 1.025860
Distance <u>8416.5</u>	Log. 3.925133
	<u>106</u>
	<u>27</u>
	<u>26</u>
	<u>1</u>

答

T. Co. S. 84°35'37" W., Distance 8416.5 miles,

C. Co. S. 89°5'37" W.

7.

S.A.T. April 12 ^d 18 ^h 15 ^m 0 ^s
L. T. 0 0 0
G.A.T. ,, 12 18 15 0 = 18.2 + = <u>5.8-</u>

N. Alm. 13th April.

<i>h. v.</i> 54.42
<u>5.8-</u>
<u>43536</u>
<u>27210</u>
<u>315.636-</u>

Correction	5' 15.6-
Decl.	9 0 58.0+
R ^d Decl.	8 55 42.4 N. sin. 9.190897
Lat.	23 10 0 S. sec. 0.036512
T.A...E.	9 43 9 N. sin. 9.227409
C.A...E.	2 48 45 S.
C. Er.	12 31 54 W.
Var.	27 45 0 E.
Dev.	<u>15 13 6 E.</u>

答

T.A.E. 9°43'9"N., C. Er. 12°31'54"W.,

Dev. 15°13'6"E.

8.

答

(a) T. Co. N. 14°W., C. Co. N. 31°15'W., Dev. 3½°E.,

Distance 76½ miles.

(b) Lat. 48°15'S., Long. 147°58'E.

(c) Lat. 47°53'S., Long. 148°36'30"E., Distance 16½ miles.

9.

S.M.T. Jan. 30 ^d 23 ^h 30 ^m 0 ^s
L. T. 2 50 40+
G.M.T. Jan. 31 <u>2 20 40</u>

C. T. Jan. 31 ^d 2 38 0
<u>2 40-</u>

G.M.T. Jan. 31 2 35 20 = 2.6 +
L. T. 2 50 40-

S.M.T. Jan. 30 23 44 40.0
Eq. T. 13 30.2-

S.A.T. Jan. 30 ^d 23 31 9.8
<i>h</i> 24
<u>0 28 50.2</u>

S.A.T. Jan. 30 ^d 23 31 9.8
<i>h</i> 24
<u>0 28 50.2</u>

S.A.T. Jan. 30 ^d 23 31 9.8
<i>h</i> 24
<u>0 28 50.2</u>

N. Alm. 31st Jan.

Decl.	Eq. T. - M. T.
41.12	0.399
<u>2.6+</u>	<u>2.6+</u>
24672	2394
8224	798
<u>106.912+</u>	<u>1.0374+</u>
1' 46.9+	<u>13^m29.16+</u>
17°40 40.0-	<u>R^d 13 30.20</u>
<u>R^d 17 38 53.1S.</u>	

l $32^{\circ}20'N.$ & z $0^{\circ}29'$... + **A** 4.976
 d $17\ 39\ S.$ & z $0\ 29$... + **B** 2.522
T. Az. S. $8^{\circ}58'E.$ + **C** 7.498
C. Az. S. $11\ 15W.$
C. Er. $20\ 13W.$
Var. $20\ 0\ E.$
Dev. $0\ 13W.$

答

Dev. $0^{\circ}13' W.$

10.

S.M.T. March $20^d 20^h 36^m\ 0^s$	C. T. March $20^d 13^h 32^m 19^s\ 0$
$\quad\quad\quad 6\ 57\ 44-$	$\quad\quad\quad 3\ 45.0+$
G.M.T. „ $20\ 13\ 38\ 16$	$13\ 36\ 4.0 = .6$
	$\quad\quad\quad 2\ 38.1+$
	G.M.T. March $20^d 13\ 38\ 42.1+$
	$13.6+ = 10.4-$

Jan. 1^st $2^m 33^s$ fast.	Jan. 31
Feb. 26^{th} $3\ 45$ slow.	1
$\quad\quad\quad 6\ 18$	„ 30
$\quad\quad\quad 60$	Feb. 26
$56\)\ 378$	$\quad\quad\quad 56$
$\quad\quad\quad 6.75$	Losing daily.

23.6	Feb. 29
6.7	26
1652	„ 3
1416	Mar. 20.6
158.12	23.6
$\underline{2^m 38^s\ 1}$	

T. Co. S.W. $\frac{3}{4}W.$ 54 gives D. lat. $32.2S.$ and
 Dep. $43.4W.$ = D. long. $44.36W.$

Noon lat. $12^{\circ}45' 20'S.$ 10.22
 D. lat. $32\ 12N.$ 4
 Obs. lat. $12\ 13\ 8S.$ 40.88
 $\quad\quad\quad 3.07$
 $\quad\quad\quad .41$
 D. Long. $44.36W.$

N. Alm. 21^{st} March.

Decl.	Eq. T.—M. T.
59.25	.750
10.4—	10.4—
23700	Scm. 3000
5925	$16'4''$ 750
616.200—	7.8000—
10' $16''2-$	7 21.93 —
$0^{\circ}12\ 21.5+N.$	$R^d 7\ 29.73$
$R^d 0\ 2\ 5.3\ N.$	
$R^d 190\ 2\ 5$	

Orig. alt. $\odot 36\ 7\ 0$
 I. E. $2\ 45-$
 Obs. alt. $\odot 36\ 4\ 15$
 $\quad\quad\quad 9\ 8+$
 $\quad\quad\quad 4+$
T. alt. $\odot 36\ 13\ 27$
T. z. ... $53\ 46\ 33$

l $12\ 13\ 8S.$	l $12\ 13\ 8S.$
d $0\ 2\ 5N.$	a $36\ 13\ 27$
s $53\ 46\ 33$	p $90\ 2\ 5$
$\quad\quad\quad 12\ 15\ 13$	$\quad\quad\quad 24\ 0\ 19$
$\quad\quad\quad 66\ 1\ 46$	$\quad\quad\quad 114\ 2\ 24$
$\quad\quad\quad 41\ 31\ 20$	$\quad\quad\quad 66\ 1\ 46$
$\quad\quad\quad 33\ 0\ 53$	$\quad\quad\quad 57\ 1\ 12$
$\quad\quad\quad 20\ 45\ 40$	$\quad\quad\quad 33\ 0\ 53$

	0.009952	0.009952	
	0.000000	0.093282	
	9.736280	9.923690	
	9.549582	9.736280	
	9.295814	9.763204	
	17	1.95	
	<u>+ .1 = 3</u>	<u>+ 5" = 9</u>	
S.A.T. March	20 ^d 20 ^h 28 ^m 51 ^s 1	T. Az. S.	99° 10' 20" E.
Eq. T.	7 29.7 +	C. Az. S.	84 22 30 E.
S.M.T. March	20 ^d 20 36 20.8	C. Er.	14 47 50 W.
G.M.T. March	20 13 38 42.1	Var.	0 0 0
L. T.	6 57 38.7	Dev.	14 47 50 W.
Sight long.	104° 24' 41" E.		
D. Long.	44 22 W.		
Noon Long.	103 40 19 E.		

答

Sight Long. 104° 24' 41" E., Noon Long. 103° 40' 19" E.,
 T. Az. S. 99° 10' 20" E., C. Error 14° 47' 50" W.,
 Dev. 14° 47' 50" W.

11.

20 ^d 7 ^h 54 ^m 9	20 ^d 20 ^h 19 ^m 2	20 ^d 7 ^h 54 ^m 9
19.0 -	19.0 -	21 8 42.8
20 7 35.9	20 20 0.2	Daily var. 47.9
11.0 -	2.0 +	Eq. T. 7^m + M. T.
20 7 24.9	20 20 2.2	Noon 20 th Sem.
5 24.0 +	5 24.0 +	14' 48"
20 ^d 12 48.9	21 ^d 1 26.2	Mid night 20 th Sem.
21 st 0 ^h 48 ^m 9 A.M.	21 st 1 ^h 26 ^m 2 P.M.	14' 47"
18.7 -	18.7 -	Long. 135 0E.
21 st 0 30.2 A.M.	21 st 1 7.5 P.M.	" 139 40E.

答

中央標準時

21st 0^h 30^m 2 A.M. and 21st 1^h 7^m 5 P.M.

第八試驗問題. 655 頁.

1.

3740112.07

2.

297.769

3.

(1)	(2)	(3)
40° 0' L.N.	35 0 L.N.	26° 0' L.N.
37 0 R.	34° 0' R.	30 0 R.
3 0 L.N.	1 0 L.N.	4 0 R.N.
<u>N. 3 W. 59.</u>	<u>N. 1 W. 191.</u>	<u>N. 4 E. 127.</u>

Nos.	T. Co.	Dist.	D. lat.		Dep.	
			N.	S.	E.	W.
1	N. 3 W.	59	58.9	—		3.1
2	N. 1 W.	191	191.0	—		3.3
3	N. 4 E.	127	126.7	—	8.9	
C	N. 39 E.	40	31.1	—	25.2	
			<u>407.7</u>		34.1	6.4
	N. 4 E.	409			6.4	
					<u>27.7</u>	

Lat. from 52° 40' S. Long. from 74° 50' W.
 D. lat. 6 47.7 N. D. long. 42 E.
 Lat. in 45 52.3 S. Long. in 74 8 W.

答

T. Co. N. 4° E., Distance 409 miles,
 Lat. 45° 52' 18" S., Long. 74° 8' 0" W.

4.

$$108^{\circ}22' \text{ E.} = \text{L. T. } 7^{\text{h}} 13^{\text{m}} 28^{\text{s}} = 7.2 -$$

Decl.
17.86
7.2 -

3572

12502

128.592 -

2' 8.6 -

22° 23 13.9 - N.

Rd 22 25 22.5 N.

Sem. 15'45"

Orig. alt. \odot 73 5 50

I. Error 45 +

Obs. alt. \odot 73 6 35

11 21 +

15 -

T. alt. \odot 73 17 41

90

T. z. 16 42 19 S.

Decl. 22 25 22 N.

Noon Lat. 5 43 3 N.

答

Noon Lat. $5^{\circ}43'3''\text{N.}$

5.

$$11\frac{1}{4} \times 50 = \frac{45}{4} \times \frac{50}{1} = \frac{2250}{4} = 562.5$$

Dep. = cos. lat. \therefore D. long. = Dep. sec. lat.

Lat. $45^{\circ}22'\text{N.}$ sec. 0.153312

Dep. 562.5 ... log. 2.750122

D. long. 800.63 log. 2.903434

16

答

D. long. $800.63 = 13^{\circ}20'6''$

18

16

2

6.

32 5 S. ... 2034.28 S. 115 47 E.

25 11 S. ... 1562.14 S. 46 57 E.

6 54 N. 472.14 N. 68 50 W.

60

414 N. 4130 W.

D. long. = tan. Co. Dist. = sec. Co.
M.D. lat. D. lat.

D. Long. 4130 W. log. 3.615950

M. D. Lat. 472.14 N. log. 2.674071

T. Co. N. 83 28 42 W. L. tan. 10.941879

C. Error. 23 30 0 E. R. 939

C. Co. N. 59 58 42 W. -3'' = 60

T. D. Lat. 414 ... log. 2.617000

T. Co. N. $83^{\circ}28'42''\text{W.}$ sec. 0.944703

Dist. 3645.0 miles. log. 3.561703

697

6

答

T. Co. N. $83^{\circ}28'42''\text{W.}$, C. Co. N. $59^{\circ}58'42''\text{W.}$,

Distance 3645 miles.

7.

C. T. June $30^{\text{d}} 0^{\text{h}} 5^{\text{m}} 26^{\text{s}}$

Chro. Error 22 44 -

G.M.T. June $29^{\text{d}} 23 42 42$

23.7 + = 0.3 -

N. Alm. 30th June.

	Decl.	
	8.93	
	.3-	
	<u>2.679-</u>	
	2.7-	
	23 11 35.5-	
	<u>R^d23 11 38.2N.</u>	
Lat.	58 20 0 N.	sin. 9.595325
T.A. ...E.	48 36 32 N.	sec. 0.279860
C.A. ...E.	98 0 0 N.	sin. 9.875185
C. Error	49 23 28 E.	1
Var.	29 30 0W.	<u>+2"=4</u>
Dev.	<u>19 53 28 E.</u>	

答

T.A. E. 48°36'32"N., C. Error 49°23'28"E.,
Deviation 19°53'28"E.

8.

答

- (a) T. Co. East, C. Co. S. 62°E., Dev. 10°E.,
Distance 69 miles.
- (b) Lat. 48°42'30"N., Long. 47°17'30"W.
- (c) Lat. 48°26' 0N., Long. 47°37'0"W.,
Distance 10½ miles.

此問題ニ於テハ偏差 38°W. ナ落セリ.

9.

G.M.T. Dec.	26 ^d 9 ^h 54 ^m 10 ^s = 9.9 +
L. T.	9 13 28-
S.M.T. Dec.	26 ^d 0 40 42.0
Eq. T.	50.5-
S.A.T. Dec.	<u>26^d0 39 51.5</u>

N. Alm. 26th Dec.

Decl.	Eq. T. - M.T.
5.06	1.237
9.9+	9.9+
<u>4554</u>	<u>11133</u>
4554	11133
<u>50.094+</u>	<u>12.2463</u>
50.1+	12.25+
23 22 48.6-	0 38.25+
<u>R^d23 21 58.5S.</u>	<u>R^d0 50.50</u>

Z 46°44' N. & h 0^h40^m ... A + 6.026

d 23 22 S. & „ „ B + 2.525

T. Az...S. 9°42'W. C + 8.551

C. Az...S. 22 30 E.

C. Error 32 12 E.

Var. 24 0 W.

Dev. 8 12 E.

答

T. Az. S. 9°42'W., Dev. 8°12'E.

10.

S.M.T. Nov. 7 ^d 3 ^h 14 ^m 0 ^s	Sept. 3 rd	2 ^m 29 ^s fast.
L. T. 0 0 0	Oct. 12 th	1 45 slow.
G.M.T. Nov. 7 3 14 0	Sept. 27	4 14
C. T. Nov. 7 ^d 3 8 46.0	Oct. 12	60
1 45.0+	39	) 254
7 3 10 31.0=.1	31	6.5 losing.
2 49.6+	12	26.1
G.M.T. Nov. 7 3 13 20.6=3.2+ Oct. 19	7.1	65
	26.1	390
		130
		169.65
		2 ^m 49 ^s 6

N. Alm. 7th Nov.

Decl.	Sem.	Eq. T. - A.T.
44.40	16' 10"	.144
3.2+		3.2+
8880		288
13320		432
142.080+		.4608
2 22.1+		0.46+
16° 15 49.1+		16 15.07-
R ^a 16 18 11.2 S.		R ^a 16 14.61
ρ 106 18 11		

N. E. 40' gives D. lat. 28.3 **N.** & Dep. 28.3 **E.** = D. Long. 28' 3**E.**

Orig. alt. \odot 35 41 40	
	42+
Obs. alt. \odot 35 42 22	
	9 45+
	10+
T. alt. \odot 35 52 17	
	90
T. z. 54 7 43	

l 0 0 0	l 0 0 0
d 16 18 11 S.	a 35 52 17
s 54 7 43	ρ 106 18 11
16 18 11	35 52 17
70 25 54	142 10 28
37 49 32	70 25 54
35 12 57	71 5 14
18 54 46	35 12 57
0.017824	0.091336
9.760918	9.975897
9.510717	9.760918
9.289459	9.828151
23	6
+ .5 = 36	- 2" = 6

S.A.T. Nov. 7 ^d 3 29 29.5	T. Az. ... N. 110 16 7 W.
16 14.6-	C. Az. ... N. 101 15 0 W.
S.M.T. „ 7 3 13 14.9	C. Error 9 1 7 W.
G.M.T. „ 7 3 13 20.6	Var. ... 15 45 0 E.
L. T. 0 0 5.7	Dev. ... 6 43 53 E.

Sight Long. 0° 1' 25" **W.**
 D. Long. 28 18 **W.**
 Noon Long. 0 29 43 **W.**

11.

Aug. 12 ^d 12 ^h 20 ^m 5	13 ^d 0 ^h 48 ^m 5	13 ^d 13 ^h 15 ^m 4
19.5-	19.5-	12 12 20.5
12 12 1.0	13 0 29.0	Daily Var. 54.9
5.0+	2.0-	Eq. T. 5 - M.T.
12 12 6.0	13 0 27.0	Sem.
7 15.0+	7 15.0+	Noon 12th.
12 ^d 19 21.0	13 ^d 7 42.0	16' 44"
20.6+	20.6+	Midnight 12th.
12 ^d 19 41.6	13 ^d 8 2.6	16' 43"
13 th 7 ^h 41 ^m 6 A.M.	13 th 8 ^h 2 ^m 6 P.M.	

$$\begin{array}{r} 129^{\circ}51' \\ 135 \ 0 \\ \hline 5 \ 9 = 20^m36^s + \end{array}$$

答

中央標準時 13^h7^m41^s6 A.M., 13^h8^m2^s6 P.M.

第九試驗問題. 658 頁.

1.

4.938284.

2.

.00053.

3.

(1)	(2)	(3)
63 R.S.	63 R.S.	63 R.S.
23 R.	23 R.	23 R.
86 R.S.	86 R.S.	86 R.S.
12 L.	10 L.	8 L.
74 R.S.	76 R.S.	78 R.S.
<u>S. 74W. 172.</u>	<u>S. 76W. 168.</u>	<u>S. 78W. 170.</u>
(C)	(C')	(C'')
22½ R.S.	22½ R.S.	22½ R.S.
12 L.	10 L.	8 L.
10½ R.S.	12½ R.S.	14½ R.S.
<u>S. 10½W. 14.</u>	<u>S. 12½W. 14.</u>	<u>S. 14½W. 14.</u>

Nos.	T. Co.	Dist.	D. lat.		Dep.	
			N.	S.	E.	W.
1	S. 74 W.	172	—	47.4	—	165.3
2	S. 76 W.	168	—	40.6	—	163.0
3	S. 78 W.	170	—	35.3	—	166.3
C	S. 10 W.	14	—	13.8	—	2.4
C'	S. 12 W.	14	—	13.7	—	2.9
C''	S. 14 W.	14	—	13.6	—	3.4
	<u>S. 72° W.</u>	529		<u>164.4</u>		<u>503.3</u>

Lat. from 26°20' 0'' S. Long. from 37°40' 0'' W.

D. Lat. 2 44 24 S. D. Long. 9 30 0 W.

Lat. in 29 4 24 S. Long. in 47 10 0 W.

26 20 0 S.

2)55 24 24

27 42 12 答

T. Co. S. 72° W., Distance 529 miles,

Lat. 29°4'24'' S., Long. 47°10'0'' W.

4.

$$121^{\circ}37' W. = 8^h 6^m 28^s = 8.1 +$$

N. Alm. 27th June.

Decl.	Sem.
5.87	<u>15'45''</u>
8.1 +	
587	
4696	
47.547 +	
23 20 28.0 -	
47.5 +	
<u>R^d 23 19 40.5 N.</u>	

Orig. alt. \odot	59°16'45"
Index Error	55-
Obs. alt. \odot	59 15 50
	10 59+
	15-
T. alt. \odot	59 26 34
	90
T. z.	30 33 26 S.
Decl.	23 19 40 N.
Lat.	7 13 46 S.

答

Noon Lat. 7°13'46"S.

5.

Dep.	= cos. lat.
D. long.	
Dep. 32	Log. 1.505150
D. long. 60	„ 1.778151
<u>57°46'8"</u>	tan. 9.726999
	77
	<u>-7" = 22</u>

答

57°46'8"

6.

T. D. lat.	M. D. lat.	D. long.
38 50 S.	2532.08 S.	178 3 E.
3 30 S.	210.13 S.	81 20 W.
35 20 N.	<u>2321.95 N.</u>	259 23 W.
60		360 0
<u>2120 N.</u>		100 37 E.
		60
		<u>6037 E.</u>

$$\frac{D. \text{ long.}}{M. D. \text{ lat.}} = \tan. \text{ Co.} \quad \frac{Dist.}{T. D. \text{ lat.}} = \sec. \text{ Co.}$$

D. long	6037 E.	Log.	3.780821
M. D. lat.	2321.95 N.	„	3.365852
T. Co. N.	68°57'44"E.(R.)	tan.	10.414969
C. Error	5 0 0 E.(R.)		974
C. Co. N.	<u>73 57 44 E.</u>		<u>-1" = 5</u>

T. D. lat.	2120 N.	Log.	3.326336
T. Co. N.	68 57 44 E.	sec.	0.444926
Distance	<u>5905.6</u>	Log.	3.771262
			20
			<u>42</u>

答

T. Co. N. 68°57'44"E., C. Co. N. 73°57'44"E.,

Distance 5905.6 miles.

7.

Approx. S.M.T.	May 23 ^d 17 ^h 0 ^m 0 ^s	April 30
L.T.	3 38 40-	6
„ G.M.T.	May 23 ^d 13 21 20	24
		May 23.6
Chronom. T.	May 23 ^d 13 47 11.0	47.6
Error	24 48.0+	7.3
	23 14 11 59.0 = .6	1428
	5 47.5+	3332
Correct G.M.T.	May 23 ^d 14 17 46.5	347.48
	14.3+ = 9.7-	5 ^m 47 ^s .5

N. Alm. 24th May.

	Decl.	
	27.90	
	9.7—	
	<u>19530</u>	
	25110	
	<u>270.630—</u>	
	4 30.6—	
	<u>20 45 19.7+</u>	
	R ^d 20 40 49.1	Sin. 9.547962
Lat.	0 0 0	sec. 0.000000
T. A.	E. 20 40 49 N.	Sin. 9.547962
C. A.	E. 5 37 30 S.	
C. Er.	<u>26 18 19 W.</u>	
Var.	5 0 0 E.	緯度 0 即チ船・赤道上に在
Dev.	<u>21 18 19 W.</u>	ルトキハ赤緯ヲ以テ直チニ 眞方位トナスベシ

答

T. A. E. 20°40'49"N., C. Error 26°18'19"W.,
Dev. 21°18'19"W.

8.

- (a) **T. Co. N. 40½°E., C. Co. N. 1½°W., Dev. 22°E.,**
Distance 52½ miles.
- (b) Lat. 48°13'30"N., Long. 140°45'30"W.,
- (c) Lat. 48° 9'30"N., Long. 140°33' 0"W.,
Distance 10¾ miles.

9.

S.A.T.	Oct. 24 ^d 18 ^h 27 ^m 36 ^s
L.T.	8 29 0—
G.A.T.	Oct. 24 ^d <u>9 58 36</u>
	9.96 + = <u>10.0+</u>

S.A.T. Oct. 24^d 18^h 27^m 36^s

24
<u>Ely. L...5 32 24</u>

N. Alm. 24th Oct.

Decl.

52.24
10+
<u>522.40+</u>
8 42.4+
<u>11 43 28.1+</u>
R ^d <u>11 52 10.5S.</u>

l 38°23'S. & l 5^h32^m...**A**+0.097
d 11 52 S. & l 5 32 ...**B**-0.212
T. Az. S. 84°52'E...C-0.115
C. Az. S. 110 0 E.
C. Error 25 8 E.
Var. 0 0
Dev. 25 8 E.

答

T. Az. S. 84°52'E., C. Error 25°8'E., Dev. 25°8'E.

10.

Chronom. T.	Aug. 31 ^d 18 ^h 50 ^m 10 ^s	July 31
	6 22+	8
	31 18 56 32.0=.8	<u>23</u>
	21.9+	Aug. 31.8
Correct G.M.T.	Aug. 31 <u>18 56 53.9</u>	54.8
	18.9+ = <u>5.1—</u>	.4
		<u>21.92</u>

N. Alm. 1st Sept.

Decl.	Sem.	Eq. T.--A.T.
54.38	<u>15'35"</u>	0.785
5.1-		5.1-
<u>5438</u>		<u>785</u>
27190		3925
<u>277.338-</u>		<u>4.0035-</u>
4 37.3-		0 1.54 +
8 19 50.7-		R ^d 0 2.46
<u>R^d 8 24 28.0N.</u>		

Dep. 62'E. = 94.49E. = 1°34'29"E.

Orig. alt. @	19 43 20
Index Error	1 30-
Obs. alt. @	19 41 50
	8 19+
	7-

T. alt. @ 19 50 2
90

T. z. ... 70 9 58

<i>l</i> 48 56 20N.	<i>l</i> 48 56 20N.
<i>d</i> 8 24 28N.	<i>a</i> 19 50 2
<i>e</i> 70 9 58	<i>p</i> 81 35 32
40 31 52	29 6 18
110 41 50	110 41 50
29 38 6	52 29 14
55 20 55	55 20 55
14 49 3	26 14 37
0.182525	0.182525
0.004693	0.026559
9.915203	9.915203
9.407801	9.645608
<u>9.510222</u>	<u>9.769895</u>
240	83
<u>+ .4 = 18</u>	<u>+ 7" = 12</u>

S.A.T. Aug. 31 ^d 19 ^h 22 ^m 33 ^s 4	T. Az. N. 100° 13' 7"E.
2.5-	C. Az. N. 120 0 0 E.
S.M.T. Aug. 31 ^d 19 22 30.9	C. Error 19 46 53 W.
G.M.T. Aug. 31 ^d 18 56 53.9	Var. 15 0 0 E.
L.T. 0 25 37.0	Dev. <u>4 46 53 W.</u>
Sight Long. 6° 24' 15" E.	
D. Long. 1 34 29 E.	
Noon Long. <u>7 58 44 E.</u>	

11.

Oct. 31 ^d 17 ^h 16 ^m 4	Oct. 32 ^d 5 ^h 45 ^m 8	31 ^d 17 ^h 16 ^m 4
21.5-	21.2-	32 18 14.2
16 54.9	5 24.6	Daily Var. <u>57.8</u>
1 13.0-	1 12.0-	Sem.
15 41.9	4 12.6	31 st Midnight
6 15.0+	6 15.0+	<u>16' 7"</u>
31 ^d 21 56.9	32 ^d 10 27.6	1 st Noon.
Nov. 1 st 9 ^h 56.9 A.M.	Nov. 1 st 10 ^h 27 ^m 6 P.M.	<u>16' 8"</u>
	答	Eq. T. <u>16^m + M.T.</u>
	地方時	
Nov. 1 st 9 ^h 56 ^m 9 A.M.	Nov. 1 st 10 ^h 27 ^m 6 P.M.	

第十試驗問題. 661 頁.

1.

.0094572

2.

.211294

3.

(D)	(1)	(2)	(3)
90 OR.N.	60 OR.N.	70 OR.N.	90 OR.N.
4 OL.	4 OL.	7 OL.	9 OL.
86 OR.N.	56 OR.N.	63 OR.N.	81 OR.N.
<u>N. 86 E. 5.</u>	<u>N. 56 E. 142.</u>	<u>N. 63 E. 141.</u>	<u>N. 81 E. 137.</u>

7.

S.A.T. Oct. 27^d 18 0 0+
 L.T. 6 54 40+
 G.A.T. Oct. 28^d 0 54 40 = 0^h 9+

N. Alm. 28th Oct.

Decl.

50.33

.9+

45.297+

0 45.3+

13 5 33.6+

R^d 13 6 18.9S. ... sin. 9.355530

Lat. 0 0 0 ... sec. 0.000000

T.A. E. 13 6 19 S. ... sin. 9.355530

C.A. E. 0 0 0 S.

C. Er. 13 6 19 E.

Var. 3 30 0W.

Dev. 9 36 19 E.

答

T.A. E. 13°6'19"S., C. Error 13°6'19"E.,

Dev. 9°36'19"E.

8.

(a) T. Co. N. 25°E., C. Co. N. 9°W., Dev. 18°E..

Distance 51 miles.

(b) Lat. 47°35'N., Long. 168°17'30"E.

(c) Lat. 47°52'30"N., Long. 168°49'30"E.,

Distance 20½ miles.

9.

Approx. S.M.T. July 29^d 20^h 30^m 0^s
 L.T. 10 50 0+
 „ GMT. July 30^d 7 20 0
 Correct GMT. July 30^d 7^h 27^m 0^s
7.4+

N. Alm. 30th July.

Decl.

36.16

7.4+

14464

25312

267.584+

4 27.6+

18 33 14.3-

R^d 18 28 46.7N.

Eq. T.

0.097

7.4+

388

679

7178+

6 14.80-

0.72+

6 14.08-M.T.

G.M.T. July 30^d 7^h 27^m 0^s
 6 14.1-

G.A.T. July 30^d 7 20 45.9

L.T. 10 50 0.0-

S.A.T. July 29^d 20 30 45.9
 24

Ely. h 3 29 14.1

l 57°20' N. & h 3^h 29^m ... A 1.208+

d 18 29 N. & h 3 29 ... B 0.423-

C 0.785+

T. Az. S. 67 E.

C. Az. S. 95 E.

C. Error 28 E.

Var. 19W.

Dev. 9 E.

答

T. Az. S. 67°E., C. Er. 28°E., Dev. 9°E.

10.

C. T. Sept. 23 ^d 9 ^h 6 ^m 42 ^s 0	July 31	5
Orig. Error 2 3.0-	" 26	
23 9 4 39.0 = .4	Aug. 31	23.4
Accum. Rate 1 44.5-	Sept. 23.4	80.4
G.M.T. Sept. 23 ^d 9 2 54.5		1.3
		2412
		804
		104.52
N. Alm. 23 rd Sept.		1 ^m 44 ^s 5
Decl. 58.44	Sem. 15' 58"	Eq. T. .873
9+		9+
525.96+		7.857+
0 1 49.2+		7 34.77+
8 46.0+		7.86+
R ^d 0 10 35.2S.		R ^d 7 42.63 - A.T.
p 90 10 35		
Orig. alt. ⊙ 30 28 10		
I. E. 3 15-		
Obs. alt. ⊙ 30 24 55		
9 15+		
2-		
T. alt. ⊙ 30 34 8		
90		
T. z. ... 59 25 52		

Noon lat. 0 27 0 N. Dep. 32. 2 E. =
 D. lat. 27 0 S. D. long. 32. 2 W.
 Sight lat. 0 0 0

l 0 0 0	l 0 0 0
d 0 10 35 S.	a 30 34 8
e 59 25 52	p 90 10 35
0 10 35	30 34 8
59 36 27	120 44 43
59 15 17	59 36 27
29 48 13	60 22 21
29 37 38	29 48 13
0.000002	0.064988
9.696382	9.939148
9.694039	9.694039
9.390423	9.698175
02	180
-.4 = 21	-3'' = 5

A.T. 23 ^d 20 2 16.6	T. Az. N. 89°53' 42'' E.
Eq. T. 7 42.6-	C. Az. N. 101 15 0 E.
S.M.T. 23 ^d 19 54 34.0	C. Er. 11 21 18 W.
G.M.T. 23 ^d 9 2 54.5	Var. 8 0 0 W.
L. T. 10 51 39.5	Dev. 19 21 18 W.

Sight Long. 162°54' 52'' E.
 D. Long. 32 12 W.
 Noon Long. 162°22' 40'' E.

答

Sight Long. 162°54'52''E., Noon Long. 162°22'40''E.,

T. Az. N. 89°53'42''E., C. Error. 11°21'18''W.,

Dev. 19°21'18''W.

11.

2 ^d 19 ^h 30 ^m 8 18.0-	3 ^d 7 ^h 53 ^m 8 18.0-	3 ^d 20 ^h 16 ^m 8 2 ^d 19 30.8
2 ^d 19 12.8 22.0-	3 ^d 7 35.8 45.5-	Daily Var. <u>46.0</u>
2 ^d 18 50.8 5 40.0+	3 ^d 6 50.3 5 40.0+	Eq. T. <u>10^m + M.T.</u>
2 ^d 24 30.8 3 ^d 0 30.8	3 ^d 12 30.3 4 th 0 30.3 A.M.	Sem. Noon 3 rd <u>15'56"</u>
3 rd 0 30.8 P.M.	No A.M. Tide.	Midnight 2 nd <u>15'59"</u>

答
地方時

3rd 0^h 30^m 8 **P.M.** and No **A.M.** Tide.

{本日ハ午後 0^h 30^m 8 ニ於テノミ}
{高潮起リ午前ニハ高潮ナシ}

第十一試験問題. 665 頁.

1.

283-683007.

2.

1259089.

3.

(D)	(1)	(2)
70 19 L.S. 22 0 R.	67 30 L.S. 22 0 R.	45 0 L.S. 22 0 R.
48 19 L.S. <u>S. 48 E. 7.</u>	45 30 L.S. <u>S. 45 E. 152.</u>	23 0 L.S. <u>S. 23 E. 159.</u>

(3)	(C ₁)	(C ₂)
45 0 L.S. 24 0 R.	45 0 R.N. 2 0 R.	45 0 R.N. 4 0 R.
21 0 L.S. <u>S. 21 E. 154</u>	47 0 R.N. <u>N. 47 E. 14</u>	49 0 R.N. <u>N. 49 E. 14</u>
	(C ₃)	
	45 0 R.N. 6 0 R.	
	51 0 R.N. <u>N. 51 E. 14</u>	

Nos.	T. Co.	Dist.	D. Lat.		Dep.	
			N.	S.	E.	W.
D	S. 48 E.	7		4.7	5.2	
1	S. 45 E.	152		107.5	107.5	
2	S. 23 E.	159		146.4	62.1	
3	S. 21 E.	154		143.8	55.2	
C ₁	N. 47 E.	14	9.5		10.2	
C ₂	N. 49 E.	14	9.2		10.6	
C ₃	N. 51 E.	14	8.8		10.9	
	S. 35° E.	458	27.5	402.4	261.7	
				27.5		
				<u>374.9</u>		

Lat. from 53° 0' 0" **N.** Long. from 160° 0' **E.**
 D. Lat. 6 14.9 S. D. Long. 6 47. E.
 Lat. in 46 45.1 N. Long. in 166 47. E.

答

T. Co. made good **S. 35° E.**, Distance

458 miles, Lat. in 46° 45.1' **N.**,

Long. in 166° 47' **E.**

4.

Long. $82^{\circ}20' W. = 5^h 29^m 20^s = 5^h 5 +$

N. Alm. 14th Dec. **G.A.N.**

	Decl.	Sem.
	9.02	16'17"
	5.5 +	
	<u>4510</u>	
	4510	
	<u>49.610 +</u>	
23 13	15.1 +	
	49.6 +	
R ^d 23 14	<u>4.7 S.</u>	

Orig. alt. \odot	58°51' 10"
I. Error	0 40 -
Obs. alt. \odot	<u>58 50 30</u>
	10 35 +
	17 +
T. alt. \odot	<u>59 1 22</u>
	90
T. z.	<u>30 58 38 S.</u>
Decl.	23 14 5 S.
Lat.	<u>54 12 43 S.</u>

答

Noon Lat. $54^{\circ}12'43'' S.$

5.

C. Co.	6 ⁰⁰ L.S.
C. Er.	2 0 L.
	<u>8 0 L.S.</u>
T. Co.	<u>East.</u>

16°40' E.
60

D. Long. 1000 E.

Dep. = Cos. Lat.
D. Long.

Dep.	800	Log.	2.903090
D. long.	1000	"	3.000000
Lat. $36^{\circ}52'12''$	Cos.	<u>9.903090</u>	
		85	
		<u>-3'' = 5</u>	

答

Lat. $36^{\circ}52'12''$ and Long. $16^{\circ}40' E.$

6.

T. D. Lat.	M. D. Lat.	D. Long.
20 8 S. ...	1233.66 S.	149 30 E.
24 50 N. ...	1538.97 N.	179 30 E.
44 58 N.	<u>2772.63 N.</u>	30 0
60		60
<u>2698 N.</u>		<u>1800 E.</u>

D. Long.	= Tan. Co.	Dist.	= Sec. Co.
M.D. Lat.		D. Lat.	
D. long. 1800 E.	... Log.	3.255272	
M. D. Lat. 2772.63 N.	... Log.	3.442892	
T. Co. N. $32^{\circ}59'30'' E. (R.)$	Tan.	9.812380	
C. Er. 21 15 0 W. (L.)		379	
C. Co. N. 11 44 30 E.		<u>1</u>	

T. D. Lat. 2698	... .. Log.	3.431042
T. Co. N. $32^{\circ}59'30'' E.$	... Sec.	0.076368
Distance <u>3216.7</u>	... .. Log.	3.507410
		316
		<u>94</u>

答

T. Co. N. $32^{\circ}59'30'' E.,$ C. Co. N. $11^{\circ}44'30'' E.,$

Distance 3216.7 miles.

7.

Long. $65^{\circ}21' E.$ = L.T. $4^h 21^m 24^s$
 Approx. S.M.T. March $20^d 18^h 0^m 0^s$
 L.T. $4 21 24$ —
 Approx. G.M.T. March $20^d 13 38 36$
 Correct G.M.T. March $20^d 13^h 38^m 36^s$
 $13.6+ = 10.4-$

N. Alm. March 21^{th}

Decl. 59.25
 $10.4-$
 23700
 5925
 616.200—

Decl. $0 12 21.5 + N.$
 Cor. $10 16.2-$
 R^d Decl. $0 2 5.3 N.$ Sin. 6.782485
 Lat. $21 30 0 N.$ Sec. 0.031322
 T.A. E. $0 2 14 N.$ Sin. 6.813807
 C.A. E. $11 15 0 S.$
 C. Er. $11 17 14 W.$
 Var. $0 0 0$
 Dev. $11 17 14 W.$

答

T.A. E. $0^{\circ}2'14'' N.$, C.E. $11^{\circ}17'14'' W.$,Dev. $11^{\circ}17'14'' W.$

8.

答

(a) T. Co. N. $51^{\circ} E.$, C. Co. N. $33^{\circ}15' E.$, Dev. $9^{\circ} E.$,

Distance 74 miles.

(b) Lat. $48^{\circ}33'30'' S.$, Long. $0^{\circ}4' 0'' W.$ (c) Lat. $48^{\circ}19' 0'' S.$, Long. $0^{\circ}7'40'' W.$

Distance 13 miles.

9.

C. T. May $25^d 13^h 44^m 50^s$
 Orig. Error $12 19-$
 G.M.T. May 25 $13 32 31 = 13.5+ = 10.5-$
 Eq. T. ... $3 13+$
 G.A.T. May 25 $13 35 44$
 L. T. $11 17 32-$
 S.A.T. May $25^d 2 18 12$

N. Alm. May 26^{th}

Decl.	Eq. T. + M.T.
26.10	.259
<u>10.5-</u>	<u>10.5-</u>
13050	1295
<u>2610</u>	<u>259</u>
274,050—	2,7195—
<u>21 6 55.7+</u>	<u>310.62-</u>
<u>4 34.0-</u>	<u>2.72-</u>
R ^d <u>21 2 21.7N.</u>	R ^d <u>3 13.34</u>

 $l 45^{\circ}8' S.$ & $h 2^h 18^m$ + A 1.458 $d 21 21\frac{1}{2} N.$ & " + B 0.678T. Az. N. $33^{\circ}30' W.$ + C 2.136C. Az. N. $33 45 W.$ C. Er. $0 15 E.$ Var. $15 0 W.$ Dev. $14 45 W.$

答

T. Az. N. 33°30'W., C. Error 0°15'E., Dev. 14°45'W.

10.

Approx. S.M.T. April 15 ^d 3 ^h 0 ^m 0 ^s	Jan 31
L. T. 7 42 16 +	16
Approx. G.M.T. April 15 ^d 10 42 16	" 15
	Feb. 15
Chronometer T. April 15 ^d 10 14 1	30
Orig. Error 25 36 +	24 ^m 15 ^s
April 15 ^d 10 39 37 = .4	25 36
Accum. rate 2 43.1 +	1 21
Correct G.M.T. April 15 ^d 10 42 20.1 = 10.7 +	60
	30)81
T. Co. S. 30° E. 29 miles gives	2.7 Losing.
D. lat. 25.1 S., Dep. 14.5 E. =	Feb. 29
D. Long. 14.64 E.	15
	" 14
Lat. at Noon 8°32' 20" N.	Mar. 31
D. Lat. ... 25 6 S.	Ap. 15.4
Sight Lat. 8 7 14 N.	60.4
	2.7
Mean Mid. Lat. 8 19 47	4228
	1208
	163.08
	2 ^m 43.1

Orig. alt. ⊙ 45 21 10
I. Error 0 43 +
Obs. alt. ⊙ 45 21 53
9 35 +
3 -
T. alt. ⊙ 45 31 25
90
T. z. 44 28 35

N. Alm. April 15th

Decl.	Sem.	Eq. T. - A.T.
53.65	15'57"	.615
10.7 +		10.7 +
37555		4205
5365		615
574.055 +		6.5705 +
9 44 11.9 +		0 5.78 -
9 34.0 +		6.57 +
R ^d 9 53 45.9		R ^d 0 0.79
p 80 6 14		
l 8 7 14N.		l 8 7 14N.
d 9 53 46N.		a 45 31 25
z 44 28 35		p 80 6 14
1 46 32		37 24 11
46 15 7		117 30 25
42 42 3		42 42 3
23 7 33		58 45 12
21 21 1		21 21 1
0.004377		0.004377
0.006510		0.154520
9.594118		9.931936
9.561183		9.561183
9.166188		9.652016
60		03
.4 = 28		+ 5" = 13

S.A.T. April 15 ^d 3 ^h 0 ^m 5 ^s .4	T. Az. N. 84° 7' 5" W.
Eq. T. 0 0.8 -	C. Az. N. 101 15 0 W.
S.M.T. April 15 ^d 3 0 4.6	C. Er. 17 7 55 E.
G.M.T. April 15 10 42 20.1	Var. 8 0 0 W.
L. T. 7 42 15.5	Dev. 9 7 55 E.
Sight Long. 115°33' 52" W.	
D. Long. 14 38 W.	
Noon Long. 115 48 30 W.	

答

Sight Long. $115^{\circ}33'52''$ W., Noon Long. $115^{\circ}48'30''$ W.,
 T. Az. **N. $84^{\circ}7'5''$ W., C. Error $17^{\circ}7'55''$ E.,**
 Dev. $9^{\circ}7'55''$ E.

11.

$17^d 23^h 27^m 3$	$17^d 11^h 1^m 8$	$18^d 11^h 52^m 5$
<u>19.5-</u>	<u>19.5-</u>	<u>17 11 1.8</u>
17 23 7.8	17 10 42.3	Daily Var. <u>50.7</u>
<u>8.0+</u>	<u>13.0+</u>	Eq. T. <u>10^m</u> —M. T.
17 23 15.8	17 10 55.3	Scm.
<u>5 40.0</u>	<u>5 40.0+</u>	Noon 18^h
$18^d 4^h 55.8$	$17 16 35.3$	<u>$14'43''$</u>
<u>$18^h 4^h 55.8$ P.M.</u>	<u>$18^h 4^h 35.3$ A.M.</u>	Midt. 17^h

答

地方時

$18^h 4^h 55^m 8$ P.M. & $18^h 4^h 35^m 3$ A.M.

第十二試驗問題. 668 頁.

1.

答

.00303

2.

答

.2430702.

3.

(1)	(2)
58 OLS.	65 OLS.
30 OR.	34 OR.
<u>28 OLS.</u>	<u>31 OLS.</u>
<u>S.28 E.117.</u>	<u>S.31 E.233.</u>

Nos.	T. Co.	Dist.	D. Lat.		Dep.	
			N.	S.	E.	W.
1	S. 28E.	117	—	103.3	54.9	—
2	S. 31E.	233	—	199.7	120.0	—
	S. 30E.	350		<u>303.0</u>	<u>174.9</u>	

Lat. from $50 22.0$ N.	Long. from $179 14$ E.
D. Lat. $5 3.0$ S.	D. Long. $4 21$ E.
Lat. in <u>$45 19.0$N.</u>	<u>$183 35$ E.</u>
	360
	Long. in <u>$176 25$W.</u>

答

T. Co. Made good **S. 30° E.,** Dist. 350 miles,

Lat. in $45^{\circ}19'0''$ N., Long. $176^{\circ}25'0''$ W.

4.

Long. $86^{\circ}40' E. = 5^h 4^m 40^s = 5^h 8^m -$

N. Alm. 10^{th} June.

Decl.	Scm.
11.62	<u>$15'46''$</u>
<u>5.8-</u>	
9296	
5810	
<u>67.396-</u>	
23 0 49.2+	
<u>1 7.4-</u>	
$R^d 22 59 41.8$ N.	

Orig. alt. @	69 58 20
	2 10 +
Obs. alt. @	70 0 30
	11 5 +
	14 -
T. alt. @	70 11 21
	90
T. z.	19 48 39 S.
Decl.	22 59 42 N.
Noon Lat.	3 11 3 N.

答

Noon Lat. 3°11'3" N.

5.

10.5	8°18'50"
36	60
630	D. Long. <u>498.833 W.</u>
315	
Distance <u>378.0 W.</u>	

Dep. = cos. lat. ∴ Dep. = D. Long. cos. lat.
D. Long.

D. Long. 498.83 W.	Log. 2.697952
Lat. 30°0'0" S.	Cos. 9.937531
Dep. 432.0 W.	Log. 2.635483
Distance 378.0 W.	36)54
Drift. <u>54.0 W.</u>	<u>1.5 miles per hour.</u>

答

Rate of Current 1.5 miles per hour.

6.

55 10 S. ...	3985.44	6 5 36 W.
49 16 N. ...	3397.35	5 15 W.
104 26 N. ...	<u>7382.79 N.</u>	6 0 21
60		60
<u>6266 N.</u>		<u>3621 E.</u>

D. Long. = tan. Co. Dist. = sec. Co.
M.D. Lat. T.D. Lat.

D. Long. 3621 E.	Log. 3.558828
M.D. lat. 7382.8 N.	" 3.868221
T. Co. N. 26° 7' 35" E. R.	tan. 9.690607
C. Error 34 50 0 W. L.	582
C. Co. N. <u>8 42 25 W.</u>	<u>+ 5' = 25</u>

T.D. Lat. 6266 N.	Log. 3.796990
T. Co. N. 26° 7' 35" E.	sec. 0.046808
Distance <u>6979.1</u>	Log. 3.843798
	<u>3</u>
	<u>5</u>

答

T. Co. N. 26° 7' 35" E., C. Co. N. 8° 42' 25" W.

Distance 6979.1 miles.

7.

S.M.T. Feb. 11^d 19^h 18^m 0^s
L.T. 1 46 0 +
G.M.T. Feb. 11^d 21 4 0 = 21.1 + = 2.9 -

N. Alm. 12th Feb.

Decl.	
49.33	
2.9-	
<u>44397</u>	
9866	
<u>143.057-</u>	
14 2 41.4-	
2 23.0-	
R ^d <u>14 5 4.4S.</u>	

Decl.	14 5 4 S.	sin.	9.386234
Lat.	48 20 0N.	sec.	0.177312
T.A. E.	21 28 21 S.	sin.	9.563546
C.A. E.	2 0 0N.		14
C. Er.	23 28 21 E.		+6''=32
Var.	30 0 0 E.		
Dev.	<u>53 28 21 E.</u>		

答

T.A. E. 21°28'21"S., Error 23°28'21"E.,

Dev. 53°28'21"E.

8.

答

(a) T. Co. N. 64° W., C. Co. N. 61°15'0"W.,

Dev. 16°45'W., Distance 47 $\frac{1}{4}$ miles.

(b) Lat. 48°33'20"N., Long. 179° 6' 0"W.

(c) Lat. 48°31'30"N., Long. 179°33'30"W.,

Distance 11 miles.

9.

S.A.T. June 5 ^d 4 ^h 22 ^m 30 ^s	
46 0+	
G.A.T. June 5 ^d 5 8 30=5.1+	

N. Alm. 5th June.

Decl.	
16.61	
5.1+	
<u>1661</u>	
8305	
<u>84.711+</u>	
22°32' 34"0+	
1 24.7+	
R ^d <u>22 33 58.7N.</u>	

l 48°15' N. & h 5^h 22^m... + A. 187

d 22 34 N. ,, -B. 421

T. Az. N. 81°0'W. -C. 234

C. Az. N. 80 0'W.

C. Error 1 0 W.

Var. 22 0 E.

Dev. 21 0 E.

答

T. Az. N. 81°W., Error 1°W., Dev. 21°E.

10.

C. Co. 48°L.N.

C. Error 7 R.

T. Co. 41 L.N.

Or. N. 41°W. 44 miles,

gives D. Lat. $33^{\circ}2'N.$, Dep. $28'.9W.$

Noon Lat. $22^{\circ}37'33''N.$	10.86
D. Lat. $33\ 12\ N.$	.2
Sight Lat. $23\ 10\ 45\ N.$	21.72
$22\ 37\ 33$	8.69
$23\ 10\ 45$	.98
$2)45\ 48\ 18$	D. Long. $31'39$
Mid. Lat. $22\ 54\ 9$	60
	$23''40W.$
Orig. alt. $\odot\ 30^{\circ}23'50''$	
I. Error $1\ 12-$	
Obs. alt. $\odot\ 30\ 22\ 38$	
$8\ 39+$	
$16+$	
T. alt. $\odot\ 30\ 31\ 33$	
90	
T. z. $\dots\ 59\ 28\ 27$	
Approx. S.M.T. Jan. $27^d\ 3^h\ 7^m$	36 42 fast.
L.T. $4\ 12+$	42 57 fast.
" G.M.T. Jan. $27^d\ 7\ 19$	6 15
	60
Chronometer T. Jan. $27^d\ 8^h\ 7^m\ 55^s$	375 (88)
$42\ 57-$	4.3 gaining
Jan. 27 $7\ 24\ 58=,3$	30 31
$3\ 57.8-$	6 3
Correct G.M.T. Jan. $27\ 7\ 21\ 0.2$	24 28
$7.3+$	31 27.3
	30 55.3 days.
	3
	88 days.
	55.3
	4.3
	1659
	2212
	237.79
	3^m57^s8-

N. Alm. 27^{th} Jan. **G.M.N.**

Decl.	Sem.	Eq. T+A.T.
37.86	$16'16''$	.538
7.3+		7.3+
11358		1614
26502		3766
276.378+		3.9274+
$18^{\circ}43'51''.9-$		12^m44^s13+
4 36. 4+		3.93+
$R^d\ 18\ 39\ 15.5S.$		$R^d\ 12\ 48.06$
$z\ 23\ 10\ 45N.$		$z\ 23\ 10\ 45N.$
$d\ 18\ 39\ 15S.$		$a\ 30\ 31\ 33$
$z\ 59\ 28\ 27$		$p\ 108\ 39\ 15$
41 50 0		7 20 48
101 18 27		116 0 3
17 38 27		101 18 27
50 39 13		58 0 1
8 49 13		50 39 13
	0.036553	0.036553
	0.023436	0.064795
	9.888364	9.928421
	9.185642	9.888364
	9.133995	9.918133
	81	2
	$+.2=14$	$+1''=1$
S.A.T. Jan. $27^d\ 2^h\ 53^m\ 13^s.2$		T. Az. N. $131^{\circ}\ 1'31''W.$
Eq. T. $12\ 48.1+$		C. Az. N. $137\ 48\ 45\ W.$
S.M.T. Jan. $27\ 3\ 6\ 1.3$		C. Error $6\ 47\ 14\ E.$
G.M.T. " $27\ 7\ 21\ 0.2$		Var. $3\ 0\ 0\ E.$
L.T. $4\ 14\ 58.9$		Dev. $9\ 47\ 14\ E.$
Sight Long. $63^{\circ}44'44''W.$		
D. Long. $35\ 31\ E.$		
Noon Long. $63\ 9\ 13\ W.$		

答

Sight Long. $63^{\circ}44'44''$ W., Noon Long. $63^{\circ}9'13''$ W.,

C. Error $6^{\circ}47'14''$ E., Dev. $9^{\circ}47'14''$ E.

11.

$28^d 12^h 54^m 1$ 16.0-	$29^d 1^h 14^m 2$ 16.0-	Mer. pass. $28^d 12^h 54^m 1$ $27 12 13.3$
$28 12 38.1$ 12.0-	$29 0 58.2$ 17.0-	Daily Var. <u>40.8</u>
$28 12 26.1$ 5 24.0+	$29 0 41.2$ 5 24.0+	Eq. T. $1^m - M.T.$
$28 17 50.1$ 18.7-	$29 6 5.2$ 18.7-	Mean Sem. <u>14'53''</u>
$28^d 17 31.4$	$29^d 5 46.5$	Long. $139^{\circ}40' E.$
<u>$29^{th} 5^h 31^m 4 A.M.$</u>	<u>$29^{th} 5^h 46^m 5 P.M.$</u>	<u>135 0 E.</u> <u>4°40'</u> <u>18°40' -</u>

答

中央標準時

$29^{th} 5^h 31^m 4 A.M.$ & $29^{th} 5^h 46^m 5 P.M.$

第十三試驗問題. 671 頁.

1.

292559.73

.00999565

3.

(D)	(1)	(2)
<u>S. $23^{\circ} E.$ L.S.</u>	<u>S. $15^{\circ} E.$ L.S.</u>	<u>S. $16^{\circ} E.$ L.S.</u>
<u>3 E.R.</u>	<u>3 E.R.</u>	<u>4 E.R.</u>
<u>S. 20 E. 12</u>	<u>S. 12 E.</u>	<u>S. 12 E.</u>

(3)

(C)

<u>S. $17^{\circ} E.$ L.S.</u>	Var. $15^{\circ} E.$	<u>S. $67^{\circ}30' W.$ R.S.</u>
<u>5 E.R.</u>	" $16 E.$	<u>16 0 E.R.</u>
<u>S. 12 E. 475</u>	" $17 E.$	<u>S. 83 30 W. 48</u>
	<u>Mean 16 E.</u>	

Nos.	T. Co.	Dist.	D. Lat.		Dep.	
			N.	S.	E.	W.
D	S. 20 E.	12	—	11.3	4.1	—
1	S. 12 E.	—	—	—	—	—
2	S. 12 E.	—	—	—	—	—
3	S. 12 E.	475	—	464.6	98.7	—
C	S. 83 W.	48	—	5.8	—	47.6
	S. $6\frac{1}{2}^{\circ} E.$	484		<u>481.7</u>	102.8	47.6
					<u>47.6</u>	<u>55.2</u>

Lat. from $15^{\circ}30'0 N.$ Long. from. $12^{\circ}11'0 W.$
 D. Lat. 8 1.7 S. D. Long. 56.2 E.
 Lat. in 7 28.3 N. Long. in 11 14.8 W.

$2) 22 58.3$ 10.18
 M. Mid. lat. 11 29.1 5
 50.90
 5.09
 0.20
 D. Long. 56.19

答

T. Co. Made good S. $6\frac{1}{2}^{\circ} E.$, Distance 484 miles.

Lat. in $7^{\circ}28'18'' N.$, Long. in $11^{\circ}14'48'' W.$

4.

$\frac{\text{Dep.}}{\text{D. Long. } 39^{\circ}5'}$ = cos. lat. $49^{\circ}27'$

答

Distance 1524.5 miles.

5.

Long. $14^{\circ}45'15''E. = L.T. 0^h 59^m 1^s = 1^h 0^m -$

N. Alm. 28th Feb. **G.A.N.**

Decl.	$8^{\circ}21'47''8-$	Sem.
	<u>56.4-</u>	
R ^d Decl.	<u>8 22 44.2 S.</u>	<u>16' 10''</u>

Orig. alt.	$\odot 45^{\circ}19'20''$
I. Error	<u>5 12-</u>
	45 14 8
	10 45+
	<u>10+</u>

T. alt.	$\odot 45 25 3$
	90

T. z.	... 44 34 57S.
Decl.	... <u>8 22 44S.</u>
Lat.	... <u>52 57 41S.</u>

答

Noon Lat. $52^{\circ}57'41''S.$

6.

$56^{\circ}12'S.$	4095.42S.	$67^{\circ}14'W.$
<u>45 9 S.</u>	<u>3042.68S.</u>	<u>112 37 W.</u>
11 3N. M.D. Lat.	<u>1052.74N.</u>	<u>45 23 W.</u>
60		60

T.D. Lat. <u>663N.</u>	<u>2723W.</u>
------------------------	---------------

D. Long. = tan. Co.	Dist. = sec. Co.
M.D. Lat.	T.D. Lat.

2723W.	Log. 3.435048
1052.74 N.	Log. 3.022320

T. Co. N. $68^{\circ}51'47''W.$	Tan. 10.412728
C. Error 10 30 0 W.	16
C. Co. N. <u>79 21 47 W.</u>	<u>+2'' = 12</u>

663.0N.	Log. 2.821514
N. $68^{\circ}51'47''W.$	Sec. 0.442976
Dist. <u>1838.6</u>	Log. <u>3.264490</u>
	345
	<u>145</u>

答

T. Co. N. $68^{\circ}51'47''W.$, C. Co. N. $79^{\circ}21'47''W.$,

Distance 1838.6 miles.

7.

S.A.T. Feb. 28^d 7^h 12^m 0^s

L.T. 3 36 27+

G.A.T. Feb. 28^d 10 48 27 = 10.8+

N. Alm. 28th Feb. **G.A.N.**

Decl.

56.37

10.8+

45096

5637

608.796+

$8^{\circ}21'47''8-$

10 8.8+

R^d 8 11 39.0S. sin. 9.153900

Lat. 45 15 0 S. sec. 0.152418

T.A. W. $11^{\circ}40'49'' S.$ sin. 9.306318

C.A. W. 22 30 0 S. 277

C. Error 10 49 11 E. +4'' = 41

Var. 15 26 0 W.

Dev. 4 36 49 W.

答

T.A.W. $11^{\circ}40'49'' S.$, C. Error $10^{\circ}49'11'' E.$,

Dev. $4^{\circ}36'49'' W.$

8.

答

- (a) C. Co. N. $74^{\circ}W.$, Dev. $20^{\circ}W.$, Dist. 65 miles.
 (b) Lat. $50^{\circ}25'0''N.$, Long. $170^{\circ}22'0''E.$
 (c) Lat. $50^{\circ}36'0''N.$, Long. $170^{\circ}9'0''E.$, Distance from A 15 miles. Bearing from A, N. $64^{\circ}W.$

9.

C.T. Feb. 27 ^d 13 ^h 36 ^m 15 ^s		Dec. 31
O. Error 11 53-		3
<u>13 24 22=,5</u>		" 28
A. Rate. 0 21.2+		Jan. 16
<u>G.M.T. Feb. 27^d 13 24 43.2=10.6-</u>		<u>44</u>
S.W. b S. 28 miles gives D. Lat.		12 15
23.3N., Dep. 15.6E. = D. Long.		11 53
22 ^h 4 ^m E.		44) 22.0
Noon Lat. $45^{\circ}12' 0'' S.$	D. Long.	Losing. 0.5
D. Lat. <u>23 18 N.</u>	14.14	Jan. 31
Sight Lat. <u>44 48 42 S.</u>	7.07	16
2) 90 0 42	0.85	" 15
M. M. Lat. <u>45 0 21</u>	<u>22.06E.</u>	Feb. 27.5
		42.5
		0.5
		<u>21.25+</u>

N. Alm. 28th Feb. G.M.N.

Decl.	Sem.	Eq. T. + A.T.
56.37	<u>16' 10''</u>	0.449
10.6-		10.6-
<u>33822</u>		2694
5637		449
<u>597.522-</u>		4.7594-
8°21' 59'' 9-		12 ^m 56 ^s 22-
9 57.5-		4.76-
R ^d <u>8 31 57.4S.</u>		R ^d <u>13 0.98</u>

Orig. alt. @ $23^{\circ}16' 12''$	
I. Error	2 15+
Obs. alt. @ $23 18 27$	
	9 43+
	10+
T. alt. @ $23 28 20$	
	90
T. z. ...	<u>66 31 40</u>
l 44 48 42 S.	0.149092
d 8 31 57 S.	0.004834
z 66 31 40	9.892961
36 16 45	9.416494
<u>102 48 25</u>	9.463381
30 14 55	51
51 24 12	<u>-.6=30</u>
15 7 27	

S.A.T.	27 ^d 19 ^h 39 ^m 0 ^s 4
Eq. T.	13 1.0+
S.M.T.	27 ^d 19 52 1.4
G.M.T.	27 13 24 43.2
L.T.	6 27 18.2
Sight Long.	<u>96°49' 33'' E.</u>
D. Long.	22 4 E.
Noon Long.	<u>97 11 37 E.</u>

l 44 49'S. & h 4 ^h 21 ^m ... + A .458
d 8 32 S. " ... - B .165
T. Az. N. $78^{\circ} 0' E.$ + C .293
C. Az. N. $67 30 E.$
C. Error 10 30 E.
Var. 10 15 W.
Dev. <u>0 15 E.</u>

答

Sight Long. $96^{\circ}49'33''E.$, Noon Long. $97^{\circ}11'37''E.$ T. Az. N. $78^{\circ}E.$, C. Error $10^{\circ}30'E.$, Dev. $0^{\circ}15'E.$

10.

S.M.T. Feb. 27^d 21^h 15^m 0^s

L.T. 6 46 0+

G.M.T. Feb. 28^d 4 1 0 = 4^h +N. Alm. 28th Feb.

Decl. Sem.

56.37 16'10"

4+

225.48+

8°21' 59''9-

3 45.5+

R^d 8 18 14.4 S.

90

p 81 41 46

Orig. alt. ⊙ 39° 7' 30"

I. Error. 2 12+

Obs. alt. ⊙ 39 9 42

10 44+

10+

T. alt. ⊙ 39 20 36

z 39°12' 0'' S. 0.110729

a 39 20 36 0.111617

p 81 41 46 9.816242

0 8 36 9.814985

81 50 22 9.853573

81 33 10 63

40 55 11 8''=10

40 46 35

T. Az. S. 115° 18' 53'' E.

C. Az. S. 112 30 0 E.

C. Error 2 48 53 W.

Var. 14 30 0 W.

Dev. 17 18 53 W.

答

T. Az. S. 115° 18' 53'' E., C. Error 2° 48' 53'' W.,

Dev. 17° 18' 53'' W.

11.

28^d 12^h 54^m 1

16.0-

28 12 38.1

12.0-

28 12 26.1

5 24.0+

28 17 50.1

18.7-

28^d 17 31.429th 5^h 31^m 4 A.M.29^d 1^h 14^m 2

16.0-

29 0 58.2

17.0-

29 0 41.2

5 24.0+

29 6 5.2

18.7-

29 5 46.5

29th 5^h 46^m 5 P.M.27^d 12^h 13.3

28 12 54.1

Daily Var. 40.8

Sem.

28th Noon

14'52''

28th Midt.

14'54''

Eq. T. 1^m - M.T.

139° 40' E.

135 0 E.

4 40

4

18^m 40 S.

答

中央標準時

29th 5^h 31^m 4 A.M. & 29th 5^h 46^m 5 P.M.

第十四試驗問題. 675 頁.

1.

答

59.126.

2.

答

.65299.

3.

(D)	(1)	(2)
N. 67°30' E. R. N.	N. 15° E. R. N.	N. 24° E. R. N.
17 0 E. R.	17 E. R.	15 E. R.
<u>N. 84 30 E. 14.</u>	<u>N. 32 E. 164.</u>	<u>N. 39 E. 88.</u>

(2')	(C)	(C')
N. 24° E. R. N.	S. 67°30' W. R. S.	S. 67°30' W. R. S.
17 E. R.	20 0 E. R.	22 0 E. R.
<u>N. 41 E. 254.</u>	<u>S. 87 30 W. 8.</u>	<u>S. 89 30 W. 8.</u>

Nos.	C. Co.	Speed.	D. Lat.		Dep.	
			N.	S.	E.	W.
D	N. 84½ E.	14	1.3	—	13.9	—
1	N. 32 E.	164	139.1	—	86.9	—
2	N. 39 E.	88	68.4	—	55.4	—
2'	N. 41 E.	254	191.7	—	166.6	—
C	S. 87½ W.	8	—	0.4	—	8.0
C'	S. 89½ W.	8	—	0.1	—	8.0
	N. 37½ E.	501.8	400.5	0.5	322.8	16.0
			0.5		16.0	
			<u>400.0</u>		<u>306.8</u>	

Lat. from	14°45.0 N.	Long. from	25°38.0 E.
D. Lat.	6 40.0 N.	D. Long.	322.4...5 22.4 E.
Lat. in	<u>21 25.0 N.</u>	Long. in	<u>31 0.4 E.</u>
	2)36 10		
M. Mid. Lat.	<u>18 5</u>		

答

Lat. in 21°25' N., Long. in 31°0.4' E.,
Co. made good N. 37½° E and Distance run 501.8 miles.

4.

答

D. Long. 373.6 or 6°13'36"

5.

15°30' E. = L.T. 1"2" = 1.0 —

N. Alm. 23rd March.

Decl.	Sem.
59.12	<u>16'4"</u>
1—	
<u>59.12—</u>	
0°59' 50.1+	
59.1—	
<u>R^d 0 58 51.0 N.</u>	

Orig. alt.	⊙ 49°23' 36"
I. Error	2 19+
Obs. alt.	⊙ 49 25 55
	11 20+
	4+
T. alt.	⊙ 49 37 19
	90
T. z ...	... 40 22 41 N.
Decl. ...	... 0 58 51 N.
Noon Lat.	<u>41 21 32 N.</u>

答

Noon Lat. 41°21'32" N.

6.

$$\begin{array}{r}
 29^{\circ} 15' \text{N.} \\
 33 \ 16 \text{N.} \\
 \hline
 4 \ 1 \\
 60 \\
 \hline
 \text{T.D. Lat. } \underline{241 \text{ N.}}
 \end{array}
 \qquad
 \begin{array}{r}
 1836.61 \\
 2118.63 \\
 \hline
 \text{M.D. Lat. } \underline{282.02 \text{ N.}}
 \end{array}$$

$$\begin{array}{r}
 2^{\circ} 10' \text{E.} \\
 0 \ 0 \\
 \hline
 2 \ 10 \text{W.} \\
 60 \\
 \hline
 \text{D. Long. } \underline{130 \text{ W.}}
 \end{array}$$

$$\begin{array}{r}
 \text{D. Long. } 130 \text{ W.} \\
 \text{M.D. Lat. } 282.02 \text{ N.} \\
 \text{T. Co. N. } 24^{\circ} 44' 52'' \text{ W.L.} \\
 \text{C. Error } 10 \ 15 \ 0 \ \text{E.R.} \\
 \text{C. Co. N. } \underline{14 \ 29 \ 52 \ \text{W.}}
 \end{array}
 \qquad
 \begin{array}{r}
 \text{Dist.} \\
 \text{T. D. Lat.} \\
 \hline
 = \tan \text{ Co.} \\
 = \sec \text{ Co.} \\
 \hline
 \text{Log. } 2.113943 \\
 \text{Log. } 2.450280 \\
 \text{Tan. } 9.663663 \\
 \underline{624} \\
 + 7'' = 39
 \end{array}$$

$$\begin{array}{r}
 \text{T.D. Lat. } 241 \text{ N.} \quad \dots \\
 \text{T. Co. N. } 24^{\circ} 44' 52'' \text{ W.} \\
 \text{Distance. } \underline{265.37} \dots
 \end{array}
 \qquad
 \begin{array}{r}
 \text{Log. } 2.382017 \\
 \text{Sec. } 0.041838 \\
 \text{Log. } 2.423855 \\
 \hline
 737 \\
 118
 \end{array}$$

答

T. Co. N. $24^{\circ} 44' 52'' \text{ W.}$, C. Co. N. $14^{\circ} 29' 52'' \text{ W.}$,

Distance 265.4 miles.

7.

$$\begin{array}{r}
 \text{S.A.T. Feb. } 10^{\text{d}} 4^{\text{h}} 12^{\text{m}} 0^{\text{s}} \\
 \quad \quad \quad 58 \text{ S} + \\
 \text{G.A.T. Feb. } 10^{\text{d}} 5 \ 10 \ 8 = \underline{5.2} +
 \end{array}$$

N. Alm. 10^{th} Feb.

$$\begin{array}{r}
 \text{Decl.} \\
 48.13 \\
 5.2 + \\
 \hline
 9626 \\
 24065 \\
 \hline
 250.276 + \\
 14^{\circ} 41' 28.78 - \\
 4 \ 10.3 + \\
 \hline
 \text{R}^{\text{d}} 14 \ 37 \ 18.5 \ \text{S.} \\
 \text{Lat. } 53 \ 25 \ 0 \\
 \text{T.A. W. } 25 \ 3 \ 34 \ \text{S.} \\
 \text{C.A. W. } 11 \ 15 \ 0 \ \text{N.} \\
 \text{C. Error } 36 \ 18 \ 34 \ \text{W.} \\
 \text{Var. } 10 \ 0 \ 0 \ \text{W.} \\
 \text{Dev. } \underline{46 \ 18 \ 34 \ \text{W.}}
 \end{array}
 \qquad
 \begin{array}{r}
 \text{sin. } 9.402154 \\
 \text{sec. } 0.224760 \\
 \text{sin. } 9.626914 \\
 \underline{895} \\
 + 4'' = 19
 \end{array}$$

答

T.A.W. $25^{\circ} 3' 34'' \text{ S.}$, Dev. $46^{\circ} 18' 34'' \text{ W.}$

8.

Chart, True.

- (a) C. Co. S. 63° W. ; Distance 52 miles;
Deviation 13° W.
- (b) Lat. $50^{\circ} 21' \text{ N.}$; Long. $28^{\circ} 42' \text{ W.}$;
- (c) Lat. $50^{\circ} 12' \text{ N.}$; Long. $28^{\circ} 15' \text{ W.}$;
Distance $17\frac{1}{2}$ miles.

9.

C.T. March 9^d 14^h 20^m 13^s
 O. Error $\frac{10\ 12-}{9\ 14\ 10\ 1} = .6$
 $\frac{14.8+}{14.2+} = 9.8-$

G.M.T. March 9 $\frac{14\ 10\ 15.8}{14.2+} = 9.8-$

S.W. 23 gives¹

D. lat. 16.3 N., Dep. 16.3 W.

Noon Lat.	24° 15' 0" N.	D. Long.	
D. Lat.	16 18 N.	10.98	
Sight Lat.	<u>24 31 18 N.</u>	6.59	
	2)48 46 18	0.33	
M. Mid. Lat.	<u>24 23 9</u>	<u>17.90 W.</u>	

Jan. 31
 " 28
 Feb. 9
37 days.
 1st. Error 10^m 31^s Fast.
 2nd Error 10 12 Fast.

$\frac{37)19.0}{0.5}$ Losing.
 Daily rate

Feb. 29
 " 9
 " 20
 Mar. 9.6
29.6
.5
14.80+

Orig. alt. \odot 23° 11' 15"
 I. Error $\frac{2\ 10+}{23\ 13\ 25}$
 Obs. alt. \odot $\frac{9\ 42+}{7+}$

T. alt. \odot $\frac{23\ 23\ 14}{90}$
 T. z. ... $\frac{66\ 36\ 46}{17.90\ W.}$

N. Alm. 10th March.

Decl.	58.75	Sem.	16' 7"	Eq. T. add to A.T.	.650
	<u>9.8-</u>				<u>9.8-</u>
	47000				5200
	<u>52875</u>				5850
	575.750-				<u>6.3700-</u>
	<u>4° 8' 0.9-</u>				10 ^m 28 ^s 76-
	9 35.7-				<u>6.37-</u>
	<u>R^d 4 17 36.6 S.</u>				<u>R^d 10 35.13</u>

ζ 24° 31' 18" N.
 d 4 17 37 S.
 z $\frac{66\ 36\ 46}{28\ 48\ 55}$
 $\frac{95\ 25\ 41}{37\ 47\ 51}$
 $\frac{47\ 42\ 50}{18\ 53\ 55}$

ζ 24° 31' 18" N.
 a $\frac{23\ 23\ 14}{94\ 17\ 37}$
 p $\frac{1\ 8\ 4}{95\ 25\ 41}$
 $\frac{93\ 9\ 33}{47\ 42\ 50}$
 $\frac{46\ 34\ 46}{18\ 53\ 55}$

0.041052
 0.001220
 9.869111
 9.510403
 9.421786
4
 0=2

0.041052
 0.037231
 9.869111
 9.861133
 9.808527
9
 -1''=2

ζ 24 $\frac{1}{2}$ ° N. & h 4^h 7^m + A .250
 d 4 $\frac{1}{4}$ S. & h 4 7 + B .084
T. Az. S. 73° E. + C .334

S.A.T. March 9^d 19^h 52^m 36^s 0
 Eq. T. $\frac{10\ 35.1+}{9^d\ 20\ 3\ 11.1}$
 S.M.T. March 9^d 20 3 11.1
 G.M.T. ,, 9^d 14 10 15.7
 L.T. $\frac{5\ 52\ 55.4}{88^{\circ}13'51''\ E.}$
 Sight Long. $\frac{17\ 54\ W.}{87\ 55\ 57\ E.}$
 D. Long.
 Noon Long.

T. Az. N. 106° 40' 29'' E.
 C. Az. N. 112 30 0 E.
 C. Error $\frac{5\ 49\ 31\ W.}{10\ 0\ 0\ W.}$
 Var. $\frac{15\ 49\ 31\ W.}{15\ 49\ 31\ W.}$
 Dev.

答

Sight Long. 88° 13' 51'' E.; Noon Long. 87° 55' 57'' E.;

T. Az. by Alt. Az. N. 106° 40' 29'' E.; and

by ABC Tables, S. 73° E.; Dev. 15° 49' 31'' W.

10.

30 ^d 11 ^h 55 ^m 7	31 ^d 0 ^h 21 ^m 7	30 ^d 11 ^h 55.7
19.0-	19.0-	31 ^d 12 48.0
30 11 36.7	31 0 2.7	Daily. Var. <u>52.3</u>
2.5+	3.5-	
30 11 39.2	30 23 59.2	Eq. T. + M.T.
7 15.0+	7 15.0+	3 ^m
30 18 54.2	31 7 14.2	Sem.
20.6+	20.6+	Noon 30 th
30 19 14.8	31 7 34.8	15' 8"
31 st 7 14.8 A.M.	31 st 7 34.8 P.M.	Midt. 30 th

答
中央標準時
31st 7^h 14^m 8^s A.M.; 7^h 34^m 8^s P.M.

Long.
135° 0' E.
129 51 E.
5 9
4
20^m 36^s +

第十五試驗問題. 678 頁.

1.

40496.6

2.

1257.07

3.

(1)	(1)	(2)
N. 73° 7' E. R. N.	S. 84° 23' E. L. S.	S. 11° 15' E. L.
30 0 E. R.	24 23 E. R.	7 34 E. R.
N. 103 7 E.	S. 60 0 E. 31.	S. 3 41 E. 36.
180		
<u>S. 76 53 E. 10.</u>		

(3)	(4)	(5)
S. 5° 37' W. R.	S. 11° 15' W. R.	S. 5° 37' E. L.
6 23 E. R.	7 11 E. R.	20 37 E. R.
<u>S. 12 0 W. 41.</u>	<u>S. 18 26 W. 43.</u>	<u>S. 15 0 W. 37.</u>

(6)	(C)
N. 84° 23' E. R.	S. 5° 37' E. L.
28 11 E. R.	10 0 E. R.
N. 112 34 E.	<u>S. 4 23 W. 36.</u>
180	
<u>S. 67 26 E. 37.</u>	

Nos.	T. Co.	Dist.	D. Lat.		Dep.	
			N.	S.	E.	W.
D	S. 77° E.	10	—	2.2	9.7	—
1	S. 60 E.	31	—	15.5	26.8	—
2	S. 4 E.	36	—	35.9	2.5	—
3	S. 12 W.	41	—	40.1	—	8.5
4	S. 18 W.	43	—	40.9	—	13.3
5	S. 15 W.	37	—	35.7	—	9.6
6	S. 67 E.	37	—	14.5	34.1	—
C	S. 4 W.	36	—	35.9	—	2.5
	S. 10° E.	224		220.7	73.1	33.9
					33.9	
					<u>39.2</u>	

Lat. from 22° 18.0' N.	Long. from 157° 54.0' W.
D. Lat. 3 40.7 S.	D. Long. 41.8 E.
Lat. in <u>18 37.3 N.</u>	Long. in <u>157 12.2 W.</u>
2) 40 55.3	10.675
M. Mid. Lat. <u>20 27.6</u>	3
	32.025
	9.61
	0.213
	<u>41.85</u>

答

Lat. in $18^{\circ}37'18''\text{N.}$; Long. in $157^{\circ}12'12''\text{W.}$;
T. Co. Made good $\text{S. } 10^{\circ}\text{E.}$; Distance 224 miles.

4.

答

Parallel Sailing—Distance 169 miles.

5.

Long. $168^{\circ}49'\text{E.} = \text{L.T. } 11^{\text{h}} 15^{\text{m}} 16^{\text{s}} = 11.2-$

N. Alm. May 15 th	
Decl.	Scm.
35.52	<u>15' 50''</u>
11.2-	
<u>7104</u>	
3552	
<u>3552</u>	
<u>397.824-</u>	
<u>18^{\circ}50' 51'' 4+</u>	
6 37.8-	
<u>R^d 18 44 13.6N.</u>	

Obs. alt. \odot $39^{\circ}30' 35''$
10 14+
10-

T. alt. \odot $39 40 39$
90

T. z. $50 19 21 \text{ S.}$

Decl. $18 44 14 \text{ N.}$

Lat. in $31 35 7 \text{ S.}$

答

Noon Lat. $31^{\circ}35'7'' \text{ S.}$

6.

T.D. Lat.	M.D. Lat.	D. Long.
$0^{\circ}15' \text{ N.}$	15.00	$6^{\circ}33' \text{ E.}$
$7 56 \text{ S.}$	477.53	$14 25 \text{ W.}$
<u>8 11</u>	<u>492.53 S.</u>	<u>20 58 W.</u>
60		60
<u>T.D. Lat. 491 S.</u>		<u>1258 W.</u>

D. Long.	= tan. Co.	Dist.	= sec. Co.
M.D. Lat.		T.D. Lat.	

D. Long.	1258 W.	... log.	3.099681
M.D. Lat.	492.53 S.	... log.	2.692433
T. Co. S.	$68^{\circ}37' 7'' \text{ W.R.}$	... tan.	10.407248
C. Error.	2 0 0 E.L.		02
C. Co. S.	<u>$66^{\circ}37' 7'' \text{ W.}$</u>		<u>+7'' = 46</u>

T.D. Lat.	491 S.	... log.	2.691081
T. Co. S.	$68^{\circ}37' 7'' \text{ W.}$	sec.	0.438214
Distance.	1346.8 miles.	... log.	3.129295
			045
			250
			226
			<u>240</u>

答

T. Co. $\text{S. } 68^{\circ}37'7''\text{W.}$; C. Co. $\text{S. } 66^{\circ}37'7''\text{W.}$;

Distance 1346.8 miles.

7.

S.A.T. May $30^{\text{d}} 7^{\text{h}} 15^{\text{m}} 50^{\text{s}}$

L.T. $2 16 44+$

G.A.T. May $30^{\text{d}} 9 32 34 = 9.5+$

N. Alm. 30th May.

	Decl.
	22.39
	9.5 +
	<u>11195</u>
	20151
	<u>212.705 +</u>
	3' 32.7 +
	<u>21°45' 42.9 +</u>
	3 32.7 +
R ^d 21°49' 15.6 N.	sin. 9.570202
Lat. 40 10 0	sec. 0.116809
T.A. W. 29 6 20 N.	sin. 9.687011
C.A. W. 36 33 45 N.	6993
C. Error 7 27 25 W.	<u>+ 5" = 18</u>
Var. 26 0 0 E.	
Dev. 18 32 35 E.	

答

T.A.W. 29° 6' 20" N.; C. Error 7° 27' 25" W.;
Dev. 18° 32' 35" E.

8.

答

- (a) C. Co. N. 13° E., Distance 41½ miles;
Dev. 10° E.
- (b) Lat. 50° 34' 30" N.; Long. 6° 41' 30" W.
- (c) Lat. 50° 9' 30" N.; Long. 5° 3' 30" W.;
Distance from E 14½ miles.

9.

Approx. S.M.T. May 18 th 3 ^h 45 ^m 0 ^s	
L.T.	1 12 48 -
" G.M.T.	<u>18th 2 32 12</u>
C.T. May 18 th 2 ^h 15 ^m 18 ^s	Feb. 29
2 nd Error 13 33 +	26
18 2 28 51 = 1	" 3
2 40 -	Mar. 31
Correct G.M.T. 18 th 2 26 11	Ap. 6
	40 days.
Obs. alt. ⊖ 35° 25' 15"	1 st Error 16 ^m 5 ^s slow.
21 46 -	2 nd Error 13 33 "
10 +	2 32
T. alt. ⊕ 35 3 39	60
90	40) 152
T. z. 54 56 21	<u>3.8 gaining.</u>
	Ap. 30
	6
	" 24
	May. 18.1
	42.1
	3.8
	<u>3368</u>
	1263
	159.98
	<u>2^m 39.98 -</u>

N. Alm. 18th May.

Decl.	Sem.	Eq. T. - A.T.
33.08	<u>15' 50"</u>	.089
2.4 +		2.4 +
<u>13232</u>		356
6616		178
<u>79.392 +</u>		<u>2136 +</u>
1' 19.4 +		3 ^m 44.40
19° 32 4.3 +		0.21 +
<u>R^d 19 33 23.7 N.</u>		<u>R^d 3 44.61</u>

z 56°20' 0''N.	0.256208
d 19 33 24 N.	0.025806
z 54 56 21	9.855891
36 46 36	9.198202
91 42 57	9.336107
18 9 45	113
45 51 28.5	<u>-1=6</u>
9 4 52.5	

S.A.T. May 18^d 3^h 42^m 0^s
 Eq. T. 3 44.6—
 S.M.T. May 18^d 3 38 16.3
 G.M.T. May 18^d 2 26 11.0
 L.T. 1 12 5.3
 Sight Long. 18° 1' 19'' E.

答

Sight Long. 18°1'19''E.

10.

S.M.T. April 17^d 21^h 10^m 0^s
 11 34 44+
 G.M.T. April 18^d 8 44 44. = 8.7+

N. Alm. 18th April.

Decl.	Sem.	Eq. T.—A.T.
52.38	15' 57"	.568
8.7+		8.7+
36666		3976
41904		4544
455.706+		4.9416+
10°47' 50''6+		0 ^m 36 ^s 84+
7 35.7+		4.94+
R ^d 10 55 26.3 N.		R ^d 0 41.78
90		
<u>p 79 4 34</u>		

第十六試驗問題. 681 頁.

1.

答

1799995.8

2.

答

14.94

3.

(D)

S. 67°30' W.R.
 9 0 W.L.
S. 58 30 W.R. 11.
S. 58 W. 11.

(1)

N. 78°45' W.L.
 14 37 W.L.
N. 93 22 W.
 180
S. 86 38 W. 38.
S. 86 W. 38.

(2)

N. 70°19' W.L.
 13 49 W.L.
N. 84 8 W.
N. 84 W. 37.

(3)

N. 11°15' W.L.
 34 37 W.L.
N. 45 52 W.
N. 46 W. 40.

(4)

N. 45° 0' E.R.
 39 49 W.L.
N. 5 11 E.
N. 5 E. 41.

(5)

N. 33°45' E.R.
 29 23 W.L.
N. 4 22 E.
N. 4 E. 42.

(6)

N. 8°26' E.R.N.
 22 34 W.L.
N. 14 8 W.
N. 14 W. 39.

(C)

N. 11°15' E.R.
 24 0 W.L.
N. 12 45 W.
N. 13 W. 30.

Nos.	T. Co.	Dist.	D. lat		Dep.	
			N.	S.	E.	W.
D	S. 58 W.	11	—	5.8	—	9.3
1	S. 86 W.	38	—	2.7	—	37.9
2	N. 82 W.	37	5.1	—	—	36.6
3	N. 46 W.	40	27.8	—	—	28.8
4	N. 5 E.	41	40.8	—	3.6	—
5	N. 4 E.	42	41.9	—	2.9	—
6	N. 14 W.	39	37.8	—	—	9.4
C	N. 13 W.	30	29.2	—	—	6.7
	<u>N. 35 W.</u>	212½	182.6 8.5 <u>174.1</u>	8.5	6.5	128.4 6.5 <u>121.9</u>

Lat. from 38°48.0' N. D. long. Long. from 9°32' 0" E.
 D. Lat. 2 54.1 N. 13.10 D. long. 2 38.4 W.
 Lat. in 41 42.1 N. 10 Long. in 6 53.6 E.
 2)80 30.1 131.00
 M. Mid. lat. 40 15.0 26.20
 1.17
 158.37 W.

答

Lat. in 41°42' 1" N., Long. in 6°53' 6" E.
 T. Co. made good N. 35° W., distance 212½ miles.

4.

答

Parallel Sailing—D. Long. 189' 1, or 3° 9' 6".

5.

Long. 21° 3' W. = L.T. 1^h 24^m 12^s = 1.4 +

N. Alm. 4th June. G.A.N.

Decl. Sem.
 17° 59 15' 47"
 1.4+
 7036
 1759
 24,626+
 22° 25' 43" 6+
 24.6+
R^d 22 26 8.2 N.

Obs. alt. @ 69° 18' 45"
 10 52+
 13-

T. alt. @ 69 29 24
 90

T. z. 20 30 36 S.
 Decl. 22 26 8 N.
 Noon Lat. 1 55 32 N.

答

Noon Lat. 1° 55' 32" N.

6.

T.D. Lat.	M.D. Lat.	D. Long.
25° 39' S.	1593.14 S.	45° 7' E.
6 47 S.	407.95 S.	105 13 E.
18 52 N.	<u>1185.19 N.</u>	60 6 E.
60		60
<u>1132 N.</u>		<u>3606 E.</u>

<u>D. Long.</u> M.D. Lat.	=tan. Co.	<u>Dist.</u> T.D. Lat.	=sec. Co.														
D. Long. 3606.00	E.	Log. 3.557026															
M.D. Lat. 1185.19	N.	Log. 3.073788															
T. Co. N. 71°48'21" E.	R.	Tan. 10.483238															
C. Error. 0 0 0		197															
C. Co. N. 71 48 21 E.		<u>+6"=41</u>															
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">T.D. Lat. 1132.00 N.</td> <td style="width: 50%;">Log. 3.053846</td> </tr> <tr> <td>T. Co. N. 71°48'21" E.</td> <td>Sec. 0.505515</td> </tr> <tr> <td>Distance <u>3625.44</u> ...</td> <td>Log. 3.559361</td> </tr> <tr> <td></td> <td style="text-align: right;">08</td> </tr> <tr> <td></td> <td style="text-align: right;">53</td> </tr> <tr> <td></td> <td style="text-align: right;">48</td> </tr> <tr> <td></td> <td style="text-align: right;"><u>50</u></td> </tr> </table>				T.D. Lat. 1132.00 N.	Log. 3.053846	T. Co. N. 71°48'21" E.	Sec. 0.505515	Distance <u>3625.44</u> ...	Log. 3.559361		08		53		48		<u>50</u>
T.D. Lat. 1132.00 N.	Log. 3.053846																
T. Co. N. 71°48'21" E.	Sec. 0.505515																
Distance <u>3625.44</u> ...	Log. 3.559361																
	08																
	53																
	48																
	<u>50</u>																

答

C. Co. N. 71°48'21" E., Distance 3625.4 miles.

7.

S.A.T. June 7 ^d 19 ^h 45 ^m 12 ^s
L.T. 3 20 12-
G.A.T. June 7 ^d 16 25 0
16.4+ = <u>7.6-</u>

N. Alm. 8th June, G.A.N.

Decl.
13".63
<u>7.6-</u>
8178
9541
<u>103.588-</u>

	22°50'43"0+	
	1 43.6-	
	<u>R^d 22 48 59.4 N.</u>	sin. 9.588585
Lat.	47 3 0 S.	sec. 0.166623
T.A. E.	34 41 21 N.	... sin. 9.755208
C.A. E.	47 48 45 N.	189
C. Error.	13 7 24 E.	<u>+6"=19</u>
Var.	30 0 0 W.	
Dev.	<u>16 52 36 W.</u>	

答

T.A.E. 34°41'21" N., C. Error 13°7'24" E.

Deviation 16°52'36" W.

8.

答

- (a) C. Co. S. 20½° W.; Dist. 62 miles; Dev. 7½° W.
 (b) Lat. 51°54' N.; Long. 175°20' W.
 (c) Lat. 51°28' N.; Long. 175°43' W.;

Distance 17 miles.

9.

C.T. June 5 ^d 13 ^h 23 ^m 53 ^s 0	Feb. 29
2 nd Error 1 37.0-	24
5 ^d 13 22 16.0	"
2 52.8-	5
5 ^d 13 19 23.2=5	Mar. 31
1.6-	Ap. 12
	<u>48 days.</u>
G.M.T. June 5 ^d 13 19 21.6	
13.3+ = <u>10.7-</u>	

1 st Error 0 ^m 58 ^s slow.	Orig. alt. \odot 29°15' 20"
2 nd Error 1 37 fast.	I.E. 2 38-
2 35	29 12 42
60	10 43+
48)155	13-
3.23 gaining.	T. alt. \odot 29 23 12
Ap. 30	90
12	T. z. 60 36 48
Ap. 18	
May. 31	
June 5	
5 4	
3.2	
10 8	
162	
172.8 = 2 ^m 52 ^s -	
.5	
3.2	
1 0	
1 5	
1.6 0-	

N. Alm. 6th June G.M.N.

Decl.	Sem.	Eq. T. sub. from A.T.
15' 62	15' 47"	0.446
10.7 -		10.7 -
10934		3122
1562		446
167.134 -		4.7722 -
22°39' 1.2 +		1 ^m 36 ^s 23 -
2 47.1 -		4.77 -
<u>22 36 14.1 N.</u>		<u>R^d 1 41.00</u>

l 16 20 0 S.	l 16 20 0 S.
d 22 36 14 N.	a 29 23 12
s 60 36 48	p 112 36 14
38 56 14	13 3 12
99 33 2	125 39 26
21 40 34	99 33 2
49 46 31	62 49 43
10 50 17	49 46 31
0.017891	0.017891
0.034712	0.059818
9.882819	9.949217
9.274236	9.882819
9.209658	9.909745
33	52
-.3 = 25	-7" = 7

S.A.T. June 5 ^d 20 ^h 50 ^m 5 ^s 7	T. Az. S. 128°39' 38" E.
Eq. T. 1 41.0 -	C. Az. S. 135 0 0 E.
S.M.T. June 5 ^d 20 48 24.7	C. Error 6 20 22 E.
G.M.T. June 5 13 19 21.6	Var. 4 10 0 W.
L.T. 7 29 3.1	Dev. 2 10 22 E.
Sight Long. 112°15' 46" E.	

答

Sight Long. 112°15' 46" E.; Dev. 2°10' 22" E.

10.

Approx. S.M.T. June 5 ^d 20 ^h 6 ^m 0 ^s	8 42 12 -
Approx. G.M.T. June 5 ^d 11 23 48	
Correct G.M.T. June 5 ^d 11 ^h 24 ^m 7 ^s	11.4 +
" " 5 ^d 11 24 7.0	
Eq. T. 1 41.8 +	
" G.A.T. June 5 ^d 11 25 48.8	
L.T. 8 42 12.0 +	
" S.A.T. " 5 ^d 20 8 0.8	
h...3 51 59.2	

N. Alm. 5th June, **G.M.N.**

Decl.	Eq. T. + M. T.
16 ^h 61	0.432
11.4+	11.4+
6644	1728
1661	432
1661	432
189.354+	4.9248+
22°32'34''5+	1 ^m 46 ^s 77-
3. 9.3+	4.92+
R ^d 22 35 43. S.N.	R ^d 1 41.85

l 44°44' **N.** & h 3^h52^m... + **A.619**
 d 22 36 **N.** ,, ... - **B.491**
 T. Az. **S. 85° 0' E.** ... + **C.128**
C. Az. S. 92 49 E.
 C. Error 7 49 **E.**
 Var. 5 0 **E.**
 Dev. 12 49 **E.**

11.

Oct. 30 ^d 16 ^h 15 ^m 6	31 ^d 4 ^h 46 ^m 3	30 ^d 16 ^h 15 ^m 6
27.0-	24.0-	29 15 13.6
30 15 48.6	31 4 19.3	Daily Var. 62.0
1 7.0-	1 11.0-	Eq. T. 16 ^m + M.T.
30 14 41.6	31 3 8.3	Sem. midt. 30 th
5 40.0+	5 40.0+	16' 3"
30 ^d 20 21.6	31 ^d 8 48.3	Sem. Noon 31 st
15.6-	15.6-	16' 5"
30 ^d 20 6.0	31 ^d 8 32.7	138°54' E.
31 st 8 ^h 6 ^m A.M.	31 st 8 ^h 32 ^m 7 ^s P.M.	135 0 E.
		3 54 = 15 ^m 36 ^s -

答

中央標準時

31st8^h6^m0 **A.M.** & 31st8^h32^m7 **P.M.**

第十七試驗問題. 684 頁.

1.

答

522484.3

2.

答

6.7152

3.

答

True Courses **N. 15° E. 8; N. 52° W. 28; N. 53° W. 25;**
N. 56° W. 29; N. 49° W. 33; N. 53° W. 36; N. 31° W. 37;
W. 36.

D. Lat. 131.1 **N.**; Dep. 172.8 **W.**; Lat. in 7°39' **S.**

D. Long. 175'; Long. in 167°25' **E.**; Course

N. 53° W.; Distance 217 miles.

4.

答

D. Long. 96'5 or 1°36'30"

5.

Long. $175^{\circ}39' E = L.T. 11^h 7^-$

N. Alm. 23rd. July G.A.N.

Decl. $20^{\circ} 6' 43'' 6^-$ h. v. $30' 57$ Sem. $15' 46''$

$5 57.7^-$ 11.7^-

<u>R^d 20 12 41.3 N.</u>	21399
	3057
	3057
	357.669-
	<u>5'57'7-</u>

Orig. alt. $\odot 66^{\circ}10' 37''$

I. Error 0 30-

Obs. alt. $\odot 66 10 7$

21 17-

14+

T. alt. $\odot 66 49 4$

90

T. z. 24 10 56 N.

Decl. 20 12 41 N.

Noon Lat. 44 23 37 N.

答

Noon Lat. $44^{\circ}23'37'' N.$

6.

T. D. Lat.	M. D. Lat.	D. Long.
48°50' S.	3366.87	178°50' E.
13 38 S.	825.83	76 28 W.
<u>35 12 N.</u>	<u>2541.04 N.</u>	255 18 W.
60		360
<u>2112 N.</u>		104 42 E.
		60
		<u>6282 E.</u>

D. Long. = Tan. Co.
M. D. Lat.

Dist. = Sec. Co.
T. D. Lat

D. Long. 6282 E.

Log. 3.798098

M. D. Lat. 2541.04 N.

Log. 3.405006

T. Co. N. 67°58'38" E.

Tan. 10.393092

45

+8" = 47

T. Co. N. 67°58'38" E. ... Sec. 0.425997

T. D. Lat. 2112 miles ... Log. 3.324694

Distance 5632.4 miles Log. 3.750691

63

28

23

5

答

T. Co. N. 67°58'38" E., Distance 5632.4 miles.

(本問題ノ羅針路ハ眞針路ノ誤リト知ルベシ)

7.

S. A. T. July 6^d 4^h 6^m 40^s

L. T. 10 42 40-

G. A. T. July 5^d 17 24 0

17.4+ = 6.6-

N. Alm. 6th July G.A.N.

Decl. $22^{\circ}42' 55'' 0^-$

h. v. 14' 94

1 38.6-

6.6-

R^d 22 44 33.6

8964

8964

98.604-

1'38'6-

T.A.W.	36°40' 37" N.	Sin.	9.587254
C.A.W.	22 30 0 N.	Sec.	0.188939
C. Er.	14 10 37 E.	Sin.	9.776193
Var.	12 50 0 W.		74
Dev.	1 20 37 E.		+7" = 19

8.

答

- (a) C. Co. N. 26° W.; Distance 45½ miles;
Dev. 14° W.
- (b) Lat. 50°18' N.; Long. 9°30' W.
- (c) Lat. 50°30' N.; Long. 9°19' W.;
Distance 13 miles.

9.

C.T. July	8 ^d 3 ^h 43 ^m 12 ^s	May 31
Error	23 30 -	17
	8 ^d 3 19 42 = .1	May 14
	3 18 +	June 30
G.M.T. July	8 ^d 3 23 0	July 8.1
	3.4 +	52.1
		3.8
Noon Lat.	23° 10' 0" N.	4168
	18 0 N.	1563
Sight Lat.	23 28 0 N.	197.98
		3 ^m 17 ^s 98

16.89	Decl.	Obs. alt. ⊙	37° 57' 30"
3.4 +	22° 30' 12" 4 -		10 29 +
6756	57.4 +		15 -
5067	R ^d 22 29 15.0 N.	T. alt. ⊙	38 7 44
57.426			90
		T. z.	51 52 16

23° 28' 0" N.	0.037492
22 29 15 N.	0.034345
51 52 16	9.648385
0 58 45	9.633122
52 51 1	9.353344
50 53 31	59
26 25 30	+ .3 = 15
25 26 45	

S.A.T. July 7 ^d 20 ^h 13 ^m 8 ^s 3
Eq. T. 4 48.7 +
S.M.T. July 7 ^d 20 17 57.0
G.M.T. July 8 ^d 3 23 0.0
L.T. 7 5 3.0
Sight Long. 106° 15' 45" W.
D. Long. 0 0 0
Noon Long. 106° 15' 45" W.

答

Noon Long. 106° 15' 45" W.

10.

Approx. S.M.T. July 24 ^d 21 ^h
L.T. 6 +
Approx. G.M.T. July 25 ^d 3 ^h
C.T. July 25 ^d 3 ^h 30 ^m 45 ^s
5 35 -
G.M.T. July 25 ^d 3 25 10 = 3.4 +
Eq. T. 6 19 -
G.A.T. July 25 ^d 3 18 51
L. T. 6 16 56 -
S.A.T. July 24 ^d 21 1 55
24
h ... 2 58 5

N. Alm. 25th July, G.M.N.

Decl.	Sem.	Eq. T. + A.T.
32 ^m 22	<u>15' 46"</u>	0:028
3.4+		3.4+
<u>12888</u>		<u>112</u>
9666		84
<u>109.548+</u>		<u>.0952+</u>
19°41' 39 ^m 8-		6 ^m 18 ^s 96+
1 49.5+		.09+
R ^d 19 39 50.3 N.		R ^d 6 19.05
<u>p 109 39 50</u>		

Obs. alt. @ 14° 2' 40"
8 29+
14-
T. alt. @ <u>14 10 55</u>

Alt-Azimuth.

z 44° 19' 0" S.	0.145397
a 14. 10 55	0.013442
<u>p 109 39 50</u>	<u>9.972707</u>
30 8 5	9.805931
<u>139 47 55</u>	<u>9.937477</u>
79 31 45	80
69 53 57	<u>-4" = 3</u>
39 45 52	

φ S.	137° 2' 26" E.
C. Az. S.	143 26 15 E.
C. Er.	6 23 48 E.
Var.	19 20 0 W.
Dev.	<u>12 56 12 W.</u>

ABC Table Method.

z 44° 20' S. & h 2 ^h 58 ^m ...	+A .995
a 19 40 N. & " ...	+B .510
φ N. 42° 54' E. ...	+C 1.505
C. N. 36 34 E.	
C. Er. 6 20 E.	
Var. 19 20 W.	
Dev. <u>13 0 W.</u>	

11.

Jan. 9 ^d 17 ^h 8 ^m 9	10 ^d 5 ^h 30 ^m 9	9 ^d 17 ^h 8 ^m 9
17.0-	17.0-	10 17 52.8
9 16 51.9	10 5 13.9	Daily Var. <u>43.9</u>
1 9.0-	1 8.0-	Sem. 9 th Midt.
9 15 42.9	10 4 5.9	<u>15' 46"</u>
5 41.0+	5 41.0+	Sem. 10 th Noon
9 21 23.9	10 9 46.9	<u>15' 39"</u>
19.1-	19.1-	Eq. T. 7 ^m - M.T.
9 ^d 21 4.8	10 ^d 9 27.8	<u>139° 46' E.</u>
<u>10th 9^h 4^m8 A.M.</u>	<u>10th 9^h 27^m8 P.M.</u>	<u>135 0 E.</u>
		4 46
		4
		<u>19^m 4"</u>

答

中央標準時

10th 9^h 4^m8 A.M. & 10th 9^h 27^m8 P.M.

第十八試驗問題. 687 頁.

1.

答

182000

2.

答

90.96

3.

答

True Courses **N. 80° W. 11**; **S. 83° W. 26**;
S. 85° W. 25; **S. 84° W. 25**; **N. 55° W. 29**;
N. 27° W. 30; **N. 21° W. 32**; **S. 79° W. 30**;
 D. Lat. 61.4 **N.**; Dep. 164.7 **W.**; Lat. in 13°24' **S.**
 D. Long. 170' **W.**; Long. in 10°35' **W.**;
T. Co. N. 70° W.; Distance 175 miles.

4.

答

D. Long. 313' or 5°13'.

5.

Long. 95°33' **E.** = **L.T. 6^h22^m12^s - = 6^h4-**

N. Alm. 6^h Aug. **G.A.N.**

Decl.	Sem.
41'21	15'48"
6.4--	
16484	
24726	
263.744-	
16°44'43".4-	
4 23.7-	
<u>R^d16 49 7.1 N.</u>	

Orig. alt.	⊙ 49°40'25"
	1 35+
Obs. alt.	⊙ 49 42 0
	10 15+
	12-
T. alt.	⊙ 49 52 3
	90
T. z.	40 7 57 S.
Decl.	16 49 7 N.
Lat.	<u>23 18 50 S.</u>

答

Lat. at Noon 23°18'50" **S.**

6.

38°42' N.	2521.82	9°8' W.
17 12 N.	1047.86	25 6 W.
21 30	<u>1473.96 S.</u>	15 58
60		60
<u>1290 S.</u>		<u>958 W.</u>

D. Long.	= Tan. Co.	Dist.	= Sec. Co.
<u>M.D. Lat.</u>		<u>T.D. Lat.</u>	

D. Long. 958 W.	... ..	Log. 2.981366
<u>M.D. Lat. 1473.96 S.</u>		Log. 3.168486
T. Co. S. 33° 1' 19" W.R.		Tan. 9.812880
C. Er. 17 15 0 W.L.		63
C. Co. S. 15 46 19 W.		+4" = 17

T.D. Lat. 1290 S.	Log. 3.110590
T. Co. S. 33° 1' 19" W.	Sec. 0.076516
Distance <u>1538.5 miles</u>	Log. 3.187106
	6956
	150

答

C. Co. S. $15^{\circ}46'19''$ W., Distance 1538.5 miles.

7.

Approx. S.A.T. Aug. $1^d 7^h 6^m 0^s$ 新表 35 頁L.T. $11 57 28-$,, G.A.T. July. $31^d 19 8 32$ C.T. July. $31^d 19 7 4$ Error. $11 57 28+$ Correct S.A.T. Aug. $1^d 7 4 32$ L.T. $11 57 28-$ Correct G.A.T. July. $31^d 19 7 4 = 19.1+ = 4.9-$ N. Alm. 1^{st} Aug. G.A.N.

Decl.

 37.66 $4.9-$ 33894 15064 $184.534-$ $18^{\circ} 3' 38'' 6-$ $3 4.5-$ $R^d 18 6 43.1 \dots \sin. 9.492585$ Lat. $41 19 0 \dots \sec. 0.124318$ T.A. W. $24 27 2 \text{ N.} \dots \sin. 9.616903$ C.A. W. $33 45 0 \text{ N.} \dots 894$ C. Error $9 17 58 \text{ W.} \dots + 2'' = 9$ Var. $11 0 0 \text{ E.}$ Dev. $1 42 2 \text{ E.}$

答

T.A.W. $24^{\circ}27'2''$ N., C. Error $9^{\circ}17'58''$ W.Dev. $1^{\circ}42'2''$ E.

8.

答

(a) C. Co. N. 38° W.; Distance 49 miles;Dev. 18° W.(b) Lat. $50^{\circ}27\frac{1}{2}'$ N.; Long. $160^{\circ}21'$ W.(c) Lat. $50^{\circ}52'$ N.; Long. $160^{\circ}31'$ W.

Distance 3 miles.

9.

Approx. S.M.T. Aug. $11^d 3^h 15^m 0^s$ L.T. $11 30 24-$ Approx. G.M.T. Aug. $10^d 15 44 36$ Chronometer T. Aug. $10^d 15^h 34^m 52^s 0$ Orig. Error $18 39.0+$ Approx. G.M.T. Aug. $10^d 15 53 31.0 = .7$ A.R. $4 35.7-$ Correct G.M.T. Aug. $10^d 15 48 55.3$ $15.8+ = 8.2-$

June 30

 1

June 29

July 31

Aug. 10.7

 70.7 days. 3.9 6363 2121 275.73 $4^m 35^s 7-$ N. Alm. 11^{th} Aug. G.M.N.

Decl.

Sem.

Eq. T + A.T.

 44.45 $15' 48''$ 0.387 $8.2-$ $8.2-$ 8890 774 35560 3096 $364,490-$ $3,1734-$ $15^{\circ}19' 4.3-$ $5^m 4^s 54-$ $6 4.5-$ $3.17-$ $R^d 15 25 8.8 \text{ N.}$ $R^d 5 7.71$

Noon Lat. $28^{\circ}20'0''S.$	D. Long. 11.36
D. Lat. 0 0 0	5.68
Sight Lat. <u>$28^{\circ}20'0''S.$</u>	<u>$17.04 W.$</u>

Obs. alt. \odot $25^{\circ}44'25''$
10 11+
12-
T. alt. \odot $25^{\circ}54'24''$
90
T. \therefore <u>$64^{\circ}5'36''$</u>

z $28^{\circ}20'0''S.$	0.055418
d $15^{\circ}25'9''N.$	0.015920
\therefore $64^{\circ}5'36''$	9.907532
43 45 9	9.246928
<u>107 50 45</u>	<u>9.225798</u>
20 20 27	756
53 55 22	<u>$+ .6 = 42$</u>
10 10 13	

S.A.T. Aug. $11^d 3^h 13^m 41.6$
Eq. T. 5 7.7+
S.M.T. Aug. $11^d 3^h 18^m 49.3$
G.M.T. Aug. $10^d 15^h 48^m 55.3$
L.T. 11 29 54.0
Sight Long. $172^{\circ}28'30''E.$
D. Long. 17 2W.
Noon Long. <u>$172^{\circ}11'29''E.$</u>

答

Noon Long. $172^{\circ}11'29''E.$

10.

S.M.T. Aug. $26^d 3^h 53^m 19''$
L.T. 9 22 52-
G.M.T. Aug. $25^d 18^h 30^m 27'' = 5.5-$
Eq. T. 1 50-
G.A.T. Aug. $25^d 18^h 28^m 37''$
L.T. 9 22 52+
S.A.T. Aug. <u>$26^d 3^h 51^m 29''$</u>

N. Alm. Aug. 26^d G.M.N.

Decl.	Sem.	Eq. T. - M.T.
52.12	<u>$15'51''$</u>	0.700
5.5-		5.5-
<u>26060</u>		<u>3500</u>
26060		35
<u>286.660</u>		<u>3.8500-</u>
$10^{\circ}27'46''3-$		$1^m 15.7600-$
4 46.7-		$R^d 1^m 19.761$
<u>$R^d 10^{\circ}32'33.0''N.$</u>		

Obs. alt. \odot $31^{\circ}39'19''$
10' 39+
9-

T. alt. \odot $31^{\circ}49'49''$

By Alt-Azimuth Method.

z $32^{\circ}39'0''N.$	0.074697
a $31^{\circ}49'49''$	0.070773
p <u>$79^{\circ}27'27''$</u>	9.809317
0 49 11	9.801840
<u>80 16 38</u>	<u>9.756632</u>
78 38 16	29
40 8 19	<u>$+ 2'' = 3$</u>
39 19 8	

ϕ N. $98^{\circ} 9' 47''$ W.
 C.N. $112\ 30\ 0$ W.
 C. Error $14\ 20\ 13$ E.
 Var. $2\ 30\ 0$ E.
 Dev. $16\ 50\ 13$ E.

By ABC Table Method.

$732^{\circ} 40' 0''$ N. & $h\ 3^h 51^m 5$... +A.403
 $d\ 10^{\circ} 32\frac{1}{2}' 30$ N. & $h\ 3^h 51^m 5$... -B.220
 ϕ S. $81^{\circ} 14'$ W. +C.183
 C.S. $67\ 30$ W.
 C. Er. $13\ 44$ E.
 Var. $2\ 30$ E.
 Dev. $16\ 14$ E.

11.

Feb. 22 ^d 15 ^h 44 ^m 6	23 ^d 4 ^h 7 ^m 9	23 ^d 4 ^h 7 ^m 9
18.0-	18.0-	22 ^d 3 22.0
22 ^d 15 26.6	23 ^d 3 49.9	Daily Var. <u>45.9</u>
53.0-	58.0-	Sem.
22 ^d 14 33.6	23 ^d 2 51.9	22 nd midt.
5 24.0+	5 24.0+	<u>15' 32''</u>
22 ^d 19 57.6	23 ^d 8 15.9	Eq. T. <u>14^m - M.T.</u>
18.7-	18.7-	139 ^o 40' E.
22 ^d 19 38.9	23 ^d 7 57.2	135 0 E.
<u>23rd 7^h 38^m 9 A.M.</u>	<u>23rd 7^h 57^m 2 P.M.</u>	4 40
		4
		<u>18^m 40^s -</u>

答

中央標準時

23rd 7^h 38^m 9 A.M. & 7^h 57^m 2 P.M.

第十九試驗問題. 690 頁.

1.

答

86070

2.

答

9.943

3.

答

True Courses N. 82° W.9; N. 31° W. 162;

N. 30° W. 164; N. 33° W. 20.5; N. 32° W. 145.5;

S. 20° W. 28.

D. Lat. 396.5 N.; Dep. 272.2 W.; Lat. in

$42^{\circ} 53'$ S.; D. Long. $6^{\circ} 32'$ W.; Long. in

$69^{\circ} 12' 24''$ E.; Course N. $34\frac{1}{2}^{\circ}$ W.; Distance

479 miles.

4.

答

D. Long. 131.9, or $2^{\circ} 11' 54''$

5.

Long. $31^{\circ}19' W. = L.T. 2^h 5^m 16^s = 2.1 +$ N. Alm. 22nd Sept. **G.A.N.**

Decl.	Scm.
58.40	15' 58"
<u>2.1 +</u>	
5840	
11680	
<u>122.640 +</u>	
0°21' 40" 4-	
2 2.6 +	
<u>0 19 37.8 N.</u>	

Orig. alt. @ $60^{\circ}43' 25''$ **I. E.** 1 35 -Obs. alt. @ $60^{\circ}41' 50''$
11 21 +
2 -T. alt. @ $60^{\circ}53' 9''$
90T. s. ... $29^{\circ} 6' 51'' N.$ Decl. ... $0^{\circ} 19' 38'' N.$ Lat. ... $29^{\circ} 26' 29'' N.$

答

Noon Lat. $29^{\circ}26'29'' N.$

6.

T.D. Lat.	M.D. Lat.	D. Long.
8°57' N.	539.20 N.	79°31' W.
37 42 S.	2445.47 S.	178 40 E.
46 39 S.	<u>2984.67 S.</u>	258 11 E.
60		360
<u>2799 S.</u>		101 49 W.
		60
		<u>6109 W.</u>

D. Long. 6109 W. ... Log. 3.785970

M.D. Lat. 2984.67 S. ... Log. 3.474897

T. Co. S. $63^{\circ}57' 41'' W.R.$ Tan. 10.311073C. Error 9 12 0 **W.L.** 17C. Co. S. $54^{\circ}45' 41'' W.$ +11" = 56T. Co. S. $63^{\circ}57' 41'' W.$... Log. 0.357559

T.D. Lat. 2799 S. ... Log. 3.447003

Distance 6376.2 miles. 3.804562

48

答

14

T. Co. S. $63^{\circ}57'41'' W.$, C. Co. S. $54^{\circ}45'41'' W.$;

Distance 6376.2 miles.

7.

S.A.T. Sept. 15^d 18^h 20^m 32^s

L.T. 0 21 40 +

G.A.T. Sept. 15^d 18 42 1218.7 = 5.3 -N. Alm. 16th Sept., **G.A.N.**

Decl.

57°.90

5.3 -

17370

28950

306.870 -

2°41' 21" 0 -

5 6.9 -

R^d 2 46 27.9 N. sin. 8.684880

Lat. 59 45 0 N. sec. 0.297764

T.A. E. 5 30 49 N. sin. 8.982644

C.A. E. 11 15 0 S. 3

C. Error 16 45 49 W. 1

Var. 28 0 0 E.

Dev. 11 14 11 E.

答

T.A.E. $5^{\circ}35'8''$ N.; Error $16^{\circ}45'49''$ W.;

Dev. $11^{\circ}14'11''$ E.

8.

答

(a) C. Co. S. 39° E.; Distance 48 miles;

Dev. 4° E.

(b) Lat. $50^{\circ}32'$ N.; Long. $9^{\circ}26'$ E.

(c) Lat. $50^{\circ}14'$ N.; Long. $9^{\circ}23'$ E.;

Dist. 13 miles.

9.

N. Alm. Sept. 22nd G.M.N.

Decl.	Scm.	Eq.T. + M.T.
58'40	<u>15' 58''</u>	0.877
5+		5+
<u>292.00+</u>		4.385+
0°21' 33'4-		7 13.77 +
4 52.0+		R ^d <u>7 18.15</u>
R ^d <u>0 16 41.4</u>		
p <u>89 43 19</u>		

Noon Lat. $50^{\circ}48' 0''$ N.
 D. Lat. 1 0 N.
 Sight Lat. 50 49 0 N.

C.T. Sept. 22 ^d 5 ^h 18 ^m 44 ^s	June. 30	1 st Er. $22^m 43^s$ fast
2 nd Error 0 19 55-	13	2 nd Er. <u>19 55 fast</u>
4 58 49 = .2	June. 17	2 48
A.R. 3 6.2+	July. 31	60
G.M.T. Sept. 22 ^d 5 1 55.2	48	48)168
Eq. T. 7 18.1+	Aug. 31	3.5 Losing
G.A.T. Sept. 22 ^d 5 9 13.3	Sept. 22.2	
	<u>53.2 days.</u>	

Obs. alt. @ $19^{\circ} 2' 0''$	53.2
8 43+	3.5
2-	<u>2660</u>
T. alt. @ $19 10 41$	1596
90	<u>186.20</u>
T. z. <u>70 49 19</u>	<u>306°2+</u>

$z 50^{\circ}49' 0''$ N.	$z 50^{\circ}49' 0''$ N.
$d 0 16 41$ N.	$a 19 19 41$
<u>$z 70 49 19$</u>	<u>$p 89 43 19$</u>
50 32 19	31 38 19
<u>121 21 38</u>	<u>121 21 38</u>
20 17 0	58 5 0
<u>60 40 49</u>	<u>60 40 49</u>
10 8 30	29 2 30
0.199418	0.199418
0.000005	0.024797
9.940467	9.940467
<u>9.245716</u>	<u>9.686140</u>
9.385606	9.850822
26	28
<u>-33=20</u>	<u>-4''=6</u>

S.A.T. Sept. 22 ^d 3 ^h 56 ^m 16 ^s 7	T. ϕ N. $114^{\circ}44' 41''$ W.
G.A.T. " " 5 9 13.3	C. N. <u>129 22 30 W.</u>
1 12 56.6 W.	C. Er. <u>14 37 49 E.</u>
Sight Long. $18^{\circ}14' 9''$ W.	Var. <u>5 12 0 W.</u>
D. Long. 51 42 W.	Dev. <u>9 25 49 E.</u>
Noon Long. <u>18 45 51 W.</u>	

∅ By ABC Tables,
 l $50^{\circ}50'N.$ & h 3^h56^m ... +A.738
 d $0^{\circ}17'N.$ -B.006
 ϕ $S. 65^{\circ}0'0''W.$... +C.732
C. S. 50 37 30 W.
C. Error 14 22 30 E.
 Var. $5\ 12\ 0\ W.$
 Dev. $9\ 10\ 30\ E.$

答

Sight Long. $18^{\circ}14'9''W.$; Noon Long. $18^{\circ}45'51''W.$;

Dev. by Alt-Azimuth $9^{\circ}25'9''E.$

Dev. by ABC Tables. $9^{\circ}10'30''E.$

10.

S.M.T. Sept. $22^d 3^h 13^m 20^s$
 L.T. $2\ 42\ 36+$
 G.M.T. Sept. $22^d 5\ 55\ 56 = 5.9+$

N. Alm. Sept. 22^d **G.M.N.**

Decl.	Sem.
58.40	<u>15' 58''</u>
5.9+	

52560
 29200
 $344.560+$
 $0^{\circ}21'33.4''N.$
 $5\ 44.6+$

$R^d\ 0\ 15\ 48.8\ N.$

Obs. alt. $\odot\ 32^{\circ}24'35''$
 $10\ 25+$
 $2-$

T. alt. $\odot\ 32\ 34\ 58$

l $32^{\circ}39'0''S.$ 0.074697
 a $32\ 34\ 58$ 0.074371
 p $90\ 15\ 49$ 9.850735
 $0\ 4\ 2$ 9.850227
 $90\ 19\ 51$ 9.850030
 $90\ 11\ 47$ 38
 $45\ 9\ 55$ $-6'' = 8-$
 $45\ 5\ 53$

∅ S. $114^{\circ}34'54''W.$

C. S. 87 11 15 W.

C. Error 27 23 39 E.

Var. $2\ 24\ 0\ E.$

Dev. $29\ 47\ 39\ E.$

答

∅ S. $114^{\circ}34'54''W.$; C. Error $27^{\circ}23'39''E.$;

Dev. $29^{\circ}47'39''E.$

11.

Aug. $13^d 13^h 15^m 4$	$14^d 1^h 41^m 4$	$13^d 0^h 48^m 5$
<u>17.0-</u>	<u>17.0-</u>	<u>14 1 41.4</u>
$13^d 12 58.4$	$14^d 1 24.4$	Daily Var. <u>52.9</u>
<u>15.0-</u>	<u>22.0-</u>	Eq. T. $5^m - M.T.$
$13^d 12 43.4$	$14^d 1 2.4$	Sem.
<u>10 15.0+</u>	<u>10 15.0+</u>	13^h Noon
$13^d 22 58.4$	$14^d 11 17.4$	<u>16' 41''</u>
<u>5.7-</u>	<u>5.7-</u>	13^h Midnt.
$13^d 22 52.7$	$14^d 11 11.7$	<u>16' 37''</u>
<u>$14^h 10^m 52^s 7$</u>	<u>$14^h 11 11.7\ P.M.$</u>	Long. $121^{\circ}25'E.$

答

西部標準時

$14^h 10^m 52^s 7\ A.M.$ & $14^h 11^m 11^s 7\ P.M.$

Long. $120^{\circ}0'E.$

1 25

4

5^m40^s-

第二十試驗問題. 693 頁.

1.

答

447670.1

2.

答

1000

3.

答

True Courses **S. 68° W. 8;** **S. 65° W. 32;** **S. 87° W. 43;****S. 11° E. 40;** **N. 36;** **N. 59° E. 41;** **S. 16° E. 28.**D. Lat. **27.9 S;** Dep. **23.9 W;** Lat. in **34° 48' S;**D. Long. **35';** Long. in **113° 59' E.**T. Co. made good **S. 46° W;** Distance 40 miles.

4.

答

D. Long. **170'S** or **2° 50' 48".**

5.

Long. **3° 3' E. = L.T. 0^h 12^m 12^s E. -- = 0.2 --**N. Alm. Oct. 1st **G.A.N.**

Decl. Sem.

58^m 24 16' 0".2 --

11.648 --

3° 8' 37.7 +

11.6 --

R^d 3 8 26.1 S.

Orig. alt. ⊖ 20° 30' 50"

3 55 --

Obs. alt. ⊖ 20 26 55

22 43 --

T. alt. ⊖ 20 4 12

90

T. z. 69 55 48 **N.**Decl. 3 8 26 **S.**Lat. 66 47 22 **N.**

答

Noon Lat. **66° 47' 22" N.**

6.

T.D. Lat.

17° 12' **N.**32 15 **N.**15 3 **N.**

60

903 **N.**

M.D. Lat.

1047.86 **N.**2046.10 **N.**998.24 **N.**2386 **W.**

D. Long.

25° 6' **W.**64 52 **W.**39 46 **W.**

60

2386 **W.**

D. Long. 2386 W.	Log. 3.377670
M.D. Lat. 998.24 N.	Log. 2.999235
T. Co. N. $67^{\circ}17'48''$ W.L.	Tan. 10.378435
C. Error 16 45 0 E.R.	14
C. Co. N. 50 32 48 W.	+3"=21
T.D. Lat. ... 903 N.	Log. 2.955688
T. Co. N. $67^{\circ}17'48''$ W.	Sec. 0.413458
Distance <u>2339.6</u>	Log. 3.369146
	030

答

T. Co. N. $67^{\circ}17'48''$ W.; C. Co. N. $50^{\circ}32'48''$ W.

Distance 2339.6 miles.

7.

S.A.T. Oct. 12 ^d 18 ^h 13 ^m 25 ^s
L.T. 8 29 36+
G.A.T. Oct. 13 ^d <u>2 53 1</u>
2.9+

N. Alm. Oct. 13th G.A.N.

Decl.	
56.19	
2.9+	
<u>50.571</u>	
11238	
<u>162.951+</u>	
$7^{\circ}44'12''7+$	
2 42.9+	
R ^d 7 46 55.6 S.	Sin. 9.131638
Lat. 23 28 0 N.	Sec. 0.037492
T.A. E. 8 29 19 S.	Sin. 9.169130
C.A. E. 14 3 45 N.	
C. Error 22 33 4 E.	
Var. 24 0 0 W.	
Dev. <u>1 26 56 W.</u>	

答

T.A.E. $8^{\circ}29'19''$ S.; C. Error $22^{\circ}33'4''$ E.;Dev. $1^{\circ}26'56''$ W.

8.

答

(a) Comp. Co. N. 68° W.; Distance 55 miles.Dev. 21° W.(b) Lat. $50^{\circ}30'$ N.; Long. $170^{\circ}27'$ E.(c) Lat. $50^{\circ}12'$ N.; Long. $169^{\circ}55'$ E.Distance $18\frac{1}{2}$ miles.

9.

June 30	1 st Error 18 ^m 49 ^s Fast
6	2 nd Error 21 23 Fast
June 24	2 34
July 31	60
<u>55 days</u>	<u>55)154</u>
	2.8 gaining

Aug. 31	65	2.8
Sept. 30	2.8	.8
Oct. 4	<u>520</u>	<u>2.24-</u>
<u>65 days</u>	130	
	<u>182.0</u>	
	<u>3^m 2^s -</u>	

C.T. Oct. 4^d 19^h 55^m 30^s 02nd Error 21 23.0- 4^d 19 34 7.0

3 2.0-

 4^d 19 31 5.2=.8

2.2-

G.M.T. Oct. 4^d 19 31 2.8=19.5+ = 4^h 5-

N. Alm. Oct. 5th G.M.N.

Decl.	Sem.	Eq. T. - A.T.
57.81	<u>16' 1"</u>	0.746
4.5-		4.5-
<u>2890.5</u>		<u>3730</u>
23124		2984
<u>260.145-</u>		<u>3.3570-</u>
4°41' 41"8+		11 ^m 31 ^s 17+
4 20.1-		3.36-
R ^d <u>4 37 21.7 S.</u>		R ^d <u>11^m27^s81</u>
<u>p 94 37 22</u>		

Noon Lat. 38°18' 0" N.	D. Long.	Obs. alt. ⊖ 30°24' 55"
D. Lat. 7 0 N.	10.18	2 23-
Sight Lat. 38 25 0 N.	0.64	30 22 32
38 18 0 N.	<u>10.82 E.</u>	21 50-
2)76 43 0		T. alt. ⊙ 30 0 42
M.M. Lat. <u>38 21 30</u>		90
		<u>T. z. 59 59 18</u>

l 38°25' 0" N.	l 38°25' 0" N.
a 4 37 22 S.	a 30 0 42
z 59 59 18	p 94 37 22
43 2 22	8 24 18
<u>103 1 40</u>	<u>103 1 40</u>
16 56 56	86 13 4
51 30 50	51 30 50
8 28 28	43 6 32

0.105954	0.105954
0.001415	0.062520
9.893628	9.893628
9.168404	9.834666
<u>9.169401</u>	<u>9.896768</u>

S.A.T. Oct. 4 ^d 20 ^h 59 ^m 11 ^s 1	φ N. 125°13' 53" E.
Eq. T. 11 27.8-	C. N. 123 45 0 E.
S.M.T. Oct. 4 ^d 20 47 43.3	C. Error 1 28 53 E.
G.M.T. Oct. 4 ^d 19 31 2.8	Var. 5 0 0 W.
L.T. 1 16 40.5	Dev. <u>3 31 7 W.</u>
Sight Long. 19°10' 37" E.	
D. Long. 10 48 E.	
Noon Long. <u>19 20 50 E.</u>	

答

Sight Long. 19°10'7"E.; D. Long. 10'48"E.;

Noon Long. 19°20'50"E.; Dev. 3°31'7"W.

10.

C.T. Oct. 2 ^d 18 ^h 24 ^m 30 ^s	G.M.T. 2 ^d 18 ^h 33 ^m 22 ^s
8 52+	Eq. T. 10 50+
G.M.T. Oct. 2 ^d 18 33 22	G.A.T. 2 ^d 18 44 12
18.5+ = 5.5-	L.T. 2 43 20+
	S.A.T. 2 ^d 21 27 32
	24
	<u>h ... 2 32 28</u>

N. Alm. Oct. 3rd G.M.N.

Decl.	Eq. T. + M.T.
58 ^m .06 ^s	0.776
5.5-	5.5-
<u>29030</u>	<u>3880</u>
29030	3880
<u>319.330-</u>	<u>4.2680</u>
3°55' 19"9+	10 ^m 54 ^s 63+
5 19.3-	4.27-
R ^d <u>3 50 0.6 S.</u>	R ^d <u>10 50.36</u>

$$\begin{array}{r} 732^{\circ}50'S. \ \& \ 72^{\text{h}}32^{\text{m}}... \ + \mathbf{A} \ 0.826 \\ 73 \ 50 \ S. \ \& \ 72^{\text{h}}32 \ ... \ - \mathbf{B} \ 0.109 \\ \hline \phantom{732^{\circ}50'S. \ \& \ 72^{\text{h}}32^{\text{m}}...} \ + \mathbf{C} \ 0.717 \end{array}$$

$$\begin{array}{r} \phi \ \mathbf{N.} \ 59^{\circ} \ 0' \ \mathbf{E.} \\ \mathbf{C.N.} \ 73 \ 7 \ \mathbf{E.} \\ \mathbf{C. Error} \ 14 \ 7 \ \mathbf{W.} \\ \mathbf{Var.} \ 24 \ 10 \ \mathbf{E.} \\ \mathbf{Dev.} \ 10 \ 3 \ \mathbf{E.} \end{array}$$

答

S.A.T. Oct. 2^d 21^h 27^m 32^s; 7^h 2^h 32^m 28^s;Decl. 3° 50' 1" S.; ϕ N. 59° 0' E.;

C. Error 14° 7' W.; Dev. 10° 3' E.

11.

Jan. 5 ^d 13 ^h 41 ^m 6	6 ^d 2 ^h 12 ^m 0	4 ^d 12 ^h 36 ^m 7
23. 5-	23. 5-	5 ^d 13 41. 6
5 ^d 13 18. 1	6 ^d 1 48. 5	Daily Var. 64. 9
22. 0-	30. 5-	Eq. T. 5 ^m - M.T.
5 ^d 12 56. 1	6 ^d 1 18. 0	Scm.
7 15. 0+	7 15. 0+	Noon 5 ^h
5 ^d 20 11. 1	6 ^d 8 33. 0	16' 45"
20. 6+	20. 6+	Midnight 5 ^h
5 ^d 20 31. 7	6 ^d 8 53. 6	16' 41"
<u>6^h 8^h 31^m 7 A.M.</u>	<u>6^h 8^h 53^m 6 P.M.</u>	135° 0' E.
		129 51 E.
		5 9
		4
		<u>20^m 36^s +</u>

答

中央標準時

Jan. 6^h 8^h 31^m 7 A.M. & 6^h 8^h 53^m 6 P.M.

第二十一試驗問題. 696 頁.

1.

答

16518.1

2.

答

712.8

3.

答

True Courses **W. 7; S. 85°W. 45; S. 65°W. 46;**

S. 7°E. 54; S. 16°W. 35; S. 89°W. 42;

S. 15°W. 36. D. Lat. 146.0 S.; Dep. 147.8 W.;

Lat. in 30°56'S. D. Long. 170'; Long. in 74°5'W.;

True Course and Distance made good **S. 45°W. 208 miles.**

4.

答

Dep. 135 miles.

5.

Long. $171^{\circ}35'W.$ = **L.T.** $11^h26^m20^s = 11.4+$

N. Alm. Nov. 21st **G.A.N.**

Decl.	Sem.
33''21	16' 13''
11.4+	
<u>13284</u>	
3321	
<u>3321</u>	
378.594+	

$19^{\circ}54'26''8 S. +$
6 18.6 +

R^d 20 0 45.4 S.

Orig. alt. $\odot 42^{\circ}47'35''S.$

I. Error 0 45+

Obs. alt. $\odot 42 48 20$
10 39+
13+

T. alt. $\odot 42 59 12$
90

T. z. 47 0 48 **N.**

Decl. 20 0 45 **S.**

Lat. 27 0 3 **N.**

答

Noon Lat. $27^{\circ}0'3''N.$

6.

T.D. Lat.	M.D. Lat.	D. Long.
32°15' N.	2046.10 N.	64°52' W.
14 43 N.	892.87 N.	17 34 W.
<u>17 32 S.</u>	<u>1153.23 S.</u>	47 18 E.
60		60
<u>1052 S.</u>		<u>2838 E.</u>

D. Long. 2838 **E.** Log. 3.453012

M.D. Lat. 1153.23 **S.** Log. 3.061915

T. Co. S. $67^{\circ}53'8''E.L.$ Tan. 10.391097

C. Error 3 45 0 **W.L.** 50

C. Co. S. 71 38 8 **E.** +8''=47.

T. Co. S. $67^{\circ}53'8''E.$ Sec. 0.424283

T.D. Lat. 1052 **S.** Log. 3.022016

Distance 2794.5 Log. 3.446299

26

答 73

T. Co. S. $67^{\circ}53'8''E.$; **C. Co. S.** $71^{\circ}38'8''E.$;

Distance 2794.5 miles

7.

Approx. **S.A.T.** Nov. $27^d6^h41^m 0^s$ 新表 35 頁.

L.T. 2 24 36- ,, 428 頁.

Approx. **G.A.T.** Nov. 27^d4 16 24

Correct. **G.M.T.** Nov. $27^d4^h 0^m30^s = 4^h +$

N. Alm. Nov. 27th **G.M.N.**

Decl.

27''50

4+

110.00+

$21^{\circ}7'29''9 + S.$

1 50.0+

R^d 21 9 19.9 **S.** Sin. 9.557388

Lat. 25 6 0 **S.** Sec. 0.043079

T.A.W. 23 29 12 **S.** Sin. 9.600467

C.A.W. 2 48 45 **N.** 82

C. Error 26 17 57 **W.** -3''=15-

Var. 22 30 0 **E.**

Dev. 3 47 57 **W.**

答

T.A.W. $23^{\circ}29'12''S$; C. Error $26^{\circ}17'57''W$.Dev. $3^{\circ}47'57''W$.

8.

答

- (a) C. Co. N. $72^{\circ}E$; Distance 68 miles; Dev. $23\frac{1}{2}^{\circ}E$.
 (b) Lat. $50^{\circ}30'N$; Long. $24^{\circ}50'W$.
 (c) Lat. $50^{\circ}40'N$; Long. $24^{\circ}7'W$; Distance 19 miles.

9.

Approx. S.M.T. Nov. $26^d 22^h 30^m 0^s$
 $\frac{5\ 10\ 0}{+}$ 新表 449 頁.Approx. G.M.T. Nov. $27^d \underline{3\ 40\ 0}$

Sept. 30	1 st Error $15^m 24^s$ slow
<u>4</u>	2 nd Error $13\ 22$ slow
Sept. 26	<u>2\ 2</u>
Oct. 11	60
<u>37 days.</u>	<u>37)122</u>
	<u>3.3</u> gaining

C.T. Nov. $27^d 3^h 19^m 59^s$	Oct. 31
2 nd Error $13\ 22+$	<u>11</u>
Nov. $27^d 3\ 33\ 21 = .1$	Oct. 20
A.R. $2\ 35.4-$	Nov. <u>27.1</u>
Correct G.M.T. Nov. $27^d 3\ 30\ 45.6$	<u>47.1</u>
<u>3.5+</u>	<u>3.3</u>
	<u>1413</u>
	<u>1413</u>
	<u>155.43</u>
	<u>2^m35^s.4-</u>

N. Alm. Nov. 27th G.M.N.

Decl.	Scm.	Eq. T.-A.T.
27.50	<u>16' 14''</u>	0.819
3.5+		3.5+
<u>13750</u>		4095
8250		<u>2457</u>
<u>96.250+</u>		2.8665+
21° 7' 29.9" +		12 ^m 20.11 -
1 36.2+		2.87+
R ^d <u>21 9 6.1 S.</u>		R ^d <u>12 17.24</u>

Noon. Lat. <u>15° 51' 0" S.</u>	Orig. alt. ⊙ 68° 17' 55"
12 0 N.	2 42+
Sight Lat. <u>15 39 0 S.</u>	Obs. alt. ⊙ 68 20 37
M. Mid. Lat. <u>15° 45' 0"</u>	11 36+
Dep. <u>5' E.</u>	T. alt. ⊙ 68 32 27
D. Long. <u>5.2 E.</u>	90
	T. z. <u>21 27 33</u>

∠ 15° 39' 0" S.	∠ 15° 39' 0" S.	注意 小角度
d 21 9 6 S.	α 68 32 27	ノ Sin ハ 微變ス
z 21 27 33	p 68 50 54	ルヲ以テ秒度
5 30 6	52 53 27	ノ小数點以下
26 57 39	121 44 21	一桁ヲ用フル
15 57 27	15 57 27	
13 28 49.5	60 52 10	
7 58 43.5	7 58 43.5	ヲ其シトス.

0.016406	0.016406
0.030291	0.436711
9.367566	9.941269
9.142408	9.142408
8.556671	9.536794
36	83
-0.2=35	+4''=11

S.A.T. Nov. 26 ^d 22 ^h 32 ^m 27 ^s 8	ϕ <u>S. 71° 50' 34" E.</u>
Eq. T. <u>12 17.2 -</u>	注意. 方位角九十
S.M.T. Nov. 26 ^d 22 20 10.6	度ニ近キ程緯度ノ
G.M.T. Nov. 27 ^d 3 30 45.6	誤差ハ程度ニ影響
L. T. <u>5 10 35.0</u>	ヲ及スコト少ナシ
Sight Long. <u>77° 38' 45" W.</u>	故ニ問題ニ於テ要
D. Long. <u>5 12 E.</u>	セザルモ眞方位ヲ
Noon Long. <u>77 33 33 W.</u>	求メテ参考ニ資ス

答

G.M.T. Nov. 27^d 3^h 30^m 45^s 6; Decl. 21° 9' 6" 1 S.;
Eq. T. 12^m 17^s 2; **T. alt.** 68° 32' 27"; **T. n.** 21° 27' 33";
 Sight Long. 77° 38' 45" W.; D. Long. 5' 12" E.;
 Noon Long. 77° 33' 33" W.

10.

Approx. **S.M.T.** March 20^d 2^h 35^m 0^s
L.T. 10 14 20 - 新表 487 頁.
 „ **G.M.T.** „ 19^d 16 20 40
C.T. „ 19^d 16^h 20^m 20^s
4 56 +
 Correct. **G.M.T.** „ 19^d 16 25 16 = 16.4 + = 7.6 -

N. Alm. 20th March, **G.M.N.**

Decl.	Sem.
59' 28	<u>16' 5"</u>
<u>7.6 -</u>	
35568	
41496	
<u>450.528 -</u>	
0° 11' 21" 3 S. -	
7 30.5 -	
R ^d <u>0° 18' 51" 8 S.</u>	
p <u>90° 18' 52"</u>	

Obs. alt. \odot 41° 32' 55"	
11 45 +	表 582 頁.
5 +	
T. alt. \odot <u>41 44 45</u>	
z 32° 30' 0"	0.073971
a 41 44 45	0.127200
p 90 18 52	9.882849
9 14 45	9.812847
99 33 37	9.896867
81 4 7	74
49 46 48	<u>-7" = 7</u>
40 32 3	

ϕ N. 125° 15' 23" W.
C. N. 112° 30 0 W.
C. Error 12 45 23 W.
Var. 2 20 0 W.
Dev. <u>15 5 23 W.</u>

答

 ϕ **N.** 125° 15' 23" W.; Error 12° 45' 23" W.;

Dev. 15° 5' 23" W.

11.

G.M.T. Nov. 15^d 16^h 8^m 10^s = 16.1 + = 7.9 -
L.T. 10 22 28 +
S.M.T. Nov. 16^d 2 30 38
Eq. T. 15 13 +
S.A.T. Nov. 16^d 2 45 51

N. Alm. Nov. 16 th G.M.N.	
Decl.	Eq. T. + M.T.
37 ^{''} 57	0.459
7.9-	7.9-
<u>33813</u>	<u>4131</u>
26299	3213
<u>296.803-</u>	<u>3.6261-</u>
18°43' 45 ^{''} 4+	15 ^m 9: 69-
4 58. 8-	3. 63-
R ^d <u>18°38' 48^{''}6 S.</u>	R ^d <u>15^m13. 32</u>
l 33°35' N. & l 2 ^h 46 ^m ... + A 0.746	
d 18 39 S. ,, ... + B 0.509	
	<u>+ C 1.255</u>

ϕ **S. 43°44' W.**
C. S. 33 45 W.
C. Error 9 59 E.
Var. 5 23 W.
Dev. 4 36 E.

答
 ϕ **S. 43°44' W.**; Error **9°59' E.**; Dev. **4°36' E.**

12.

May 12 ^d 21 ^h 6 ^m 0	12 ^d 8 ^h 44 ^m 7	11 ^d 20 ^h 23 ^m 6
<u>16.0-</u>	<u>16.0-</u>	12 ^d 21 6.0
12 20 50.0	12 8 28.7	Daily Var <u>42.4</u>
<u>22.0+</u>	<u>16.0+</u>	Eq. T. 4 + M.T.
12 21 12.0	12 8 44.7	Sem.
<u>6 15.0+</u>	<u>6 15.0+</u>	12 th Midnt.
13 ^d 3 27.0	12 ^d 14 59.7	<u>15' 23"</u>
<u>7.3-</u>	<u>7.3-</u>	12 th Noon
13 ^d 3 19.7	12 ^d 14 52.4	<u>15' 17"</u>
<u>13th 3^h 19^m7 P.M.</u>	<u>13th 2^h 52^m4 A.M.</u>	136°49' E.
		135 0 E.

答

中央標準時
 13th 3^h 19^m7 P.M. & 13th 2^h 52^m4 A.M.

1 49
4
7^m16^s-

第二十二試驗問題. 699 頁.

1.

答

3120338.1

2.

答

81081.2

3.

答

True Courses **S. 29°W. 8; S. 84°W. 228; S. 80°W. 245;**

N. 17°E. 15.

D. Lat. 59; Dep. 467.6; Lat. in **50°27'N.**; Long.

21°52'5''W.; T. Co. Made good **S. 83°W.** and

Distance 471 miles.

4.

答

D. Long. 248.'8 or **4°8'48''.**

5.

Long. $34^{\circ}33'E. = 2^h 18^m 12^s = 2.3 -$

N. Alm. Dec. 3rd **G.A.N.**

Decl.	Sem.
21'33	16'15"
2.3 -	
<u>6399</u>	
4266	
<u>49.059 -</u>	

$22^{\circ}6' 6'' 1 + S.$
49.0 -

R^d 22 5 17.1 S.

Obs. alt. $\odot 74^{\circ}26' 35''$
11 15 +
15 +

T. alt. $\odot 74 38 5 S.$
90

T. z. 15 21 55 **N.**

Decl. 22 5 17 **S.**

Lat. 6 43 22 S.

答

Noon Lat. $6^{\circ}43'22''S.$

6.

T.D. Lat.	M.D. Lat.	D. Long.
35°54' N.	2310.58	14°32' E.
31 12 N.	1972.03	29 52 E.
4 42	<u>338.55 S.</u>	15 20
60		60
<u>282 S.</u>		<u>920 E.</u>

D. Long. 920 E.	Log. 2.963788
M.D. Lat. 338'55 S.	Log. 2.529623
T. Co. S. 69°47' 49'' E.L.	Tan. 10.434165
C. Error 6 0 0 W.L.	39
C. Co. S. 75 47 49 E.	+4'' = 26

T.D. Lat. 282 S.	Log. 2.450249
T. Co. S. 69°47' 49'' E.	Sec. 0.461743
Distance: <u>816.57 miles.</u>	Log. 2.911992

56
36

答

T. Co. S. 69°47'49'' **E.**; **C. Co. S.** 75°47'49'' **E.**;

Distance 816.6 miles.

7.

S.A.T. Dec. 8th 21^h 5^m44^s

L.T. 4 11 20 +

G.A.T. Dec. 9th 1 17 4 = 1.3 +

N. Alm. Dec. 9th **G.A.N.**

Decl.

14'74

1.3 +

4422

1474

19.162 +

22°49' 27'' **S.** +

19.2 +

R^d 22 49 47.0 **S.** Sin. 9.588825

Lat. 59 35 0 **N.** Sec. 0.295605

T.A. E. 50° 1' 40'' **S.** Sin. 9.884430

C.A. E. 92 48 45 **S.** 39

C. Error 42 47 5 **W.** -5'' = 9

Var. 29 0 0 **E.**

Dev. 13 47 5 W.

答

T.A.E. $50^{\circ}1'40''S$; C. Error $42^{\circ}47'5''W$;Dev. $13^{\circ}47'5''W$.

8.

答

(a) C. Co. S. $73^{\circ}W$; Distance 43 miles;Dev. $15^{\circ}W$.(b) Lat. $50^{\circ}18'N$; Long. $14^{\circ}51'W$.(c) Lat. $50^{\circ}33'N$; Long. $15^{\circ}58'W$.

Distance 18 miles.

9.

Aug. 31	1 st Error 1^m24^s fast
25	2 nd Error $12\ 12$ slow
Aug. 6	3 36
Sept. 30	60
Oct. 12	48; 216
<u>48 days</u>	<u>4.5 Losing</u>

Oct. 31	56.7
12	4.5
Oct. 19	2835
Nov. 30	2268
Dec. 7.7	255.15+
<u>56.7 days</u>	<u>4^m15^s 1+</u>

C.T. Dec. 7^d 17^h 40^m 59^s 0
 2nd Error 2 12. 0+
 17 43 11. 0 = .7 新表 6 頁.

A.R. 4 15. 1+

G.M.T. Dec. 7^d 17^h 47^m 26^s 1
 17.8+ = 6.2-

N. Alm. Dec. 8th G.M.N.

Decl.	Sem.	Eq. T. - A.T.
15.86	<u>16' 16"</u>	1.105
6.2-		6.2-
<u>3172</u>		<u>2210</u>
9516		6630
<u>98.332-</u>		<u>6.8510-</u>
22°43' 22".7+		8 ^m 3 ^s 46-
1 38.3-		6.85-
R ^d <u>22 41 44.4 S.</u>		R ^d <u>8 10.31</u>

Obs. alt. @ 16° 3' 55"
 7 59+
 16+

T. alt. @ 16 12 10
 T. z. 73 47 50

l 38° 9' 0" N.	0.104359
d 22 41 44 S.	0.035002
z 73 47 50	9.965052
60 50 44	9.052248
<u>134 38 34</u>	<u>9.156661</u>
12 57 6	27
<u>67 19 17</u>	<u>+ .5 = 34</u>
6 28 33	

S.A.T. Dec. 8^d 2^h 58^m 2^s 5
 Eq. T. 8 10.3-

S.M.T. Dec. 8^d 2 49 52.2

G.M.T. Dec. 7^d 17 47 26.1

L.T. 9 2 26.1

Sight Long. 135°36' 31" E.

D. Long. 20 21 E.

Noon Long. 135°56' 52" E.

答

Sight Long. 135°36' 31" E.; D. Long. 20' 21" E.;

Noon Long. 135°56' 52" E.

10.

S.M.T. Dec. 13^d 20^h 37^m 11^s

L.T. 10 3 4+

G.M.T. Dec. 14^d 6 40 15 = 6.7+S.M.T. Dec. 13^d 20^h 37^m 11^s

Eq. T. 5 9+

S.A.T. Dec. 13^d 20 42 20

24

h...3 17 40N. Alm. 14th Dec. G.M.N.

Decl. Sem. Eq. T. + M.T.

9'02 16' 17" 1.199

6.7+ 6.7+

6314 8393

5412 7194

60.434+ 8.0333+23°13' 15"9+ 5^m17'01-

1 0.4+ 8.03+

R^d 23°14' 16"3 S. R^d 5^m 8:98p 66°45' 44"

Orig. alt. ⊖ 46° 8' 41"

2 53-

Obs. alt. ⊖ 46 5 48

20 54-

17-

True alt. ⊙ 45 44 37

l 33°49' 0" S. 0.080492

a 45 44 37 0.156225

p 66 45 44 9.802076

11 55 37 9.663202

78 41 21 9.701995

54 50 7 1

39 20 40 + 2" = 4

27 25 3

φ S. 90°24' 2" E.

C. S. 84 22 30 E.

C. Er. 6 1 32 W.

Var. 15 33 0 W.

Dev. 21 34 32 W.

By ABC Tables.

l 33°49' S. & h 3^h18^m ... +A 0.572d 23 14^h S. & h 3 18 ... -B 0.564+C 0.008

φ N. 89°37' E.

C. N. 95 37 E.

C. Er. 6 0 W.

Var. 15 33 W.

Dev. 21 33 W.

答

Alt-Azimuth.

G.M.T. Dec. 14^d 6^h40^m15^s; Decl. 23°14'16"3 S.;Eq. T. 5^m9^s + M.T.; T. Alt. 45°44'37"; T. Az.

S. 90°24'2" E.; C. Error 6°1'32" W.; Dev.

21°34'32" W.

Time-Azimuth.

h 3^h18^m; C. Error 6°0' W.; Dev. 21°33' W.

第二十三試驗問題. 702 頁.

1.

答

2412500

2.

答

1023.8

3.

答

T. Courses **N. 28°W. 7; N. 51°E. 33; N. 74°E. 37;**
S. 84°E. 37; S. 62°E. 37; S. 79°E. 36; S. 73°E. 42;
N. 80°W. 36.

D. Lat. 3'0 **N.**; Dep. 167'4 **E.**; Lat. in 34°42'**N.**;

D. Long. 204'; Long. in 178°18'**W.**; T. Course
 made good **N. 89°E.** and Distance 167.5 miles.

4.

答

D. Long. 223'3 or 3°43'18"

5.

Long. 174°40'**E.** = **L.T.** 11^h 38^m 40^s = 11^h 6—

N. Alm. Jan. 13th **G.A.N.**

Decl.	Sem.
24".48	<u>16' 17"</u>
11.6—	
<u>14688</u>	
2448	
<u>2448</u>	
<u>283.968—</u>	
21° 39' 38".4—	
4 44. 0—	
R ^d <u>21° 44' 22".4 S.</u>	

Orig. alt. \odot	54°37' 50"
I. E.	1 50 -
Obs. alt. \odot	54 36 0
	10 47 +
	17 +
True. alt. \odot	54 47 4
	90
True z.	35 12 56 S.
Decl.	21 44 22 S.
Lat.	<u>56 57 18 S.</u>

答

Noon Lat. 56°57'18" **S.**

6.

T.D. Lat.	M.D. Lat.	D. Long.
34°22' S.	2198.07 S.	18°24' E.
5 28 S.	328.50 S.	35 17 W.
<u>28 54 N.</u>	<u>1869.57 N.</u>	53 41
60		60
<u>1734 N.</u>		<u>3221 W.</u>

D. Long. 3221 W.	Log. 3.507991
<u>M.D. Lat. 1869.57 N.</u>	Log. 3.271741
<u>T. Co. N. 59°52' 4" W.L.</u>	Tan. 10.236250
<u>C. Er. 5 0 0 E.R.</u>	30
<u>C. Co. N. 54 52 4 W.</u>	+4" = 20
<u>T.D. Lat. 1734 N.</u>	Log. 3.239049
<u>T. Co. N. 59°52' 4" W.</u>	Sec. 0.299298
Distance <u>3454.2 miles.</u>	Log. 3.538347
	22
	25

答

T. Co. N. $59^{\circ}52'4''$ W.; C. Error $5^{\circ}0'0''$ W.;C. Course N. $54^{\circ}52'4''$ W.; Distance 3454.2 miles.

7.

Approx. S.A.T. Jan. 8^d 4^h 54^m 0^s 新表 35 頁.L.T. $\frac{9\ 18\ 28}{+}$,, 480 頁.Approx. G.A.T. Jan. 8^d 14 12 28Correct G.M.T. Jan. 8^d $\frac{14^h\ 20^m\ 30^s}{+} = 14.3 + = 9.7 -$ N. Alm. Jan. 9th G.M.N.

Decl.	
20''19	
<u>9.7-</u>	
14133	
18171	
<u>195.843-</u>	
22°15' 26''2-	
<u>3 15.8-</u>	
R ^d 22 18 42.0 S.	Sin. 9.579378
Lat. 34 51 0 N.	Sec. 0.085842
T.A. W. 27 33 22 S.	Sin. 9.665220
C.A. W. 19 41 15 S.	193
C. Error 7 52 7 W.	<u>+7'' = 27</u>
Var. 14 0 0 W.	
Dev. <u>21 52 7 W.</u>	

T.A.W. $27^{\circ}33'22''$ S.; C. Error $7^{\circ}52'7''$ W.; Dev. $21^{\circ}52'7''$ W.

8.

答

(a) C. Co. N. 24° E.; Distance 66 miles;Dev. 17° E.(b) Lat. $50^{\circ}41'0''$ N.; Long. $152^{\circ}24'0''$ E.(c) Lat. $50^{\circ}39'0''$ N.; Long. $151^{\circ}46'0''$ E.;

Distance 14 miles.

9.

Approx. S.M.T. Jan. 9^d 3^h 0^m 0^sL.T. $\frac{9\ 10\ 20}{+}$ Approx. G.M.T. Jan. 9^d $\frac{12\ 10\ 20}{+}$

Oct. 31	1 st Error 9 ^m 10 ^s
<u>4</u>	2 nd Error 12 28
Nov. 27	<u>3 18</u>
Nov. 28	60
<u>55</u> days	<u>55)198</u>
Nov. 30	42
<u>28</u>	<u>3.6</u> Losing
Dec. 2	252
Dec. 31	126
Jan. 9	<u>151.2</u>
<u>42</u> days	<u>2^m31^s2^s+</u>

C.T. Jan. 9^d 11^h 8^m 57^s 02nd Error 12 28. 0+Jan. 9^d 11 21 25. 0 = .5 of a day.2 33. 0+Correct G.M.T. Jan. 9^d $\frac{11\ 23\ 58. 0}{+}$ 11.4+

N. Alm. Jan. 9th G.M.N.

Decl.	Sem.	Eq.T. + A.T.
20'19	16'17"	1:058
11.4+		11.4+
8076		4232
2019		1058
2019		1058
230.166+		12.0612+
22°15'26"2-		6 ^m 50 ^s 29+
3 50.2+		12.06+
R ^d 22 11 36.0 S.		R ^d 7 ^m 2.35
Orig. alt. ⊙ 23°20'35"	Noon Lat. 37°20' 0"N.	
2 17-	17 0 N.	
Obs. alt. ⊙ 23 18 18	Sight Lat. 37 37 0 N.	
10 21+	2)74 57 0	
17+	M. Mid. Lat. 37 28 30	
True alt. ⊙ 23 28 56		
90		
True z. 66 31 4		
l 37°37' 0"N.	l 37°37' 0"N.	
d 22 11 36 S.	a 23 28 56	
z 66 31 4	p 112 11 36	
59 48 36	14 8 4	
126 19 40	126 19 40	
6 42 28	98 3 32	
63 9 50	63 9 50	
3 21 14	49 1 46	
0.101213	0.101213	
0.033429	0.037543	
9.950511	9.950511	
8.767178	9.877974	
8.852331	9.967241	
316	40	
0=15	+1''=1	

S.A.T. Jan. 9 ^d 2 ^h 3 ^m 47 ^s 0	φ N. 148°43'31"W.
Eq.T. 7 2.3+	C. N. 146 15 0 W.
S.M.T. Jan. 9 ^d 2 10 49.3	C. Error 2 28 31 W.
G.M.T. Jan. 9 ^d 11 23 58.0	Var. 15 0 0 W.
L.T. 9 13 8.7	Dev. 17 28 31 W.
Sight Long. 138°17'11"W.	
D. Long. 0 0	
Noon Long. 138°17'11"W.	

答

G.M.T. Jan. 9^d 11^h23^m58^s0; Decl. 22°11'36"0 S;
 Eq. T. 7^m2^s3; Sight Lat. 37°37'N.; T. alt. 23°28'
 56"; S.A.T. 9^d2^h3^m47^s0; T. Az. N. 148°43'31"W.;
 Dev. 17°28'31"W.; Noon Long. 138°17'11"W.

10.

S.M.T. Jan. 1 ^d 3 ^h 39 ^m 49 ^s	
6 38 20-	
G.M.T. Dec. 31 ^d 21 1 29	
21.0+ = 3 ^h -	
N. Alm. Jan. 1 st G.M.N.	
Decl.	Eq. T. - M.T.
11'19	1:192
3-	3-
33.57-	3.576-
23°5'44"3-	3 ^m 13 ^s 25+
33.6-	3.58-
R ^d 23 6 17.9 S.	R ^d 3 ^m 9 ^s 67
S.M.T. Jan. 1 ^d 3 ^h 39 ^m 49 ^s	
Eq. T. 3 10-	
S.A.T. Jan. 1 ^d 3 36 39	

l $32^{\circ}35'$ S. & h $3^h37^m...$ + **A** .460
 d 23 6.3 S. ,, ... - **B** .526
- **C** .066

ϕ S. $86^{\circ}48'W.$
C. S. $123\ 45\ W.$
C. Error $36\ 57\ W.$
 Var. $14\ 30\ E.$
 Dev. $22\ 27\ W.$

答

G.M.T. Dec. $31^d\ 21^h\ 1^m29^s$; Decl. $23^{\circ}6'17''9\ S.$;
Eq. T. $3^m9^s\ 7-M.T.$; **S.A.T.** Jan. $1^d\ 3^h\ 36^m39^s$;
T. Azimuth S. $86^{\circ}48'W.$; **C. Error** $36^{\circ}57'W.$;
 Dev. $22^{\circ}27'W.$

11.

Aug. $23^d\ 9^h10^m2$	$23^d\ 21^h35^m3$	$24^d\ 9^h59^m8$
<u>19.5-</u>	<u>19.5-</u>	<u>23\ 9\ 10.2</u>
23 $8\ 50.7$	23 $21\ 15.8$	Daily Var <u>49.6</u>
<u>22.0+</u>	<u>26.0+</u>	Eq. T. $2^m-M.T.$
23 $9\ 12.7$	23 $21\ 41.8$	Mean. Sem.
<u>5\ 40.0+</u>	<u>5\ 40.0+</u>	<u>14' 47''</u>
$23^d\ 14\ 52.7$	$24^d\ 3\ 26.8$	Long.
<u>15.6-</u>	<u>15.6-</u>	<u>138^{\circ}54'E.</u>
$23^d\ 14\ 37.1$	$24^d\ 2\ 6.2$	<u>135\ 0\ E.</u>
<u>$24^h\ 2^h29^m1\ A.M.$</u>	<u>$24^h\ 2^h6^m2\ P.M.$</u>	<u>3\ 54</u>
		<u>15^m36^s</u>
		<u>15^m6-</u>

答

中央標準時
 $24^h\ 2^h\ 29^m1\ A.M.$ & $24^h\ 2^h\ 6^m2\ P.M.$

第二十四試驗問題. 705 頁.

1.

答

9091250

2.

答

.05161

3.

答

True Courses **N.** $77^{\circ}W.$ 12; **N.** $38^{\circ}W.$ 127; **N.** $37^{\circ}W.$ 102.5; **N.** $41^{\circ}W.$ 148.5; **N.** $40^{\circ}W.$ 204.5; **N.** $39^{\circ}W.$ 26.5; **N.** $4^{\circ}E.$ 10.
 D. Lat. 484; Dep. 396.2; Lat. $52^{\circ}54'N.$; Long. $40^{\circ}19'W.$
 True Co. and Distance made good **N.** $39^{\circ}W.$; 625 miles.

4.

答

D. Long. $86'9$ or $1^{\circ}26'54''$

5.

注意 本問題ノ二月十八日ハ
二月廿八日ノ誤リ

$$\text{Long. } 157^{\circ}7'W. = \text{L.T. } 10^h 28^m 28^s = 10.5+$$

N. Alm. Feb. 28th **G.A.N.**

Decl.	Sem.
56.37	16' 10''
10.5+	

28185

5637

591.885+

8°21' 47'' 8-

9 51.9+

R^d 8 11 55.9 S.

Orig. alt. \odot 37°29' 20''

I. Error 0 59+

Obs. alt. \odot 37 30 19
10 9+
10+

T. alt. \odot 37 40 38
90

T. z. 52 19 22 N.

Decl. 8 11 56 S.

Lat. 44 7 26 N.

答

Noon Lat. 44°7'26''N.

6.

T.D. Lat.	M.D. Lat.	D. Long.
4°24' N.	264.26 N.	7°46' W.
32 54 S.	2092.38 S.	43 16 W.
37 18 S.	2356.64 S.	35 30 W.
60		60
<u>2238 S.</u>		<u>2130 W.</u>

D. Long. 2130 W. Log. 3.328380

M.D. Lat. 2356.64 S. Log. 3.372293

T. Co. S. 42° 6' 30'' W.R. Tan. 9.956087

C. Error 25 45 0 W.L.

C. Co. S. 16 21 30 W.

T.D. Lat. 2238 S. Log. 3.349860

T. Co. S. 42°6' 30'' W. Sec. 0.129667

Distance 3016.6 Log. 3.479527

431

96

答

T. Co. S. 42°6'30''W.; C. Co. S. 16°21'30''W.;

Distance 3016.6 miles.

7.

S.A.T. Feb. 23^d 17^h 29^m 45^s
7 36 56-

G.A.T. Feb. 23^d 9 52 49 = 9.9+

N. Alm. Feb. 23rd **G.A.N.**

Decl.

54.66

9.9+

49194

49194

541.134+

10°12' 54'' 3-

9 1.1+

R^d 10 3 53.2 S. Sin. 9.242442

Lat. 39 1 0 S. Sec. 0.109600

T.A. E. 12°59' 55'' S. Sin. 9.352042

C.A. E. 16 52 30 S. 1951

C. Error 3 52 35 W. + 10'' = 91

Var. 10 0 0 E.

Dev. 6 7 25 E.