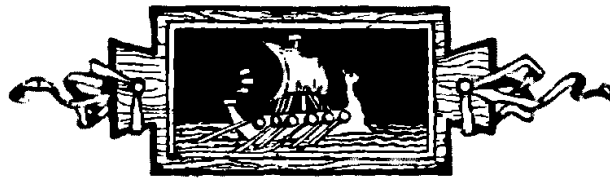


ECLECTIC EDUCATIONAL SERIES.

KEY
TO
RAY'S NEW
ARITHMETICS,
INTELLECTUAL AND PRACTICAL.



NEW-YORK ❖ CINCINNATI ❖ CHICAGO
AMERICAN BOOK COMPANY

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

NOTATION.

NUMBERS TO BE WRITTEN.

Art. 5.

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

NUMBERS TO BE READ.

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

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

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

NUMBERS TO BE WRITTEN.

Art. 7.

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

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

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

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

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

NUMBERS TO BE READ.

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

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

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

Art. 11.

(2.) 2000; 30000; 400000.	(8.) 678912.
(3.) 5000000; 60000000; 700000000.	(9.) 1357924.
(4.) 8000000000; 90000- 000000; 100000000000.	(10.) 68143792.
(5.) 1200; 2100.	(11.) 1001; 1010; 1100.
(6.) 3450; 6789.	(12.) 1101; 1110; 1111.
(7.) 12345.	(13.) 2003; 4050.
	(14.) 45026.
	(15.) 80201.

(16.) 90001.	(21.) 909090000.
(17.) 410205.	(22.) 700010002.
(18.) 100010.	(23.) 40000200005.
(19.) 3070509.	(24.) 726050001243.
(20.) 45083026.	(25.) 80703000504.

NUMERATION.

Art. 12.

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

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

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

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

(6.) Seven thousand and eighty-five; sixty-two thou-

sand and one; four hundred thousand and nine; two million one hundred and two thousand one hundred and two; nine million one thousand and three.

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

(8.) Five hundred and seventy trillion ten million three hundred and twenty-six thousand and forty-nine; two hundred quadrillion one hundred and three trillion four hundred and seventy-eight billion five hundred and eleven million nine hundred and ninety-two thousand four hundred and eighty-five.

(9.) Forty-five quintillion seven hundred and sixty-three quadrillion twenty billion one hundred and eight million five hundred and seven.

(10.) Eight hundred trillion eight hundred and twenty billion twenty million eight hundred and two thousand and eight.

Art. 13. (P. 21.)

(1.) I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII, XIII, XIV, XV, XVI, XVII, XVIII, XIX, XX.

(2.) XXI, XXII, XXIII, XXIV, etc., XXX.

(3.) XXX, XL, L, LX, LXX, LXXX, XC.

(4.) LVII, XXIX, LXI, XXXVIII, XLVI, LXXII, XCIII.

(5.) C, CI, CVI, CXVII, CXXIX, CLXVIII.

(6.) CXCIX, CCXLVI, CCCIX, CCCCLXXXII, DXXVII, DCXCIII.

(7.) DCCXXXIV, DCCCLIX, DCCCCLXXV, MI, MX.

(8.) MXLVIII, MCXIX, MCCLXXXV, MCCCXXVI.
 (9.) MCCCCXCII, MDCCLXXVI, MDCCCLXI,
 MDCCCC.

ADDITION.**Art. 17.**

(2.) \$210	(4.) 50230
142	3105
35	423
<u>\$387</u>	<u>53758</u>

Art. 19.

(8.) 21023. (9.) 27910. (10.) 89569.

(11.) 2499593. (12.) 24194086.

(29.) $146 + 607 + 47 = 800$: 1700 yr. + 800 yr. =
 2500 yr.

(30)	(31)	(32)	(33)
3005	275432	880000889	8955752
42627	402030	2002002	6917246
105	300005	77436000	94523
307004	872026	206005207	<u>15967521</u>
80079	4002347	49003	
320600	<u>5851840</u>	990019919	
<u>753420</u>		<u>2155513020</u>	

(34)	(35)	(36)	(37)	(38)
\$600	\$7850	\$8785	\$7000	30
1325	3275	12789	12875	30
30	3275	878	5600	25
120	2650	1250	4785	25
250	2650	<u>\$23702</u>	3500	25
140	2650		<u>\$33760</u>	25
120	<u>\$22350</u>			20
115				20
<u>\$2700</u>				<u>200 yd.</u>

SUBTRACTION.

Art. 26.

(5)	(6)	(8)	(9)
4444444	91516171	153425178	100000000
<u>1234567</u>	<u>15161718</u>	<u>53845248</u>	<u>10001001</u>
3209877	76354453	99579930	89998999

(14)	(15)	16)	(18)	(19)
\$1840	\$10104	\$100000	912010	4000000
<u>475</u>	<u>7426</u>	<u>11</u>	<u>50082</u>	<u>4004</u>
\$1365	\$2678	\$99989	861928	3995996

(20)	(21)	(22)	(23)
2020930	2000687	17102102	\$30000
<u>1009006</u>	<u>405022</u>	<u>13000201</u>	<u>26967</u>
1011924	1595665	4101901	\$3033

(24)	(25)
18126402	19900900900
<u>9238715</u>	<u>9909090009</u>
8887687	9991810891

ADDITION AND SUBTRACTION.

(1)	(2)	(3)	(4)
275	6723	\$2675	\$3000
381	479	4375	4947
<u>625</u>	<u>6244</u>	<u>1897</u>	<u>\$7947</u>
1281	347	\$8947	
<u>1098</u>	<u>5897</u>	<u>7947</u>	\$1300
183	228	\$1000, Ans.	<u>900</u>
	5669		\$400

$$\begin{array}{r}
 \text{(5)} \\
 \$450 \\
 725 \\
 1235 \\
 4675 \quad \$5935 \\
 \underline{1727} \quad \underline{877} \\
 \$8812 \quad \$6812 \\
 \underline{6812} \\
 \$2000, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{(6)} \\
 \$350 \\
 125 \\
 375 \\
 \underline{150} \\
 \$1000 \\
 \\
 \$2300 \\
 \underline{1000} \\
 \$1300, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{(7)} \\
 \$4875 \\
 4875 \} \\
 2250 \} \\
 \underline{3725} \\
 \$15725 \\
 \\
 \$20838 \\
 \underline{15725} \\
 \$5113, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{(8)} \\
 \$16785 \quad \$49570 \\
 \underline{24937} \quad \underline{41722} \\
 \$41722 \quad \$7848, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{(9)} \\
 \$7895 \quad \$10093 \\
 175 \quad \underline{8073} \\
 \underline{3} \quad \$2020, \text{ Ans.} \\
 \$8073
 \end{array}$$

$$\begin{array}{r}
 \text{(10)} \\
 \$5750 \quad \$10000 \\
 925 \quad \underline{8925} \\
 1575 \quad \$1075, \text{ Ans.} \\
 \underline{675} \\
 \$8925
 \end{array}$$

$$\begin{array}{r}
 \text{(11)} \\
 \$4625 \quad \$6955 \quad \$9395 \\
 3785 \quad 895 \quad \underline{9225} \\
 \underline{985} \quad \underline{1375} \quad \$170, \text{ Ans.} \\
 \$9395 \quad \$9225
 \end{array}$$

$$\begin{array}{r}
 \text{(12)} \\
 \text{Received, \$50} \quad \text{Spent, \$25} \quad \$100 \\
 \quad \quad \quad 50 \quad \quad \quad 91 \\
 \quad \quad \quad \underline{50} \quad \quad \quad \underline{91} \\
 \quad \quad \quad \$100 \quad \quad \quad \$9, \text{ Ans.} \\
 \\
 \quad \quad \quad 7 \\
 \quad \quad \quad 2 \\
 \quad \quad \quad 5 \\
 \quad \quad \quad 35 \\
 \quad \quad \quad 7 \\
 \quad \quad \quad 2 \\
 \quad \quad \quad \underline{8} \\
 \quad \quad \quad \$91
 \end{array}$$

MULTIPLICATION.

Art. 31.

(25)	(26)	(27)	(28)	(29)
235	346	425	518	279
13	19	29	34	37
<u>705</u>	<u>3114</u>	<u>3825</u>	<u>2072</u>	<u>1953</u>
235	346	850	1554	837
<u>3055</u>	<u>6574</u>	<u>12325</u>	<u>17612</u>	<u>10323</u>
(30)	(31)	(32)	(33)	(34)
869	294	429	485	624
49	57	62	76	85
<u>7821</u>	<u>2058</u>	<u>858</u>	<u>2910</u>	<u>3120</u>
3476	1470	2574	3395	4992
<u>42581</u>	<u>16758</u>	<u>26598</u>	<u>36860</u>	<u>53040</u>
(35)	(36)	(37)	(38)	
976	342	376	476	
97	364	526	536	
<u>6832</u>	<u>1368</u>	<u>2256</u>	<u>2856</u>	
8784	2052	752	1428	
<u>94672</u>	<u>1026</u>	<u>1880</u>	<u>2380</u>	
	<u>124488</u>	<u>197776</u>	<u>255136</u>	
(39)	(40)	(41)	(42)	
2187	3489	1646	8432	
215	276	365	635	
<u>10935</u>	<u>20934</u>	<u>8230</u>	<u>42160</u>	
2187	24423	9876	25296	
<u>4374</u>	<u>6978</u>	<u>4938</u>	<u>50592</u>	
<u>470205</u>	<u>962964</u>	<u>600790</u>	<u>5354320</u>	

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

(47)	(48)	(51)	(52)
83457	31624	675	496
6835	7138	13	24
<hr/> 417285	<hr/> 252992	<hr/> 2025	<hr/> 1984
250371	94872	675	992
667656	31624	<hr/> 8775 ct.	<hr/> 11904 ct.
500742	221368		
<hr/> 570428595	<hr/> 225732112		

(53)	(54)	(55)	(56)
152	1760	365	2029
28	209	24	1007
<hr/> 1216	<hr/> 15840	<hr/> 1460	<hr/> 14203
304	3520	730	2029
<hr/> 4256 mi.	<hr/> 367840 yd.	<hr/> 8760	<hr/> 2043203
		8	
		<hr/> 70080 mi.	

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

Ans. 360 ct.

(61)

95 ct. — 2 ct. = 93 ct.

$$\begin{array}{r}
 2650 \\
 93 \\
 \hline
 7950 \\
 23850 \\
 \hline
 246450 \text{ ct.}
 \end{array}$$

(62)

$$\$75 \times 6 = \$450$$

$$125 \times 5 = 625$$

$$\underline{\$1075}$$

$$\$150 \times 11 = \$1650$$

$$\$1650 - \$1075 = \$575, \text{ Ans.}$$

(63)

$$\begin{array}{r}
 \$250 \\
 \$325 \times 2 = 650 \\
 175 \times 3 = 525 \\
 \hline
 \$1425 \\
 356 \\
 \hline
 \$1781, \text{ Ans.}
 \end{array}$$

(64)

$$24 \times \$5 = \$120$$

$$36 \times 14 = 504$$

$$9 \times 45 = 405$$

$$\underline{\$1029}$$

$$275$$

$$\underline{\$754, \text{ Ans.}}$$

(65)

$$75 \quad 85$$

$$37 \quad 54$$

$$\underline{525} \quad \underline{340}$$

$$225 \quad 425$$

$$\underline{2775} \quad \underline{4590}$$

$$4590$$

$$\underline{7365}$$

$$5284$$

$$\underline{2081, \text{ Ans.}}$$

(66)

$$\begin{array}{r}
 69 \quad 48 \\
 53 \quad 27 \\
 \hline
 207 \quad 336 \\
 345 \quad 96 \\
 \hline
 3657 \quad 1296 \\
 3657 \\
 \hline
 4953 \\
 4279 \\
 \hline
 674, \text{ Ans.}
 \end{array}$$

(67)

$$63 \text{ lb.}$$

$$50$$

$$\underline{3150 \text{ lb.}}$$

$$3150$$

$$34 \text{ ct.}$$

$$\underline{12600}$$

$$9450$$

$$\underline{107100 \text{ ct., Ans.}}$$

Art. 32.

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

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

Art. 33.

(1)	(2)	(3)
245	138	428
<u>100</u>	<u>1000</u>	<u>10000</u>
24500	138000	4280000

(4)	(5)	(6)
872	9642	10045
<u>100000</u>	<u>1000000</u>	<u>1000000</u>
87200000	9642000000	10045000000

Art. 34.

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

$$\begin{array}{r}
 (7) \\
 18001 \\
 \underline{26000} \\
 108006 \\
 36002 \\
 \hline
 468026000
 \end{array}$$

$$\begin{array}{r}
 (8) \\
 8602 \\
 \underline{1030} \\
 25806 \\
 8602 \\
 \hline
 8860060
 \end{array}$$

$$\begin{array}{r}
 (9) \\
 3007 \\
 \underline{9100} \\
 3007 \\
 27063 \\
 \hline
 27363700
 \end{array}$$

$$\begin{array}{r}
 (10) \\
 80600 \\
 \underline{7002} \\
 1612 \\
 5642 \\
 \hline
 564361200
 \end{array}$$

$$\begin{array}{r}
 (11) \\
 70302 \\
 \underline{80300} \\
 210906 \\
 562416 \\
 \hline
 5645250600
 \end{array}$$

$$\begin{array}{r}
 (12) \\
 904000 \\
 \underline{10200} \\
 1808 \\
 904 \\
 \hline
 9220800000
 \end{array}$$

SHORT DIVISION.

Art. 41.

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

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

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

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

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

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

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

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

LONG DIVISION.

Art. 42.

$$\begin{array}{r} (5) \\ 14) 11577 (826\frac{13}{14}, \text{Ans.} \end{array}$$

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

$$\begin{array}{r} (6) \\ 15) 48690 (3246 \end{array}$$

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

$$\begin{array}{r} (7) \\ 23) 1110960 (48302\frac{14}{23} \end{array}$$

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

$$\begin{array}{r} (8) \\ 67) 122878 (1834 \end{array}$$

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

$$\begin{array}{r} (9) \\ 53) 12412 (234\frac{10}{53} \end{array}$$

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

$$\begin{array}{r} (10) \\ 72) 146304 (2032 \end{array}$$

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

$$\begin{array}{r} (11) \\ 54) 47100 (872\frac{12}{54} \end{array}$$

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

$$\begin{array}{r} (12) \\ 88) 71104 (808 \end{array}$$

$$\begin{array}{r} 704 \\ \hline 704 \\ 704 \\ \hline \end{array}$$

$$\begin{array}{r} (13) \\ 66) 43956 (666 \end{array}$$

$$\begin{array}{r} 396 \\ \hline 435 \\ 396 \\ \hline 396 \\ 396 \\ \hline \end{array}$$

Key 5.

$$\begin{array}{r} (14) \\ 99) 121900 (1231\frac{31}{99} \end{array}$$

$$\begin{array}{r} 99 \\ \hline 229 \\ 198 \\ \hline 310 \\ 297 \\ \hline 130 \\ 99 \\ \hline 31 \end{array}$$

$$\begin{array}{r} (15) \\ 112) 25312 (226 \end{array}$$

$$\begin{array}{r} 224 \\ \hline 291 \\ 224 \\ \hline 672 \\ 672 \\ \hline \end{array}$$

$$\begin{array}{r} (16) \\ 123) 381600 (3102\frac{54}{123} \end{array}$$

$$\begin{array}{r} 369 \\ \hline 126 \\ 123 \\ \hline 300 \\ 246 \\ \hline 54 \end{array}$$

$$\begin{array}{r} (17) \\ 204) 105672 (518 \end{array}$$

$$\begin{array}{r} 1020 \\ \hline 367 \\ 204 \\ \hline 1632 \\ 1632 \\ \hline \end{array}$$

$$\begin{array}{r} (18) \\ 1234) 600000 (486\frac{276}{1234} \end{array}$$

$$\begin{array}{r} 4936 \\ \hline 10640 \\ 9872 \\ \hline 7680 \\ 7404 \\ \hline 276 \end{array}$$

$$\begin{array}{r} (19) \\ 4321) 1234567 (285\frac{3082}{4321} \end{array}$$

$$\begin{array}{r} 8642 \\ \hline 37036 \\ 34568 \\ \hline 24687 \\ 21605 \\ \hline 3082 \end{array}$$

$$\begin{array}{r} (20) \\ 7819) 50964242 (6518 \end{array}$$

$$\begin{array}{r} 46914 \\ \hline 40502 \\ 39095 \\ \hline 14074 \\ 7819 \\ \hline 62552 \\ 62552 \\ \hline \end{array}$$

$$\begin{array}{r} (22) \\ 12345) 4049160 (328 \end{array}$$

$$\begin{array}{r} 37035 \\ \hline 34566 \\ 24690 \\ \hline 98760 \\ 98760 \\ \hline \end{array}$$

$$\begin{array}{r} (21) \\ 9876) 48905952 (4952 \end{array}$$

$$\begin{array}{r} 39504 \\ \hline 94019 \\ 88884 \\ \hline 51355 \\ 49380 \\ \hline 19752 \\ 19752 \\ \hline \end{array}$$

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

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

$$\begin{array}{r}
 (24) \\
 15 \overline{) 3465} \text{ (231} \\
 \underline{30} \\
 46 \\
 \underline{45} \\
 15 \\
 \underline{15}
 \end{array}$$

$$\begin{array}{r}
 (26) \\
 19 \overline{) 1083} \text{ (57 dollars.} \\
 \underline{95} \\
 133 \\
 \underline{133}
 \end{array}$$

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

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

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

Ans. \$136 and \$360 over.

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

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

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

$$\begin{array}{r}
 (33) \\
 1006) 10401000 (10338 \overset{972}{\underset{1006}{\cancel{1006}}} \\
 \underline{1006} \\
 3410 \\
 \underline{3018} \\
 3920 \\
 \underline{3018} \\
 9020 \\
 \underline{8048} \\
 972
 \end{array}$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Art. 43.

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

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

$$\begin{array}{r} (8) \\ 8 \overline{)7840} \text{ Ans.} \\ 8 \overline{)980} \quad 122\frac{32}{84} \\ \hline 122-4 \\ 8 \times 4 = 32 \text{ rem.} \end{array}$$

$$\begin{array}{r} (9) \\ 8 \overline{)14771} \text{ Ans.} \\ 9 \overline{)1846}-3 \quad 205\frac{11}{72} \\ \hline 205-1 \\ 8 \times 1 + 3 = 11 \text{ rem.} \end{array}$$

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

$$\begin{array}{r} (11) \\ 11 \overline{)81344} \\ 11 \overline{)7394}-10 \\ \hline 672-2 \\ 2 \times 11 + 10 = 32 \\ \text{Ans. } 672\frac{32}{121} \end{array}$$

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

$$\begin{array}{r} (12) \\ 9 \overline{)98272} \\ 12 \overline{)10919}-1 \\ \hline 909-11 \\ 11 \times 9 + 1 = 100 \\ \text{Ans. } 909\frac{100}{108} \end{array}$$

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

Art. 44.

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

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

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

$$\begin{array}{r} (5) \\ 1 \overline{)00}462 \overline{)50} \\ \hline 462\frac{50}{1000} \end{array}$$

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

Art. 45.

$$\begin{array}{r} (4) \\ 4 \overline{)000}73 \overline{)005} \\ \hline 18\frac{1005}{4000} \end{array}$$

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

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

$$\begin{array}{r} (7) \\ 18|0)4016|7(223\overset{27}{\underset{180}{} \end{array}$$

$$\begin{array}{r} 36 \\ \hline 41 \\ 36 \\ \hline 56 \\ 54 \\ \hline 2 \end{array}$$

$$\begin{array}{r} (9) \\ 64|00)3640|06(56\overset{5606}{\underset{8400}{} \end{array}$$

$$\begin{array}{r} 320 \\ \hline 440 \\ 384 \\ \hline 56 \end{array}$$

$$\begin{array}{r} (8) \\ 21|00)9072|37(432\overset{37}{\underset{2100}{} \end{array}$$

$$\begin{array}{r} 84 \\ \hline 67 \\ 63 \\ \hline 42 \\ 42 \\ \hline \end{array}$$

$$\begin{array}{r} (10) \\ 25|0000)7654|6037(306\overset{46037}{\underset{250000}{} \end{array}$$

$$\begin{array}{r} 75 \\ \hline 154 \\ 150 \\ \hline 4 \end{array}$$

$$\begin{array}{r} (11) \\ 634|00)435637|54(687\overset{7954}{\underset{63400}{} \end{array}$$

$$\begin{array}{r} 3804 \\ \hline 5523 \\ 5072 \\ \hline 4517 \\ 4438 \\ \hline 79 \end{array}$$

Art. 49.

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

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

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

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

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

(6)	(7)	(8)
86) 31173 (362 $\frac{41}{86}$	28	63 gallons.
258	3 \$	5
<u>537</u>	25) 1400 (56 dolls.	15) 315 (21, Ans.
516	125	30
<u>213</u>	150	15
172	150	15
<u>41</u>		

(9)	(10)
73900	148
70	56
<u>214) 73830 (345, Ans.</u>	<u>92</u>
642	204, sum.
963	92, diff.
856	<u>408</u>
<u>1070</u>	1836
1070	23) 18768 (816, Ans.
	184

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

(12)

\$30	\$6000		156 acres.
70	2100	$3900 \div 25 = 156$	70 acres.
<u>\$2100</u>	<u>\$3900</u>		<u>226 acres, Ans.</u>

(13)

\$360		yr.
300	\$1800	800) 10400 (13, Ans.
150	1000	800
100	<u>\$800, saved each yr.</u>	<u>2400</u>
90		<u>2400</u>
<u>\$1000, spent each yr.</u>		

(14)

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

$$80 \times 25 = 2000$$

Amt. pd., \$2600

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

$$30 \times 60 = 1800$$

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

(15)

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

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

$$25 \times 6 = 150$$

$$\underline{\$1400}$$

$$1100$$

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

(17)

125	75	175) 19250 (110, Ans.
<u>\$85</u>	<u>\$115</u>	175
625	375	175
1000	75	175
<u>\$10625</u>	75	0
	<u>\$8625</u>	
	10625	
	<u>\$19250</u>	

\$150	\$125
15	20
<u>750</u>	<u>\$2500</u>
150	
<u>\$2250</u>	\$45
2500	50
<u>\$4750</u>	<u>\$2250</u>
2250	
<u>\$2500</u>	
95	
<u>\$2405, Ans.</u>	

COMPOUND NUMBERS.

U. S. MONEY.

EXAMPLES TO BE WRITTEN.

Art. 53.

(1.) \$12.178	(6.) \$ 20.022
(2.) \$ 6.066	(7.) \$100.10
(3.) \$ 7.007	(8.) \$200.02
(4.) \$40.535	(9.) \$400.018
(5.) \$ 2.03	

EXAMPLES TO BE READ.

Eighteen dollars sixty-two cents five mills; twenty dollars thirty-two cents four mills; seventy-nine dollars five cents; forty-six dollars; seventy dollars one cent five mills; one hundred dollars twenty-eight cents; etc.

REDUCTION.

Art. 55.

Since the operations in this section consist simply in adding ciphers or removing them, or erasing points or inserting them between the different denominations, it is deemed unnecessary to occupy space, as the whole solution, when presented to the eye, would consist in nothing more than writing down the question to be solved, and then placing the answer under it.

ADDITION.

Art. 56.

(2)	(3)	(4)
\$17.15	\$18.041	\$43.75
23.43	16.317	29.18
7.19	100.503	17.63
8.37	87.338	268.95
12.31	<u>\$222.199</u>	<u>718.07</u>
<u>\$68.45</u>		<u>\$1077.58</u>

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

SUBTRACTION.

Art. 57.

(2)	(3)	(4)	(5)
\$29.342	\$46.28	\$20.05	\$3.00
17.265	17.75	5.50	.03
<u>\$12.077</u>	<u>\$28.53</u>	<u>\$14.55</u>	<u>\$2.97</u>
(6)	(7)	(8)	(9)
\$10.000	\$50.000	\$1000.000	\$1000.48
.001	.505	1.011	900.68
<u>\$9.999</u>	<u>\$49.495</u>	<u>\$998.989</u>	<u>\$99.75</u>

MULTIPLICATION.

Art. 58.

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

$$\begin{array}{r}
 (8) \\
 \$0.125 \\
 \underline{17} \\
 875 \\
 \underline{125} \\
 \$2.125
 \end{array}$$

$$\begin{array}{r}
 (9) \\
 \$3.28 \\
 \underline{38} \\
 2624 \\
 \underline{984} \\
 \$124.64
 \end{array}$$

$$\begin{array}{r}
 (10) \\
 \$1.06 \\
 \underline{338} \\
 848 \\
 \underline{318} \\
 318 \\
 \underline{\hspace{1cm}} \\
 \$358.28
 \end{array}$$

$$\begin{array}{r}
 (11) \\
 \$5.75 \\
 \underline{38} \\
 4600 \\
 \underline{1725} \\
 \$218.50
 \end{array}$$

$$\begin{array}{r}
 (13) \\
 \$0.34 \\
 \underline{89} \\
 306 \\
 \underline{272} \\
 \$30.26
 \end{array}$$

$$\begin{array}{r}
 (14) \\
 \$5.67 \\
 \underline{24} \\
 2268 \\
 \underline{1134} \\
 \$136.08
 \end{array}$$

$$\begin{array}{r}
 (15) \\
 \$2.69 \\
 \underline{169} \\
 2421 \\
 \underline{1614} \\
 269 \\
 \underline{\hspace{1cm}} \\
 \$454.61
 \end{array}$$

$$\begin{array}{r}
 (16) \\
 \$1.25 \\
 \underline{691} \\
 125 \\
 \underline{1125} \\
 750 \\
 \underline{\hspace{1cm}} \\
 \$863.75
 \end{array}$$

$$\begin{array}{r}
 (17) \\
 73 \\
 \underline{63 \text{ gal.}} \\
 219 \\
 \underline{438} \\
 4599 \text{ gal.} \\
 \underline{\$0.55} \\
 22995 \\
 \underline{22995} \\
 \$2529.45
 \end{array}$$

$$\begin{array}{r}
 (18) \\
 281 \text{ lb.} \\
 \underline{4} \\
 1124 \text{ lb.} \\
 \underline{\$0.065} \\
 5620 \\
 \underline{6744} \\
 \$73.060
 \end{array}$$

$$\begin{array}{r}
 (19) \\
 35 \\
 \underline{10 \text{ yd.}} \\
 350 \text{ yd.} \\
 \underline{\$0.01} \\
 \$3.50
 \end{array}$$

$$\begin{array}{r}
 (20) \\
 312 \\
 \underline{11 \text{ hr.}} \\
 3432 \text{ hr.} \\
 \underline{\$0.13} \\
 10296 \\
 \underline{3432} \\
 \$446.16, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 (21) \\
 18 \\
 \underline{3 \text{ bu.}} \\
 54 \text{ bu.} \\
 \underline{\$1.25} \\
 54 \\
 \underline{\hspace{1cm}} \\
 500 \\
 \underline{625} \\
 \text{Ans. } \$67.50
 \end{array}$$

$$\begin{array}{r}
 (22) \\
 \$10.001 \\
 \underline{.150} \\
 500050 \\
 \underline{10001} \\
 \$1500.150
 \end{array}$$

$$\begin{array}{r}
 (23) \\
 17 \quad \$0.247 \\
 \underline{51 \text{ lb.}} \quad \underline{867} \\
 17 \quad 1729 \\
 \underline{85} \quad 1482 \\
 867 \text{ lb.} \quad \underline{1976} \\
 \$214.149, \text{ Ans.}
 \end{array}$$

DIVISION.

Art. 59.

CASE I.

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

$$\begin{array}{r}
 (6) \quad (7) \quad (8) \\
 805 \overline{)16100} (20 \text{ bbl.} \quad 75 \overline{)1200} (16 \quad 1125 \overline{)234000} (208 \text{ bu.} \\
 \underline{1610} \quad \underline{75} \quad \underline{2250} \\
 0 \quad 450 \quad 9000 \\
 \underline{450} \quad \underline{9000}
 \end{array}$$

CASE II.

$$\begin{array}{r}
 (3) \quad (4) \quad (5) \\
 8 \overline{)\$65.000} \quad 23 \overline{)\$29.610} (\$1.287 + \quad 4 \overline{)\$92.250} \\
 \underline{\$8.125} \quad \underline{23} \quad \underline{\$23.062 +} \\
 66 \quad 66 \\
 \underline{46} \quad \underline{46} \\
 201 \quad 201 \\
 \underline{184} \quad \underline{184} \\
 170 \quad 170 \\
 \underline{161} \quad \underline{161} \\
 9 \quad 9
 \end{array}$$

$$\begin{array}{r}
 (6) \\
 8 \overline{)\$57.500} \\
 \underline{\$7.187 +}
 \end{array}$$

$$\begin{array}{r} (7) \\ 16) \$25.76 (\$1.61 \end{array}$$

$$\begin{array}{r} 16 \\ \hline 97 \\ 96 \\ \hline 16 \\ 16 \\ \hline \end{array}$$

$$\begin{array}{r} (8) \\ 755) \$328.425 (\$0.435 \\ 3020 \\ \hline 2642 \\ 2265 \\ \hline 3775 \\ 3775 \\ \hline \end{array}$$

$$\begin{array}{r} (9) \\ 313) \$800.000 (\$2.555 + \end{array}$$

$$\begin{array}{r} 626 \\ \hline 1740 \\ 1565 \\ \hline 1750 \\ 1565 \\ \hline 1850 \\ 1565 \\ \hline 285 \end{array}$$

$$\begin{array}{r} (10) \\ 133) \$10000.000 (\$75.187 + \end{array}$$

$$\begin{array}{r} 931 \\ \hline 690 \\ 665 \\ \hline 250 \\ 133 \\ \hline 1170 \\ 1064 \\ \hline 1060 \\ 931 \\ \hline 129 \end{array}$$

$$\begin{array}{r} (11) \\ 154) \$2705.010 (\$17.565 \end{array}$$

$$\begin{array}{r} 154 \\ \hline 1165 \\ 1078 \\ \hline 870 \\ 770 \\ \hline 1001 \\ 924 \\ \hline 770 \\ 770 \\ \hline \end{array}$$

$$\begin{array}{r} (12) \\ 25 \\ 15 \text{ lb.} \\ \hline 125 \\ 25 \\ \hline \text{lb. } 375) \$60.00 (\$0.16 \\ 375 \\ \hline 2250 \\ 2250 \\ \hline \end{array}$$

$$\begin{array}{r} (13) \\ 235 \text{ lb.} \\ 8 \\ \hline \text{lb. } 1880) \$122.200 (\$0.065 \\ 11280 \\ \hline 9400 \\ 9400 \\ \hline \end{array}$$

Art. 60.

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

(5)	(6)
\$8.10	\$50.00
5.65	30.50
\$0.25 \times 8 = 2.00	<u>\$19.50</u>
4.00	6
<u>\$19.75</u>	<u>\$117.00</u>

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

(11)	(12)
365	21 63
65 ct.	3 bu. 35 ct.
<u>1825</u>	<u>63 bu.</u>
2190	315
<u>\$237.25</u>	189
	<u><i>Ans.</i> \$22.05</u>

<p>(13)</p> $\begin{array}{r} 19 \text{ yd.} \quad 76 \\ 4 \quad 23 \text{ ct.} \\ \hline 76 \text{ yd.} \quad 228 \\ \quad 152 \\ \hline \$17.48, \text{ Ans.} \end{array}$	<p>(14)</p> $\begin{array}{r} \$2000.00 \\ 163.75 \\ \hline \$1836.25 \end{array}$	<p>(14)</p> $\begin{array}{r} 5) \$1836.25 \\ 5) \$367.25 \\ \hline \$73.45, \text{ Ans.} \end{array}$
--	--	--

(15)

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

(16)

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

(17)

$$22 = 2 \times 11$$

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

MERCHANTS' BILLS.

(18.)

9	lb.	@	\$0.32 =	\$2.88	
4	"	"	1.25 =	5.00	
45	"	"	.09 =	4.05	
17	"	"	.20 =	3.40	<u>\$15.33</u>

(19.)

22	yd.	@	\$1.75 =	\$38.50	
18	"	"	.15 =	2.70	
25	"	"	.65 =	16.25	
6	"	"	.18 =	1.08	<u>\$58.53</u>

(20.)

4	lb.	@	\$0.18 =	\$0.72	
8	"	"	.23 =	1.84	
7	"	"	.11 =	.77	
6	"	"	.09 =	.54	
13	"	"	.35 =	4.55	
26	"	"	.12 =	3.12	<u>\$11.54</u>

Key 6.

$$\begin{array}{rcl}
 (21.) & 43 \text{ yd. @ } \$0.13 & = \$5.59 \\
 & 28 \text{ " " } .09 & = 2.52 \\
 & 23 \text{ " " } .23 & = \underline{5.29} \quad \underline{\$13.40}
 \end{array}$$

DRY MEASURE.

Art. 63.

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

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

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

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

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

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

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

LIQUID MEASURE.

Art. 64.

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

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

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

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

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

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

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

AVOIRDUPOIS WEIGHT.

Art. 65.

(1.) $2 \text{ cwt.} \times 4 \times 25 = 200 \text{ lb., Ans.}$

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

(3.) $1 \text{ T.} \times 20 + 2 \text{ cwt.} = 22 \text{ cwt.} \times 100 = 2200 \text{ lb., Ans.}$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

LONG MEASURE.

Art. 66.

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

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

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

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

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

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

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

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

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

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

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

SQUARE MEASURE.

Art. 67.

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

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

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

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

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

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

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

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

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

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

Art. 68.

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

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

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

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

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

(7.) $18 \text{ ft.} \div 3 = 6 \text{ yd.}; 15 \text{ ft.} \div 3 = 5 \text{ yd.}$
 $5 \text{ yd.} \times 6 \text{ yd.} \times 2 = 60 \text{ sq. yd.}; 60 \times \$1.25 = \$75, \text{ Ans.}$

(8.) $21 \text{ ft.} = 7 \text{ yd.}; 18 \text{ ft.} = 6 \text{ yd.}; 7 \text{ yd.} \times 6 \text{ yd.} = 42 \text{ sq. yd.}; 42 \times \$0.17 = \$7.14, \text{ Ans.}$

Art. 69.

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

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

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

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

CUBIC MEASURE.

Art. 70.

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

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

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

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

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

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

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

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

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

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

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

TIME MEASURE.

Art. 71.

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

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

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

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

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

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

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

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

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

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

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

MISCELLANEOUS TABLES.

Art. 73.

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

(2.) $9 \text{ lb.} \times 12 + 3 \text{ oz.} = 111 \text{ oz.}$; $111 \text{ oz.} \times 20 + 5 \text{ pwt.} = 2225 \text{ pwt.}$, *Ans.*

(3.) $8 \text{ lb.} \times 12 + 9 \text{ oz.} = 105 \text{ oz.}$; $105 \text{ oz.} \times 20 + 13 \text{ pwt.} = 2113 \text{ pwt.}$; $2113 \text{ pwt.} \times 24 + 17 \text{ gr.} = 50729 \text{ gr.}$, *Ans.*

(4.) $805 \text{ pwt.} \div 20 = 40 \text{ oz. } 5 \text{ pwt.}$; $40 \text{ oz.} \div 12 = 3 \text{ lb. } 4 \text{ oz.}$ *Ans. 3 lb. 4 oz. 5 pwt.*

(5.) $12530 \text{ gr.} \div 24 = 522 \text{ pwt. } 2 \text{ gr.}$; $522 \text{ pwt.} \div 20 = 26 \text{ oz. } 2 \text{ pwt.}$; $26 \text{ oz.} \div 12 = 2 \text{ lb. } 2 \text{ oz.}$ *Ans. 2 lb. 2 oz. 2 pwt. 2 gr.*

(6.) $4 \text{ lb.} \times 12 + 5 \text{ } \frac{3}{4} = 53 \text{ } \frac{3}{4}$: $53 \times 8 \times 3 \times 20 + 2 \text{ gr.} = 25442 \text{ gr., Ans.}$

(7.) $7 \text{ lb.} \times 12 + 2 \text{ } \frac{3}{4} = 86 \text{ } \frac{3}{4}$: $86 \text{ } \frac{3}{4} \times 8 = 688 \text{ } \frac{3}{4}$: $688 \text{ } \frac{3}{4} \times 3 + 1 \text{ } \frac{3}{4} = 2065 \text{ } \frac{3}{4}$: $2065 \text{ } \frac{3}{4} \times 20 = 41300 \text{ gr., Ans.}$

(8.) $431 \text{ } \frac{3}{4} \div 8 = 53 \text{ } \frac{3}{4} 7 \text{ } \frac{3}{4}$: $53 \text{ } \frac{3}{4} \div 12 = 4 \text{ lb. } 5 \text{ } \frac{3}{4}$. *Ans.*
 $4 \text{ lb. } 5 \text{ } \frac{3}{4} 7 \text{ } \frac{3}{4}$.

(9.) $975 \text{ } \frac{3}{4} \div 3 = 325 \text{ } \frac{3}{4}$: $325 \text{ } \frac{3}{4} \div 8 = 40 \text{ } \frac{3}{4} 5 \text{ } \frac{3}{4}$: $40 \text{ } \frac{3}{4} \div 12 = 3 \text{ lb. } 4 \text{ } \frac{3}{4}$. *Ans.* $3 \text{ lb. } 4 \text{ } \frac{3}{4} 5 \text{ } \frac{3}{4}$.

(10.) $6321 \text{ gr.} \div 20 = 316 \text{ } \frac{3}{4} 1 \text{ gr.}$: $316 \text{ } \frac{3}{4} \div 3 = 105 \text{ } \frac{3}{4} 1 \text{ } \frac{3}{4}$: $105 \text{ } \frac{3}{4} \div 8 = 13 \text{ } \frac{3}{4} 1 \text{ } \frac{3}{4}$: $13 \text{ } \frac{3}{4} \div 12 = 1 \text{ lb. } 1 \text{ } \frac{3}{4}$. *Ans.*
 $1 \text{ lb. } 1 \text{ } \frac{3}{4} 1 \text{ } \frac{3}{4} 1 \text{ } \frac{3}{4} 1 \text{ gr.}$

(11.) $4 \text{ cong.} \times 8 \times 16 + 7 \text{ f. } \frac{3}{4} \times 8 = 4152 \text{ f. } \frac{3}{4}$, *Ans.*

(12.) $5 \text{ O.} \times 16 + 6 \text{ f. } \frac{3}{4} = 86 \text{ f. } \frac{3}{4}$: $86 \text{ f. } \frac{3}{4} \times 8 + 3 \text{ f. } \frac{3}{4} = 691 \text{ f. } \frac{3}{4}$: $691 \times 60 = 41460 \text{ minims, Ans.}$

(13.) $2469 \text{ f. } \frac{3}{4} \div 8 = 308 \text{ f. } \frac{3}{4} 5 \text{ f. } \frac{3}{4}$: $308 \div 16 = 19 \text{ O. } 4 \text{ f. } \frac{3}{4}$: $19 \div 8 = 2 \text{ cong. } 3 \text{ O.}$ *Ans.* $2 \text{ cong. } 3 \text{ O. } 4 \text{ f. } \frac{3}{4} 5 \text{ f. } \frac{3}{4}$.

(14.) $3 \text{ yd.} \times 3 = 9 \text{ ft.,} \times 12 = 108 \text{ in.,} \times 3 = 324 \text{ barleycorns, Ans.}$

(15.) $1 \text{ ft.} \times 12 + 6 \text{ in.} = 18 \text{ in.}$: $18 \times 12 = 216 \text{ lines, Ans.}$

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

(17.) $24 \text{ chains} \times 4 = 96 \text{ rd.}$: $15 \text{ chains} \times 4 = 60 \text{ rd.}$: $96 \text{ rd.} \times 60 \text{ rd.} = 5760 \text{ sq. rd.}$: $5760 \div 160 = 36 \text{ A., Ans.}$

(18.) $267 \text{ cu. ft.} \times 1728 + 624 \text{ cu. in.} = 462000 \text{ cu. in.}$: $462000 \div 231 = 2000 \text{ gal., Ans.}$

(19.) $8^\circ \times 60 + 41' = 521'$: $521' \times 60 + 45'' = 31305''$, *Ans.*

(20.) $61^\circ \times 60 + 59' = 3719'$: $3719' \times 60 + 28'' = 223168''$, *Ans.*

(21.) $915' \div 60 = 15^{\circ} 15'$, *Ans.*

(22.) $3661'' \div 60 = 61' 1''$: $61' \div 60 = 1^{\circ} 1'$. *Ans.* $1^{\circ} 1' 1''$.

(23.) $6 \text{ gross} \times 12 = 72 \text{ doz.}, \times 5 \text{ ct.} = \3.60 , *Ans.*

(24.) $4 \text{ score} \times 20 + 10 \text{ yr.} = 90 \text{ yr.}$, *Ans.*

(25.) $3 \text{ bdl.} \times 2 = 6 \text{ rm.}, \times 20 = 120 \text{ qr.}: 120 @ 18 \text{ ct.} = \21.60 , *Ans.*

(26.) $336 \text{ pp.} \div 2 = 168 \text{ leaves}: 168 \div 12 = 14 \text{ sheets}$, *Ans.*

(27.) $512 + 528 + 528 + 512 + 496 = 2576 \text{ pp.}, \div 2 = 1288 \text{ leaves}: 1288 \div 8 = 161 \text{ sheets}, \div 24 = 6 \text{ qr. } 17 \text{ sheets}$, *Ans.*

Art. 74.

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

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

(3.) $3 \text{ pk.} \times 8 + 3 \text{ qt.} = 27 \text{ qt.}: 27 \text{ qt.} \times 2 = 54 \text{ pt.}: 3 \text{ ct.} \times 54 = \1.62 , *Ans.*

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

(5.) $\$1.66 = 166 \text{ ct.}: 166 \text{ ct.} \div 4 = 41 \text{ qt. and } 2 \text{ ct. over, which will buy } 1 \text{ pt. at } 4 \text{ ct. a qt. } 41 \text{ qt.} \div 8 = 5 \text{ pk. } 1 \text{ qt.}: 5 \text{ pk.} \div 4 = 1 \text{ bu. } 1 \text{ pk.}$ *Ans.* $1 \text{ bu. } 1 \text{ pk. } 1 \text{ qt. } 1 \text{ pt.}$

Or thus: $4 \text{ ct. a qt. is } 2 \text{ ct. a pt.}; \text{ and } 166 \text{ ct.} \div 2 \text{ ct.} = 83 \text{ pt.} = 1 \text{ bu. } 1 \text{ pk. } 1 \text{ qt. } 1 \text{ pt.}$, *Ans.*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Art. 75.

(4.) 17 bu. 3 pk. 7 qt., *Ans.*

(5.) 26 bu. 1 qt. 1 pt., *Ans.*

(6.) 24 qt., *Ans.*

(7.) 128 gal. 3 qt. 1 pt. 3 gi., *Ans.*

(8.) 79 T. 15 cwt. 48 lb. 6 oz., *Ans.*

(9.) 57 cwt. 51 lb. 7 oz., *Ans.*

(10.) 111 mi. 44 rd., *Ans.*

(11.) 14 yd. 4 in., *Ans.*

(12.) 299 A. 150 sq. rd., *Ans.*

(13.) 51 sq. yd. 4 sq. ft. 73 sq. in., *Ans.*

(14.) 49 C. 58 cu. ft. 519 cu. in., *Ans.*

(15.) 143 cu. yd. 2 cu. ft. 990 cu. in., *Ans.*

(16.) 50 da. 3 hr. 12 min. 28 sec., *Ans.*

(17.) 8 mo. 4 da. 8 hr. 49 min. 35 sec., *Ans.*

(18)		(19)		(20)	
bu.	pk.	bu.	pk.	cwt.	lb.
21	3	200	3	8	36
14	1	143	1	4	64
23	2	400	3	5	19
18	1	255	1	7	75
<u>22</u>	<u>1</u>	<u>1000</u>	<u>0</u>	<u>7</u>	<u>84</u>
100	0			33	78

(21)		(22)		(23)	
lb.	oz.	mi.	rd.	A.	sq. rd.
13	11	104	50	186	134
17	13	95	270	286	17
14	14	<u>200</u>	<u>0</u>	<u>113</u>	<u>89</u>
16	0			586	80
19	7				
<u>17</u>	<u>9</u>				
99	6				

(24)			(25)		(26)		
sq. yd.	sq. ft.	sq. in.	C.	cu. ft.	hhd.	gal.	qt. pt.
17	3	119	7	78	4642	3	1
18	0	141	16	24	945	0	0
23	7	0	35	127	1707	0	1
<u>29</u>	<u>5</u>	<u>116</u>	<u>29</u>	<u>10</u>	<u>10206</u>	<u>1</u>	<u>0</u>
88	8	88	88	111	277	50	1 0

Art. 76.

- (4.) 3 gal. 3 qt. 1 pt., *Ans.*
 (5.) 19 gal. 1 qt. 1 pt. 3 gi., *Ans.*
 (6.) 3 T. 18 cwt. 75 lb., *Ans.*
 (7.) 11 T. 42 lb. 15 oz., *Ans.*
 (8.) 6 mi. 282 rd., *Ans.*

- (9.) 1 yd. 2 ft. 11 in., *Ans.*
 (10.) 249 A. 153 sq. rd., *Ans.*
 (11.) 2 sq. yd. 8 sq. ft. 104 sq. in., *Ans.*
 (12.) 8 C. 125 cu. ft., *Ans.*
 (13.) 8 cu. yd. 18 cu. ft. 1727 cu. in., *Ans.*
 (14.) 51 min. 42 sec., *Ans.*
 (15.) 55 da. 5 hr. 55 min. 55 sec., *Ans.*

(16)

bu.	pk.	qt.
4	0	0
2	1	1
<hr/>		
1	2	7

(17)

bu.	pk.	qt.	pt.
100	0	0	0
24	0	0	1
<hr/>			
75	3	7	1

(18)

lb.	oz.
46	4
19	8
<hr/>	
26	12

(19)

cwt.	lb.
32	66
8	67
<hr/>	
23	99

(20)

mi.	rd.
24899	0
100	41
<hr/>	
24798	279

(21)

A.	sq. rd.
146	80
86	94
<hr/>	
59	146

(22)

C.	cu. ft.
8	50
3	75
<hr/>	
4	103

(23)

gal.	qt.	pt.	gi.
63	0	0	0
51	1	0	2
<hr/>			
11	2	1	2

(24)

da.	hr.	min.	sec.
5	10	27	15
2	4	13	29
<hr/>			
3	6	13	46

Art. 77.

(2)

yr.	mo.	da.
1876	9	1
1776	7	4
<hr/>		
100	1	27

(3)

yr.	mo.	da.
1191	7	12
1099	7	15
<hr/>		
91	11	27

(4)

yr.	mo.	da.
1587	2	8
1215	6	15
<hr/>		
371	7	23

(5)		
yr.	mo.	da.
1688	11	5
1066	10	14
<hr/>		
622	0	21

(6)		
yr.	mo.	da.
1815	6	18
1805	12	2
<hr/>		
9	6	16

Art. 78.

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

Art. 79.

(2)				(3)			(4)			
bu.	pk.	qt.	pt.	bu.	pk.	qt.	bu.	pk.	qt.	pt.
2	1	1	1	2	2	2	4	3	3	1
			6			9				12
<hr/>				<hr/>			<hr/>			
13	3	1	0	23	0	2	58	1	2	0

(5)	
T.	cwt. lb.
8	62
	9
<hr/>	
3	17 58

(6)	
T.	cwt. lb.
10	89
	7
<hr/>	
3	16 23

(7)	
mi.	rd.
208	176
	15
<hr/>	
3128	80

$$\begin{array}{r}
 \text{(8)} \\
 \text{cu. yd. cu. ft. cu. in.} \\
 23 \quad 9 \quad 228 \\
 \quad \quad \quad 12 \\
 \hline
 280 \quad 1 \quad 1008
 \end{array}$$

$$\begin{array}{r}
 \text{(9)} \\
 \text{T. cwt. lb.} \\
 16 \quad 74 \\
 \quad 119 \\
 \hline
 99 \quad 12 \quad 6
 \end{array}$$

$$\begin{array}{r}
 \text{(10)} \\
 \text{gal. qt. pt.} \\
 47 \quad 3 \quad 1 \\
 \quad \quad 59 \\
 \hline
 2824 \quad 2 \quad 1
 \end{array}$$

$$\begin{array}{r}
 \text{(11)} \\
 \text{mi. rd.} \\
 27 \quad 155 \\
 \quad 31 \\
 \hline
 852 \quad 5
 \end{array}$$

$$\begin{array}{r}
 \text{(12)} \\
 \text{C. cu. ft.} \\
 7 \quad 98 \\
 \quad 17 \\
 \hline
 132 \quad 2
 \end{array}$$

$$\begin{array}{r}
 \text{(13)} \\
 \text{mo. wk. da. hr. min. sec.} \\
 \quad 2 \quad 4 \quad 13 \quad 48 \quad 39 \\
 \quad \quad \quad \quad 75 \\
 \hline
 49 \quad 3 \quad 0 \quad 3 \quad 48 \quad 45
 \end{array}$$

$$\begin{array}{r}
 \text{(14)} \\
 \text{cwt. lb.} \quad 813 \text{ cwt.} = 81300 \text{ lb.} \\
 10 \quad 84 \quad 8 \text{ ct.} - 6 \text{ ct.} = 2 \text{ ct., gain on 1 lb.} \\
 \quad 75 \quad 2 \text{ ct.} \times 81300 = 162600 \text{ ct.} = \$1626, \text{ Ans.} \\
 \hline
 813 \quad 0
 \end{array}$$

$$\begin{array}{r}
 \text{(15)} \\
 4 \text{ cwt. } 85 \text{ lb.} = 485 \text{ lb.} \\
 485 \text{ lb.} \times 425 = 206125 \text{ lb.} \\
 206125 \times 13 \text{ ct.} = \$26796.25 \\
 \$26796.25 - \$24735 = \$2061.25, \text{ Ans.}
 \end{array}$$

DIVISION.

Art. 80.

$$\begin{array}{r}
 \text{(4)} \\
 \text{bu. pk. qt. pt.} \\
 5)67 \quad 3 \quad 4 \quad 1 \\
 \hline
 13 \quad 2 \quad 2 \quad 1
 \end{array}$$

$$\begin{array}{r}
 \text{(5)} \\
 \text{cwt. lb. oz.} \\
 11)35 \quad 44 \quad 12 \\
 \hline
 3 \quad 22 \quad 4
 \end{array}$$

$$\begin{array}{r}
 \text{(6)} \\
 \text{mi. rd.} \\
 7)39 \quad 288 \\
 \hline
 5 \quad 224
 \end{array}$$

$$\begin{array}{r}
 (7) \\
 \text{A. sq. rd.} \\
 16 \overline{)69 \ 64} \\
 \underline{4 \ 54}
 \end{array}$$

$$\begin{array}{r}
 (8) \\
 \text{bu. pk. qt.} \\
 10 \overline{)490 \ 2 \ 4} \\
 \underline{10 \ 49 \ 0 \ 2} \\
 \text{Ans. 4 \ 3 \ 5}
 \end{array}$$

$$\begin{array}{r}
 (9) \\
 \text{lb. oz.} \\
 5 \overline{)265 \ 10} \\
 \underline{10 \ 53 \ 2} \\
 \text{Ans. 5 \ 5}
 \end{array}$$

$$\begin{array}{r}
 (10) \\
 \text{T. cwt.} \\
 17 \overline{)45 \ 18} \\
 \underline{2 \ 14}
 \end{array}$$

$$\begin{array}{r}
 (11) \\
 \text{dr. hr. min. sec.} \\
 6 \overline{)114 \ 22 \ 45 \ 18} \\
 \underline{9 \ 19 \ 3 \ 47 \ 33} \\
 \text{Ans. 2 \ 3 \ 5 \ 17}
 \end{array}$$

$$\begin{array}{r}
 (12) \\
 \text{lb. oz.} \\
 27 \ 13
 \end{array}$$

$$\begin{array}{r}
 10 \text{ cwt.} = 1000 \\
 23 \overline{)1027} (44 \text{ lb.} \\
 \underline{92} \\
 107 \\
 \underline{92} \\
 15
 \end{array}$$

$$\begin{array}{r}
 15 \times 16 + 13 \text{ oz.} \div 23 = 11 \text{ oz.} \\
 \text{Ans. 44 lb. 11 oz.}
 \end{array}$$

$$\begin{array}{r}
 (13) \\
 \text{bu. pk. qt. bu. pk. qt.} \\
 78 \overline{)309 \ 2 \ 2 \ 3 \ 3 \ 7, \text{ Ans.}} \\
 \underline{234} \\
 75 \\
 \underline{4} \\
 78 \overline{)302} (3 \text{ pk.} \\
 \underline{234} \\
 68 \\
 \underline{8} \\
 78 \overline{)546} (7 \text{ qt.} \\
 \underline{546}
 \end{array}$$

$$\begin{array}{r}
 (14) \\
 \text{gal. qt. pt. gi.} \\
 63 \overline{)127 \ 3 \ 1 \ 3} \\
 \underline{\text{gal. 2} \dots 1} \\
 \underline{4 \text{ qt. qt.}} \\
 4 + 3 = 7 \\
 \text{pt.} \quad \underline{2 \text{ pt. pt.}} \\
 15 \quad 14 + 1 = 15 \\
 \underline{4} \\
 60 + 3 \text{ gi.} = 63 \text{ gi.} \\
 63 \div 63 = 1 \text{ gi.} \\
 \text{Ans. 2 gal. 1 gi.}
 \end{array}$$

$$\begin{array}{r}
 \text{mi. rd. mi. rd.} \\
 319)788 \quad 169 \text{ (2 151, } \textit{Ans.} \\
 \underline{638}
 \end{array}$$

$$150 \times 320 = 48000 \text{ rd.}$$

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

$$1626$$

$$1595$$

$$319$$

$$319$$

$$319$$

$$160 \text{ sq. rd.} + 155 \text{ sq. rd.} = 315 \text{ sq. rd.}$$

$$315 \text{ sq. rd.} \div 3 = 105 \text{ sq. rd.}$$

$$\textit{Ans.} 50 \text{ A. } 105 \text{ sq. rd.}$$

$$\begin{array}{r}
 \text{bu. pk.} \\
 5000 \quad 3 \\
 7245 \quad 2 \\
 \hline
 12245 \quad 5 \\
 8022 \quad 1 \\
 \hline
 4223 \quad 4 = 4224 \text{ bu.} \\
 4224 \div 8 = 528 \text{ bu., } \textit{Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{A. sq. rd.} \\
 104 \quad 117 \\
 87 \quad 78 \\
 \hline
 191 \quad 195 \\
 40 \quad 40 \\
 \hline
 3)151 \quad 155
 \end{array}$$

$$50 \dots 1 = 160 \text{ sq. rd.}$$

$$(18)$$

$$\text{A. sq. rd.}$$

$$4 \quad 80$$

$$160$$

$$640 + 80 = 720 \text{ sq. rd.}$$

$$720 \text{ sq. rd.} \times 6 = 4320 \text{ sq. rd.}$$

$$54)4320(80 \text{ sq. rd. in each lot.}$$

$$432$$

$$0$$

$$80 \times \$5 = \$400, \textit{Ans.}$$

$$(19)$$

$$\text{lb. oz.}$$

$$35 \quad 9$$

$$75 \quad 14$$

$$85 \quad 15$$

$$195 \quad 38$$

$$186 \quad 14$$

$$9 \quad 24$$

$$8$$

$$72 \quad 192 = 84 \text{ lb.}$$

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

Art. 81.

$$\begin{array}{r}
 \text{(1)} \\
 15 \overline{) 18^\circ \quad 25' \quad 30''} \\
 \hline
 1 \text{ hr. } 13 \text{ min. } 42 \text{ sec.}
 \end{array}
 \qquad
 \begin{array}{r}
 \text{(2)} \\
 30^\circ \div 15 = 2. \text{ Ans. } 2 \text{ hr.}
 \end{array}$$

$$\begin{array}{r}
 \text{(3)} \\
 15 \overline{) 71^\circ \quad 4' \quad 0''} \\
 \hline
 4 \text{ hr. } 44 \text{ min. } 16 \text{ sec.}
 \end{array}
 \qquad
 \begin{array}{r}
 \text{(4)} \\
 15 \overline{) 10^\circ \quad 35' \quad 0''} \\
 \hline
 0 \text{ hr. } 42 \text{ min. } 20 \text{ sec.}
 \end{array}$$

$$\begin{array}{r}
 \text{(5)} \\
 \text{min. sec.} \\
 37 \quad 20 \\
 \quad 15 \\
 \hline
 9^\circ \quad 20' \quad 0''
 \end{array}
 \qquad
 \begin{array}{r}
 \text{(6)} \\
 \text{hr. min. sec.} \\
 1 \quad 4 \quad 56 \\
 \quad 15 \\
 \hline
 16^\circ \quad 14' \quad 0''
 \end{array}
 \qquad
 \begin{array}{r}
 \text{(7)} \\
 \text{hr. min. sec.} \\
 5 \quad 8 \quad 4 \\
 \quad 15 \\
 \hline
 77^\circ \quad 1' \quad 0''
 \end{array}$$

Art. 82.

$$\begin{array}{r}
 \text{(8)} \\
 \text{hr. min. sec.} \\
 \text{Time at C. } 12 \quad 0 \quad 0 \\
 \text{Add diff. } \quad 37 \quad 20 \\
 \hline
 12 \quad 37 \quad 20 \\
 \text{(See Ex. 5, Art. 81.)}
 \end{array}
 \qquad
 \begin{array}{r}
 \text{(9)} \\
 \text{hr. min. sec.} \\
 \text{Time at N. Y. } 11 \quad 0 \quad 0 \text{ A. M.} \\
 30^\circ = 2 \quad 0 \quad 0 \text{ to be added.} \\
 \hline
 1 \quad 0 \quad 0 \text{ P. M.}
 \end{array}$$

$$\begin{array}{r}
 \text{(10)} \\
 \text{hr. min. sec.} \\
 \text{Time at Ph. } 12 \quad 0 \quad 0 \\
 \text{Subtr. diff. } \quad 37 \quad 20 \\
 \hline
 11 \quad 22 \quad 40 \text{ A. M.}
 \end{array}
 \qquad
 \begin{array}{r}
 \text{(11)} \\
 \text{hr. min. sec.} \\
 \text{Time at N. Y. } 11 \quad 0 \quad 0 \\
 \text{Subtr. diff. } \quad 1 \quad 4 \quad 56 \\
 \hline
 9 \quad 55 \quad 4 \text{ A. M.}
 \end{array}$$

(See Ex. 6, Art. 81.)

(12)

$$124^{\circ} - 80^{\circ} 42' = 43^{\circ} 18': 43^{\circ} 18' \div 15 = 2 \text{ hr. } 53 \text{ min. } 12 \text{ sec.}$$

	hr.	min.	sec.
Time at W.	1	0	0
Subtr. diff.	2	53	12
<i>Ans.</i>	10	6	48 A. M.

the remainder is the 10th hr. from midnight, or 10 A. M.

NOTE.—In performing the subtraction, we can not take 3 hr. from 1 hr., but 1 P. M. is the 13th hour from midnight, from which, after taking 3 hr.,

FACTORING.

Arts. 87 and 88.

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

Art. 89.

(2)		
2)16	2)24	2)40
2)8	2)12	2)20
2)4	2)6	2)10
2)2	3	5
1		

$$2 \times 2 \times 2 = 8, \text{ G. C. D.}$$

(3)		
2)24	2)36	2)60
2)12	2)18	2)30
3)6	3)9	3)15
2)2	3)3	5
1	1	

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

(4)		
2)36	54	90
3)18	27	45
3)6	9	15
2	3	5

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

(5)		
2)40	60	100
2)20	30	50
5)10	15	25
2	3	5

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

$$\begin{array}{r}
 \text{(6)} \\
 3 \overline{)54} \quad 81 \quad 108 \\
 3 \overline{)18} \quad 27 \quad 36 \\
 3 \overline{)6} \quad 9 \quad 12 \\
 \hline
 2 \quad 3 \quad 4 \\
 3 \times 3 \times 3 = 27, \text{ G. C. D.}
 \end{array}$$

$$\begin{array}{r}
 \text{(7)} \\
 2 \overline{)60} \quad 90 \quad 120 \\
 3 \overline{)30} \quad 45 \quad 60 \\
 5 \overline{)10} \quad 15 \quad 20 \\
 \hline
 2 \quad 3 \quad 4 \\
 2 \times 3 \times 5 = 30, \text{ G. C. D.}
 \end{array}$$

$$\begin{array}{r}
 \text{(8)} \\
 2 \overline{)32} \quad 48 \quad 80 \quad 112 \\
 2 \overline{)16} \quad 24 \quad 40 \quad 56 \\
 2 \overline{)8} \quad 12 \quad 20 \quad 28 \\
 2 \overline{)4} \quad 6 \quad 10 \quad 14 \\
 \hline
 2 \quad 3 \quad 5 \quad 7 \\
 2 \times 2 \times 2 \times 2 = 16, \text{ G. C. D.}
 \end{array}$$

$$\begin{array}{r}
 \text{(9)} \\
 2 \overline{)48} \quad 72 \quad 96 \quad 120 \\
 2 \overline{)24} \quad 36 \quad 48 \quad 60 \\
 2 \overline{)12} \quad 18 \quad 24 \quad 30 \\
 3 \overline{)6} \quad 9 \quad 12 \quad 15 \\
 \hline
 2 \quad 3 \quad 4 \quad 5 \\
 2 \times 2 \times 2 \times 3 = 24, \text{ G. C. D.}
 \end{array}$$

$$\begin{array}{r}
 \text{(10)} \\
 2 \overline{)72} \quad 108 \quad 144 \quad 180 \\
 2 \overline{)36} \quad 54 \quad 72 \quad 90 \\
 3 \overline{)18} \quad 27 \quad 36 \quad 45 \\
 3 \overline{)6} \quad 9 \quad 12 \quad 15 \\
 \hline
 2 \quad 3 \quad 4 \quad 5 \\
 2 \times 2 \times 3 \times 3 = 36, \text{ G. C. D.}
 \end{array}$$

$$\begin{array}{r}
 \text{(11)} \\
 \text{(By 2d method.)} \\
 62 \overline{)93} (1 \\
 \quad 62 \\
 \hline
 \quad 31 \overline{)62} (2 \\
 \quad \quad 62 \\
 \hline
 31 = \text{G. C. D.}
 \end{array}$$

$$\begin{array}{r}
 \text{(12)} \\
 78 \overline{)130} (1 \\
 \quad 78 \\
 \hline
 \quad 52 \overline{)78} (1 \\
 \quad \quad 52 \\
 \hline
 \quad \quad 26 \overline{)52} (2 \\
 \quad \quad \quad 52 \\
 \hline
 26 = \text{G. C. D.}
 \end{array}$$

$$\begin{array}{r}
 \text{(13)} \\
 161 \overline{)253} (1 \\
 \quad 161 \\
 \hline
 \quad 92 \overline{)161} (1 \\
 \quad \quad 92 \\
 \hline
 \quad \quad 69 \overline{)92} (1 \\
 \quad \quad \quad 69 \\
 \hline
 \quad \quad \quad 23 \overline{)69} (3 \\
 \quad \quad \quad \quad 69 \\
 \hline
 23 = \text{G. C. D.}
 \end{array}$$

$$\begin{array}{r}
 \text{(14)} \\
 247 \overline{)323} (1 \\
 \quad 247 \\
 \hline
 \quad 76 \overline{)247} (3 \\
 \quad \quad 228 \\
 \hline
 \quad \quad 19 \overline{)76} (4 \\
 \quad \quad \quad 76 \\
 \hline
 19 = \text{G. C. D.}
 \end{array}$$

<p>(16)</p> $\begin{array}{r} 2145)3471(1 \\ \underline{2145} \\ 1326)2145(1 \\ \underline{1326} \\ 819)1326(1 \\ \underline{819} \end{array}$ <p>39 = G. C. D.</p>	<p>(15)</p> $\begin{array}{r} 391)697(1 \\ \underline{391} \\ 306)391(1 \\ \underline{306} \\ 85)306(3 \\ \underline{255} \\ 51)85(1 \\ \underline{51} \end{array}$ <p>17 = G. C. D.</p>																
<p>(17)</p> $\begin{array}{r} 16571)38363(2 \\ \underline{33142} \\ 5221)16571(3 \\ \underline{15663} \\ 908)5221(5 \\ \underline{4540} \\ 681)908(1 \\ \underline{681} \end{array}$ <p>227 = G. C. D.</p>	<p>(18)</p> $\begin{array}{r} 72)120(1 \\ \underline{72} \\ 48)72(1 \\ \underline{48} \\ 24)48(2 \\ \underline{48} \end{array}$ <p>12 = G. C. D.</p>																
<p>(19)</p> $\begin{array}{r} 75)125(1 \\ \underline{75} \\ 50)75(1 \\ \underline{50} \\ 25)50(2 \\ \underline{50} \end{array}$	<p>(20)</p> $\begin{array}{r} 25)165(6 \\ \underline{150} \\ 15)25(1 \\ \underline{15} \\ 10)15(1 \\ \underline{10} \\ 5)10(2 \\ \underline{10} \end{array}$ <p>5 = G. C. D.</p>																
<p>(20)</p> <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right;">2)64</td> <td style="text-align: right;">96</td> <td style="text-align: right;">112</td> <td style="text-align: right;">136</td> </tr> <tr> <td style="text-align: right;"><u>2)32</u></td> <td style="text-align: right;"><u>48</u></td> <td style="text-align: right;"><u>56</u></td> <td style="text-align: right;"><u>68</u></td> </tr> <tr> <td style="text-align: right;"><u>2)16</u></td> <td style="text-align: right;"><u>24</u></td> <td style="text-align: right;"><u>28</u></td> <td style="text-align: right;"><u>34</u></td> </tr> <tr> <td style="text-align: right;">8</td> <td style="text-align: right;">12</td> <td style="text-align: right;">14</td> <td style="text-align: right;">17</td> </tr> </table> <p>$2 \times 2 \times 2 = 8$, G. C. D.</p>		2)64	96	112	136	<u>2)32</u>	<u>48</u>	<u>56</u>	<u>68</u>	<u>2)16</u>	<u>24</u>	<u>28</u>	<u>34</u>	8	12	14	17
2)64	96	112	136														
<u>2)32</u>	<u>48</u>	<u>56</u>	<u>68</u>														
<u>2)16</u>	<u>24</u>	<u>28</u>	<u>34</u>														
8	12	14	17														

Art. 90.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(18)	(19)
5)125 150 200	5)10 24 25 32 45
5)25 30 40	3)2 24 5 32 9
2)5 6 8	2)2 8 5 32 3
2)5 3 4	2)4 5 16 3
5 3 2	2)2 5 8 3
5×5×2×2×5×3×2=3000, L. C. M.	2)5 4 3
	5 2 3
	5×3×2×2×2×2×5×2×3=7200, L. C. M.

(20)							
3)2	3	4	5	6	7	8	9
2)2		4	5	2	7	8	3
		2)2	5		7	4	3
			5		7	2	3
3×2×2×5×7×2×3=2520, L. C. M.							

(21)	(22)
3)16 27 42 108	13)13 29 52 87
2)16 9 14 36	29)29 4 87
3)8 9 7 18	2)4 3
3)8 3 7 6	2 3
2)8 7 2	13×29×2×2×3=4524,
2)4 7	L. C. M.
2 7	
3×2×3×3×2×2×2×7=3024, L. C. M.	

$$\begin{array}{r}
 \text{(23)} \\
 5 \overline{)120} \quad 360 \quad 144 \quad 720 \quad 72 \\
 3 \overline{)24} \quad 72 \quad 144 \quad 144 \quad 72 \\
 3 \overline{)8} \quad 24 \quad 48 \quad 48 \quad 24 \\
 2 \overline{)8} \quad 8 \quad 16 \quad 16 \quad 8 \\
 2 \overline{)4} \quad 4 \quad 8 \quad 8 \quad 4 \\
 2 \overline{)2} \quad 2 \quad 4 \quad 4 \quad 2 \\
 \hline
 2 \overline{)2} \quad 2
 \end{array}$$

$$5 \times 3 \times 3 \times 2 \times 2 \times 2 \times 2 = 720, \text{ L. C. M.}$$

CANCELLATION.

Art. 91.

$$(4.) \frac{1\cancel{3} \times 4}{\cancel{1}\cancel{3}} = 4, \text{ Ans.}$$

$$(5.) \frac{17 \times \overset{3}{\cancel{1}8}}{\underset{6}{\cancel{6}}} = 51, \text{ Ans.}$$

$$(6.) \frac{15 \times \overset{2}{\cancel{6}}}{\underset{4}{\cancel{4}}} = 30, \text{ Ans.}$$

$$(7.) \frac{\overset{3}{\cancel{2}4} \times 4}{\underset{8}{\cancel{8}}} = 12, \text{ Ans.}$$

$$(8.) \frac{37 \times \overset{3}{\cancel{1}5}}{\underset{5}{\cancel{5}}} = 111, \text{ Ans.}$$

$$(9.) \frac{\overset{6}{\cancel{3}6} \times \overset{5}{\cancel{4}0}}{\underset{5}{\cancel{3}0} \times \underset{5}{\cancel{8}}} = 6, \text{ Ans.}$$

$$(10.) \frac{\overset{12}{\cancel{3}6} \times \underset{3}{\cancel{5}}}{\underset{3}{\cancel{1}5}} = 12, \text{ Ans.}$$

$$(11.) \frac{\overset{2}{\cancel{4}2} \times \overset{5}{\cancel{2}5} \times \overset{6}{\cancel{1}8}}{\underset{3}{\cancel{2}1} \times \underset{3}{\cancel{1}5}} = 60, \text{ Ans.}$$

$$(12.) \frac{23 \times \overset{2}{\cancel{1}0}}{\underset{5}{\cancel{5}}} = 46, \text{ Ans.}$$

$$(13.) \frac{\overset{3}{\cancel{1}5} \times \overset{2}{\cancel{1}4}}{\underset{7}{\cancel{3}5} \times \underset{7}{\cancel{7}}} = 6, \text{ Ans.}$$

$$(14.) \quad \begin{array}{cccc} 3 & & 3 & 2 \\ 21 \times 11 \times 6 \times 26 \\ 13 \times 3 \times 14 \times 2 \end{array} = 33, \text{ Ans.}$$

$$(15.) \quad \begin{array}{cccccc} 7 & 3 & 3 & 2 & 7 \\ 21 \times 15 \times 33 \times 8 \times 14 \times 17 \\ 20 \times 34 \times 22 \times 27 \\ 4 & 17 & 2 & 9 \\ & & & 3 \end{array} = 49, \text{ Ans.}$$

$$(16.) \quad \begin{array}{ccc} 3 & 19 & 2 \\ 21 \times 95 \times 6 \\ 35 \times 9 \\ 5 & 3 \end{array} = 38, \text{ Ans.}$$

$$(17.) \quad \begin{array}{ccc} & & 2 \\ 5 & 3 & 4 \\ 35 \times 39 \times 40 \\ 26 \times 30 \times 42 \\ 2 & 3 & 6 \\ & & 3 \end{array} = \frac{5}{3} = 1\frac{2}{3}, \text{ Ans.}$$

$$(18.) \quad \begin{array}{ccc} 13 & 11 & 7 \\ 26 \times 33 \times 35 \\ 4 \times 9 \times 25 \\ 2 & 3 & 5 \end{array} = \frac{13 \times 11 \times 7}{2 \times 3 \times 5} = \frac{1001}{30} = 33\frac{11}{30}, \text{ Ans.}$$

$$(19.) \quad \begin{array}{ccc} & 3 & 3 \\ 6 \times 9 \times 15 \times 21 \\ 4 \times 6 \times 10 \times 14 \\ & 2 & 2 \end{array} = 5\frac{1}{6}, \text{ Ans.}$$

$$(20.) \quad \begin{array}{cccc} & 2 & & \\ 3 & 4 & 7 & 7 \\ 21 \times 24 \times 28 \times 35 \\ 14 \times 18 \times 20 \times 25 \\ 2 & 3 & 5 & 5 \end{array} = \frac{98}{25} = 3\frac{23}{25}, \text{ Ans.}$$

FRACTIONS.

Art. 103.

$$(8.) \text{ 4 times } \frac{7}{7} = \frac{28}{7}, \text{ or } \frac{7}{7} \times 4 = \frac{28}{7}.$$

$$(9.) \text{ 8 times } \frac{9}{9} = \frac{72}{9}, \text{ or } \frac{9}{9} \times 8 = \frac{72}{9}.$$

$$(10.) \text{ 19 times } \frac{13}{13} = \frac{247}{13}, \text{ or } \frac{13}{13} \times 19 = \frac{247}{13}.$$

$$(11.) \frac{20}{20} \times 25 = \frac{500}{20}.$$

$$(12.) \frac{23}{23} \times 37 = \frac{851}{23}.$$

Art. 104.

$$(2.) \frac{2}{2} \times 4 + \frac{1}{2} = \frac{9}{2}.$$

$$(3.) \frac{3}{3} \times 2 + \frac{1}{3} = \frac{7}{3}.$$

$$(8.) \frac{6}{6} \times 15 + \frac{5}{6} = \frac{95}{6}.$$

$$(9.) \frac{24}{24} \times 26 + \frac{13}{24} = \frac{637}{24}.$$

$$(12.) \frac{583}{583} \times 21 + \frac{117}{583} = \frac{12360}{583}.$$

$$(14.) \frac{71}{71} \times 14 + \frac{6}{71} = \frac{1000}{71}.$$

Art. 105.

$$\begin{array}{r} (3) \\ 3 \overline{)6} \\ 2 \end{array}$$

$$\begin{array}{r} (4) \\ 4 \overline{)12} \\ 3 \end{array}$$

$$\begin{array}{r} (5) \\ 4 \overline{)15} \\ 3\frac{3}{4} \end{array}$$

$$\begin{array}{r} (6) \\ 5 \overline{)17} \\ 3\frac{2}{5} \end{array}$$

$$\begin{array}{r} (7) \\ 7 \overline{)19} \\ 2\frac{5}{7} \end{array}$$

$$\begin{array}{r} (8) \\ 10 \overline{)23} \\ 2\frac{3}{10} \end{array}$$

$$\begin{array}{r} (13) \\ 24 \overline{)611} \quad (25\frac{11}{24}) \\ 48 \\ \hline 131 \\ 120 \\ \hline 11 \end{array}$$

$$\begin{array}{r} (14) \\ 75 \overline{)3000} \quad (40) \\ 300 \\ \hline 0 \end{array}$$

$\begin{array}{r} (15) \\ 25 \overline{)775} (31 \\ \underline{75} \\ 25 \\ \underline{25} \end{array}$	$\begin{array}{r} (16) \\ 12 \overline{)171} \\ \underline{14} \frac{3}{2} \end{array}$	$\begin{array}{r} (17) \\ 11 \overline{)509} (46 \frac{3}{11} \\ \underline{44} \\ 69 \\ \underline{66} \\ 3 \end{array}$	$\begin{array}{r} (18) \\ 298 \overline{)6437} (21 \frac{17}{298} \\ \underline{596} \\ 477 \\ \underline{298} \\ 179 \end{array}$
---	---	---	--

$\begin{array}{r} (19) \\ 125 \overline{)7536} (60 \frac{36}{125} \\ \underline{750} \\ 36 \end{array}$	$\begin{array}{r} (20) \\ 19 \overline{)3781} (199 \\ \underline{19} \\ 188 \\ \underline{171} \\ 171 \\ \underline{171} \end{array}$	$\begin{array}{r} (21) \\ 101 \overline{)1325} (13 \frac{12}{101} \\ \underline{101} \\ 315 \\ \underline{303} \\ 12 \end{array}$
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Art. 106.

(2.) $\frac{1}{2} \times \frac{2}{2} = \frac{2}{4}, \text{ Ans.}$

(3.) $\frac{2}{3} \times \frac{2}{2} = \frac{4}{6}, \text{ Ans.}$

(4.) $\frac{3}{4} \times \frac{3}{3} = \frac{9}{12}, \text{ Ans.}$

(5.) $\frac{5}{6} \times \frac{4}{4} = \frac{20}{24}, \text{ Ans.}$

(6.) $\frac{5}{7} \times \frac{4}{4} = \frac{20}{28}, \text{ Ans.}$

(7.) $\frac{4}{21} \times \frac{4}{4} = \frac{16}{84}, \text{ Ans.}$

(8.) $\frac{7}{8} \times \frac{9}{9} = \frac{63}{72}, \text{ Ans.}$

(9.) $\frac{3}{5} \times \frac{12}{12} = \frac{36}{60}, \text{ Ans.}$

(10.) $\frac{9}{10} \times \frac{10}{10} = \frac{90}{100}, \text{ Ans.}$

(11.) $20 \overline{)720}; \frac{9}{20} \times \frac{36}{36} = \frac{324}{720}, \text{ Ans.}$

(12.) $14 \overline{)2016} (144; \frac{13}{24} \times \frac{144}{144} = \frac{1872}{2016}, \text{ Ans.}$

$$\begin{array}{r} 14 \\ \underline{61} \\ 56 \\ \underline{56} \\ 56 \\ \underline{56} \end{array}$$

(13.) 43)1935(45; $\frac{22}{43} \times \frac{45}{45} = \frac{990}{1935}$, *Ans.*

$$\begin{array}{r} 172 \\ \hline 215 \\ 215 \\ \hline \end{array}$$

(14.) 41)8118(198; $\frac{35}{41} \times \frac{198}{198} = \frac{6930}{8118}$, *Ans.*

$$\begin{array}{r} 41 \\ \hline 401 \\ 369 \\ \hline 328 \\ 328 \\ \hline \end{array}$$

(15.) 17)5134(302; $\frac{16}{17} \times \frac{302}{302} = \frac{4832}{5134}$, *Ans.*

$$\begin{array}{r} 51 \\ \hline 34 \\ 34 \\ \hline \end{array}$$

(16.) 81)23328(288; $\frac{77}{81} \times \frac{288}{288} = \frac{22176}{23328}$, *Ans.*

$$\begin{array}{r} 162 \\ \hline 712 \\ 648 \\ \hline 648 \\ 648 \\ \hline \end{array}$$

(17.) 21)2541(121; $\frac{13}{21} \times \frac{121}{121} = \frac{1573}{2541}$, *Ans.*

$$\begin{array}{r} 21 \\ \hline 44 \\ 42 \\ \hline 21 \\ 21 \\ \hline \end{array}$$

Art. 107.

- (2.) The G. C. D. of 18 and 30 is 6: $6)\frac{18}{30} = \frac{3}{5}$, *Ans.*
- (3.) $10)\frac{60}{90} = \frac{6}{9}$: $3)\frac{6}{9} = \frac{2}{3}$, *Ans.*
- (4.) G. C. D. of 12 and 18 = 6: $6)\frac{12}{18} = \frac{2}{3}$, *Ans.*
- (5.) $5)\frac{30}{45} = \frac{6}{9}$: $3)\frac{6}{9} = \frac{2}{3}$, *Ans.*
- (6.) G. C. D. of 60 and 150 = 30: $30)\frac{60}{150} = \frac{2}{5}$, *Ans.*
- (7.) G. C. D. of 42 and 70 = 14: $14)\frac{42}{70} = \frac{3}{5}$, *Ans.*
- (8.) G. C. D. of 96 and 112 = 16: $16)\frac{96}{112} = \frac{6}{7}$, *Ans.*
- (9.) $5)\frac{60}{125} = \frac{12}{25}$, *Ans.*
- (10.) $2)\frac{126}{99} = \frac{63}{99}$: $9)\frac{63}{99} = \frac{7}{11}$, *Ans.*
- (11.) $2)\frac{182}{98} = \frac{91}{49}$: $7)\frac{91}{49} = \frac{13}{7}$, *Ans.*
- (12.) $5)\frac{615}{915} = \frac{123}{183}$: $3)\frac{123}{183} = \frac{41}{61}$, *Ans.*
- (13.) G. C. D. of 873 and 1067 = 97: $97)\frac{873}{1067} = \frac{9}{11}$, *Ans.*
- (14.) G. C. D. of 777 and 1998 = 111: $111)\frac{777}{1998} = \frac{7}{18}$, *Ans.*
- (15.) G. C. D. of 909 and 2323 = 101: $101)\frac{909}{2323} = \frac{9}{23}$, *Ans.*
- (16.) $\frac{391}{667}$: G. C. D. = 23: $23)\frac{391}{667} = \frac{17}{29}$, *Ans.*
- (17.) $\frac{585}{1287}$: G. C. D. = 117: $117)\frac{585}{1287} = \frac{5}{11}$, *Ans.*
- (18.) $\frac{796}{14129}$: G. C. D. = 199: $199)\frac{796}{14129} = \frac{4}{71}$, *Ans.*
- (19.) $\frac{1457}{5921}$: G. C. D. = 31: $31)\frac{1457}{5921} = \frac{47}{191}$, *Ans.*
- (20.) $5)\frac{6465}{7335} = \frac{1293}{1467}$, $\div 3 = \frac{431}{489}$, *Ans.*

Art. 108.

- (2.) $2)\frac{2}{3} \frac{3}{4}$
 $\frac{1}{3} \frac{2}{4}$; $2 \times 3 \times 2 = 12$, L. C. Denominator.
 Each must be changed to twelfths. If there are $\frac{1}{2}$ in 1,
 in $\frac{1}{2}$ there are $\frac{1}{2}$ of $\frac{1}{2} = \frac{6}{12}$: $\frac{1}{3}$ of $\frac{1}{2} = \frac{4}{12}$, and $\frac{2}{3} = \frac{8}{12}$:
 $\frac{1}{4}$ of $\frac{1}{2} = \frac{3}{12}$, and $\frac{3}{4} = \frac{9}{12}$.

(3.) L. C. M. of 3, 6, and 9 is 18; $\frac{1}{3} = \frac{6}{18}$, and $\frac{2}{3} = \frac{12}{18}$: $\frac{1}{6} = \frac{3}{18}$, and $\frac{5}{6} = \frac{15}{18}$: $\frac{1}{9} = \frac{2}{18}$, and $\frac{7}{9} = \frac{14}{18}$.

(4.) The L. C. M. of 2, 4, and 5 = 20; $\frac{1}{2} = \frac{10}{20}$: $\frac{1}{4} = \frac{5}{20}$, and $\frac{3}{4} = \frac{15}{20}$: $\frac{1}{5} = \frac{4}{20}$, and $\frac{4}{5} = \frac{16}{20}$.

(5.) L. C. M. of 8, 5, and 10 = 40: $\frac{1}{8} = \frac{5}{40}$ of $\frac{40}{40} = \frac{5}{40}$, and $\frac{3}{8} = \frac{15}{40}$: $\frac{1}{5} = \frac{8}{40}$ of $\frac{40}{40} = \frac{8}{40}$, and $\frac{4}{5} = \frac{32}{40}$: $\frac{1}{10} = \frac{4}{40}$ of $\frac{40}{40} = \frac{4}{40}$, and $\frac{9}{10} = \frac{36}{40}$.

(6.) The L. C. M. of 3, 4, and 8 is 24; $\frac{1}{3} = \frac{8}{24}$, and $\frac{2}{3} = \frac{16}{24}$: $\frac{1}{4} = \frac{6}{24}$, and $\frac{3}{4} = \frac{18}{24}$: $\frac{1}{8} = \frac{3}{24}$, and $\frac{7}{8} = \frac{21}{24}$.

(7.) L. C. M. of 4, 8, and 9 = 72; $\frac{1}{4} = \frac{18}{72}$, and $\frac{3}{4} = \frac{54}{72}$: $\frac{1}{8} = \frac{9}{72}$, and $\frac{5}{8} = \frac{45}{72}$: $\frac{1}{9} = \frac{8}{72}$, and $\frac{5}{9} = \frac{40}{72}$.

(12.) L. C. M. of 3, 5, 7, and 8 = 840; $\frac{1}{3} = \frac{280}{840}$, and $\frac{2}{3} = \frac{560}{840}$: $\frac{1}{5} = \frac{168}{840}$, and $\frac{2}{5} = \frac{336}{840}$: $\frac{1}{7} = \frac{120}{840}$, and $\frac{3}{7} = \frac{360}{840}$: $\frac{1}{8} = \frac{105}{840}$, and $\frac{5}{8} = \frac{525}{840}$.

(13.) First reduce $\frac{9}{21}$ to lowest terms = $\frac{3}{7}$. L. C. M. of 7, 14, 7, and 28 is 28; $\frac{1}{7} = \frac{4}{28}$, and $\frac{2}{7} = \frac{8}{28}$: $\frac{1}{14} = \frac{2}{28}$, and $\frac{5}{14} = \frac{10}{28}$: $\frac{1}{7} = \frac{4}{28}$, and $\frac{3}{7} = \frac{12}{28}$: $\frac{11}{28}$ is already reduced.

(14.) $\frac{6}{9} = \frac{2}{3}$: $\frac{15}{18} = \frac{5}{6}$; the L. C. M. of 5, 4, 3, and 6 is 60; $\frac{1}{5} = \frac{12}{60}$, and $\frac{2}{5} = \frac{24}{60}$: $\frac{1}{4} = \frac{15}{60}$, and $\frac{3}{4} = \frac{45}{60}$: $\frac{1}{3} = \frac{20}{60}$, and $\frac{2}{3} = \frac{40}{60}$: $\frac{1}{6} = \frac{10}{60}$, and $\frac{5}{6} = \frac{50}{60}$.

(15.) The L. C. M. of 4, 9, and 12 = 36; $1 = \frac{36}{36}$, and $2 = \frac{72}{36}$: $\frac{1}{4} = \frac{9}{36}$, and $\frac{3}{4} = \frac{27}{36}$: $\frac{1}{9} = \frac{4}{36}$, and $\frac{5}{9} = \frac{20}{36}$: $\frac{1}{12} = \frac{3}{36}$, and $\frac{7}{12} = \frac{21}{36}$.

(16.) $2\frac{2}{3} = \frac{8}{3}$: $5\frac{5}{6} = \frac{35}{6}$; L. C. M. of 3, 5, and 6 is 30; $\frac{1}{3} = \frac{10}{30}$, and $\frac{8}{3} = \frac{80}{30}$: $\frac{1}{5} = \frac{6}{30}$, and $\frac{3}{5} = \frac{18}{30}$: $1 = \frac{30}{30}$, and $4 = \frac{120}{30}$: $\frac{1}{6} = \frac{5}{30}$, and $\frac{35}{6} = \frac{175}{30}$.

(17.) $2\frac{1}{2} = \frac{5}{2}$: $3\frac{1}{3} = \frac{10}{3}$: $4\frac{1}{4} = \frac{17}{4}$; L. C. M. of 2, 3, and 4 is 12; $\frac{1}{2} = \frac{6}{12}$, and $\frac{5}{2} = \frac{30}{12}$: $\frac{1}{3} = \frac{4}{12}$, and $\frac{10}{3} = \frac{40}{12}$: $\frac{1}{4} = \frac{3}{12}$, and $\frac{17}{4} = \frac{51}{12}$: $1 = \frac{12}{12}$, and $5 = \frac{60}{12}$.

(18.) L. C. M. of 16, 18, 24, 36, and 48 is 144; $\frac{1}{16} = \frac{9}{144}$, and $\frac{7}{16} = \frac{63}{144}$; $\frac{1}{18} = \frac{8}{144}$, and $\frac{11}{18} = \frac{88}{144}$; $\frac{1}{24} = \frac{6}{144}$, and $\frac{17}{24} = \frac{102}{144}$; $\frac{1}{36} = \frac{4}{144}$, and $\frac{19}{36} = \frac{76}{144}$; $\frac{1}{48} = \frac{3}{144}$, and $\frac{25}{48} = \frac{75}{144}$.

(19.) L. C. M. of 7, 10, 12, 35, 63, and 28 is 1260: $\frac{1}{7} = \frac{180}{1260}$, and $\frac{4}{7} = \frac{720}{1260}$; $\frac{1}{10} = \frac{126}{1260}$, and $\frac{3}{10} = \frac{378}{1260}$; $\frac{1}{12} = \frac{105}{1260}$, and $\frac{5}{12} = \frac{525}{1260}$; $\frac{1}{35} = \frac{36}{1260}$, and $\frac{17}{35} = \frac{612}{1260}$; $\frac{1}{63} = \frac{20}{1260}$, and $\frac{4}{63} = \frac{80}{1260}$; $\frac{1}{28} = \frac{45}{1260}$, and $\frac{15}{28} = \frac{675}{1260}$.

(20.) L. C. M. of 5, 10, 25, 30, 45, and 60 is 900; $\frac{1}{5} = \frac{180}{900}$, and $\frac{3}{5} = \frac{540}{900}$; $\frac{1}{10} = \frac{90}{900}$, and $\frac{7}{10} = \frac{630}{900}$; $\frac{1}{25} = \frac{36}{900}$, and $\frac{6}{25} = \frac{216}{900}$; $\frac{1}{30} = \frac{30}{900}$, and $\frac{11}{30} = \frac{330}{900}$; $\frac{1}{45} = \frac{20}{900}$, and $\frac{13}{45} = \frac{260}{900}$; $\frac{1}{60} = \frac{15}{900}$, and $\frac{23}{60} = \frac{345}{900}$.

Art. 110.

$$(6.) \frac{3}{11} + \frac{7}{11} + \frac{8}{11} + \frac{10}{11} = \frac{28}{11} = 2\frac{6}{11}, \text{ Ans.}$$

$$(7.) \frac{5}{13} + \frac{8}{13} + \frac{9}{13} + \frac{11}{13} = \frac{33}{13} = 2\frac{7}{13}, \text{ Ans.}$$

$$(8.) \frac{7}{15} + \frac{8}{15} + \frac{11}{15} + \frac{13}{15} = \frac{39}{15} = 2\frac{9}{15} = 2\frac{3}{5}, \text{ Ans.}$$

$$(9.) \frac{9}{20} + \frac{11}{20} + \frac{13}{20} + \frac{17}{20} = \frac{50}{20} = 2\frac{10}{20} = 2\frac{1}{2}, \text{ Ans.}$$

$$(10.) \frac{12}{25} + \frac{16}{25} + \frac{18}{25} + \frac{24}{25} = \frac{70}{25} = 2\frac{20}{25} = 2\frac{4}{5}, \text{ Ans.}$$

Art. 111.

(2.) The least common denominator is 6; $\frac{1}{2} = \frac{3}{6}$, $\frac{1}{3} = \frac{2}{6}$: $\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$, *Ans.*

(4.) The L. C. D. is 10; $\frac{1}{2} = \frac{5}{10}$, $\frac{3}{5} = \frac{6}{10}$: $\frac{5}{10} + \frac{6}{10} = \frac{11}{10} = 1\frac{1}{10}$, *Ans.*

(8.) $2\frac{1}{2} = \frac{5}{2}$, $3\frac{2}{3} = \frac{11}{3}$; the L. C. D. = 6; $\frac{5}{2} = \frac{15}{6}$, $\frac{11}{3} = \frac{22}{6}$: $\frac{15}{6} + \frac{22}{6} = \frac{37}{6} = 6\frac{1}{6}$, *Ans.*

(9.) L. C. D. = 12; $\frac{2}{3} = \frac{8}{12}$, $\frac{3}{4} = \frac{9}{12}$, $\frac{5}{6} = \frac{10}{12}$: $\frac{8+9+10}{12} = \frac{27}{12} = 2\frac{3}{4} = 2\frac{3}{4}$, *Ans.*

(10.) L. C. D. = 24; $\frac{1}{4} = \frac{6}{24}$, $\frac{7}{8} = \frac{21}{24}$, $\frac{11}{12} = \frac{22}{24}$: $\frac{6+21+22}{24} = \frac{49}{24} = 2\frac{1}{24}$, *Ans.*

(11.) L. C. D. = 792; $\frac{1}{8} = \frac{99}{792}$, $\frac{1}{9} = \frac{88}{792}$, $\frac{2}{11} = \frac{144}{792}$:
 $\frac{99+88+144}{792} = \frac{331}{792}$, *Ans.*

(12.) $\frac{4}{5} = \frac{16}{20}$, $\frac{1}{2} = \frac{10}{20}$, $\frac{3}{4} = \frac{15}{20}$; $\frac{16}{20} + \frac{10}{20} + \frac{15}{20} = \frac{41}{20} = 2\frac{1}{20}$:
 $7 + 8 + 2\frac{1}{20} = 17\frac{1}{20}$, *Ans.*

(13.) L. C. D. = 5460; $\frac{1}{12} = \frac{455}{5460}$, $\frac{1}{13} = \frac{420}{5460}$, $\frac{1}{14} = \frac{390}{5460}$,
 $\frac{1}{15} = \frac{364}{5460}$: $\frac{455+420+390+364}{5460} = \frac{1629}{5460} = \frac{543}{1820}$, *Ans.*

(14.) L. C. D. = 180; $\frac{13}{18} = \frac{130}{180}$, $\frac{8}{15} = \frac{96}{180}$, $\frac{11}{20} = \frac{99}{180}$,
 $\frac{13}{30} = \frac{78}{180}$: $\frac{130+96+99+78}{180} = \frac{403}{180} = 2\frac{43}{180}$, *Ans.*

(15)

$\frac{7}{12}$	$\frac{7}{12} = \frac{42}{72}$
$2\frac{5}{6}$	$\frac{5}{6} = \frac{60}{72}$
$3\frac{3}{8}$	$\frac{3}{8} = \frac{27}{72}$
$3\frac{4}{9}$	$\frac{4}{9} = \frac{32}{72}$
<hr style="width: 100px; border: 0.5px solid black;"/>	
8	$\frac{161}{72} = 2\frac{17}{72}$
$2\frac{17}{72}$	
<hr style="width: 100px; border: 0.5px solid black;"/>	
$10\frac{17}{72}$	

Ans.

(16)

$16\frac{2}{3}$	$\frac{2}{3} = \frac{40}{60}$
$12\frac{3}{4}$	$\frac{3}{4} = \frac{45}{60}$
$8\frac{3}{5}$	$\frac{3}{5} = \frac{36}{60}$
$2\frac{1}{4}$	$\frac{1}{4} = \frac{15}{60}$
<hr style="width: 100px; border: 0.5px solid black;"/>	
38	$\frac{136}{60} = 2\frac{4}{15}$
$2\frac{4}{15}$	
<hr style="width: 100px; border: 0.5px solid black;"/>	
$40\frac{4}{15}$	

Ans.

(17.) L. C. D. = 60; $\frac{1}{2} = \frac{30}{60}$, $\frac{1}{3} = \frac{20}{60}$, $\frac{1}{4} = \frac{15}{60}$, $\frac{1}{5} = \frac{12}{60}$,
 $\frac{1}{6} = \frac{10}{60}$: $\frac{30+20+15+12+10}{60} = \frac{87}{60} = 1\frac{27}{60} = 1\frac{9}{20}$, *Ans.*

(18.) $\frac{2}{5} = \frac{1120}{2800}$, $\frac{7}{16} = \frac{1225}{2800}$, $\frac{7}{50} = \frac{392}{2800}$, $\frac{3}{140} = \frac{60}{2800}$, $\frac{3}{2800}$:
 $\frac{1120+1225+392+60+3}{2800} = \frac{2800}{2800} = 1$, *Ans.*

(19.) $\frac{1}{20} = \frac{36}{720}$, $\frac{7}{16} = \frac{315}{720}$, $\frac{11}{12} = \frac{660}{720}$, $\frac{2}{15} = \frac{96}{720}$, $\frac{11}{18} = \frac{440}{720}$:
 $\frac{36}{720} + \frac{315}{720} + \frac{660}{720} + \frac{96}{720} + \frac{440}{720} = \frac{1547}{720} = 2\frac{107}{720}$: $1 + 2 + 2\frac{107}{720} = 5\frac{107}{720}$, *Ans.*

(20.) $\frac{2}{3} = \frac{40}{60}$, $\frac{1}{2} = \frac{30}{60}$, $\frac{1}{5} = \frac{12}{60}$, $\frac{1}{3} = \frac{20}{60}$, $\frac{1}{4} = \frac{15}{60}$: $\frac{40}{60} + \frac{30}{60}$
 $+ \frac{12}{60} + \frac{20}{60} + \frac{15}{60} = \frac{117}{60} = 1\frac{57}{60} = 1\frac{19}{20}$: $2 + 4 + 6 + 8 + 1\frac{19}{20}$
 $= 21\frac{19}{20}$, *Ans.*

(21.) $\frac{1}{3} = \frac{35}{105}$, $\frac{2}{7} = \frac{30}{105}$, $\frac{1}{5} = \frac{21}{105}$, $\frac{1}{21} = \frac{5}{105}$: $\frac{35}{105} + \frac{30}{105} +$
 $\frac{21}{105} + \frac{5}{105} = \frac{91}{105} = \frac{13}{15}$: $1 + 4 + 2 + 2 + \frac{13}{15} = 9\frac{13}{15}$, *Ans.*
 Key 8.

Art. 113.

$$(2.) \frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2}, \text{ Ans.}$$

(7.) $4\frac{1}{4} - 2\frac{3}{4}$. $\frac{3}{4}$ can not be taken from $\frac{1}{4}$; so borrow 1 from 4. $1 = \frac{4}{4}$; $\frac{4}{4} + \frac{1}{4} = \frac{5}{4}$; $\frac{3}{4}$ from $\frac{5}{4} = \frac{2}{4}$ or $\frac{1}{2}$. Since we took 1 from 4, only 3 remain, and $3 - 2 = 1$. *Ans.* $1\frac{1}{2}$.

$$\begin{array}{r} (8) \\ 8\frac{1}{3} \\ 3\frac{2}{3} \\ \hline 4\frac{2}{3}, \text{ Ans.} \end{array} \quad \begin{array}{l} \frac{1}{3} + \frac{3}{3} = \frac{4}{3} \\ \frac{4}{3} - \frac{2}{3} = \frac{2}{3} \end{array}$$

$$\begin{array}{r} (9) \\ 23\frac{7}{20} \\ 17\frac{11}{20} \\ \hline 5\frac{4}{5}, \text{ Ans.} \end{array} \quad \begin{array}{l} \frac{7}{20} + \frac{20}{20} = \frac{27}{20} \\ \frac{27}{20} - \frac{11}{20} = \frac{16}{20} = \frac{4}{5} \end{array}$$

Art. 114.

$$(9.) \text{ L. C. D. } = 30; \frac{4}{15} = \frac{8}{30}, \frac{1}{10} = \frac{3}{30}; \frac{8}{30} - \frac{3}{30} = \frac{5}{30} = \frac{1}{6}, \text{ Ans.}$$

$$(10.) \text{ L. C. D. } = 42; \frac{16}{21} = \frac{32}{42}, \frac{5}{14} = \frac{15}{42}; \frac{32}{42} - \frac{15}{42} = \frac{17}{42}, \text{ Ans.}$$

$$(12.) 5 = \frac{15}{3}; \frac{15}{3} - \frac{2}{3} = \frac{13}{3} = 4\frac{1}{3}, \text{ Ans.}$$

$$(13.) 5\frac{2}{3} = \frac{17}{3} = \frac{34}{6}, 4\frac{1}{2} = \frac{9}{2} = \frac{27}{6}; \frac{34}{6} - \frac{27}{6} = \frac{7}{6} = 1\frac{1}{6}, \text{ Ans.}$$

$$(14.) 7\frac{2}{3} = \frac{23}{3} = \frac{92}{12}, 4\frac{3}{4} = \frac{19}{4} = \frac{57}{12}; \frac{92}{12} - \frac{57}{12} = \frac{35}{12} = 2\frac{11}{12}, \text{ Ans.}$$

$$(15.) 14\frac{1}{4} = \frac{57}{4} = \frac{171}{12}, 12\frac{2}{3} = \frac{38}{3} = \frac{152}{12}; \frac{171}{12} - \frac{152}{12} = \frac{19}{12} = 1\frac{7}{12}, \text{ Ans.}$$

$$(16.) 5\frac{3}{14} = \frac{73}{14} = \frac{219}{42}, 2\frac{10}{21} = \frac{52}{21} = \frac{104}{42}; \frac{219}{42} - \frac{104}{42} = \frac{115}{42} = 2\frac{31}{42}, \text{ Ans.}$$

$$(17.) 4\frac{1}{24} = \frac{97}{24} = \frac{194}{48}, 3\frac{1}{16} = \frac{49}{16} = \frac{147}{48}; \frac{194}{48} - \frac{147}{48} = \frac{47}{48}, \text{ Ans.}$$

$$(18.) 56\frac{1}{3} = \frac{169}{3} = \frac{676}{12}, 42\frac{1}{4} = \frac{169}{4} = \frac{507}{12}; \frac{676}{12} - \frac{507}{12} = \frac{169}{12} = 14\frac{1}{12}, \text{ Ans.}$$

$$(19.) 60\frac{4}{5} = \frac{304}{5} = \frac{608}{10}, 41\frac{3}{10} = \frac{413}{10}; \frac{608}{10} - \frac{413}{10} = \frac{195}{10} = 19\frac{1}{2}, \text{ Ans.}$$

$$(20.) 97\frac{1}{2} = \frac{195}{2} = \frac{585}{6}, 48\frac{5}{6} = \frac{293}{6}; \frac{585}{6} - \frac{293}{6} = \frac{292}{6} = 48\frac{2}{3}, \text{ Ans.}$$

Art. 115.

$$(5.) \frac{3}{4} \times 3 = \frac{9}{4} = 2\frac{1}{4}, \text{ Ans.}$$

$$(6.) 8 \times \frac{2}{3} = \frac{16}{3} = 5\frac{1}{3}, \text{ Ans.}$$

$$(7.) \frac{3}{4} \times \frac{5}{7} = \frac{15}{28}, \text{ Ans.}$$

$$(8.) \frac{2}{3} \times 4 = \frac{8}{3} = 2\frac{2}{3}, \text{ Ans.}$$

$$(9.) 5 \times \frac{3}{4} = \frac{15}{4} = 3\frac{3}{4}, \text{ Ans.}$$

$$(11.) \frac{2}{3} \times 6 = \frac{12}{3} = 4, \text{ Ans.}$$

$$(12.) 20 \times \frac{3}{4} = \frac{60}{4} = 15, \text{ Ans.}$$

$$(13.) \frac{8}{13} \times \frac{11}{16} = \frac{11}{26}, \text{ Ans.}$$

$$(14.) \frac{3}{5} \times 10 = \frac{30}{5} = 6, \text{ Ans.}$$

$$(15.) 12 \times \frac{2}{3} = \frac{24}{3} = 8, \text{ Ans.}$$

$$(16.) \frac{9}{13} \times \frac{3}{7} : \frac{9}{13} \times \frac{3}{7} = \frac{27}{91}, \text{ Ans.}$$

$$(17.) \frac{3}{7} \times 6 = \frac{18}{7} = 2\frac{4}{7}, \text{ Ans.}$$

$$(18.) 7 \times \frac{2}{3} = \frac{14}{3} = 4\frac{2}{3}, \text{ Ans.}$$

$$(21.) 8 \text{ times } 3 = 24 : 8 \text{ times } \frac{2}{3} = \frac{16}{3} = 5\frac{1}{3} : 24 + 5\frac{1}{3} = 29\frac{1}{3}, \text{ Ans.}$$

$$(22.) 2\frac{1}{2} = \frac{5}{2} : \frac{5}{2} \times \frac{5}{2} = \frac{25}{4} = 6\frac{1}{4}, \text{ Ans.}$$

$$(23.) 10 \times 7 = 70 : \frac{7}{9} \times 7 = \frac{49}{9} = 5\frac{4}{9} : 70 + 5\frac{4}{9} = 75\frac{4}{9}, \text{ Ans.}$$

$$(24.) 25 \times 8 = 200 : 25 \times \frac{3}{5} = \frac{75}{5} = 15 : 200 + 15 = 215, \text{ Ans.}$$

$$(25.) \quad \quad \quad 19$$

$$17\frac{3}{11} = \frac{190}{11} : \frac{9}{10} \times \frac{190}{11} = \frac{171}{11} = 15\frac{6}{11}, \text{ Ans.}$$

$$(26.) 10 \times 9 = 90 : \frac{5}{6} \times 9 = \frac{45}{6} = 7\frac{3}{2} = 7\frac{1}{2} : 90 + 7\frac{1}{2} = 97\frac{1}{2}, \text{ Ans.}$$

(27.) 8 times $64 = 512$: $\frac{1}{8}$ of $64 = 8$: $\frac{7}{8} = 56$: $512 + 56 = 568$, *Ans.*

(28.) $8\frac{3}{4} = \frac{35}{4}$: $\frac{1}{7}$ of $\frac{35}{4} = \frac{5}{4}$: $\frac{3}{7} = \frac{15}{4} = 3\frac{3}{4}$, *Ans.*

(29.)
 $2\frac{2}{11} = \frac{24}{11}$: $\frac{5}{\cancel{12}_4} \times \frac{9}{\cancel{16}_2} \times \frac{\overset{3}{\cancel{24}}}{11} = \frac{45}{88}$, *Ans.*

(30.)
 $2\frac{1}{16} = \frac{33}{16}$: $\frac{\overset{3}{\cancel{33}}}{\cancel{16}} \times \frac{\overset{3}{\cancel{11}}}{11} \times \frac{\cancel{16}}{\underset{3}{\cancel{9}}} = 1$, *Ans.*

(31.) $\frac{3}{\cancel{27}_2} \times \frac{13}{\cancel{26}_9} \times \frac{21}{1} = \frac{819}{2} = 409\frac{1}{2}$, *Ans.*

(32.)
 $\frac{5}{\cancel{2}} \times \frac{11}{3} \times \frac{19}{4} \times \frac{\overset{2}{\cancel{8}}}{7} = \frac{1945}{21} = 49\frac{16}{21}$, *Ans.*

(33.)
 $\frac{\cancel{11}}{\cancel{5}} \times \frac{\overset{11}{\cancel{55}}}{\cancel{26}_2} \times \frac{\cancel{13}}{4} \times \frac{\overset{2}{\cancel{16}}}{\cancel{11}_4} = 22$, *Ans.*

(34.) $\frac{\cancel{7}}{\cancel{8}} \times \frac{\overset{3}{\cancel{3}}}{\cancel{10}_2} \times \frac{8}{9} \times \frac{\cancel{5}}{\cancel{6}} \times \frac{\cancel{2}}{\cancel{3}} \times \frac{6}{\cancel{7}} = \frac{1}{9}$, *Ans.*

(35.)
 $\frac{\cancel{1}}{\cancel{4}_2} \times \frac{\cancel{9}}{\cancel{7}} \times \frac{\cancel{4}}{\cancel{5}} \times \frac{\cancel{7}}{\cancel{9}} \times \frac{\cancel{5}}{\cancel{4}} \times \frac{\cancel{2}}{\cancel{3}} \times \frac{\overset{2}{\cancel{6}}}{\cancel{1}} = 1$, *Ans.*

$$(36.) \quad \frac{\cancel{6}}{\cancel{7}} \times \frac{\cancel{4}}{9} \times \frac{\cancel{7}}{\cancel{4}} \times \frac{\cancel{1}}{\underset{\cancel{3}}{6}} \times \frac{\cancel{3}}{\cancel{4}} \times \frac{\cancel{5}}{\cancel{6}} \times \frac{\cancel{2}}{\cancel{5}} \times \frac{\overset{5}{\cancel{20}}}{\cancel{1}} = \frac{5}{9}, \text{ Ans.}$$

$$(37.) \quad \frac{\cancel{5}}{\cancel{2}} \times \frac{\overset{8}{\cancel{32}}}{\cancel{5}} \times \frac{\cancel{13}}{\cancel{4}} \times \frac{\cancel{7}}{\cancel{13}} \times \frac{\cancel{2}}{1} \times \frac{3}{\cancel{7}} = 24, \text{ Ans.}$$

Art. 116.

(2.) $\frac{1}{4}$ of 5 = $\frac{5}{4}$; then $\frac{3}{4}$ of 5 = 3 times $\frac{5}{4} = \frac{15}{4} = 3\frac{3}{4}$,
Ans.

(3.) $\frac{2}{5}$ of 7 = $\frac{14}{5} = 2\frac{4}{5}$, *Ans.*

(4.) $\frac{4}{5}$ of 10 = $\frac{40}{5} = 8$, *Ans.*

(5.) $\frac{1}{6}$ of 12 = 2: $\frac{5}{6} = 2 \times 5 = 10$, *Ans.*

(6.) $\frac{5}{6}$ of 15 = $\frac{75}{6} = 12\frac{3}{6} = 12\frac{1}{2}$, *Ans.*

(7.) $\frac{8}{9}$ of 21 = $\frac{168}{9} = 18\frac{6}{9} = 18\frac{2}{3}$, *Ans.*

(8.) $\frac{1}{10}$ of 25 = $\frac{25}{10} = \frac{5}{2}$: $\frac{7}{10} = \frac{35}{2} = 17\frac{1}{2}$, *Ans.*

(9.) $\frac{5}{12}$ of 27 = $\frac{135}{12} = 11\frac{3}{4} = 11\frac{1}{4}$, *Ans.*

(10.) $\frac{7}{12}$ of 28 = $\frac{196}{12} = 16\frac{4}{3} = 16\frac{1}{3}$, *Ans.*

Art. 117.

(4.) $\frac{1}{2}$ of $\frac{3}{5}$ of $\frac{11}{4} = \frac{1}{2} \times \frac{3}{5} \times \frac{11}{4} = \frac{33}{40}$, *Ans.*

(7.) $\frac{2}{3}$ of $\frac{5}{7}$ of $\frac{13}{9} = \frac{2}{3} \times \frac{5}{7} \times \frac{13}{9} = \frac{130}{189}$, *Ans.*

(8.) $\frac{2}{\cancel{3}}$ of $\frac{\cancel{3}}{\cancel{4}}$ of $\frac{\cancel{4}}{5} = \frac{2}{5}$, *Ans.*

(9.) $\frac{1}{\cancel{3}}$ of $\frac{\cancel{3}}{4}$ of $\frac{5}{6} = \frac{5}{24}$, *Ans.*

(10.) $\frac{3}{\cancel{5}}$ of $\frac{\cancel{5}}{\cancel{7}}$ of $\frac{\cancel{7}}{8} = \frac{3}{8}$, *Ans.*

$$(11.) \quad \frac{\cancel{3}}{5} \text{ of } \frac{\cancel{4}}{\cancel{9}} \text{ of } \frac{\cancel{7}}{\cancel{12}} \text{ of } \frac{\cancel{18}}{\cancel{35}} = \frac{2}{25}, \text{ Ans.}$$

$$(12.) \quad \frac{1}{\cancel{3}} \text{ of } \frac{\cancel{3}}{\cancel{4}} \text{ of } \frac{\cancel{4}}{9} = \frac{1}{9}, \text{ Ans.}$$

$$(13.) \quad \frac{1}{9} \text{ of } \frac{\cancel{3}}{\cancel{4}} \text{ of } \frac{\cancel{4}}{\cancel{3}} = \frac{1}{9}, \text{ Ans.}$$

$$(14.) \quad \frac{\cancel{3}}{\cancel{5}} \text{ of } \frac{\cancel{6}}{\cancel{7}} \text{ of } \frac{\cancel{35}}{\cancel{18}} = 1, \text{ Ans.}$$

$$(15.) \quad \frac{\cancel{3}}{\cancel{7}} \text{ of } \frac{\cancel{8}}{\cancel{3}} \text{ of } \frac{\cancel{7}}{\cancel{4}} = 2, \text{ Ans.}$$

$$(16.) \quad \frac{\cancel{9}}{\cancel{13}} \text{ of } \frac{\cancel{7}}{\cancel{18}} \text{ of } \frac{\cancel{13}}{\cancel{7}} = \frac{1}{2}, \text{ Ans.}$$

$$(17.) \quad \frac{1}{2} \text{ of } \frac{\cancel{4}}{\cancel{5}} \text{ of } \frac{1}{\cancel{8}} \text{ of } \frac{\cancel{5}}{1} = \frac{1}{4}, \text{ Ans.}$$

$$(18.) \quad \frac{1}{\cancel{2}} \text{ of } \frac{\cancel{2}}{\cancel{3}} \text{ of } \frac{\cancel{3}}{\cancel{4}} \text{ of } \frac{\cancel{4}}{\cancel{5}} \text{ of } \frac{\cancel{5}}{8} \text{ of } \frac{\cancel{5}}{\cancel{9}} \text{ of } \frac{\cancel{9}}{\cancel{10}} = \frac{1}{16}, \text{ Ans.}$$

Art. 118.

$$(1.) \quad 2\frac{1}{3} = \frac{7}{3}, 13\frac{1}{5} = \frac{66}{5} : \frac{7}{3} \times \frac{66}{5} = \frac{22}{5} = 4\frac{2}{5} = 4\frac{4}{5} \text{ ct., Ans.}$$

$$(2.) \quad 3 \text{ times } \frac{2}{3} = \frac{6}{3} = \$2: \quad 5 \text{ times } \frac{2}{3} = \frac{10}{3} = \$3\frac{1}{3}: \quad 7 \text{ times } \frac{2}{3} = \frac{14}{3} = \$4\frac{2}{3}: \quad \frac{13}{2} \times \frac{2}{3} = \frac{13}{3} = \$4\frac{1}{3}: \quad \frac{23}{4} \times \frac{2}{3} = \frac{23}{6} = \$3\frac{5}{6}.$$

$$(3.) \quad \frac{10}{3} \times \frac{24}{5} = 16 \text{ ct., Ans.}$$

$$(4.) \quad \frac{16}{5} \times \frac{75}{4} = \$60, \text{ Ans.}$$

$$(5.) \quad \frac{5}{3} \times \frac{3}{20} = \$\frac{1}{4}, \text{ Ans.}$$

$$(6.) \quad \frac{5}{2} \times \frac{4}{5} = \$2, \text{ Ans.}$$

$$(7.) \quad \frac{50}{9} \times \frac{6}{5} = \frac{20}{3} = \$6\frac{2}{3}, \text{ Ans.}$$

$$(8.) \quad \frac{11}{2} \times \frac{31}{4} = \frac{341}{8} = 42\frac{5}{8} \text{ mi., Ans.}$$

$$(9.) \quad \frac{3}{5} \text{ of } \frac{2}{3} = \frac{2}{5}, \text{ Ans.}$$

$$(10.) \quad \frac{2}{9} \text{ of } \frac{11}{2} = \frac{11}{9}: \quad \frac{11}{9} \times \frac{27}{4} = \frac{33}{4} = \$8\frac{1}{4}, \text{ Ans.}$$

$$(11.) \quad \frac{3}{7} \times \frac{5}{9} \times \frac{33}{2} \times \frac{2}{3} \times \frac{7}{8} \times \frac{15}{1} = \frac{275}{8} = 34\frac{3}{8}, \text{ Ans.}$$

$$(12.) \quad \frac{2}{3} = \frac{8}{12}, \quad \frac{3}{4} = \frac{9}{12}: \quad \frac{8}{12} + \frac{9}{12} = \frac{17}{12}: \quad \frac{2}{3} \times \frac{3}{4} = \frac{1}{2}: \quad \frac{1}{2} = \frac{6}{12}: \quad \frac{17}{12} \times \frac{6}{12} = \frac{17}{2} = 8\frac{1}{2}, \text{ Ans.}$$

Art. 119.

REMARK.—Pupils are often at a loss to understand, why it is that the quotient of one proper fraction, divided by another, is sometimes a whole number, or greater than unity. The teacher should be careful to explain this subject, by means of familiar examples, such as may be found in “Ray’s New Intellectual Arithmetic,” Lessons XXXIII—XXXVIII.

It should also be shown, that if we take any dividend, and divide it by different numbers, that as the divisor becomes less, the quotient becomes greater; so that, by making the divisor sufficiently small, the quotient may be made as large as we please. Thus, the quotient of $\frac{1}{2}$ divided by $\frac{1}{4}$ is 2; by $\frac{1}{8}$, is 4; by $\frac{1}{16}$ is 8; by $\frac{1}{4000000}$, is 2000000, etc. It is on this principle, that mathematicians, say, that the quotient of any number, divided by 0, is infinitely large.

$$(6.) \text{ 1 yd. will cost } \frac{1}{4} \text{ of } \$\frac{8}{9} = \$\frac{2}{9}, \text{ Ans.}$$

$$(7.) \text{ } 3 \div \frac{1}{2} = 3 \times \frac{2}{1} = 6, \text{ Ans.}$$

$$(8.) \text{ } \frac{9}{10} \div \frac{1}{5} = \frac{9}{10} \times \frac{5}{1} = \frac{9}{2} = 4\frac{1}{2} \text{ yd., Ans.}$$

$$(9.) \text{ One cent will buy } \frac{1}{3} \text{ of an orange: } \frac{1}{2} \text{ cent will buy } \frac{1}{2} \text{ of } \frac{1}{3} = \frac{1}{6}, \text{ Ans.}$$

$$(10.) \text{ } 6 \div \frac{3}{4} = 6 \times \frac{4}{3} = \frac{24}{3} = 8 \text{ yd., Ans.}$$

$$(11.) \text{ } \frac{3}{4} \div \frac{1}{5} = \frac{3}{4} \times \frac{5}{1} = \frac{15}{4} = 3\frac{3}{4} \text{ yd., Ans.}$$

$$(12.) \text{ 1 lb. will cost } \frac{1}{7} \text{ of } \$\frac{14}{25} = \$\frac{2}{25}, \text{ Ans.}$$

$$(14.) \quad \quad \quad 2 \\ 2\frac{2}{5} = \frac{12}{5} : \frac{1}{6} \text{ of } \frac{12}{5} = \frac{2}{5}, \text{ Ans.}$$

$$(15.) \quad \quad \quad 2 \\ 5\frac{1}{2} = \frac{11}{2} : \frac{22}{1} \times \frac{2}{11} = 4, \text{ Ans.}$$

$$(16.) \quad \frac{5}{\cancel{2}} \times \frac{\cancel{16}^8}{1} = 40, \text{ Ans.}$$

$$(17.) \quad \frac{\cancel{24}^3}{5} \times \frac{1}{\cancel{8}} = \frac{3}{5}, \text{ Ans.}$$

$$(18.) \quad \frac{\cancel{6}}{1} \times \frac{5}{\cancel{12}^2} = \frac{5}{2} = 2\frac{1}{2}, \text{ Ans.}$$

$$(19.) \quad \frac{19}{\cancel{4}} \times \frac{\cancel{8}^2}{41} = \frac{38}{41}, \text{ Ans.}$$

$$(20.) \quad \frac{\cancel{88}^8}{7} \times \frac{1}{\cancel{11}} = \frac{8}{7} = 1\frac{1}{7}, \text{ Ans.}$$

$$(21.) \quad \frac{\cancel{30}^2}{1} \times \frac{4}{\cancel{15}} = 8, \text{ Ans.}$$

$$(22.) \quad \frac{\cancel{9}^3}{\cancel{4}^2} \times \frac{\cancel{2}}{\cancel{15}^5} = \frac{3}{10}, \text{ Ans.}$$

$$(23.) \quad \frac{11}{3} \times \frac{1}{7} = \frac{11}{21}, \text{ Ans.}$$

$$(24.) \quad \frac{50}{1} \times \frac{7}{31} = \frac{350}{31} = 11\frac{9}{31}, \text{ Ans.}$$

$$(25.) \quad \frac{1}{2} \times \frac{50}{1} = 25, \text{ Ans.}$$

$$(26.) \quad \frac{237}{5} \times \frac{1}{15} = \frac{237}{75} = 3\frac{12}{75} = 3\frac{4}{25}, \text{ Ans.}$$

$$(27.) \quad \frac{\cancel{56}^8}{1} \times \frac{9}{\cancel{49}^7} = \frac{72}{7} = 10\frac{2}{7}, \text{ Ans.}$$

$$(28.) \quad \frac{\cancel{14}^2}{15} \times \frac{1}{\cancel{21}^3} = \frac{2}{45}, \text{ Ans.}$$

$$(29.) \quad \frac{392}{3} \times \frac{1}{18} = \frac{392}{54} = \frac{196}{27} = 7\frac{7}{27}, \text{ Ans.}$$

$$(31.) \quad \frac{\cancel{3}}{5} \times \frac{\cancel{8}}{\cancel{9}} \times \frac{7}{\cancel{6}} \times \frac{4}{3} = \frac{112}{135}, \text{ Ans.}$$

$$(32.) \quad \frac{1}{3} \times \frac{41}{\cancel{8}} \times \frac{\cancel{4}}{3} \times \frac{\cancel{2}}{35} = \frac{41}{315}, \text{ Ans.}$$

$$(33.) \quad \frac{\cancel{5}}{\cancel{18}} \times \frac{\cancel{2}}{\cancel{5}} \times \frac{\cancel{123}}{\cancel{10}} \times \frac{\cancel{5}}{1} \times \frac{5}{\cancel{41}} = \frac{5}{6}, \text{ Ans.}$$

$$(34.) \quad \frac{\cancel{2}}{\cancel{7}} \times \frac{\cancel{7}}{\cancel{8}} \times \frac{\cancel{4}}{\cancel{3}} \times \frac{\cancel{3}}{1} \times \frac{1}{5} = \frac{1}{5}, \text{ Ans.}$$

$$(35.) \quad \frac{\cancel{5}}{\cancel{18}} \times \frac{\cancel{2}}{\cancel{5}} \times \frac{\cancel{123}}{\cancel{10}} \times \frac{\cancel{5}}{1} \times \frac{\cancel{10}}{\cancel{41}} \times \frac{1}{\cancel{20}} = \frac{1}{12}, \text{ Ans.}$$

Art. 120.

$$(6.) \quad \frac{3}{4} \times \frac{1}{5} = \frac{3}{20}, \text{ Ans.}$$

$$(7.) \quad \frac{1}{\cancel{4}} \times \frac{\cancel{2}}{1} = \frac{1}{2}, \text{ Ans.}$$

$$(9.) \quad \frac{\cancel{15}}{4} \times \frac{1}{\cancel{5}} = \frac{3}{4}, \text{ Ans.}$$

$$(8.) \quad \frac{2}{\cancel{3}} \times \frac{\cancel{6}}{5} = \frac{4}{5}, \text{ Ans.}$$

$$(10.) \quad \frac{5}{\cancel{6}} \times \frac{\cancel{9}}{8} = \frac{15}{8}, \text{ Ans.}$$

$$(11.) \quad \begin{array}{c} 7 \\ \cancel{77} \\ 9 \end{array} \times \frac{1}{\cancel{11}} = \frac{7}{9}, \text{ Ans.}$$

$$(12.) \quad \begin{array}{c} 3 \\ 3 \\ \cancel{21} \\ \cancel{32} \\ 4 \\ 2 \end{array} \times \frac{\begin{array}{c} 3 \\ 6 \\ \cancel{48} \\ \cancel{35} \\ 5 \end{array}}{\begin{array}{c} 3 \\ 5 \end{array}} = \frac{9}{10}, \text{ Ans.}$$

Art. 121.

$$(2.) \quad \frac{6}{7} \times \frac{5}{11} = \frac{30}{77}, \text{ Ans.}$$

$$(3.) \quad \frac{2}{3} \times \frac{1}{5} = \frac{2}{15}, \text{ Ans.}$$

$$(4.) \quad \frac{2}{1} \times \frac{3}{11} = \frac{6}{11}, \text{ Ans.}$$

$$(5.) \quad \frac{25}{8} \times \frac{7}{33} = \frac{175}{264}, \text{ Ans.}$$

$$(6.) \quad \frac{7}{8} \times \frac{2}{9} = \frac{14}{27}, \text{ Ans.}$$

$$(7.) \quad \begin{array}{c} 2 \\ \cancel{15} \\ 4 \end{array} \times \frac{\begin{array}{c} 8 \\ \cancel{45} \\ 3 \end{array}}{\begin{array}{c} 3 \\ 5 \end{array}} = \frac{2}{3}, \text{ Ans.}$$

$$(8.) \quad \begin{array}{c} 8 \\ \cancel{88} \\ 9 \end{array} \times \frac{\begin{array}{c} 3 \\ \cancel{27} \\ \cancel{55} \\ 5 \end{array}}{\begin{array}{c} 5 \\ 5 \end{array}} = \frac{24}{5} = 4\frac{4}{5}, \text{ Ans.}$$

$$(9.) \quad \begin{array}{c} 7 \\ \cancel{35} \\ 4 \end{array} \times \frac{\begin{array}{c} 2 \\ \cancel{8} \\ \cancel{45} \\ 9 \end{array}}{\begin{array}{c} 9 \\ 5 \end{array}} = 1\frac{5}{9}, \text{ Ans.}$$

$$(10.) \quad \frac{47}{6} \times \frac{11}{97} = \frac{517}{582}, \text{ Ans.}$$

Art. 122.

$$(1.) \quad 3\frac{1}{4} \div \frac{1}{2} = \frac{13}{4} \times \frac{2}{1} = \frac{13}{2} = 6\frac{1}{2} \text{ yd., Ans.}$$

$$(2.) \quad 2\frac{3}{10} \div \frac{3}{5} = \frac{23}{10} \times \frac{5}{3} = \frac{23}{6} = 3\frac{5}{6} \text{ lb., Ans.}$$

$$(3.) \quad 42\frac{1}{2} \div 3\frac{3}{4} = \frac{85}{2} \div \frac{15}{4} = \frac{85}{2} \times \frac{4}{15} = \frac{17}{1} \times \frac{2}{3} = \frac{34}{3} = 11\frac{1}{3} \text{ yd., Ans.}$$

$$(4.) \quad 10 \div \frac{3}{8} = \frac{10}{1} \times \frac{8}{3} = \frac{80}{3} = 26\frac{2}{3}, \text{ Ans.}$$

$$(5.) \quad \frac{3}{7} \text{ of } 1\frac{1}{2} = \frac{3}{7} \text{ of } \frac{3}{2} = \frac{9}{14}: \quad 3\frac{3}{7} = \frac{24}{7}: \quad \frac{24}{7} \div \frac{9}{14} = \frac{24}{7} \times \frac{14}{9} = \frac{8}{1} \times \frac{2}{3} = \frac{16}{3} = 5\frac{1}{3}, \text{ Ans.}$$

$$(6.) \quad \frac{4}{11} \text{ of } 27\frac{1}{2} = \frac{4}{11} \text{ of } \frac{55}{2} = 10: \quad \frac{3}{10} \text{ of } 21\frac{1}{4} = \frac{3}{10} \text{ of } \frac{85}{4} = \frac{51}{8}: \quad 10 \div \frac{51}{8} = \frac{10}{1} \times \frac{8}{51} = \frac{80}{51} = 1\frac{29}{51}, \text{ Ans.}$$

$$(7.) \frac{3}{2} \times \frac{\cancel{3}}{7} \times \frac{\cancel{3}}{7} \times \frac{2}{\cancel{9}^{\cancel{3}}} = \frac{3}{49}, \text{ Ans.}$$

$$(8.) \frac{\cancel{11}^4}{\cancel{15}} \times \frac{\cancel{12}^4}{\cancel{11}^4} \times \frac{19}{\cancel{9}^{\cancel{3}}} \times \frac{\cancel{15}}{47} \times \frac{\cancel{5}}{4} \times \frac{\cancel{6}^2}{\cancel{5}} = \frac{38}{47}, \text{ Ans.}$$

$$(9.) \frac{1\frac{1}{2}}{\frac{2}{3}} = \frac{3}{2} \times \frac{3}{2} = \frac{9}{4} : \frac{2\frac{2}{5}}{2\frac{1}{6}} = \frac{12}{5} \times \frac{6}{13} = \frac{72}{65} : \frac{9}{4} \div \frac{72}{65} = \frac{9}{4} \times \frac{65}{72} = \frac{1}{4} \times \frac{65}{8} = \frac{65}{32} = 2\frac{1}{32}, \text{ Ans.}$$

$$(10.) \frac{\cancel{5}}{3} \times \frac{2}{\cancel{5}} = \frac{2}{3} : \frac{\cancel{36}^2}{\cancel{7}^{\cancel{33}}} \times \frac{\cancel{7}}{\cancel{594}^{33}} = \frac{2}{33} : \frac{\cancel{2}}{\cancel{3}} \times \frac{\cancel{33}^{11}}{\cancel{2}} = 11, \text{ Ans.}$$

Art. 123.

(1)	(2)	(3)	(4)	(5)
\$16\frac{1}{16}	\$9\frac{1}{8}	\$50\frac{1}{4}	\$32.31\frac{1}{4}	\$5.81\frac{1}{4}
9\frac{1}{8}	4\frac{7}{16}	27\frac{3}{16}	15.12\frac{1}{2}	1.18\frac{3}{4}
5\frac{7}{16}	0\frac{3}{8}	\$23\frac{1}{16}	\$17.18\frac{3}{4}	\$4.62\frac{1}{2}
2\frac{13}{16}	1\frac{5}{8}			
\$33\frac{7}{16}	\$15\frac{9}{16}			

$$(6.) 12\frac{1}{2} \times 9 = 108 + 4\frac{1}{2} = 112\frac{1}{2} \text{ ct.} = \$1.12\frac{1}{2}, \text{ Ans.}$$

$$(7.) 21 \times 6\frac{1}{4} = 126 + 5\frac{1}{4} = 131\frac{1}{4} \text{ ct.} = \$1.31\frac{1}{4}, \text{ Ans.}$$

$$(8.) \$3.18\frac{3}{4} \times 15 = \$47.70 + \$0.11\frac{1}{4} = \$47.81\frac{1}{4}, \text{ Ans.}$$

$$(9.) 62\frac{1}{2} \times 5\frac{1}{2} = \frac{125}{2} \times \frac{11}{2} = \frac{1375}{4} = 343\frac{3}{4} \text{ ct.} = \$3.43\frac{3}{4}, \text{ Ans.}$$

$$(10.) 18\frac{3}{4} = \frac{75}{4} : 12\frac{1}{2} = \frac{25}{2} : \frac{75}{4} \times \frac{25}{2} = \frac{1875}{8} = 234\frac{3}{8} \text{ ct.} = \$2.34\frac{3}{8}, \text{ Ans.}$$

$$(11.) 16\frac{2}{3} = \frac{50}{3} : 13\frac{1}{2} = \frac{27}{2} : \frac{50}{3} \times \frac{27}{2} = 25 \times 9 = 225 \text{ ct.} = \$2.25, \text{ Ans.}$$

$$(12.) \$3.37\frac{1}{2} \times 10\frac{1}{4} = \frac{675}{2} \times \frac{41}{4} = \frac{27675}{8} = 3459\frac{3}{8} \text{ ct.} = \$34.59\frac{3}{8}, \text{ Ans.}$$

$$(13.) 17\frac{2}{3} = \frac{53}{3}: 3\frac{1}{5} \times \frac{53}{3} = 125 \times 53 = 6625 \text{ ct.} = \$66.25, \text{ Ans.}$$

$$(14.) 225 \div 18\frac{3}{4} = \frac{225}{1} \times \frac{4}{75} = \frac{3}{1} \times \frac{4}{1} = 12 \text{ yd., Ans.}$$

$$(15.) 581\frac{1}{4} \div 37\frac{1}{2} = \frac{2325}{4} \times \frac{2}{75} = \frac{31}{2} \times \frac{1}{1} = 15\frac{1}{2} \text{ bu., Ans.}$$

$$(16.) \$11.56\frac{1}{4} \div 5 = \$2.31\frac{1}{4}, \text{ Ans.}$$

$$(17.) \$31.06\frac{1}{4} \div 7 = \$4.43\frac{3}{4}, \text{ Ans.}$$

$$(18.) 5 \text{ mi.} \times 320 = 1600 \text{ rd.: } 1600 \text{ rd.} \times 16\frac{1}{2} = 26400 \text{ ft.: } 26400 \text{ ft.} \times 12 = 316800 \text{ in., Ans.}$$

$$(19.) 2 \text{ mi.} \times 320 + 2 \text{ rd.} = 642 \text{ rd.: } 642 \text{ rd.} \times 16\frac{1}{2} + 2 \text{ ft.} = 10595 \text{ ft., Ans.}$$

$$(21.) 15875 \text{ ft.} \div 16\frac{1}{2} = 962 \text{ rd. } 2 \text{ ft.: } 962 \text{ rd.} \div 320 = 3 \text{ mi. } 2 \text{ rd. } \text{ Ans. } 3 \text{ mi. } 2 \text{ rd. } 2 \text{ ft.}$$

$$(22.) 142634 \text{ in.} \div 12 = 11886 \text{ ft. } 2 \text{ in.: } 11886 \text{ ft.} \div 3 = 3962 \text{ yd.: } 3962 \text{ yd.} \div 5\frac{1}{2} = 720 \text{ rd. } 2 \text{ yd.: } 720 \text{ rd.} \div 320 = 2 \text{ mi. } 80 \text{ rd. } \text{ Ans. } 2 \text{ mi. } 80 \text{ rd. } 2 \text{ yd. } 2 \text{ in.}$$

$$(23.) 2 \text{ mi.} = 126720 \text{ in.: } 2 \text{ ft. } 8 \text{ in.} = 32 \text{ in.: } 126720 \text{ in.} \div 32 \text{ in.} = 3960, \text{ Ans.}$$

$$(24.) 65 \text{ mi.} = 4118400 \text{ in.: } 9 \text{ ft. } 2 \text{ in.} = 110 \text{ in.: } 4118400 \text{ in.} \div 110 \text{ in.} = 37440, \text{ Ans.}$$

$$(25.) 1 \text{ A.} \times 160 + 136 \text{ sq. rd.} = 296 \text{ sq. rd.: } 296 \text{ sq. rd.} \times 30\frac{1}{4} + 25 \text{ sq. yd.} = 8979 \text{ sq. yd., Ans.}$$

$$(26.) 7506 \text{ sq. yd.} \div 30\frac{1}{4} = 248 \text{ sq. rd. } 4 \text{ sq. yd.: } 248 \text{ sq. rd.} \div 160 = 1 \text{ A. } 88 \text{ sq. rd. } \text{ Ans. } 1 \text{ A. } 88 \text{ sq. rd. } 4 \text{ sq. yd.}$$

$$(27.) 5 \text{ ch. } 15 \text{ l.} = 515 \text{ l.: } 7\frac{92}{100} \text{ in.} = \frac{792}{100} \text{ in.: } \frac{792}{100} \text{ in.} \times 515 = \frac{407880}{100} = 4078\frac{4}{5} \text{ in., Ans.}$$

$$(28.) 40\frac{1}{2} = \frac{81}{2}: \frac{81}{2} \times \frac{32}{1} = 81 \times 16 = 1296 \text{ sq. rd.: } 1296 \text{ sq. rd.} \div 160 = 8 \text{ A. } 16 \text{ sq. rd., Ans.}$$

(29.) $365\frac{1}{4}$ da. $\times 4 = 1461$ da.: 1461 da. $\times 24 = 35064$ hr., *Ans.*

(30.) 914092 hr. $\div 24 = 38087$ da. 4 hr.: 38087 da. $\div 365\frac{1}{4} = 104$ yr. 101 da.: 104 yr. $\div 100 = 1$ cen. 4 yr. *Ans.* 1 cen. 4 yr. 101 da. 4 hr.

(31.) $238545 \div 31 = 7695$ da.: $7695 \div 365\frac{1}{4} = 21$ yr., and 99 quarter days remaining, which, reduced to days, by dividing by 4, makes $24\frac{3}{4}$ days. *Ans.* 21 yr. $24\frac{3}{4}$ da.

Art. 124.

(3.) $\frac{1}{28}$ lb. $\times 16 = \frac{16}{28} = \frac{4}{7}$ oz., *Ans.*

(4.) $\frac{1}{16}$ lb. $\times 12 = \frac{12}{16} = \frac{3}{4}$ oz., *Ans.*

(5.) $\frac{1}{20}$ rd. $\times 5\frac{1}{2} = \frac{11}{40}$ yd. $\times 3 = \frac{33}{40}$ ft., *Ans.*

(6.) $\frac{7}{1280}$ A. $\times 160 = \frac{7}{8}$ sq. rd., *Ans.*

(7.) $\$ \frac{3}{850} \times 100 = \frac{300}{850} = \frac{6}{17}$ ct., *Ans.*

(8.) $\frac{1}{1584}$ da. $\times 24 = \frac{1}{66}$ hr.: $\frac{1}{66}$ hr. $\times 60 = \frac{60}{66} = \frac{10}{11}$ min., *Ans.*

(9.) $\frac{3}{820}$ bu. $\times 4 = \frac{3}{205}$ pk.: $\frac{3}{205}$ pk. $\times 8 = \frac{3}{25.625}$ qt.: $\frac{3}{25.625}$ qt. $\times 2 = \frac{3}{12.8125}$ pt., *Ans.*

Art. 125.

(2.) $\frac{4}{5}$ mi. $\times 320 = \frac{1280}{5}$ rd. = 256 rd., *Ans.*

(3.) $\$ \frac{3}{5} \times 100 = \frac{300}{5}$ ct. = 60 ct., *Ans.*

(4.) $\frac{2}{5}$ mi. $\times 320 = \frac{640}{5}$ rd. = 128 rd., *Ans.*

(5.) $\frac{4}{5}$ lb. $\times 12 = \frac{48}{5}$ oz. = $9\frac{3}{5}$ oz.: $\frac{3}{5}$ oz. $\times 20 = \frac{60}{5}$ pwt. = 12 pwt. *Ans.* 9 oz. 12 pwt.

(6.) $\frac{7}{16}$ T. $\times 20 = \frac{140}{16} = 8\frac{3}{4}$ cwt.; $\frac{3}{4}$ cwt. $\times 100 = \frac{300}{4}$ lb. = 75 lb. *Ans.* 8 cwt. 75 lb.

$$(7.) \frac{5}{8} \text{ A.} \times 160 = \frac{800}{8} \text{ sq. rd.} = 100 \text{ sq. rd., Ans.}$$

$$(8.) \frac{1}{8} \text{ of } 63 \text{ gal.} = 7\frac{7}{8}, \text{ and } \frac{7}{8} = 55\frac{1}{8} \text{ gal.: } \frac{1}{8} \text{ gal.} \times 4 = \frac{4}{8} \text{ or } \frac{1}{2} \text{ qt.: } \frac{1}{2} \text{ qt.} \times 2 = \frac{2}{2} \text{ or } 1 \text{ pt. Ans. } 55 \text{ gal. } 1 \text{ pt.}$$

Art. 126.

$$(2.) \frac{4}{5} \times \frac{1}{8} \times \frac{1}{4} = \frac{1}{40} \text{ bu., Ans.}$$

$$(3.) \frac{4}{5} \times \frac{2}{33} = \frac{8}{165} \text{ rd., Ans. } (16\frac{1}{2} \text{ ft. in a rd.} = \frac{33}{2} \text{ ft.})$$

$$(4.) \frac{3}{80} \times \frac{1}{16} = \frac{3}{1280} \text{ lb., Ans.}$$

$$(5.) \frac{4}{9} \times \frac{1}{100} \times \frac{1}{20} = \frac{1}{4500} \text{ T., Ans.}$$

$$(6.) \frac{3}{5} \times \frac{1}{2} \times \frac{1}{8} \times \frac{1}{4} = \frac{3}{320} \text{ bu., Ans.}$$

$$(7.) \frac{4}{7} \times \frac{1}{16} \times \frac{1}{100} = \frac{1}{2800} \text{ cwt., Ans.}$$

$$(8.) \frac{3}{4} \times \frac{1}{12} \times \frac{2}{33} = \frac{1}{264} \text{ rd., Ans.}$$

$$(9.) \frac{8}{9} \times \frac{1}{60} \times \frac{1}{24} = \frac{1}{1620} \text{ da., Ans.}$$

$$(10.) \frac{5}{112} \times \frac{1}{16} \times \frac{1}{100} = \frac{1}{35840} \text{ cwt., Ans.}$$

Art. 127.

$$(2.) 2 \text{ ft. } 6 \text{ in.} = 30 \text{ in.: } 6 \text{ ft. } 8 \text{ in.} = 80 \text{ in.: } \frac{30}{80} = \frac{3}{8}, \text{ Ans.}$$

$$(3.) 2 \text{ pk. } 4 \text{ qt.} = 20 \text{ qt.: } 1 \text{ bu.} = 32 \text{ qt.: } \frac{20}{32} = \frac{5}{8}, \text{ Ans.}$$

(4.) 2 yd. 9 in. = 81 in.: 8 yd. 2 ft. 3 in. = 315 in.:
 $\frac{81}{315} = \frac{9}{35}$, *Ans.*

(5.) 13 hr. 30 min. = 810 min.: 1 da. $\times 24 \times 60 = 1440$ min.:
 $\frac{810}{1440} = \frac{9}{16}$, *Ans.*

(6.) $\frac{145}{320} = \frac{29}{64}$, *Ans.*

(7.) 2 ft. 8 in. = 32 in.: 1 yd. = 36 in.: $\frac{32}{36} = \frac{8}{9}$, *Ans.*

(8.) 15 mi. 123 rd. = 4923 rd.: 35 mi. 287 rd. = 11487 rd.:
 $\frac{4923}{11487} = \frac{3}{7}$, *Ans.*

(9.) 37 A. 94 sq. rd. = 6014 sq. rd.: 168 A. 28 sq. rd. = 26908 sq. rd.:
 $\frac{6014}{26908} = \frac{97}{434}$, *Ans.*

(10.) 4
 $\frac{64}{9}$ oz. $\times \frac{1}{16} = \frac{4}{9}$, *Ans.*

(11.) 2 qt. $1\frac{1}{3}$ pt. = $5\frac{1}{3}$ or $\frac{16}{3}$ pt.: 1 bu. 1 qt. $1\frac{2}{3}$ pt. =
 $67\frac{2}{3}$ or $\frac{203}{3}$ pt.: $\frac{16}{3} \times \frac{3}{203} = \frac{16}{203}$, *Ans.*

(12.) 1 yd. 1 ft. $1\frac{9}{11}$ in. = $49\frac{9}{11}$ in. = $\frac{548}{11}$: 3 yd. 2 ft. $8\frac{6}{7}$ in. = $140\frac{6}{7} = \frac{986}{7}$: $\frac{548}{11} \times \frac{7}{986} = \frac{3836}{10890} = \frac{1918}{5445}$, *Ans.*

Art. 128.

(3)
 hr. min.
 $\frac{2}{3}$ da. = 16 0
 $\frac{3}{4}$ hr. = 45

Ans. 16 45

(4)
 da. hr. min.
 $\frac{1}{4}$ wk. = 1 18 0
 $\frac{1}{4}$ da. = 6 0
 $\frac{1}{4}$ hr. = 15

Ans. 2 0 15

$$\begin{array}{r}
 \text{(5)} \\
 \text{da. hr. min. sec.} \\
 \frac{2}{3} \text{ wk.} = 4 \quad 16 \quad 0 \quad 0 \\
 \frac{5}{9} \text{ da.} = \quad 13 \quad 20 \quad 0 \\
 \frac{2}{3} \text{ hr.} = \quad \quad 40 \quad 0 \\
 \frac{2}{3} \text{ min.} = \quad \quad \quad 40 \\
 \hline
 \text{Ans. } 5 \quad 6 \quad 0 \quad 40
 \end{array}$$

$$\begin{array}{r}
 \text{(6)} \\
 \text{qt. pt. gi.} \\
 \frac{11}{12} \text{ gal.} = 3 \quad 1 \quad \frac{11}{3} \\
 \frac{1}{12} \text{ qt.} = \quad 0 \quad \frac{2}{3} \\
 \hline
 \text{Ans. } 3 \quad 1 \quad 2
 \end{array}$$

$$\begin{array}{r}
 \text{(7)} \\
 \text{hr. min. sec.} \\
 \frac{7}{9} \text{ da.} = 18 \quad 40 \quad 0 \\
 \frac{1}{18} \text{ hr.} = \quad \quad 3 \quad 20 \\
 \hline
 \text{Ans. } 18 \quad 36 \quad 40
 \end{array}$$

$$\begin{array}{r}
 \text{(8)} \\
 \text{ct.} \\
 \$ \frac{5}{8} = 62\frac{1}{2} \\
 \$ \frac{3}{40} = 7\frac{1}{2} \\
 \hline
 \text{Ans. } 55
 \end{array}$$

$$(9.) \frac{3}{8} \text{ lb.} = 6 \text{ oz.} : 6 \text{ oz.} - \frac{7}{8} \text{ oz.} = 5\frac{1}{8} \text{ oz., Ans.}$$

$$\begin{aligned}
 (10.) \frac{1}{7} \text{ da.} &= \frac{24}{7} \text{ hr.} : \frac{24}{7} - \frac{6}{7} = \frac{18}{7} = 2\frac{4}{7} \text{ hr.} : \frac{4}{7} \text{ hr.} \times 60 \\
 &= 24\frac{0}{7} \text{ or } 34\frac{2}{7} \text{ min.} : \frac{2}{7} \text{ min.} \times 60 = 17\frac{0}{7} \text{ or } 17\frac{1}{7} \text{ sec.} \quad \text{Ans.} \\
 &2 \text{ hr. } 34 \text{ min. } 17\frac{1}{7} \text{ sec.}
 \end{aligned}$$

PROMISCUOUS EXAMPLES.

Art. 129.

$$(1.) \frac{32989}{56981} = \frac{2999 \times 11}{2999 \times 19} = \frac{11}{19}, \text{ Ans.}$$

$$\begin{aligned}
 (2.) 2 + 3 &= 5 : \frac{1}{2} + \frac{2}{3} + \frac{5}{14} + \frac{8}{21} = \frac{21}{42} + \frac{28}{42} + \frac{15}{42} + \\
 \frac{16}{42} &= \frac{80}{42} = \frac{40}{21} = 1\frac{19}{21} : 5 + 1\frac{19}{21} = 6\frac{19}{21}, \text{ Ans.}
 \end{aligned}$$

$$(3.) \frac{25}{7} = \frac{125}{35} : \frac{9}{5} = \frac{63}{35} : \frac{125-63}{35} = \frac{62}{35} = 1\frac{27}{35}, \text{ Ans.}$$

$$\begin{aligned}
 (4.) 3\frac{5}{8} &= \frac{29}{8} : \frac{1}{3} \text{ of } 3\frac{1}{2} = \frac{1}{3} \text{ of } \frac{7}{2} = \frac{7}{6} : \frac{29}{8} - \frac{7}{6} = \frac{87}{24} - \\
 \frac{28}{24} &= \frac{59}{24} = 2\frac{11}{24}, \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 (5.) \frac{5}{9} \text{ of } \frac{7}{10} &= \frac{7}{18} : \frac{2}{5} \text{ of } \frac{7}{12} = \frac{7}{30} : \frac{7}{18} + \frac{7}{30} = \frac{35}{90} + \frac{21}{90} \\
 &= \frac{56}{90} = \frac{28}{45}, \text{ Ans.}
 \end{aligned}$$

Key 9.

(6.)

$$1\frac{3}{4} \div 2\frac{1}{2} = \frac{7}{\cancel{4}^2} \times \frac{\cancel{2}}{5} = \frac{7}{10}; \quad 5\frac{1}{2} \div 3\frac{1}{8} = \frac{11}{\cancel{2}} \times \frac{\cancel{8}^4}{25} = \frac{44}{25};$$

$$\frac{7}{10} + \frac{44}{25} = \frac{35}{50} + \frac{88}{50} = \frac{123}{50} = 2\frac{23}{50}, \text{ Ans.}$$

$$(7.) \quad 10 \times \frac{3}{5} = \frac{30}{5} = 6, \text{ Ans.}$$

$$(8.) \quad 10 \div \frac{3}{5} = 10 \times \frac{5}{3} = \frac{50}{3} = 16\frac{2}{3}, \text{ Ans.}$$

(9.) Any number less $\frac{3}{7} = \frac{4}{7}$: then 16 is $\frac{4}{7}$ of the number: 4 is $\frac{1}{7}$, and 28 is $\frac{7}{7}$, the number.

(10.) Any number plus $\frac{3}{7} = \frac{10}{7}$: then $20 = \frac{10}{7}$: $\frac{1}{7} = \frac{1}{10}$ of 20 = 2: $\frac{7}{7} = 14$, the number.

(11.) $\frac{1}{3}$ of $\frac{5}{8} = \frac{5}{24}$, and $\frac{5}{8} - \frac{5}{24} = \frac{15}{24} - \frac{5}{24} = \frac{10}{24} = \frac{5}{12}$, part left.

Or, the part left may be found thus: If he sell $\frac{1}{3}$ of his share, he has $\frac{2}{3}$ of it left, and $\frac{2}{3}$ of $\frac{5}{8} = \frac{10}{24} = \frac{5}{12}$. $\frac{5}{12}$ of \$900 = $\frac{4500}{12} = \$375$, Ans.

(12.) I sell $\frac{1}{3}$ of $\frac{7}{12}$ of the ship = $\frac{7}{36}$ of the ship for \$1944 $\frac{4}{9}$; at that rate, $\frac{1}{36}$ of the ship is worth $\frac{1}{7}$ of \$1944 $\frac{4}{9}$ = \$277 $\frac{4}{9}$, and $\frac{36}{36}$ is worth 36 times \$277 $\frac{4}{9}$ = \$10000.

$$(13.) \quad \frac{2}{3} \text{ of } 2 = \frac{4}{3} = 1\frac{1}{3}: \quad \frac{1\frac{1}{3}}{3} = \frac{4}{3} \times \frac{1}{3} = \frac{4}{9}, \text{ Ans.}$$

$$(14.) \quad \frac{176}{368} = \frac{16 \times 11}{16 \times 23} = \frac{11}{23}, \text{ Ans.}$$

$$(15.) \quad \frac{1}{8} + \frac{1}{18} + \frac{13}{111} = \frac{333}{2664} + \frac{148}{2664} + \frac{312}{2664} = \frac{793}{2664}: \quad \frac{25}{37} - \frac{793}{2664} = \frac{1800}{2664} - \frac{793}{2664} = \frac{1007}{2664}, \text{ Ans.}$$

(16.)

$$4\frac{9}{14} = \frac{65}{14}: \quad \frac{3}{10} \text{ of } \frac{7}{12} \text{ of } \frac{65}{14} = \frac{13}{16}: \quad 1 - \frac{13}{16} = \frac{3}{16}, \text{ Ans.}$$

$$(17.) \quad \frac{2}{3} \div \frac{5}{7} = \frac{2}{3} \times \frac{7}{5} = \frac{14}{15} : \frac{5}{8} \div \frac{10}{11} = \frac{5}{8} \times \frac{11}{10} = \frac{11}{16} : \frac{14}{15} = \frac{11}{16} = \frac{224}{240} - \frac{165}{240} = \frac{59}{240}, \text{ Ans.}$$

(18.) In $\frac{1}{15}$ of an hour he walks $\frac{1}{7}$ of 2044 rd., which is 292 rd.: $1\frac{14}{15} = \frac{29}{15}$: in $\frac{29}{15}$ hr. he will walk 29 times 292 rd. = 8468 rd., *Ans.*

$$(19.) \quad 1\frac{1}{4} \text{ ft.} = 15 \text{ in.} = \frac{45}{3} : 3\frac{1}{3} = \frac{10}{3} : \frac{10}{45} = \frac{2}{9}, \text{ Ans.}$$

$$(20.) \quad 3\frac{1}{5} + 3\frac{2}{3} = \frac{16}{5} + \frac{11}{3} = \frac{48}{15} + \frac{55}{15} = \frac{103}{15}. \quad \text{Ans.} \quad \frac{48}{103} \text{ and } \frac{55}{103}.$$

(21.) $\frac{5}{8}$ of \$2400 = \$1500: \$1500 + \$500 = \$2000. If $\frac{5}{4}$ of B's money = \$2000, $\frac{1}{4}$ is $\frac{1}{5}$ of \$2000, which is \$400, and the whole will be 4 times \$400, which are \$1600, *Ans.*

(22.) If \$2200 are $\frac{5}{12}$ of the elder one's share, $\frac{1}{12}$ is \$440, and $\frac{1}{12}$, the elder one's share = \$5280; if \$5280 are $\frac{16}{35}$ of the whole estate, $\frac{1}{35}$ is \$330, and $\frac{35}{3} = $11550; $2200 + $5280 = $7480; $11550 - $5280 = $4070; each daughter had $\frac{1}{3}$ of $4070 = $1356 $\frac{2}{3}$, *Ans.*$

PRACTICE.

Art. 130.

$$(3.) \quad 12\frac{1}{2} = \frac{25}{2} : 18\frac{3}{4} \text{ ct.} = \$\frac{3}{16} : \frac{25}{2} \times \frac{3}{16} = \$\frac{75}{32} = \$2.34\frac{3}{8}, \text{ Ans.}$$

$$(4.) \quad \begin{array}{cc} 3 & 4 \\ \$2.25 = \$2\frac{1}{4} = \frac{9}{4} \times \frac{16}{3} = 12 \text{ yd., Ans.} \end{array}$$

$$(5.) \quad \frac{11}{2} \times \frac{5}{8} = \frac{55}{16} : \$\frac{1}{16} = 6\frac{1}{4} \text{ ct.; } \$\frac{55}{16} = \$3.43\frac{3}{4}, \text{ Ans.}$$

(6.)

$$\begin{array}{r} 53 \\ \$66.25 = 2\frac{65}{4} : \$3.75 = 3\frac{3}{4} = 1\frac{5}{4} : \frac{265}{4} \times \frac{4}{15} = \frac{53}{3} \\ = 17\frac{2}{3} \text{ doz., Ans.} \end{array}$$

(7.)

$$\begin{array}{r} 10 \\ \$2.37\frac{1}{2} = 2\frac{3}{8} = 1\frac{9}{8} : \frac{19}{8} \times \frac{80}{1} = \$190, \text{ Ans.} \end{array}$$

$$(8.) \$4.87\frac{1}{2} = 4\frac{7}{8} = 3\frac{9}{8} : \frac{39}{1} \times \frac{8}{39} = 8 \text{ men, Ans.}$$

(9.)

$$\begin{array}{r} 12 \\ \$8.33\frac{1}{3} = 8\frac{1}{3} = 2\frac{5}{3} : \frac{25}{3} \times \frac{36}{1} = \$300, \text{ Ans.} \end{array}$$

$$(10.) \$246.66\frac{2}{3} = 246\frac{2}{3} = 74\frac{0}{3} : \$1.33\frac{1}{3} = 1\frac{1}{3} = \frac{4}{3} : \\ 185 \\ \frac{740}{3} \times \frac{3}{4} = 185 \text{ yd., Ans.}$$

(12.)

$$\begin{array}{r} 275 \\ \$18\frac{1}{3} = \frac{55}{3} : \$229\frac{1}{6} = 13\frac{75}{6} : \frac{1375}{6} \times \frac{3}{55} = \frac{275}{22} = \\ 12\frac{1}{2}, \text{ Ans.} \end{array}$$

$$(13.) 120 \text{ sq. rd.} = \frac{3}{4} \text{ A. } \$125.60 \times 11 = \$1381.60 = \\ \text{cost of 11 A.: } \frac{3}{4} \text{ of } \$125.60 = \$94.20 = \text{cost of 120 sq. rd.:} \\ \$1381.60 + \$94.20 = \$1475.80, \text{ Ans.}$$

$$(14.) \frac{10000}{250} = 40 \text{ lots. } 50 \text{ ft.} \times 150 \text{ ft.} = 7500 \text{ sq. ft.:}$$

$$7500 \text{ sq. ft.} \times 40 = 300000 \text{ sq. ft., } \div 9 = 33333 \text{ sq. yd.} + 3 \\ \text{sq. ft.: } 33333 \text{ sq. yd.} \div 30\frac{1}{4} = 1101 \text{ sq. rd.} + 27\frac{3}{4} \text{ sq. yd.:} \\ \frac{3}{4} \text{ sq. yd.} = \frac{27}{4} \text{ sq. ft.} = 6 \text{ sq. ft.} + \frac{3}{4}; \frac{3}{4} \text{ sq. ft.} \times 144 = 108 \\ \text{sq. in.; } 6 \text{ sq. ft.} + 3 \text{ sq. ft.} = 9 \text{ sq. ft.} = 1 \text{ sq. yd., which} \\ \text{added to 27} = 28 \text{ sq. yd.: } 1101 \text{ sq. rd.} \div 160 = 6 \text{ A. } 141 \\ \text{sq. rd. } \text{Ans. } 6 \text{ A. } 141 \text{ sq. rd. } 28 \text{ sq. yd. } 108 \text{ sq. in.}$$

$$(15.) \quad 2 \text{ qt.} = \frac{1}{4} \text{ pk.} = \frac{1}{16} \text{ bu.: } 3 \text{ pk.} = \frac{3}{4} \text{ or } \frac{12}{16} \text{ bu.: } \$6.20 \\ = \$6\frac{1}{5} = \frac{31}{5}: 83\frac{13}{16} = \frac{1341}{16}; \times \frac{31}{5} = \frac{41571}{80} = \$519.63\frac{3}{4}, \text{ Ans.}$$

$$(16.) \quad 167\frac{1}{2} = \frac{335}{2}: \frac{335}{2} \times \frac{4}{3} = \frac{670}{3} = 223\frac{1}{3} \text{ bu.: } \frac{1}{3} \text{ bu.} = \frac{4}{3} \\ \text{or } 1\frac{1}{3} \text{ pk.: } \frac{1}{3} \text{ pk.} = \frac{8}{3} \text{ or } 2\frac{2}{3} \text{ qt.: } \frac{2}{3} \text{ qt.} = \frac{4}{3} \text{ or } 1\frac{1}{3} \text{ pt. } \text{Ans.} \\ 223 \text{ bu. } 1 \text{ pk. } 2 \text{ qt. } 1\frac{1}{3} \text{ pt.}$$

$$(17.) \quad \$1.75 = 1\frac{3}{4} \text{ or } \frac{7}{4}: \frac{7}{2} \times \frac{7}{4} = \frac{49}{8} = \$6.12\frac{1}{2}, \text{ Ans.}$$

$$(18.) \quad \$1.50 = \frac{3}{2}; \$7.12\frac{1}{2} = \frac{57}{8}: \frac{57}{8} \times \frac{2}{3} = \frac{19}{4} = 4\frac{3}{4} \text{ yd., Ans.}$$

$$(19.) \quad 12 \text{ oz.} = \frac{12}{16} \text{ or } \frac{3}{4} \text{ lb.: } 45\frac{3}{4} \text{ lb.} = \frac{183}{4}: \frac{183}{4} \times \frac{3}{8} = \\ \frac{549}{32} = \$17.15\frac{5}{8}, \text{ Ans.}$$

$$(20.) \quad \$0.93\frac{3}{4} = \left\{ \begin{array}{l} 87\frac{1}{2} = \frac{7}{8} = \frac{14}{16} \\ 6\frac{1}{4} = \frac{1}{16} \end{array} \right\} = \frac{15}{16}: \$2\frac{15}{16} = \$4\frac{7}{16}: \\ \frac{47}{16} \times \frac{8}{1} = \frac{47}{2} = 23\frac{1}{2} \text{ lb., Ans.}$$

$$(21.) \quad 2 \text{ T. } 9 \text{ cwt.} = 49 \text{ cwt.: } 37\frac{1}{2} \text{ ct. per lb.} = \$37\frac{1}{2} \\ \text{per cwt.: } \frac{49}{1} \times \frac{75}{2} = \$1837.50, \text{ Ans.}$$

$$(22.) \quad \$3.90 = 3\frac{9}{10} = \frac{39}{10}: \frac{100}{12} \times \frac{39}{10} = \$32.50, \text{ Ans.}$$

$$(23.) \quad 3\frac{3}{4} = \frac{15}{4}; \$5.40 = 5\frac{4}{10} = \frac{54}{10}: \frac{15}{4} \times \frac{54}{10} = \$20.25, \text{ Ans.}$$

(24.)

$$\frac{13}{2} \times \frac{1}{3} \times \frac{12}{1} \text{ (1 doz.)} = \$26. \quad \left. \begin{array}{l} \\ \frac{7.5}{2} \times \frac{3}{8} = \frac{22.5}{16} = \$14.06\frac{1}{4} \end{array} \right\} = \$40.06\frac{1}{4}:$$

$$\$40.06\frac{1}{4} - \$36 = \$4.06\frac{1}{4} = \$4\frac{1}{16} = \$\frac{65}{16}: \quad \frac{65}{16} \times \frac{8}{1} = \frac{65}{2} = 32\frac{1}{2} \text{ lb., Ans.}$$

DECIMAL FRACTIONS.

Art. 135.

REMARKS.—Pupils must have a thorough knowledge of common fractions, before they can understand fully the reason of the rules in decimals.

When a pupil is in doubt with regard to the accuracy of the result in any operation involving decimals, let him convert the decimals into common fractions, and then perform the work; the results in both cases ought to be the same.

It is a useful exercise to perform the same operations in equivalent common and decimal fractions. Thus, they may be required to perform the operations indicated in the following examples, by the rules for common fractions; then to convert the common fractions into decimals, and work by the rules for decimals.

(5.) .26	(16.) .00009
(6.) .35	(17.) .900
(7.) .87	(18.) .00605
(8.) 4.19	(19.) .20304
(9.) .905	(20.) .000007
(10.) .054	(21.) .000203
(11.) .304	(22.) .300004
(12.) 7.293	(23.) .0000024
(13.) 25.047	(24.) .0080006
(14.) .0205	(25.) .000200
(15.) .4125	(26.) .00000002

(27.) .00000967	(37.) .001000005
(28.) .20020003	(38.) .0000000202
(29.) 1.010100	(39.) 200.0000000002
(30.) .01010001	(40.) 65.006005
(31.) 106.037	(41.) .3 .7 .09 .17 .23
(32.) 1000.001	.41 .53
(33.) .225	(42.) .87 .97 .123 .289
(34.) 200.025	.487 .733
(35.) .002929	(43.) .003 .0101 .00053
(36.) 2900.000029	.000503

Art. 136.

(4.) Twenty-eight *thousandths*; three hundred and forty-one *thousandths*; two and three hundred and twenty-seven *thousandths*; fifty and five *thousandths*; one hundred and eighty-four and one hundred and seventy-three *thousandths*.

(5.) Three *ten-thousandths*; six hundred and twenty-five *ten-thousandths*; two thousand three hundred and seventy-four *ten-thousandths*; two thousand and six *ten-thousandths*; one hundred and four *ten-thousandths*.

(6.) Three and two hundred and five *ten-thousandths*; eight hundred and ten and two thousand four hundred and six *ten-thousandths*; ten thousand seven hundred and twenty and nine hundred and five *ten-thousandths*.

(7.) Four *hundred-thousandths*; one hundred and thirty-seven *hundred-thousandths*; two thousand three hundred and seventy-six *hundred-thousandths*; one thousand and seven *hundred-thousandths*.

(8.) One thousand seven hundred and sixty-eight *millionths*; forty thousand and thirty-five *millionths*; seventy and three hundred and sixty thousand and four *millionths*.

(9.) One million ten thousand one hundred and one *ten-millionths*; forty thousand and five *hundred-millionths*; one hundred thousand three hundred and four *hundred-millionths*.

(10.) Thirty-one thousand four hundred and fifty-six *hundred-thousandths*; one hundred and thirty-three *millionths*; sixty and four *hundredths*; forty-five and one thousand and three *ten-thousandths*.

(11.) Three hundred and fifty-seven and seventy-five *hundredths*; four thousand nine hundred and twenty-eight *ten-thousandths*; five and nine hundred and forty-five *thousandths*; six hundred and eighty-one and two *ten-thousandths*.

(12.) Seventy and one million two hundred thousand seven hundred and sixty-four *ten-millionths*; nine hundred and fifty-four and two hundred and three *thousandths*; thirty-eight and twenty-seven *thousandths*.

(13.) One thousand and seven and three thousand one hundred and fifty-four *ten-thousandths*; seven thousand four hundred and ninety-six and thirty-five million four hundred and ninety-one thousand seven hundred and sixty-eight *hundred-millionths*.

(14.) Seven hundred and fifteen *hundred-thousandths*; three and five *hundred-thousandths*; twenty-eight and ten million sixty-five thousand seven hundred and one *hundred-millionths*.

(15.) Thirteen and eight trillion two hundred and forty-one billion ninety-four million seven hundred and ten thousand nine hundred and forty-seven *ten-quadrillionths*.

$$(16.) \frac{9}{10}; \frac{13}{100}; \frac{19}{100}; \text{ etc.}$$

$$(17.) \frac{91}{100}; \frac{347}{1000}; \frac{513}{1000}; \text{ etc.}$$

$$(18.) \frac{7}{1000}; \frac{207}{10000}; \frac{79}{100000}; \frac{1007}{1000000}.$$

$$(19.) 1\frac{36}{100}; \frac{3421}{10000}; \frac{3401}{100000}; \frac{900}{10000}.$$

$$(20.) \frac{1}{1000}; \frac{5302}{10000}; 8\frac{1}{100}; \frac{53}{100000}.$$

Art. 141.

$$(2.) .6 = \frac{6}{10} = \frac{3}{5}, \text{ Ans.} \quad (3.) .25 = \frac{25}{100} = \frac{1}{4}, \text{ Ans.}$$

$$(4.) .375 = \frac{375}{1000} = \frac{3}{8}, \text{ Ans.}$$

$$(5.) .035 = \frac{35}{1000} = \frac{7}{200}, \text{ Ans.}$$

$$(6.) .5625 = \frac{5625}{10000} = \frac{9}{16}, \text{ Ans.}$$

$$(7.) .34375 = \frac{34375}{100000} = \frac{11}{32}, \text{ Ans.}$$

$$(8.) .1484375 = \frac{1484375}{10000000} = \frac{19}{128}, \text{ Ans.}$$

$$(9.) 4.02 = 4\frac{2}{100} = 4\frac{1}{50}, \text{ Ans.}$$

$$(10.) 8.415 = 8\frac{415}{1000} = 8\frac{83}{200}, \text{ Ans.}$$

Art. 142.

$$(2.) \frac{4}{5} = \frac{40}{50} = .8, \text{ Ans.} \quad (3.) \frac{5}{8} = \frac{500}{800} = .625, \text{ Ans.}$$

$$(4.) \frac{7}{25} = \frac{700}{2500} = \frac{140}{500} = .28, \text{ Ans.}$$

$$(5.) \frac{3}{40} = \frac{3000}{40000} = .075, \text{ Ans.}$$

$$(6.) \frac{15}{16} = \frac{150000}{160000} = .9375, \text{ Ans.}$$

$$(7.) \frac{1}{1250} = \frac{10000}{12500000} = .0008, \text{ Ans.}$$

$$(8.) \frac{9}{400} = \frac{90000}{4000000} = .0225, \text{ Ans.}$$

$$(9.) \frac{1}{256} = \frac{100000000}{25600000000} = .00390625, \text{ Ans.}$$

$$(10.) \frac{5}{6} = \frac{50000}{60000} = .8333+, \text{ Ans.}$$

$$(11.) \frac{1}{11} = \frac{1000000}{11000000} = .090909+, \text{ Ans.}$$

$$(12.) \frac{4}{33} = \frac{4000000}{33000000} = .121212+, \text{ Ans.}$$

Art. 143.

(2)	(3)	(4)	(5)
37.1065	4.0004	3.25	21.611
432.07	28.035	6.4	6888.32
4.20733	8.07	.35	3.4167
11.706	.09404	10.00	6913.3477
<u>485.08983</u>	<u>40.19944</u>		

(6)	(7)	(8)	(9)
6.61	4.8	45.019	432.432
636.1	43.31	7.00071	61.0793
6516.14	74.019	93.4327	100.07794
67.1234	11.204	6.0401	6.009
5.1233	133.333	151.49251	1000.1001
<u>7231.0967</u>			<u>1599.69834</u>

(10)	(11)	(12)
16.041	204.0009	.0035
9.000094	103.00000009	.00035
33.27	42.009099	.000035
8.969	430.99	.0000035
32.719906	220.0000009	.0038885
<u>100.000000</u>	<u>999.99999999</u>	

Art. 144.

(2)	(3)	(4)	(5)
97.5168	20.014	5.03	24.0042
38.25942	7.0021	2.115	13.7013
<u>59.25738</u>	<u>13.0119</u>	<u>2.915</u>	<u>10.3029</u>

(6)	(7)	(8)	(9)
170.0035	.0142	.05	13.5
68.00181	.005	.0024	8.037
<u>102.00169</u>	<u>.0092</u>	<u>.0476</u>	<u>5.463</u>

$$\begin{array}{r} (10) \\ 3.00000 \\ .00003 \\ \hline 2.99997 \end{array}$$

$$\begin{array}{r} (11) \\ 29.0029 \\ 19.003 \\ \hline 9.9999 \end{array}$$

$$\begin{array}{r} (12) \\ 5.000 \\ .125 \\ \hline 4.875 \end{array}$$

$$\begin{array}{r} (13) \\ 1000.0000 \\ .0001 \\ \hline 999.9999 \end{array}$$

$$\begin{array}{r} (14) \\ 1.000000 \\ .000001 \\ \hline .999999 \end{array}$$

$$\begin{array}{r} (15) \\ .025 \\ .000025 \\ \hline .024975 \end{array}$$

Art. 147.

$$\begin{array}{r} (4) \\ 33.21 \\ 4.41 \\ \hline 3321 \\ 13284 \\ 13284 \\ \hline 146.4561 \end{array}$$

$$\begin{array}{r} (5) \\ 32.16 \\ 22.5 \\ \hline 16080 \\ 6432 \\ 6432 \\ \hline 723.600 \end{array}$$

$$\begin{array}{r} (6) \\ .125 \\ 9 \\ \hline 1.125 \end{array}$$

$$\begin{array}{r} (7) \\ .35 \\ 7 \\ \hline 2.45 \end{array}$$

$$(10.) \ .15 \times .7 = \frac{15}{100} \times \frac{7}{10} = \frac{105}{1000} = .105, \text{ Ans.}$$

$$(13.) \ 1.035 \times 17 = 17.595, \text{ Ans.}$$

$$\begin{array}{r} (14) \\ 19 \\ .125 \\ \hline 95 \\ 38 \\ 19 \\ \hline 2.375 \end{array}$$

$$\begin{array}{r} (15) \\ 4.5 \\ 4 \\ \hline 18.0 \end{array}$$

$$\begin{array}{r} (16) \\ .625 \\ 64 \\ \hline 2500 \\ 3750 \\ \hline 40.000 \end{array}$$

$$\begin{array}{r} (17) \\ 61.76 \\ .0071 \\ \hline 6176 \\ 43232 \\ \hline .438496 \end{array}$$

$$\begin{array}{r}
 (18) \\
 1.325 \\
 .0716 \\
 \hline
 7950 \\
 1325 \\
 9275 \\
 \hline
 .0948700
 \end{array}$$

$$\begin{array}{r}
 (26) \\
 .043 \\
 .0021 \\
 \hline
 43 \\
 86 \\
 \hline
 .0000903
 \end{array}$$

$$\begin{array}{r}
 (24) \\
 .1 \\
 .01 \\
 \hline
 .001
 \end{array}$$

$$\begin{array}{r}
 (27) \\
 40000 \\
 .000001 \\
 \hline
 .040000
 \end{array}$$

$$\begin{array}{r}
 (25) \\
 100 \\
 .0001 \\
 \hline
 00.0100 = .01, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 (28) \\
 .09375 \\
 1.064 \\
 \hline
 37500 \\
 56250 \\
 93750 \\
 \hline
 .09975000
 \end{array}$$

Art. 150.

SUGGESTIONS TO TEACHERS.—The division of decimals is generally a troublesome subject to pupils; this arises from a want of attention to the rule. Should the pupil be at a loss to understand why, in some cases, when the divisor and dividend are both decimals, the quotient should be a whole number, let him read the remarks on the division of fractions, page 120. When the divisor contains more decimal places than the dividend, it is best, before commencing the division, to reduce them both to the same denomination, that is, to make the number of decimal places the same in both; the quotient will then be a whole number.

$$\begin{array}{r}
 (7) \\
 .03)1.125 \\
 \hline
 37.5, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 (8) \\
 27.5)86.075(3.13, \text{ Ans.} \\
 825 \\
 \hline
 357 \\
 275 \\
 \hline
 825 \\
 825 \\
 \hline
 \hline
 \end{array}$$

$$\begin{array}{r}
 (9) \\
 3.44)24.73704(7.191, \text{ Ans.} \\
 2408 \\
 \hline
 657 \\
 344 \\
 \hline
 3130 \\
 3096 \\
 \hline
 344 \\
 344 \\
 \hline
 \hline
 \end{array}$$

$$\begin{array}{r}
 (10) \\
 4.123 \overline{)206.166492} (50.004, \text{Ans.} \\
 \underline{20615} \\
 16492 \\
 \underline{16492}
 \end{array}$$

$$\begin{array}{r}
 (13) \\
 .5 \overline{)21.0} (42, \text{Ans.} \\
 \underline{20} \\
 10 \\
 \underline{10}
 \end{array}$$

$$\begin{array}{r}
 (14) \\
 .008 \overline{)2.000} \\
 \underline{250}, \text{Ans.}
 \end{array}$$

$$\begin{array}{r}
 (15) \\
 5 \overline{)37.20} \\
 \underline{7.44}, \text{Ans.}
 \end{array}$$

$$\begin{array}{r}
 (16) \\
 454 \overline{)100.8788} (.2222, \text{Ans.} \\
 \underline{908} \\
 1007 \\
 \underline{908} \\
 998 \\
 \underline{908} \\
 908 \\
 \underline{908} \\
 908
 \end{array}$$

$$\begin{array}{r}
 (18) \\
 .108649 \overline{)9811.004700} (90300, \text{Ans.} \\
 \underline{977841} \\
 325947 \\
 \underline{325947} \\
 00
 \end{array}$$

$$\begin{array}{r}
 (19) \\
 .19 \overline{)21318} (1.122, \text{Ans.} \\
 \underline{19} \\
 23 \\
 \underline{19} \\
 41 \\
 \underline{38} \\
 38 \\
 \underline{38} \\
 38
 \end{array}$$

$$\begin{array}{r}
 (20) \\
 .3189 \overline{)102048.0000} (320000, \text{Ans.} \\
 \underline{9567} \\
 6378 \\
 \underline{6378} \\
 0000
 \end{array}$$

$$\begin{array}{r}
 (21) \\
 3189 \overline{)102048} (.000032, \text{Ans.} \\
 \underline{9567} \\
 6378 \\
 \underline{6378}
 \end{array}$$

$$\begin{array}{r}
 (22) \\
 .0225 \overline{)9.9000} (440, \text{Ans.} \\
 \underline{900} \\
 900 \\
 \underline{900} \\
 0
 \end{array}$$

$$\begin{array}{r} (26) \\ 10 \overline{).10} \end{array}$$

.01, *Ans.*

$$\begin{array}{r} (27) \\ .1 \overline{)1.0} \end{array}$$

10, *Ans.*

$$\begin{array}{r} (28) \\ .01 \overline{)10.00} \end{array}$$

1000, *Ans.*

$$(29.) \frac{1.7}{64} = \frac{1.7000000}{64} = .0265625, \text{ Ans.}$$

$$\begin{array}{r} (30) \\ 80 \overline{).080} \\ .001, \text{ Ans.} \end{array}$$

$$\begin{array}{r} (31) \\ 7 \overline{)1.5000000} \\ .2142857+, \text{ Ans.} \end{array}$$

$$(32) \\ 32.76 \overline{)11.100000000} (.3388278+ \text{ Ans.}$$

$$\begin{array}{r} 9828 \\ \overline{12720} \\ 9828 \\ \overline{28920} \\ 26208 \\ \overline{27120} \\ 26208 \\ \overline{9120} \\ 6552 \\ \overline{25680} \\ 22932 \\ \overline{27480} \\ 26208 \\ \overline{} \end{array}$$

$$\begin{array}{r} (33) \\ 3.21 \overline{).0123000000} (.00383177+ \\ \text{Ans.} \\ 963 \\ \overline{2670} \\ 2568 \\ \overline{1020} \\ 963 \\ \overline{570} \\ 321 \\ \overline{2490} \\ 2247 \\ \overline{2430} \\ 2247 \\ \overline{} \end{array}$$

Art. 151.

$$(2.) .035 \text{ pk.} \times 8 = .280 \text{ qt.} : .28 \text{ qt.} \times 2 = .56 \text{ pt., Ans.}$$

$$(3.) .0075 \text{ bu.} \times 4 = .0300 \text{ pk.} : .03 \text{ pk.} \times 8 = .24 \text{ qt., Ans.}$$

$$(4.) .005 \text{ yd.} \times 3 = .015 \text{ ft.,} \times 12 = 0.180 \text{ in.} = .18 \text{ in., Ans.}$$

$$(5.) .00546875 \text{ A.} \times 160 = 0.87500000 \text{ sq. rd.} = .875 \text{ sq. rd., Ans.}$$

Art. 152.

(2.) $.75 \text{ yd.} \times 3 = 2.25 \text{ ft.}$; $.25 \text{ ft.} \times 12 = 3.00 \text{ in.}$
Ans. 2 ft. 3 in.

(3.) $.3375 \text{ A.} \times 160 = 54.0000 \text{ sq. rd.} = 54 \text{ sq. rd.}$, *Ans.*

(4.) $.7 \text{ lb.} \times 12 = 8.4 \text{ oz.}$; $.4 \text{ oz.} \times 20 = 8.0 \text{ pwt.} = 8 \text{ pwt.}$ *Ans.* 8 oz. 8 pwt.

(5.) $.8125 \text{ bu.} \times 4 = 3.2500 \text{ pk.}$; $.25 \text{ pk.} \times 8 = 2.00 \text{ qt.}$
 $= 2 \text{ qt.}$ *Ans.* 3 pk. 2 qt.

(6.) $.44 \text{ mi.} \times 320 = 140.8 \text{ rd.}$; $.8 \text{ rd.} \times 5\frac{1}{2} = 4.4 \text{ yd.}$; $.4 \text{ yd.} \times 3 = 1.2 \text{ ft.}$; $.2 \text{ ft.} \times 12 = 2.4 \text{ in.}$ *Ans.* 140 rd. 4 yd. 1 ft. 2.4 in.

(7.) $.33625 \text{ cwt.} \times 100 = 33.625 \text{ lb.}$; $.625 \text{ lb.} \times 16 = 10.000 \text{ oz.} = 10 \text{ oz.}$ *Ans.* 33 lb. 10 oz.

Art. 153.

(2.) $.72 \text{ qt.} \div 8 = .09 \text{ pk.}$, $\div 4 = .0225 \text{ bu.}$, *Ans.*

(3.) $.77 \text{ yd.} \div 5\frac{1}{2} = .14 \text{ rd.}$, $\div 320 = .0004375 \text{ mi.}$, *Ans.*

(4.) $.25 \text{ pt.} \div 2 = .125 \text{ qt.}$, $\div 4 = .03125 \text{ gal.}$, *Ans.*

(5.) $.6 \text{ pt.} \div 2 = .3 \text{ qt.}$, $\div 8 = .0375 \text{ pk.}$ $\div 4 = .009375 \text{ bu.}$, *Ans.*

(6.) $.7 \text{ rd.} \div 320 = .0021875 \text{ mi.}$, *Ans.*

Art. 154.

(1.) $\$0.40 \times 9 = \3.60 ; $\$0.75 \times 12 = \9.00 ; $\$3.60 + \$9.00 = \$12.60$, *Ans.*

(2.) $\$0.45 \times 2.3 = \1.035 ; $\$0.375 \times 1.5 = \0.5625 ; $\$1.035 + \$0.5625 = \$1.5975$, *Ans.*

(3.) $\$2.6875 \times 16\frac{1}{4} = \43.671875 , *Ans.*

(4.) $35.25 \div .75 = 47 \text{ bu.}$, *Ans.*

(5.) $98.4 \div 2.5625 = 38.4$ yd., *Ans.*

(6.) 6 cwt. 50 lb. = 6.5 cwt.: $\$3.25 \times 6.5 = \21.125 ,
Ans.

(7.) 14 bu. 3 pk. 4 qt. = 14.875 bu.: $\$0.625 \times 14.875 = \9.296875 , *Ans.*

(8.) 13 A. 115 sq. rd. = 13.71875 A.: $\$17.28 \times 13.71875 = \237.06 , *Ans.*

(9.) $\$9.296875 \div \$0.3125 = 29.75$ bu. = 29 bu. 3 pk.,
Ans.

(10.) $59.265 \div 4.32 = 13.71875$ A. = 13 A. 115 sq. rd.,
Ans.

(11.) 1 gal. would cost $\$4\frac{9}{8} = \$7\frac{7}{8} = \$0.77\frac{7}{8}$: $464 \times .77\frac{7}{8} = \360.88 , *Ans.*

	ft.	in.	
(12.) .34 yd. $\times 3 = 1.02$ ft.:	1	.24	
.02 ft. $\times 12 = .24$ in.:	1	.84	
1.07 ft. : .07 ft. $\times 12 = .84$ in.		8.92	
	<u>Ans. 2</u>	<u>10.00</u>	

	qt.	pt.	
(13.) .625 gal. $\times 4 = 2.500$ qt.:	2	1	
.5 qt. $\times 2 = 1.0$ pt.:		1.5	
.75 qt. $\times 2 = 1.5$ pt.		<u>1.5</u>	
	<u>Ans. 3</u>	<u>.5</u>	

	ft.	in.	
(14.) 1.53 yd. $\times 3 = 4.59$ ft.:	4	7.08	
.59 ft. $\times 12 = 7.08$ in.	2	3.08	
	<u>Ans. 2</u>	<u>4</u>	

(15.) $365.25 \times .05 = 18.2625$ da.: .2625 da. $\times 24 = 6.3$ hr.: 6.3 hr. — .5 hr. = 5.8 hr.: .8 hr. $\times 60 = 48$ min.
Ans. 18 da. 5 hr. 48 min.

(16.) .41 da. = 9.84 hr.: 9.84 hr. — .16 hr. = 9.68 hr.:
.68 hr. $\times 60 = 40.8$ min.: .8 min. $\times 60 = 48$ sec. *Ans.*
9 hr. 40 min. 48 sec.

(17.) $365.25 \text{ da.} \times .3 = 109.575 \text{ da.}$: $.575 \text{ da.} \times 24 = 13.8 \text{ hr.}$: $.8 \text{ hr.} \times 60 = 48 \text{ min.}$ *Ans.* 109 da. 13 hr. 48 min.

(18.) $3 \text{ in.} = \frac{1}{4} \text{ ft.}$: $2\frac{1}{4} \text{ or } \frac{9}{4} \text{ ft.} = \frac{3}{4} \text{ yd.}$: $343\frac{3}{4} \times \$0.16 = \55.00 , *Ans.*

(19.) $17 \text{ mi. } 135 \text{ rd.} = 17.421875 \text{ mi.}$: $\$690.35 \times 17.421875 = \12027.19140625 , *Ans.*

THE METRIC SYSTEM.

Art. 160.

(3.) $20 \text{ Km.} \times .62137 = 12.42740 \text{ mi.}$, *Ans.*

(4.) $160 \text{ acres} \div 2.471 = 64.75+ \text{ Ha.}$, *Ans.*

(5.) $49 \text{ m.} \times 39.37 = 1929.13 \text{ in.}$, $\div 12 = 160 \text{ ft.}$ 9.13 in. : $160 \text{ ft.} \div 3 = 53 \text{ yd.}$ 1 ft. : $53 \text{ yd.} \div 5\frac{1}{2} = 9 \text{ rd.}$ $3\frac{1}{2} \text{ yd.}$: $\frac{1}{2} \text{ yd.} = \frac{3}{2} \text{ or } 1\frac{1}{2} \text{ ft.}$; $\frac{1}{2} \text{ ft.} = 6 \text{ in.}$; $9.13 \text{ in.} + 6 \text{ in.} = 15.13 \text{ in.} = 1 \text{ ft.}$ 3.13 in. ; $1 + 1 + 1 = 3 \text{ ft.} = 1 \text{ yd.}$; $3 \text{ yd.} + 1 \text{ yd.} = 4 \text{ yd.}$ *Ans.* 9 rd. 4 yd. 3.13 in.

(6.) $15 \text{ g.} \times 15.432 = 231.480 \text{ gr. T.}$, $\div 24 = 9 \text{ pwt.}$ 15.48 gr. , *Ans.*

(7.) $42 \text{ bu.} \div 2.8375 = 14.8+ \text{ Hl.}$, *Ans.*

(8.) $500 \text{ sters} \times .2759 = 137.95 \text{ C.}$, *Ans.*

(9.) $9 \text{ m.} \times 5 \text{ m.} = 45 \text{ m}^2$, $\times 1.196 = 5.382 \text{ sq. yd.}$, *Ans.*

(10.) $32 \text{ l.} \times 1.0567 = 33.8144 \text{ qt.}$, $\div 4 = 8.4536 \text{ gal.}$, *Ans.*

Art. 161.

(1.) $127 \text{ dl.} + 234.5 \text{ dl.} = 361.5 \text{ dl.}$, $\div 10 = 36.15 \text{ l.}$: $1563 \text{ cl.} \div 100 = 15.63 \text{ l.}$: $4.87 \text{ l.} + 36.15 \text{ l.} + 15.63 \text{ l.} = 56.65 \text{ l.}$, *Ans.*

(2.) $45 \text{ Ha.} = 4500 \text{ a.}$, $@ \$3.32 = \14940 , *Ans.*
Key 10.

$$(3.) 457.92 \div 3 = 152.64 \text{ m., } Ans.$$

$$(4.) .72 \times .48 \times .5 = .1728: \$8.640 \div .1728 = \$5, Ans.$$

(5)	(6)	(7)
380)454.10(1.195	4685	346.75)194.1800(0.56
<u>380</u> <i>Ans.</i> \$1.195	<u>1.6</u>	<u>173375</u>
741	28110	208050
<u>380</u>	<u>4685</u>	<u>208050</u>
3610	7496.0	
<u>3420</u>		<i>Ans.</i> \$0.56
1900	<i>Ans.</i> 7496 Hl.	
<u>1900</u>		

$$(8.) 1 \text{ M.} \times 100 = 100 \text{ cm.: } 100 \div 2 = 50, \text{ the number of coins: } 50 \times 5 \text{ g.} = 250 \text{ g., } Ans.$$

$$(9.) 1.25 \times 6.5 = 8.125, \div 1.85 = 4.39+ \text{ m., } Ans.$$

$$(10.) 60 \text{ mi.} \div .62137 = 96.56+ \text{ Km., } Ans.$$

$$(11.) 29 \text{ Mm.} \times 22.4 \text{ Mm.} = 649.6 \text{ Mm}^2, Ans.$$

$$(12.) 13.24 \text{ Km.} \times 1000 = 13240 \text{ m., } \div .715 \text{ m.} = 18517+, \text{ which would, of course, necessitate his taking } 18518 \text{ steps, } Ans.$$

NOTE.—The answer to the example given here is also 18517+ steps.

PERCENTAGE.

Art. 164.

$$\begin{array}{r}
 (6) \\
 165 \\
 .03\frac{1}{3} \\
 \hline
 495 \\
 55 \\
 \hline
 5.50, Ans.
 \end{array}$$

$$(7.) 240 \times .03\frac{3}{4} = 9, Ans.$$

$$(14.) 8\frac{1}{3}\% = \frac{1}{12}: \frac{1}{12} \text{ of } 384 = 32, Ans.$$

$$(16.) 12\frac{1}{2}\% = \frac{1}{8}: \frac{1}{8} \text{ of } 292 = 36.5, Ans.$$

$$(19.) \quad 18\frac{3}{4} = \frac{3}{16} : \frac{.7}{1} \times \frac{3}{16} = 2.1, \text{ Ans.}$$

$$(20.) \quad 20\% = \frac{1}{5} : \frac{1.97}{1} \times \frac{1}{5} = 1.97, \text{ Ans.}$$

$$(21.) \quad 25\% = \frac{1}{4} : \frac{1}{4} \text{ of } 43 = 10.75, \text{ Ans.}$$

$$(22.) \quad 33\frac{1}{3}\% = \frac{1}{3} : \frac{1}{3} \text{ of } 6.93 = 2.31, \text{ Ans.}$$

$$(23.) \quad 45 \times 5.7 = 2.565, \text{ Ans.}$$

$$(24.) \quad 50\% = \frac{1}{2} : \frac{1}{2} \text{ of } 38.75 = 19.375, \text{ Ans.}$$

$$(25.) \quad \frac{1}{2}\% = \frac{1}{200} : \frac{1}{200} \text{ of } 456 = 2.28, \text{ Ans.}$$

$$(26.) \quad \frac{3}{8}\% = .00375 : 464 \times .00375 = 1.74, \text{ Ans.}$$

$$(27.) \quad \frac{7}{16} = .4375 : 144 \times .4375 = 63, \text{ Ans.}$$

$$(28.) \quad 125\% = \frac{5}{4} : \frac{5}{4} \text{ of } 36 = 45, \text{ Ans.}$$

$$(29.) \quad 208\% \text{ of } 650 = 650 \times 2.08 = 1352, \text{ Ans.}$$

$$(30.) \quad 4\frac{1}{2} \text{ times } 12 = 48 + 6 = 54, \text{ Ans.}$$

$$(31.) \quad 10 \text{ times } 24.75 = 247.5, \text{ Ans.}$$

Art. 165.

$$(3.) \quad 3 \text{ is } \frac{1}{5} \text{ of } 15 : \frac{1}{5} = 20\%, \text{ Ans.}$$

$$(4.) \quad 6 \text{ is } \frac{3}{25} \text{ of } 50 : \frac{3}{25} = .12 = 12\%, \text{ Ans.}$$

$$(5.) \quad 4.5 \text{ is } \frac{4.5}{75}\% \text{ of } 75 = \frac{3}{5} = .6 = 6\%, \text{ Ans.}$$

$$\begin{array}{r}
 (11) \\
 243)8.505(.035 = 3\frac{1}{2}\%, \text{ Ans.} \\
 \underline{729} \\
 1215 \\
 \underline{1215}
 \end{array}$$

$$(12.) .002 \text{ of } 2 = .002 \div 2 = .001 = \frac{1}{10} \text{ of } 1\%, \text{ Ans.}$$

$$(13.) 13.245 \div 3532 = .00375 = \frac{375}{100000} = \frac{3}{8}\%, \text{ Ans.}$$

$$(14.) \frac{3}{\cancel{25}^5} \times \frac{\cancel{5}}{4} = \frac{3}{20} = 15\%, \text{ Ans.}$$

$$(15.) \frac{\cancel{2}}{\cancel{15}^5} \times \frac{\cancel{3}}{\cancel{2}} = \frac{1}{5} = 20\%, \text{ Ans.}$$

$$(16.) \frac{\cancel{2}}{\cancel{7}} \times \frac{\cancel{21}^3}{\cancel{16}^8} = \frac{3}{8} = 37\frac{1}{2}\%, \text{ Ans.}$$

$$(17.) \frac{\cancel{21}^3}{\cancel{4}} \times \frac{3}{\cancel{35}^5} = \frac{9}{20} = 45\%, \text{ Ans.}$$

$$(18.) \frac{\cancel{65}^3}{\cancel{6}^2} \times \frac{\cancel{9}}{\cancel{520}^8} = \frac{3}{16} = 18\frac{3}{4}\%, \text{ Ans.}$$

Art. 166.

$$(3.) 20\% = \frac{1}{5}: 60 \times 5 = 300, \text{ Ans.}$$

$$(4.) 75\% = \frac{3}{4}. \text{ If } 90 \text{ is } \frac{3}{4}, \frac{1}{4} = 30, \text{ and } \frac{4}{4} = 120, \text{ Ans.}$$

$$(5.) 125\% = \frac{5}{4}. \text{ If } 85 \text{ is } \frac{5}{4}, \frac{1}{4} = 17, \text{ and } \frac{4}{4} = 68, \text{ Ans.}$$

(6.) $7.13 \div .23 = 31$, *Ans.*

(7.) $20.23 \div .34 = 59.5$, *Ans.*

(8.) $23.5 \div .47 = 50$, *Ans.*

(9.) If 45 is $1\frac{1}{2}\%$, $\frac{1}{2}\%$ is $\frac{1}{3}$ of $45 = 15$: $1\% = 2$ times $15 = 30$: 100 times $30 = 3000$, the number.

(10.) $12\frac{1}{2}\% = \frac{1}{8}$: $2.25 \times 8 = 18$, *Ans.*

(11.) 1% is $\frac{1}{250}$ of $\frac{3}{4} = \frac{3}{1000}$: 100% is 100 times $\frac{3}{1000} = \frac{300}{1000} = \frac{3}{10}$, *Ans.*

(12.) $14\frac{2}{7} = \frac{100}{7}$: $16\frac{2}{3}\% = \frac{1}{6}$. If $\frac{100}{7} = \frac{1}{6}$, $\frac{6}{6} = \frac{600}{7} = 85\frac{5}{7}$, *Ans.*

Art. 167.

(3.) $721 \div 1.03 = 700$, *Ans.*

(4.) $100\% - 66\% = 34\%$: $68 \div .34 = 200$, *Ans.*

(5.) If $2125 = \frac{5}{4}$, $\frac{1}{4} = 425$, and $\frac{4}{4} = 1700$, *Ans.*

(6.) If $7.52 = \frac{94}{100}$, $\frac{1}{100} = \frac{7.52}{94} = 8$, and the number $= 8$, *Ans.*

(7.) $37\frac{1}{2}\% = \frac{3}{8}$. If $8250 = \frac{11}{8}$, $\frac{1}{8} = 750$, and $\frac{8}{8} = 6000$, *Ans.*

(8.) $10\% = \frac{1}{10}$, then $\frac{9}{10}$ of the fraction $= \frac{3}{8}$: $\frac{3}{8} \times \frac{10}{9} = \frac{30}{72} = \frac{5}{12}$, *Ans.*

(9.) $20\% = \frac{1}{5}$. If $6.6 = \frac{6}{7}$, $\frac{1}{5} = 1.1$, and $\frac{5}{5} = 5.5$, *Ans.*

Art. 169.

(1.) $800 \times .36 = 288.00$: $\$800 - \$288 = \$512$, *Ans.*

(2.) $300 - 225 = 75 = \frac{1}{4}$ of $300 = 25\%$, *Ans.*

(3.) $100\% - 40\% = 60\% = \frac{6}{10}$. If $\$3000 = \frac{6}{10}$, $\frac{1}{10} = \$500$, and $\frac{4}{10} (40\%) = \$2000$, *Ans.*

(4.) If 56 ct. = 140% of the cost, the cost = $56 \div 1.40 = 40$ ct., *Ans.*

(5.) $12\frac{1}{2}\% = \frac{1}{8}$: $\$175 = \frac{7}{8}$, $\frac{1}{8} = 25$, and $\frac{8}{8} = \$200$, *Ans.*

(6.) $75 \times 4 = 300$: $\frac{1}{8}$ of 300 = $37\frac{1}{2}$: $300 - 37\frac{1}{2} = 262\frac{1}{2}$, $\times 35$ ct. = $\$91.87\frac{1}{2}$, *Ans.*

(7.) $\$500 - \$425 = \$75$: $7500 \div 500 = 15\%$, *Ans.*

(8.) $100\% - 75\% = 25\%$: $\$5000 = 25\% = \frac{1}{4}$; then $\frac{4}{4} = \$20000$, and $\$20000 - \$5000 = \$15000$, *Ans.*

(9.) $12\frac{1}{2}\% = \frac{1}{8}$: 250 A. 86 sq. rd. = 40086 sq. rd. = $\frac{9}{8}$ of neighbor's: $\frac{1}{8} = 4454$, and $\frac{8}{8} = 35632$ sq. rd., $\div 160 = 222$ A. 112 sq. rd., *Ans.*

(10.) $160 \times .35 = 56.00$: $160 + 56 = 216$, *Ans.*

(11.) 5 bu. $\times 32 = 160$ qt.: $6.00 \div 160 = 3\frac{3}{4}\%$, *Ans.*

(12.) $60\% = \frac{6}{10}$: $\frac{6}{10}$ of 45% = $\frac{270}{100} = 27\%$: $540 \div .27 = 2000$ A., *Ans.*

(13.) $371.29 \div 1.07 = \$347$, *Ans.*

(14.) $18 + 15 + 23 + 12 = 68\%$: $100 - 68 = 32\%$: $\$800 \times .32 = \256 , *Ans.*

(15.) $\frac{1}{20} = 5\%$: $\frac{17}{20} = 17 \times 5 = 85\%$, *Ans.*

(16.) $33\frac{1}{3}\% = \frac{1}{3}$: 2 bu. 3 pk. = $\frac{1}{3}$ of 6 bu. 9 pk. = 8 bu. 1 pk., *Ans.*

(17.) 100% less $7\frac{1}{2}\% = 92\frac{1}{2}\%$: $37 \div .925 = 40$, *Ans.*

(18.) $25.8 - 2.58 (10\%) = 23.22$ grains, *Ans.*

(19.) $1.25 = \frac{1}{4}$ of 5: $\frac{3}{4}$ remain = 75%, *Ans.*

(20.) $25\% = \frac{1}{4}$. If $\$150 = \frac{5}{4}$, $\frac{1}{4} = 30$, and $\frac{4}{4} = \$120 =$ cost: $\$200 - \$120 = \$80$: $\frac{80}{120} = \frac{2}{3} = 66\frac{2}{3}\%$, *Ans.*

Art. 172.

(1.) $\$240 \times .05 = \12 , *Ans.*

(2.) $11.50 \div 460 = .02\frac{1}{2} = 2\frac{1}{2}\%$, *Ans.*

(3.) $\$8.12\frac{1}{2} = 2\frac{1}{2}\%$ of the selling price: $\$8.12\frac{1}{2} \div .02\frac{1}{2} = \325 , selling price: 1 barrel sold for $\frac{1}{25}$ of $\$325 = \13 , *Ans.*

(4.) $210 \div 1.05 = \$200$, *Ans.*

(5.) $\$180 \times .04 = \7.20 : $\$180 - \$7.20 = \$172.80$, *Ans.*

(6.) If $\$11.25 = \frac{1}{20}$ (5%), $\frac{29}{20} = \$225$, *Ans.*

(7.) $\$1323.54 \div 1.08 = \1225.50 , cost of goods: $\$1323.54 - \$1225.50 = \$98.04$, commission, *Ans.*

$$\left. \begin{array}{rcl} (8.) & 250 \times \$15 & = \$3750 \\ & 175 \times \$7 & = 1225 \\ & 1456 \times \$0.25 & = 364 \end{array} \right\} = \$5339$$

3% of $\$5339 = \160.17 : $\$5339 - \$160.17 = \$5178.83$, *Ans.*

Art. 173.

(1.) $20\% = \frac{1}{5}$: $\frac{1}{5}$ of $\$225.50 = \45.10 : $\$225.50 - \$45.10 = \$180.40$, *Ans.*

(2.) $\frac{1}{3}$ of $\$725.16 = 241.72$: $\$725.16 - 241.72 = 483.44$, $\times .05 = 24.17$ +: $\$483.44 - \$24.17 = \$459.27$, *Ans.*

(3.) $100\% - 3\% = 97\%$: $1430.75 \div .97 = \$1475$, *Ans.*

(4.) $100\% - 5\% = 95\%$: $\$390.45 \div .95 = \411 : $100\% - 25\% = 75\%$: $\$411 \div .75 = \548 , *Ans.*

(5.) $10\% =$ first discount; $100\% - 10\% = 90\%$: 10% of $90\% = 9\%$, second discount; $90\% - 9\% = 81\%$: 10% of $81\% = 8.1\%$, third discount: $10\% + 9\% + 8.1\% = 27.1\%$, sum of the three discounts: $\$325.20 \div .271 = \1200 : 1 doz. cost $\frac{1}{20}$ of $\$1200 = \60 , *Ans.*

(6.) 100 doz. @ 60 ct. = $\$60.00$, less $\$24$ (40%) = $\$36$, less $\$3.60$ (10%) = $\$32.40$, less $\$2.43$ ($7\frac{1}{2}\%$) = $\$29.97$, *Ans.*

(7.) \$50 less 50% = \$25, less 10% = \$22.50, less 10% = \$20.25, less 2% = \$19.845, $\div 10 = \$1.98+$, *Ans.*

Art. 174.

(1.) $\$40 + 10\% = \44 , *Ans.*

(2.) 5 ct. = $\frac{5}{6}$ the cost; the loss, therefore, is $\frac{1}{6} = 16\frac{2}{3}\%$, *Ans.*

(3.) $12\frac{1}{2} = \frac{1}{8}$; then 27 ct. = $\frac{9}{8}$ of the cost, $\frac{1}{8} = 3$ ct., and $\frac{8}{8}$ or the cost = 24 ct., *Ans.*

(4.) $\$15.30 \div .04 = \382.50 , *Ans.*

(5.) $37\frac{1}{2}\% = \frac{3}{8}$: $\$8 + \text{its } \frac{3}{8} = \11 , *Ans.*

(6.) $90 - 75 = 15 = \frac{1}{5}$ of 75 = 20%, *Ans.*

(7.) $6\frac{1}{4}\% = \frac{1}{16}$. If 5 ct. = $\frac{1}{16}$ of the cost, the cost = 80 ct., *Ans.*

(8.) $18\frac{3}{4}\% = \frac{3}{16}$; then $\$4.75 = \frac{19}{16}$, $\frac{1}{16} = \$0.25$, and $\frac{16}{16} = \$0.25 \times 16 = \4 , *Ans.*

(9.) $\$1.35 = \frac{9}{10}$ of the cost, $\frac{1}{10} = \$0.15$, and $\frac{10}{10} = \$1.50 = \text{cost}$: $16\frac{2}{3}\% = \frac{1}{6}$: $\frac{1}{6}$ of 1.50 = .25: $\$1.50 + \$0.25 = \$1.75$, *Ans.*

(10.) $25\% = \frac{1}{4}$: $\frac{1}{4}$ of $\$874 = \218.50 , *Ans.*

(11.) $\$1.75 - \$0.25 = \$1.50$: $25 = \frac{1}{6}$ of 150 = $16\frac{2}{3}\%$, *Ans.*

(12.) On the first horse $\$150 = \frac{5}{4}$ cost, $\frac{1}{4} = \$30$, and the cost = $\$120$: on the second horse $\$150 = \frac{3}{4}$ cost, $\frac{1}{4} = \$50$, and the cost = $\$200$: $\$200 + \$120 = \$320$, $-\$300 = \20 , *Ans.*

(13.) 5 ct. = $10\% - 8\% = 2\%$ of the cost per yd. If $2\% = 5$ ct., $1\% = 2\frac{1}{2}$ ct., and $100\% = \$2.50$, *Ans.*

(14.) $60 \text{ ct.} \times 10000 = \6000 , cost of the corn: $65 \text{ ct.} \times 7000 = \4550 : $10000 - 7000 = 3000$: $55 \text{ ct.} \times 3000 = \1650 : $\$4550 + \$1650 = \$6200$, the selling price: $\$6200 - \$6000 = \$200$ gain: $\$200 = \frac{1}{30}$ of $\$6000 = 3\frac{1}{3}\%$, *Ans.*

(15.) $33\frac{1}{3}\% = \frac{1}{3}$; then $\$12000 = \frac{4}{3}$, $\frac{1}{3} = \$3000$, and $\frac{2}{3} = \$9000 = \text{cost of house and lot}$. The profit was $\$3000$. On the city lots he lost $\frac{1}{3}$. $\frac{1}{3}$ of $12000 = 4000$: $\$4000 - \$3000 = \$1000$, *Ans.*

Art. 175.

(1.) $100\% - 20\% = 80\%$, cost price. If he sell at the list price, he will gain $\frac{20}{80} = \frac{1}{4} = 25\%$, *Ans.*

(2.) $74 \times 5 \times 45 = 166.50$, less 3.33 (2%) $= \$163.17$: $12\frac{1}{3}\%$ of this amount $= \$20.12+$, *Ans.*

(3.) $\$45$ less $5\% = \$42.75$, $\div 12 = \$3.56\frac{1}{4} = \text{cost per pair}$: $\$4.25 - \$3.56\frac{1}{4} = \$0.68\frac{3}{4} = \text{gain per pair}$: $5 \times 12 = 60 = \text{number of pairs}$: $60 \times \$0.68\frac{3}{4} = \41.25 , *Ans.*

(4.) The profit on 36 hats equals 36 times $37\frac{1}{2}$ ct., which is $\$13.50$. If $\$13.50 = \frac{1}{8}$ of the cost, $\frac{8}{8}$ are 8 times $\$13.50 = \108 : $\$108 = \frac{9}{10}$ of the list price: $\frac{10}{9} = \$12$, $\frac{10}{9} = \$120$, *Ans.*

(5.) $\$1 \times 100 = \100 : $\$100$ less $60\% = \$40$: $\$40$ less $5\% = \$38$: $\$38$ less $5\% = \$36.10$: $\$36.10 + \$23.90 = \$60$: $\$60 \div (100 \times 12)$ or $1200 = 5$ ct., *Ans.*

(6.) 100 bbl. @ $\$9.50 = \950 , less $2\frac{1}{2}\% = \$23.75$, less $\$17.25 = \909 : $\$909 - (100 \times \$7.50)$ or $\$750 = \159 , *Ans.*

(7.) $80 \times \$125 = \10000 , $+ \$200 = \10200 : $\$10450 - \$10200 = \$250 = 2\frac{1}{2}\%$ of $\$10000$. *Ans.* $2\frac{1}{2}\%$.

(8.) 1500 lb. $\times 50 = 75000$ lb.: $10\frac{1}{2}$ ct. $\times 75000 = \$7875$: 2% of $\$7875 = \157.50 , commission: $\$157.50 + \22.50 , charges, $= \$180$: $\$7875 - \$180 = \$7695$, that the consignor receives: $\$7695 = 114\%$ of the cost price: $\$7695 \div 1.14 = \6750 , cost: $\$6750 \div 75000 = 9$ ct., cost per pound.

(9.) $60 \times 70 \text{ ct.} = \42.00 : $\$42$ less 50% and 10% and $5\% = \$17.955$: $\$42$ less 20% and 10% and $5\% = \$28.728$: $\$28.728 - \$17.955 = \$10.773$, *Ans.*

(10.) $\$35.91 = 112\%$ of the cost: $\$35.91 \div 1.12 = \$32.06\frac{1}{4}$, the cost: $\$32.06\frac{1}{4} \div .95 = \33.75 : $\$33.75 \div .90 = \37.50 : $\$37.50 \div .75 = \$50 =$ the list price: $\$50 \div 50 = \1 , list price per gross, *Ans.*

Art. 177.

(1.) 1% of $\$7500$ is $\$75$, and $\frac{1}{4}\%$ is $\frac{1}{4}$ of $\$75 = \18.75 , *Ans.*

(2.) 50 shares $= \$5000$: $\$6.25 \div \$5000 = .00125 = \frac{1}{8}\%$, *Ans.*

(3.) $\$10 = \frac{1}{4}\%$ of the investment: $1\% = 4$ times $\$10 = \40 : $100\% = 100$ times $\$40 = \$4000 = 40$ shares, *Ans.*

(4.) 1% on $\$1700 = \17.00 , and $\frac{1}{4}\% = \$4.25$, *Ans.*

(5.) 95 shares $= \$9500$: $\$11.875 \div \$9500 = .00125 = \frac{1}{8}\%$, *Ans.*

(6.) If $\$9.50 = \frac{1}{4}\%$, $1\% = \$38$, and $100\% = \$3800 = 38$ shares, *Ans.*

Art. 178.

(1.) The dividend will be 3500 times 4 ct. or $(\$0.04) = \140 , *Ans.*

(2.) If $\$300$ is $7\frac{1}{2}\% = \frac{15}{2}\%$, $\frac{1}{2}\%$ is $\$20$, and 1% is $\$40$. If $\$40 = 1\%$, then 100% is $\$4000 = 40$ shares, *Ans.*

(3.) 15% on $\$8000 = \1200 , *Ans.*

(4.) $5\% = \frac{1}{20}$: $\frac{1}{20}$ of 60 $= 3$: $60 + 3 = 63$ shares, *Ans.*

(5.) $\$15700 - \$4500 = \$11200$: $11200 \div 160000 = .07 = 7\%$, *Ans.*

Art. 179.

(1.) 150 shares of \$50 each are equivalent to 75 shares of \$100. $139\frac{3}{4} \times 75 = \10481.25

$$\frac{1}{4}\% \text{ brokerage on } \$7500 = \frac{18.75}{\$10500.00, \text{ Ans.}}$$

$$(2.) \quad \$8000 \times 1.10 = \$8800$$

$$\frac{1}{8}\% \text{ brokerage on } \$8000 = \frac{10}{\$8810, \text{ Ans.}}$$

(3.) $\frac{1}{4}\%$ brokerage on 50 shares = \$12.50: $\$2475 + \$12.50 = \$2487.50$: $2487.50 \div 50 = 49\frac{3}{4}\%$, Ans.

$$(4.) \quad \$25000 \times 1.14\frac{1}{4} = \$28562.50$$

$$\frac{1}{8}\% \text{ brokerage on } \$25000 = \frac{31.25}{\$28593.75, \text{ Ans.}}$$

$$(5.) \quad 19\frac{1}{4} + \frac{1}{4} = 19\frac{1}{2} \text{ or } 19.5: \$1560 \div 19.5 = 80, \text{ Ans.}$$

$$(6.) \quad 100 \div 1.05 = 95\frac{5}{21} \text{ ct., Ans.}$$

$$(7.) \quad 1.12\frac{1}{2} = 1\frac{1}{8} = \frac{9}{8}: 100 \times \frac{8}{9} = \frac{800}{9} = 88\frac{8}{9} \text{ ct., Ans.}$$

$$(8.) \quad 35\frac{5}{7} = \frac{250}{7}: 100 \times \frac{7}{250} = 2.80 = 280, \text{ Ans.}$$

$$(9.) \quad \$8946.25 \div 1.0525 = \$8500, \text{ Ans.}$$

(10.) If $\$15.62\frac{1}{2} = \frac{1}{16}\%$, $1\% = \$250$, and $100\% = \$25000$: $\$25734.37\frac{1}{2} - \$25000 = \$734.375$; adding the brokerage to this = \$750: $\$750 \div 25000 = .03 = \text{gold premium}$: 103 = Ans.

Art. 180.

$$(1.) \quad \$39900 \times .06 = \$2394, \text{ Ans.}$$

$$(2.) \quad \$39900 \div 1.05 = \$38000: \$38000 \times .06 = \$2280, \text{ Ans.}$$

$$(3.) \quad \$39900 \div .95 = \$42000: 42000 \times .06 = \$2520, \text{ Ans.}$$

(4.) If gold was *at par*, 6% interest on \$20000 would be \$1200; at 7% premium it would yield an income 7% greater = \$1284, *Ans.*

(5.) $\$5220 \div 1.16 = \4500 = amount in bonds; $\$4500 \times .06$ (%) = \$270. Gold being at 5% premium, add to \$270 its 5% = \$13.50; $\$270 + \$13.50 = \$283.50$, *Ans.*

(6.) $4\frac{1}{2}$ per cents, when gold is at 105, would yield an income $\frac{1}{20}$ greater than when at par. $4.5 + (\frac{1}{20} \text{ of } 4.5)$ or .225 = 4.725: $4.725 \div 1.08 = 4\frac{3}{8}\%$, *Ans.*

$$(7.) \quad 37\frac{1}{2}\% = \frac{2}{3} : \frac{6\%}{1} \times \frac{8}{3} = 16\%, \text{ Ans.}$$

(8.) $\$1921 \div 1.13 = \1700 = annual income in gold. $\$1700 \div .05 = \34000 : $\$34000 \times 1.18 = \40120 , *Ans.*

(9.) $95\frac{1}{4} + \frac{1}{4} = 95\frac{1}{2}$: $105 - \frac{1}{4} = 104\frac{3}{4}$: $104\frac{3}{4} - 95\frac{1}{2} = 9\frac{1}{4}\% = .0925$: $\$925 \div .0925 = \$10000 = 100$ shares, *Ans.*

(10.) $6 = \frac{3}{4}$ of 8: $\frac{3}{4} = 75\%$, *Ans.*

(11.) $\$4982 \div 1.06 = \4700 = amount of bonds that can be bought: 4% on \$4700 = \$188, *Ans.*

(12.) $7 \div .87\frac{1}{2} = .08 = 8\%$, *Ans.*

(13.) $.07 \div .06 = 116\frac{2}{3}$, *Ans.*

INTEREST.

SIMPLE INTEREST.

Art. 183.

1st. *When the time is one year.*

(7.) $6\frac{1}{4}\% = \frac{1}{16}$: $\$7200 \div 16 = \450 , *Ans.*

(8.) $8\frac{1}{3}\% = \frac{1}{12}$: $\$28.20 \div 12 = \2.35 : $\$28.20 + \$2.35 = \$30.55$, *Ans.*

(9.) $10\% = \frac{1}{10}$: $\frac{1}{10}$ of 45.50 = 4.55: \$45.50 + \$4.55 = \$50.05, *Ans.*

(10.) $\$420 \times .05\frac{1}{3} = \22.40 , + \$420 = \$442.40, *Ans.*

(11.) $\$857 \times .09 = \77.13 , + \$857 = \$934.13, *Ans.*

(12.) $\$96 \times .08\frac{1}{2} = \8.16 , + \$96 = \$104.16, *Ans.*

(13.) $\$2000 \times .04\frac{1}{2} = \90 , + \$2000 = \$2090, *Ans.*

(14.) $12\frac{1}{2}\% = \frac{1}{8}$: $\$164 \div 8 = \20.50 , + \$164 = \$184.50, *Ans.*

2d. *When the time is two or more years.*

(8.) $\$45 \times .08 = \3.60 : $\$3.60 \times 2 = \7.20 : $\$7.20 + \$45 = \$52.20$, *Ans.*

(9.) $\$80 \times .07 = \5.60 : $\$5.60 \times 4 = \22.40 : $\$80 + \$22.40 = \$102.40$, *Ans.*

(10.) $3\frac{3}{4}\% \times 2 = 7\frac{1}{2}\%$: $\$237.16 \times .07\frac{1}{2} = \17.79 : $\$237.16 + \$17.79 = \$254.95$, *Ans.*

(11.) $4\% \times 5 = 20\% = \frac{1}{5}$: $\$74.75 \div 5 = \14.95 : $\$74.75 + \$14.95 = \$89.70$, *Ans.*

(12.) $\$85.45 \times .06 = \5.127 : $\$5.127 \times 4 = \20.51 : $\$20.51 + \$85.45 = \$105.96$, *Ans.*

(13.) $\$325 \times .05\frac{2}{5} = \17.55 : $\$17.55 \times 3 = \52.65 : $\$52.65 + \$325 = \$377.65$, *Ans.*

(14.) $\$129.36 \times .04\frac{3}{8} = \5.6595 : $\$5.6595 \times 4 = \22.638 : $\$22.64 + \$129.36 = \$152$, *Ans.*

(15.) $\$8745 \times .16 = \1399.20 , + \$8745 = \$10144.20, *Ans.*

3d. *When the time is any number of months.*

(2.) $\$300 @ 6\%$, 1 yr. = \$18: 1 mo. = $\frac{1}{12}$ yr.: $\$18 \div 12 = \1.50 , *Ans.*

(3.) $\$240 \times .08 = \19.20 : 2 mo. $= \frac{1}{6}$ yr.: $\$19.20 \div 6 = \3.20 , *Ans.*

(4.) $\$50 \times .06 = \3.00 : 4 mo. $= \frac{1}{3}$ yr.: $\frac{1}{3}$ of $\$3.00 = 1.00$
 1 mo. $= \frac{1}{4}$ of 4 mo.: $\frac{1}{4}$ of 1.00 $= .25$
 Interest 5 mo. $= \$1.25$

(5.) $\$86 \times .06 = \5.16 : 3 mo. $= \frac{1}{4}$ yr.: $\frac{1}{4}$ of $\$5.16 = \1.29 , *Ans.*

(6.) $\$50 \times .08 = \4.00 : 4 mo. $= \frac{1}{3}$ yr.: $\frac{1}{3}$ of $\$4.00 = \$1.33+$, *Ans.*

(7.) $\$150.25 \times .08 = \12.0200 : 6 mo. $= \frac{1}{2}$ yr.: $\frac{1}{2}$ of $\$12.02 = \6.01 : $\$150.25 + \$6.01 = \$156.26$, *Ans.*

(8.) $\$360 \times .05 = \18 : 6 mo. $= \frac{1}{2}$ yr.: $\frac{1}{2}$ of $\$18 = \9 :
 1 mo. $= \frac{1}{6}$ of 6 mo.: $\frac{1}{6}$ of $\$9 = \1.50 : $\$9 + \$1.50 = \$10.50 =$ int. 7 mo.: $\$360 + \$10.50 = \$370.50$, *Ans.*

(9.) $\$204 \times .07 = \14.28 10 mo. $= \frac{10}{12}$ yr.
 $\frac{10}{12}$ of 14.28 $= 11.90$ 1 mo. $= \frac{1}{10}$ of 10 mo.
 $\frac{1}{10}$ of 11.90 $= 1.19$
 Int. 11 mo. $= \$13.09$, + $\$204 = \217.09 . *Ans.*

(10.) $\$228 \times .06 = \13.68 6 mo. $= \frac{1}{2}$ yr.
 $\frac{1}{2}$ of 13.68 $= 6.84$ 3 mo. $= \frac{1}{2}$ of 6 mo.
 $\frac{1}{2}$ of 6.84 $= 3.42$
 Int. 9 mo. $= \$10.26$, + $\$228 = \238.26 , *Ans.*

(11.) $\$137.50 \times .06 = \8.25 : 8 mo. $= \frac{2}{3}$ yr.: $\frac{1}{3}$ of $\$8.25 = \2.75 , $\frac{2}{3} = \$5.50$: $\$137.50 + \$5.50 = \$143$, *Ans.*

(12.) $\$7596 \times .08 = \607.68 : 10 mo. $= \frac{5}{6}$ yr.: $\frac{5}{6}$ of $\$607.68 = \506.40 : $\$7596 + \$506.40 = \$8102.40$, *Ans.*

4th. When the time is any number of days.

(2.) $\$360 \times .06 = 21.60$: $\frac{1}{12}$ (1 mo.) of $\$21.60 = \1.80 :
 20 da. $= \frac{2}{3}$ mo.: $\frac{2}{3}$ of $\$1.80 = \1.20 , *Ans.*

(3.) $\$726 \times .06 = \43.56 : $\frac{1}{12}$ (1 mo.) of $\$43.56 = \3.63 :
 10 da. $= \frac{1}{3}$ mo.: $\frac{1}{3}$ of $\$3.63 = \1.21 , *Ans.*

(4.) $\$1200 \times .06 = \72 : $\frac{1}{12}$ of $\$72 = \$6 = \text{int. 1 mo.}$:
 15 da. $= \frac{1}{2}$ mo.: $\frac{1}{2}$ of $\$6 = \3 , *Ans.*

(5.) $\$180 \times .08 = \14.40 : $\frac{1}{12}$ of $\$14.40 = \1.20 (1 mo.).

$$15 \text{ da.} = \frac{1}{2} \text{ mo.} = \$0.60$$

$$3 \text{ da.} = \frac{1}{5} \quad 15 \text{ da.} = .12$$

$$1 \text{ da.} = \frac{1}{3} \quad 3 \text{ da.} = .04$$

$$\text{Int. for 19 da.} = \underline{\$0.76}, \text{ Ans.}$$

(6.) $\$240 \times .07, \div 12 = \$1.40 = \text{int. 1 mo.}$

$$24 \text{ da.} = \frac{4}{5} \text{ mo.} = \$1.12$$

$$3 \text{ da.} = \frac{1}{8} \quad 24 \text{ da.} = .14$$

$$\text{Int. 27 da.} = \underline{\$1.26}, \text{ Ans.}$$

(7.) $\$320 \times .05, \div 12 = \$1.33\frac{1}{3} = \text{int. 1 mo.}$

$$20 \text{ da.} = \frac{2}{3} \text{ mo.} = \$0.888 +$$

$$1 \text{ da.} = \frac{1}{20} \quad 20 \text{ da.} = .044 +$$

$$\text{Int. 21 da.} = \underline{\$0.93}, \text{ Ans.}$$

(8.) $\$450 \times .10, \div 12 = \$3.75 = \text{int. 1 mo.}$: 25 da. $= \frac{5}{6}$ mo.: $\frac{5}{6}$ of $\$3.75 = \3.125 . *Ans.* $\$3.13$.

(9.) $\$100.80 \times .05, \div 12 = \$0.42 = \text{int. 1 mo.}$

$$25 \text{ da.} = \frac{5}{6} \text{ mo.} = \$0.35$$

$$3 \text{ da.} = \frac{1}{10} \text{ mo.} = .042$$

$$\text{Int. 28 da.} = \$0.39, + \$100.80 = \$101.19, \text{ Ans.}$$

(10.) $\$150 \times .05, \div 12 = \$0.62\frac{1}{2}$: 18 da. $= \frac{3}{5}$ mo.: $\frac{3}{5}$ of $\$0.625 = \0.375 : $\$150 + \$0.375 = \$150.38$, *Ans.*

$$(11.) \$360 \times .06, \div 12 = \$1.80 = \text{int. 1 mo.}$$

$$10 \text{ da.} = \frac{1}{3} \text{ mo.} = \$0.60$$

$$1 \text{ da.} = \frac{1}{10} \quad 10 \text{ da.} = \underline{.06}$$

$$\text{Int. for 11 da.} = \$0.66, + \$360 = \$360.66, \text{ Ans.}$$

$$(12.) \$264 \times .06, \div 12 = \$1.32 = \text{int. 1 mo.}$$

$$6 \text{ da.} = \frac{1}{5} \text{ mo.} = \$0.264$$

$$3 \text{ da.} = \frac{1}{2} \quad 6 \text{ da.} = \underline{.132}$$

$$\text{Int. 9 da.} = \$0.40, + \$264 = \$264.40, \text{ Ans.}$$

$$(13.) \$900 \times .07 = \$63, \div 12 = \$5.25 = \text{int. 1 mo.}$$

$$10 \text{ da.} = \frac{1}{3} \text{ mo.} = \$1.75$$

$$3 \text{ da.} = \frac{1}{10} \text{ mo.} = .525$$

$$1 \text{ da.} = \frac{1}{3} \quad 3 \text{ da.} = \underline{.175}$$

$$\text{Int. 14 da.} = \$2.45, + \$900 = \$902.45, \text{ Ans.}$$

$$(14.) \$430 \times .04\frac{1}{2}, \div 12 = \$1.61\frac{1}{4} = \text{int. 1 mo.}$$

$$15 \text{ da.} = \frac{1}{2} \text{ mo.} = \$0.806$$

$$3 \text{ da.} = \frac{1}{5} \quad 15 \text{ da.} = .161$$

$$1 \text{ da.} = \frac{1}{3} \quad 3 \text{ da.} = \underline{.053}$$

$$\text{Int. 19 da.} = \$1.02, + \$430 = \$431.02, \text{ Ans.}$$

5th. When the time is years, months, and days, or any two of these periods.

$$(3.) \$150 \times .06 = \$9, \times 4 \text{ (yr.)} = \$36.00: 2 \text{ mo.} = \frac{1}{6} \text{ yr.: } \frac{1}{6} \text{ of } \$9 = \$1.50: \$36 + \$1.50 = \$37.50, \text{ Ans.}$$

$$(4.) \$375.40 \times .06 = \$22.524 \quad 8 \text{ mos.} = \frac{2}{3} \text{ yr.}$$

$$\frac{2}{3} \text{ of } \$22.524 = \underline{15.016}$$

$$\$37.54, \text{ Ans.}$$

$$(5.) \$92.75 \times .06 = \$5.565, \times 3 \text{ (yr.)} = \$16.695$$

$$4 \text{ mo.} = \frac{1}{3} \text{ yr.} \quad \frac{1}{3} \text{ of } 5.565 = 1.855$$

$$1 \text{ mo.} = \frac{1}{4} \quad 4 \text{ mo.} \quad \frac{1}{4} \text{ of } 1.855 = \underline{.46375}$$

$$\$19.01, \text{ Ans.}$$

$$(6.) \$500 \times .06 = \$30.00 = \text{int. 1 yr.}$$

$$\frac{1}{12} \text{ of } \$30.00 = 2.50 = \text{int. 1 mo.}$$

$$\frac{1}{2} \text{ of } 2.50 = 1.25 = \text{int. 15 da.}$$

$$\frac{1}{5} \text{ of } 1.25 = .25 = \text{int. 3 da.}$$

$$\underline{\$34.00, \text{ Ans.}}$$

$$(7.) \$560 \times .08 = \$44.80, \times 2 = \$89.60 = \text{int. 2 yr.}$$

$$\frac{1}{3} \text{ of } 44.80 = 14.933+ = \text{int. 4 mo.}$$

$$\frac{1}{8} \text{ of } 14.933 = 1.866 = \text{int. 15 da.}$$

$$\underline{\$106.40, \text{ Ans.}}$$

$$(8.) \$750 \times .06 = \$45, \times 4 = \$180.00 = \text{int. 4 yr.}$$

$$3 \text{ mo.} = \frac{1}{4} \text{ yr.} \quad \frac{1}{4} \text{ of } \$45.00 = 11.25 = \text{int. 3 mo.}$$

$$\text{Int. 1 mo.} = \frac{1}{3} \text{ of } 11.25 = 3.75:$$

$$\frac{1}{5} \text{ of } 3.75 = .75 = \text{int. 6 da.}$$

$$\underline{\$192, \text{ Ans.}}$$

$$(9.) \$456 \times .05 = \$22.80, \times 3 = \$68.40 = \text{int. 3 yr.}$$

$$\frac{1}{12} \text{ of } \$22.80 = \$1.90, \frac{5}{12} = 9.50 = \text{int. 5 mo.}$$

$$\frac{1}{2} \text{ of } 1.90 = .95 = \text{int. 15 da.}$$

$$\frac{1}{5} \text{ of } .95 = .19 = \text{int. 3 da.}$$

$$\underline{\$79.04, \text{ Ans.}}$$

$$(10.) \$216 \times .10 = \$21.60, \times 5 = \$108.00 = \text{int. 5 yr.}$$

$$\frac{1}{12} \text{ of } \$21.60 = 1.80 (1 \text{ mo.}),$$

$$\frac{7}{12} \text{ of } 21.60 = 12.60 = \text{int. 7 mo.}$$

$$27 \text{ da.} = 3 \text{ da., or } \frac{1}{10} \text{ less than 1}$$

$$\text{mo.: } \frac{1}{10} \text{ of } 1.80 = .18: 1.80 - .18 = 1.62 = \text{int. 27 da.}$$

$$\underline{\$122.22, \text{ Ans.}}$$

$$(11.) \$380 \times .15 = \$57.00, \times 3 = \$171.00 = \text{int. 3 yr.}$$

$$9 \text{ mo.} = \frac{3}{4} \text{ yr.:} \quad \frac{3}{4} \text{ of } \$57 = 42.75 = \text{int. 9 mo.}$$

$$\frac{1}{12} \text{ of } \$57 = \$4.75 (1 \text{ mo.): } 9 \text{ da.}$$

$$= \frac{3}{10} \text{ mo.: } \frac{3}{10} \text{ of } \$4.75 = 1.425 = \text{int. 9 da.}$$

$$\underline{\$215.18, \text{ Ans.}}$$

$$\begin{aligned}
 (12.) \quad \$300 \times .06 &= \$18, \times 3 = \$54.00 = \text{int. 3 yr.} \\
 \frac{1}{2} \text{ of } \$18 &= 9.00 = \text{int. 6 mo.} \\
 \frac{1}{3} \text{ of } 9 &= \underline{3.00} = \text{int. 2 mo.} \\
 \text{Int. 3 yr. 8 mo.} &= \$66. \\
 &\quad 300. \\
 &\hline
 &= \$366, \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 (13.) \quad \$250 \times .06 &= \$15.00 = \text{int. 1 yr.} \\
 \frac{1}{2} \text{ of } \$15.00 &= 7.50 = \text{int. 6 mo.} \\
 \frac{1}{6} \text{ of } 7.50 &= \underline{1.25} = \text{int. 1 mo.} \\
 &\quad \$23.75 \\
 &\quad 250.00 \\
 &\hline
 &= \$273.75, \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 (14.) \quad \$205.25 \times .06 &= \$12.315, \times 2 = \$24.63 \text{ (2 yr.)} \\
 \text{Int. 6 mo.} &= \frac{1}{2} \text{ of } \$12.315 = 6.1575 \\
 \text{Int. 2 mo.} &= \frac{1}{3} \text{ of } 6.1575 = 2.0525 \\
 \text{Int. 15 da.} &= \frac{1}{4} \text{ of } 2.0525 = \underline{.5131} \\
 &\quad \$33.3531 \\
 &\quad .205.25 \\
 &\hline
 &= \$238.60, \text{ Ans.}
 \end{aligned}$$

$$\begin{aligned}
 (15.) \quad \$150.62 \times .05 &= \$7.5310, \times 3 = \$22.5930 \text{ (3 yr.)} \\
 \text{Int. 4 mo.} &= \frac{1}{3} \text{ of } \$7.5310 = 2.5103 \\
 \text{Int. 1 mo.} &= \frac{1}{4} \text{ of } 2.5103 = .6275 \\
 \text{Int. 12 da.} &= \frac{2}{5} \text{ of } .6275 = \underline{.2510} \\
 &\quad \$25.9818 \\
 &\quad 150.62 \\
 &\hline
 &= \$176.60, \text{ Ans.}
 \end{aligned}$$

(16.) $\$210.25 \times .07 = \$14.7175, \times 2 = \$29.4350$ (2 yr.)

Int. 6 mo. $= \frac{1}{2}$ of $\$14.7175 = 7.3587$

Int. 1 mo. $= \frac{1}{6}$ of $7.3587 = 1.2264$

Int. 20 da. $= \frac{2}{3}$ of $1.2264 = .8176$

$\$38.8377$

210.25

$\$249.09, Ans.$

(17.) $\$57.85 \times .05 = \$2.8925, \times 2 = \$5.7850$ (2 yr.)

Int. 3 mo. $= \frac{1}{4}$ of $\$2.8925 = .7231$

Int. 20 da. $= \frac{2}{3}$ of $\frac{1}{3}$ of $.7231 = .1606$

Int. 2 da. $= \frac{1}{10}$ of $.1606 = .0160$

Int. 1 da. $= \frac{1}{2}$ of $.0160 = .0080$

$\$6.6927$

57.85

$\$64.54, Ans.$

(18.) yr. mo. da.

1849 4 19

1847 1 9

2 3 10

$\$150 \times .06 = \$9.00, \times 2 = \$18.00 = \text{int. 2 yr.}$

Int. 3 mo. $= \frac{1}{4}$ of $\$9.00 = 2.25$

Int. 10 da. $= \frac{1}{3}$ of $\frac{1}{3}$ of $2.25 = .25$

$\$20.50, Ans.$

(19.) yr. mo. da.

1849 4 27

1848 2 15

1 2 12

$\$240 \times .08 = \$19.20 = \text{int. 1 yr.}$

$\frac{1}{6}$ of $\$19.20 = 3.20 = \text{int. 2 mo.}$

$\frac{2}{3}$ of $\frac{1}{2}$ of $3.20 = .64 = \text{int. 12 da.}$

$\$23.04, Ans.$

(20.)	yr.	mo.	da.
	1845	8	28
	1843	5	14
	<hr/>		
	2	3	14

$$\begin{aligned}
 \$180 \times .07 &= \$12.60, \times 2 = \$25.20 = \text{int. 2 yr.} \\
 \frac{1}{4} \text{ of } \$12.60 &= 3.15 = \text{int. 3 mo.} \\
 \frac{2}{5} \text{ of } \frac{1}{3} \text{ of } 3.15 &= .42 = \text{int. 12 da.} \\
 \frac{1}{6} \text{ of } .42 &= \underline{.07} = \text{int. 2 da.} \\
 &\quad \$28.84, \text{ Ans.}
 \end{aligned}$$

(21.)	mo.	da.
	11	27
	7	3
	<hr/>	
	24	

$$\begin{aligned}
 \$137.50 \times .09 &= \$12.3750 = \text{int. 1 yr.} \\
 \frac{1}{3} \text{ of } \$12.3750 &= \$4.125 = \text{int. 4 mo.} \\
 \frac{4}{5} \text{ of } \frac{1}{4} (= \frac{1}{5}) \text{ of } 4.125 &= \underline{.825} = \text{int. 24 da.} \\
 &\quad \$4.95, \text{ Ans.}
 \end{aligned}$$

(22.)	mo.	da.
	8	28
	3	1
	<hr/>	
	5	27

$$\begin{aligned}
 \$125.40 \times .08\frac{1}{2} &= \$10.659 = \text{int. 1 yr.} \\
 \frac{5}{12} \text{ of } \$10.659 &= \$4.44 + = \text{int. 5 mo.} \\
 \frac{9}{10} \text{ of } \frac{1}{5} \text{ of } 4.44 &= \underline{.799} + = \text{int. 27 da.} \\
 &\quad \$5.24 \\
 &\quad \underline{125.40} \\
 &\quad \$130.64, \text{ Ans.}
 \end{aligned}$$

(23.)

yr.	mo.	da.
1848	3	9
1847	8	2
<hr/>		
	7	7

$$\$234.60 \times .05\frac{1}{4} = \$12.3165 = \text{int. 1 yr.}$$

$$\begin{aligned} \frac{7}{12} \text{ of } \$12.3165 &= \$7.1848 = \text{int. 7 mo.} \\ \frac{1}{5} \text{ of } \frac{1}{12} \text{ of } 12.3165 &= .2052 = \text{int. 6 da.} \\ \frac{1}{6} \text{ of } .2052 &= .0342 = \text{int. 1 da.} \end{aligned}$$

$$\begin{array}{r} \$7.4242 \\ 234.60 \\ \hline \$242.02, \text{ Ans.} \end{array}$$

(24.)

yr.	mo.	da.
1847	7	24
1846	10	25
<hr/>		
	8	29

$$\$153.80 \times .05 = \$7.69 = \text{int. 1 yr.}$$

$$\frac{2}{3} \text{ of } \$7.69 = \$5.126 = \text{int. 8 mo.}$$

$$\text{Int. 1 mo.} = \frac{1}{8} \text{ of } \$5.126 = .64$$

$$\text{Int. 29 da.} = .64 \text{ less } \frac{1}{30} = \underline{.62}$$

$$\begin{array}{r} \$5.75 \\ 153.80 \\ \hline \$159.55, \text{ Ans.} \end{array}$$

Art. 184. 1ST PROCESS.

(5.) 1 yr. 4 mo. = 16 mo. *Ans.* 16 ct.

(6.) 1 yr. 5 mo. = 17 mo.: $\frac{1}{3}$ of 27 da. = 9. *Ans.*
\$0.179

(7.) 2 yr. 3 mo. = 27 mo.: $\frac{1}{3}$ of 21 da. = 7. *Ans.*
\$0.277

(8.) 3 yr. 7 mo. = 43 mo.: $\frac{1}{3}$ of 12 da. = 4. *Ans.*
\$0.434

(9.) 4 yr. 2 mo. = 50 mo.: $\frac{1}{8}$ of 15 da. = 5 da. *Ans.* \$0.505

(10.) 2 ct. for the 2 mo., and $\frac{1}{8}$ mill for the 1 da. *Ans.* \$0.020 $\frac{1}{8}$

(11.) $\frac{1}{8}$ of 17 = 5 $\frac{2}{8}$ (apply rule). *Ans.* \$0.055 $\frac{2}{8}$

(12.) $\frac{1}{8}$ of 13 = 4 $\frac{1}{8}$ (apply rule). *Ans.* \$0.104 $\frac{1}{8}$

(13.) 1 yr. 2 mo. = 14 mo.: $\frac{1}{8}$ of 4 = 1 $\frac{1}{8}$. *Ans.* \$0.141 $\frac{1}{8}$

(14.) 2 yr. 9 mo. = 33 mo.: $\frac{1}{8}$ of 20 = 6 $\frac{2}{8}$. *Ans.* \$0.336 $\frac{2}{8}$

(15.) 3 yr. 5 mo. = 41 mo.: $\frac{1}{8}$ of 29 = 9 $\frac{2}{8}$. *Ans.* \$0.419 $\frac{2}{8}$

2D PROCESS.

(3.) Int. on \$1 for 7 mo. 24 da. @ 12% = \$0.078: int. for 7 mo. 24 da. @ 6% = $\frac{1}{2}$ of \$0.078 = \$0.039, *Ans.*

(4.) Int. at 12% = \$0.105

Int. at 4% = $\frac{1}{3}$ of \$0.105 = \$0.035

Int. at 1% = $\frac{1}{4}$ of .035 = $\frac{.00875}{\$0.043\frac{3}{4}}$, *Ans.*

(5.) Int. at 12% = \$0.116: int. at 9% = $\frac{3}{4}$ of \$0.116 = \$0.087, *Ans.*

(6.) 1 yr. 2 mo. = 14 mo.: int. 14 mo. 9 da. @ 12% = \$0.143: int. @ 6% = $\frac{1}{2}$ of \$0.143 = \$0.071 $\frac{1}{2}$, *Ans.*

(7.) 2 yr. 5 mo. = 29 mo.: int. 29 mo. 12 da. @ 12% = \$0.294: int. @ 8% = $\frac{2}{3}$ of \$0.294 = \$0.196, *Ans.*

(8.) 3 yr. 10 mo. = 46 mo.: int. 46 mo. 17 da. @ 12% = \$0.465 $\frac{2}{3}$: int. @ 10% = $\frac{5}{6}$ of \$0.465 $\frac{2}{3}$ = \$0.388 $\frac{1}{18}$, *Ans.*

(9.) 4 yr. 3 mo. = 51 mo.: int. 51 mo. 11 da. @ 12% = \$0.513 $\frac{2}{3}$

Int. @ 6% = $\frac{1}{2}$ of \$0.513 $\frac{2}{3}$ = \$0.256 $\frac{5}{6}$

Int. @ 1% = $\frac{1}{6}$ of .256 $\frac{5}{6}$ = $\frac{.042\frac{2}{3}}{\$0.299\frac{2}{3}}$, *Ans.*

\$0.299 $\frac{2}{3}$, *Ans.*

(10.) 5 yr. 7 mo. = 67 mo.: int. 67 mo. 24 da. @ 12% = \$0.678: int. @ 4% = $\frac{1}{3}$ of \$0.678 = \$0.225, *Ans.*

3D PROCESS.

(3.) Int. \$1 for 6 mo. 21 da. @ 12% = \$0.067: @ 6% = $\frac{1}{2}$ of \$0.067 = \$0.0335, $\times 40 = \$1.34$, *Ans.*

(4.) Int. \$1 for 8 mo. 24 da. @ 12% = \$0.088: int. \$1 for 8 mo. 24 da. @ 9% = $\frac{3}{4}$ of \$0.088 = \$0.066: \$0.066 $\times 50 = \$3.30$, *Ans.*

(5.) Int. \$1 for 10 mo. 12 da. @ 12% = \$0.104
 Int. \$1 for 10 mo. 12 da. @ 6% = $\frac{1}{2}$ of \$0.104 = \$0.052
 Int. \$1 for 10 mo. 12 da. @ 1% = $\frac{1}{8}$ of .052 = $\frac{.008\frac{2}{3}}{.008\frac{2}{3}}$
 $\$0.060\frac{2}{3} \times 120 = \7.28 , *Ans.*

(6.) Int. \$1 for 11 mo. 15 da. @ 12% = \$0.115: int. \$1 for 11 mo. 15 da. @ 6% = $\frac{1}{2}$ of \$0.115 = \$0.0575: \$0.0575 $\times 200 = \$11.50$, *Ans.*

(7.) 1 yr. 3 mo. = 15 mo.: int. \$1 for 15 mo. 6 da. @ 12% = \$0.152: at 3% = $\frac{1}{4}$ of \$0.152 = \$0.038: \$0.038 $\times 500 = \$19$, *Ans.*

(8.) 1 yr. 5 mo. = 17 mo.: int. \$1 for 17 mo. 27 da. @ 12% = \$0.179: at 8% = $\frac{2}{3}$ of \$0.179 = \$0.119 $\frac{1}{3}$: \$0.119 $\frac{1}{3}$ $\times 750 = \$89.50$, *Ans.*

(9.) 1 yr. 9 mo. = 21 mo.: int. \$1 for 21 mo. 3 da. @ 12% = \$0.211: @ 6% = $\frac{1}{2}$ of \$0.211 = \$0.105 $\frac{1}{2}$, $\times 48.75 = \$5.14$, *Ans.*

(10.) 1 yr. 10 mo. = 22 mo.: Int. \$1 for 22 mo. 25 da. @ 12% = \$0.228 $\frac{1}{3}$: at 4% = $\frac{1}{3}$ of \$0.228 $\frac{1}{3}$ = \$0.076 $\frac{1}{3}$: \$0.076 $\frac{1}{3}$ $\times 76.32 = \$5.81$, *Ans.*

(11.) 2 yr. 1 mo. = 25 mo.: int. \$1 for 25 mo. 9 da. @ 12% = \$0.253: at 4% = $\frac{1}{3}$ of \$0.253 = \$0.084 $\frac{1}{3}$: 1% = $\frac{1}{4}$

of $\$0.084\frac{1}{3} = \$0.021\frac{1}{12}$: $\$0.084\frac{1}{3} + \$0.021\frac{1}{12} = \$0.105\frac{5}{12}$, $\times 600 = \$63.25$: $\$600 + \$63.25 = \$663.25$, *Ans.*

(12.) 2 yr. 4 mo. = 28 mo.: int. \$1 @ 12% for 28 mo. 10 da. = $\$0.283\frac{1}{3}$: @ 6% = $\frac{1}{2}$ of $\$0.283\frac{1}{3} = \$0.141\frac{2}{3}$, $\times 900 = \$127.50$: $\$900 + \$127.50 = \$1027.50$, *Ans.*

(13.) 2 yr. 7 mo. = 31 mo.: int. \$1 @ 12% for 31 mo. 17 da. = $\$0.315\frac{2}{3}$: 9% = $\frac{3}{4}$ of 12% = $\$0.236\frac{3}{4}$: $\$0.236\frac{3}{4} \times 86.25 = \$20.419+$: $\$86.25 + \$20.42 = \$106.67$, *Ans.*

(14.) 3 yr. 2 mo. = 38 mo.: int. \$1 for 38 mo. 13 da. @ 12% = $\$0.384\frac{1}{3}$: 8% = $\frac{2}{3}$ of 12% = $\$0.256\frac{2}{3}$, $\times 450 = \$115.30$: $\$450 + \$115.30 = \$565.30$, *Ans.*

(15.) 3 yr. 5 mo. = 41 mo.: int. \$1 for 41 mo. 22 da. @ 12% = $\$0.417\frac{1}{3}$: 4% = $\frac{1}{3}$ of 12% = $\$0.139\frac{1}{9}$: $\$0.139\frac{1}{9} \times 534.78 = \$74.39+$: $\$534.78 + \$74.39 = \$609.17$, *Ans.*

(16.) 3 yr. 11 mo. = 47 mo.: int. \$1 @ 12% for 47 mo. 15 da. = $\$0.475$: int. @ 10% = $\frac{5}{6}$ of 12% = $\$0.395\frac{5}{6}$: $\$0.395\frac{5}{6} \times 1200 = \475 , $+ \$1200 = \1675 , *Ans.*

Art. 185.

(4.) Int. on \$200 for 1 yr. @ 6% = \$12.00: $36 \div 12 = 3$. *Ans.* 3 yr.

(5.) Int. on \$60 for 1 yr. @ 5% = \$3.00: $\$72 - \$60 = \$12$: $12 \div 3 = 4$. *Ans.* 4 yr.

(6.) If the principal is doubled, the int. will equal 100%. $100\% \div 6\% = 16\frac{2}{3}$: $\frac{2}{3}$ yr. = 8 mo. *Ans.* 16 yr 8 mo.

(7.) Int. on \$375 for 1 yr. @ 8% = \$30: $90 \div 30 = 3$. *Ans.* 3 yr.

(8.) Int. on \$600 @ 9% for 1 yr. = \$54: $\$798 - \$600 = \$198$: $198 \div 54 = 3\frac{2}{3} = 3$ yr. 8 mo., *Ans.*

(9.) $100(\%) \div 10(\%) = 10$. *Ans.* 10 yr.

(10.) Int. on \$250 for 1 yr. @ 6% = \$15: $34.50 \div 15 = 2.30$ or $2\frac{3}{10}$ yr.: $\frac{3}{10}$ yr. = $3\frac{3}{5}$ mo.: $\frac{3}{5}$ mo. = 18 da.
Ans. 2 yr. 3 mo. 18 da.

(11.) The int. on \$60 for 1 yr. @ 6% = \$3.60: \$73.77 — \$60 = \$13.77: $13.77 \div 3.60 = 3.825$ or $3\frac{33}{40}$ yr.: $\frac{33}{40}$ yr. = $9\frac{9}{10}$ mo.: $\frac{9}{10}$ mo. = 27 da. *Ans.* 3 yr. 9 mo. 27 da.

(12.) If the principal is trebled, the int. will equal 200%. $200(\%) \div 6(\%) = 33\frac{1}{3}$: $\frac{1}{3}$ yr. = 4 mo. *Ans.* 33 yr. 4 mo.

(13.) Int. on \$400 for 1 yr. @ 7% = \$28: $68.60 \div 28 = 2.45$ or $2\frac{9}{20}$ yr.: $\frac{9}{20}$ yr. = $5\frac{4}{10}$ mo.: $\frac{4}{10}$ mo. = 12 da.
Ans. 2 yr. 5 mo. 12 da.

(14.) Int. on \$700 for 1 yr. @ 9% = \$63: \$924.70 — \$700 = \$224.70: $224.70 \div 63 = 3.566+$ or $3\frac{57}{100}$ yr.: $\frac{57}{100}$ yr. = $6\frac{79}{100}$ mo.: $\frac{79}{100}$ mo. = $23\frac{9}{10}$ da. *Ans.* 3 yr. 6 mo. 24 da.

(15.) If the principal is increased one half, the int. will equal 50%. $50(\%) \div 8(\%) = 6\frac{1}{4}$: $\frac{1}{4}$ yr. = 3 mo. *Ans.* 6 yr. 3 mo.

(16.) Int. on \$1200 for 1 yr. @ 10% = \$120: \$1675 — \$1200 = \$475: $475 \div 120 = 3.959+$ or $3\frac{96}{100}$ yr.: $\frac{96}{100}$ yr. = $11\frac{52}{100}$ mo.: $\frac{52}{100}$ mo. = $15+$ da. *Ans.* 3 yr. 11 mo. 15 da.

Art. 186.

(3.) $\$48 \div 2 = \$24 = \text{int. 1 yr.}$: $24 \div 600 = .04 = 4\%$, *Ans.*

(4.) 2 yr. 6 mo. = $2\frac{1}{2}$ or $\frac{5}{2}$ yr. If int. for $\frac{5}{2}$ yr. = \$200, for $\frac{1}{2}$ yr. = \$40, and for 1 yr. = \$80: $80 \div 1000 = .08 = 8\%$, *Ans.*

(5.) 2 yr. 4 mo. 24 da. = $2\frac{2}{3}$ or $\frac{12}{5}$ yr.: $\$310 - \$250 = \$60$. If int. for $\frac{12}{5}$ yr. = \$60, for $\frac{1}{5}$ yr. = \$5, and for 1 yr. = \$25: $25 \div 250 = .10 = 10\%$, *Ans.*

(6.) $\$23.40 \div 2 = \$11.70 = \text{int. 1 yr.}$: $11.70 \div 260 = .04\frac{1}{2} = 4\frac{1}{2}\%$, *Ans.*

(7.) Since the int. for $12\frac{1}{2}$ or $\frac{25}{2}$ yr. is 100%, for $\frac{1}{2}$ yr. it is $\frac{100}{25}$ or 4%, and for 1 yr. = 8%, *Ans.*

(8.) $\$250.25 - \$175 = \$75.25$: 3 yr. 7 mo. = $3\frac{7}{12}$ or $\frac{43}{12}$ yr. Since $\$75.25 = \text{int. for } \frac{43}{12} \text{ yr.}$, for $\frac{1}{12}$ yr. = $\$75.25 \div 43 = \1.75 , and for 1 yr. = $\$1.75 \times 12 = \21 : $21 \div 175 = .12 = 12\%$, *Ans.*

(9.) 1 yr. 8 mo. 12 da. = $1\frac{7}{10}$ or $\frac{17}{10}$ yr.: $\$61.20 \div 17 = \3.60 , $\times 10 = \$36 = \text{int. 1 yr.}$: $36 \div 450 = 0.08 = 8\%$, *Ans.*

(10.) 11 yr. 1 mo. 10 da. = $11\frac{1}{9}$ or $\frac{100}{9}$ yr. Since the int. for $\frac{100}{9}$ yr. = 100%, for $\frac{1}{9}$ yr. = 1%, and for 1 yr. = 9%, *Ans.*

(11.) $\$746.20 - \$650 = \$96.20$: 2 yr. 5 mo. 18 da. = $2\frac{7}{15}$ or $\frac{37}{15}$ yr.: $\$96.20 \div 37 = \2.60 , $\times 15 = \$39 = \text{int. 1 yr.}$: $39 \div 650 = .06 = 6\%$, *Ans.*

(12.) $\$110.40 \div 6 = \$18.40 = \text{int. 1 yr.}$: $18.40 \div 640 = .02\frac{7}{8} = 2\frac{7}{8}\%$, *Ans.*

Art. 187.

(3.) The int. of \$1 for 3 yr. at 5% is 15 ct. It will take as many dollars to gain \$8.25 int. as 15 ct. are contained times in $\$8.25 = 55$ times. *Ans.* \$55.

(4.) Int. of \$1 for 3 yr. at 5% = 15 ct.: $\$341.25 \div .15 = \2275 , *Ans.*

(5.) 1 yr. 4 mo. = $1\frac{1}{3}$ yr.: 6% for 1 yr. = .06, and for $1\frac{1}{3}$ yr. = .08: $\$226 \div .08 = \28.25 , *Ans.*

(6.) Int. of \$1 = 5 ct.: $\$1023.75 \div .05 = \20475 , *Ans.*

(7.) The int. of \$1 for 1 yr. 6 mo. 27 da. at 12% = \$0.189: at 8% the int. is $\frac{2}{3}$ of \$0.189 = \$0.126: $\$30.24 \div .126 = \240 , *Ans.*

(8.) Int. of \$1 for 12 yr. 3 mo. 20 da. at 12% = $\$1.476\frac{2}{3}$: at 9% = $\frac{3}{4}$ of $\$1.476\frac{2}{3} = \1.1075 : $\$525.40 \div 1.1075 = \474.40 , *Ans.*

(9.) Int. at 12% on \$1 for 2 yr. 7 mo. 11 da. is $\$0.313\frac{2}{3}$: at 4% it is $\frac{1}{3}$ of $\$0.313\frac{2}{3} = \$0.104\frac{5}{9}$: $\$9.41 \div .104\frac{5}{9} = \90 , *Ans.*

(10.) The int. of \$1 for 5 yr. 8 mo. 24 da. at 12% is \$0.688: at 6% it is $\frac{1}{2}$ of \$0.688 = \$0.344: $\$28.38 \div .344 = \82.50 , *Ans.*

Art. 188.

(2.) 9 yr. $\times .05 = .45$: $\$435 \div 1.45 = \300 , *Ans.*

(3.) 4 yr. $\times .05 = .20$: $\$571.20 \div 1.20 = \$476 =$ principal: $\$571.20 - \$476 = \$95.20$, *Ans.*

(4.) 6 yr. $\times .07 = 0.42$: $\$532.50 \div 1.42 = \375 : $\$532.50 - \$375 = \$157.50$, *Ans.*

(5.) 2 yr. 9 mo. = $2\frac{3}{4}$ yr.: $2\frac{3}{4} \times .08 = 0.22$: $\$285.48 \div 1.22 = \234 , *Ans.*

(6.) $2\frac{1}{2}$ yr. $\times .06 = 0.15$: $\$690 \div 1.15 = \600 : $\$690 - \$600 = \$90$, *Ans.*

(7.) 3 yr. 4 mo. 24 da. = $3\frac{2}{5}$ yr.: $3\frac{2}{5} \times .07 = 0.238$: $\$643.760 \div 1.238 = \520 , *Ans.*

(8.) 4 yr. 3 mo. 27 da. = $\frac{519}{120}$ yr.: $\frac{519}{120} \times .04 = 0.173$: $\$914.940 \div 1.173 = \$780 =$ principal: $\$914.94 - \$780 = \$134.94$, *Ans.*

COMPOUND INTEREST.

Art. 190.

(2)	\$500	530	561.80
	.06	.06	.06
	<hr/> 30.00	<hr/> 31.80	<hr/> 33.7080
	500	530	561.80
	<hr/> \$530, 1st yr.	<hr/> \$561.80, 2d yr.	<hr/> Ans. \$595.51

(3)	\$800	848	898.88	952.81
	.06	.06	.06	.06
	<hr/> 48.00	<hr/> 50.88	<hr/> 53.9328	<hr/> 57.1686
	800	848	898.88	952.81
	<hr/> \$848, 1st yr.	<hr/> \$898.88, 2d yr.	<hr/> \$952.81, 3d yr.	<hr/> \$1009.98, Ans.

(4)	\$250	15.90
	.06	265
	<hr/> \$15.00 = 1st yr.	<hr/> \$280.90
	250	.06
	<hr/> 265	<hr/> \$16.8540 = 3d yr.
	.06	
	<hr/> \$15.90 = 2d yr.	<hr/> \$15 + \$15.90 + \$16.85 = \$47.75, Ans.

(5)	\$300	330.75
	.05	.05
	<hr/> \$15.00 = 1st yr.	<hr/> \$16.5375 = 3d yr.
	300	330.75
	<hr/> 315	<hr/> 347.29
	.05	.05
	<hr/> \$15.75 = 2d yr.	<hr/> \$17.3645 = 4th yr.
	315	
	<hr/> \$330.75	<hr/> \$15 + \$15.75 + \$16.54 + \$17.36 = \$64.65, Ans.

(5) \$200 .03 <hr style="width: 100px; margin-left: 0;"/> \$6.00 = 1st hf.-yr. 200 <hr style="width: 100px; margin-left: 0;"/> 206 .03 <hr style="width: 100px; margin-left: 0;"/> \$6.18 = 2d hf.-yr. 206 <hr style="width: 100px; margin-left: 0;"/> \$212.18	212.18 .03 <hr style="width: 100px; margin-left: 0;"/> \$6.3654 = 3d hf.-yr. 212.18 <hr style="width: 100px; margin-left: 0;"/> 218.55 .03 <hr style="width: 100px; margin-left: 0;"/> \$6.5565 = 4th hf.-yr.
$\$6 + \$6.18 + \$6.36 + \$6.56 = \$25.10, \text{ Ans.}$	

(7.) 20% annually = 5% quarterly.
 1st qr., $\$500 \times .05 = \$25, + \$500 = \525 :
 2d qr., $\$525 \times .05 = \$26.25, + \$525 = \551.25 :
 3d qr., $\$551.25 \times .05 = \$27.56, + \$551.25 = \578.81 :
 4th qr., $\$578.81 \times .05 = \$28.94, + \$578.81 = \607.75 :
 5th qr., $\$607.75 \times .05 = \$30.39, + \$607.75 = \638.14 :
 6th qr., $\$638.14 \times .05 = \$31.91, + \$638.14 = \670.05 :
 7th qr., $\$670.05 \times .05 = \$33.50, + \$670.05 = \703.55 :
 8th qr., $\$703.55 \times .05 = \$35.18, + \$703.55 = \$738.73, \text{ Ans.}$

(8.) Int. on \$300, 1 yr. @ 6% = \$18, + \$300 = \$318 :
 int. on \$318 for 1 yr. @ 6% = \$19.08, + \$318 = \$337.08 :
 int. on \$337.08, $\frac{1}{2}$ yr. @ 6% = \$10.11, + \$337.08 = \$347.19 :
 $\$347.19 - \$300 = \$47.19, \text{ Ans.}$

(9.) Int. on \$1000, 1 yr. @ 6% = \$60, + \$1000 = \$1060 :
 int. on \$1060, 1 yr. @ 6% = \$63.60, + \$1060 = \$1123.60 :
 int. on \$1123.60 for $8\frac{1}{2}$ mo. @ 6% = \$47.75, + \$1123.60 =
 $\$1171.35$: $\$1171.35 - \$1000 = \$171.35, \text{ Ans.}$

(10.) 6% int. annually = 3% semi-annually.
 Int. 6 mo. on \$620 @ 3% = \$18.60, + \$620 = \$638.60 :
 int. 6 mo. on \$638.60 @ 3% = \$19.16, + \$638.60 = \$657.76 :
 int. 6 mo. on \$657.76 @ 3% = \$19.73, + \$657.76 = \$677.49 :
 int. 6 mo. on \$677.49 @ 3% = \$20.32, + \$677.49 = \$697.81 :

int. 6 mo. on \$697.81 @ 3% = \$20.93, + \$697.81 = \$718.74:

int. 6 mo. on \$718.74 @ 3% = \$21.56, + \$718.74 = \$740.31:

int. 6 mo. on \$740.31 @ 3% = \$22.21, + \$740.30 = \$762.52,

Ans.

(1st.—Compound Interest.)

(11.) 1st yr., int. on \$500 @ 6% = \$30, + \$500 = \$530:

2d yr., int. on \$530 @ 6% = \$31.80, + \$530 = \$561.80:

3d yr., int. on \$561.80 @ 6% = \$33.71, + \$561.80 =

\$595.51: 4th yr., int. on \$595.51 @ 6% = \$35.73, + \$595.51

= \$631.24: 8 mo. = $\frac{2}{3}$ yr., int. on \$631.24 @ 6% = \$25.25,

+ \$631.24 = \$656.49: \$656.49 — \$500 = \$156.49

(2d.—Simple Interest.)

Int. on \$500 for 1 yr. @ 6% = \$30: int. on \$500 for $4\frac{2}{3}$ yr. = \$140. \$156.49 — \$140 = \$16.49, *Ans.*

ANNUAL INTEREST.

Art. 191.

(2.) Int. @ 8% on \$800 for 3 yr. = \$192.00

Int. @ 8% on \$800 for 1 yr. = \$64

Int. on annual int. 1 yr. = \$5.12

Int. on annual int. 3 yr. = \$15.36 . . . 15.36

Total interest, \$207.36

Add principal, 800.00

Ans. \$1007.36

(3.) Int. on \$750 for 3 yr. @ 10% = \$225.00

Annual int. = \$75.00

Int. on annual int. = 7.50

Int. on an. int. 2 + 1, or 3, yr. = 22.50

\$247.50

Add principal, 750.00

Ans. \$997.50

(4.) Int. on \$10000 for 4 yr. @ 5% = \$2000.

Annual int. = \$500

Int. on annual int. = 25

Int. on an. int. $3 + 2 + 1$, or 6, yr. = 150.

Ans. \$2150.

(5.) yr. mo. da.

1877 9 1

1875 6 1

2 3 = $2\frac{1}{4}$ yr.

Int. on \$500 for 1 yr. @ 6% = \$30.00

Int. on \$500 for $2\frac{1}{4}$ yr. @ 6% = 67.50 .. \$67.50

Each semi-annual int. = 15.00

Interest on int. each half-yr. = .45

Interest on int. $3\frac{1}{2} + 2\frac{1}{2} + 1\frac{1}{2} + \frac{1}{2}$, or 8, half-yr. .. 3.60

Total interest, \$71.10

Add principal, 500.00

Ans. \$571.10

(6.) yr. mo. da.

1877 9 20

1873 5 12

4 4 8 = $4\frac{6}{5}$ yr.

Int. on \$1200 for 1 yr. @ 6% = \$72.00

Int. on \$1200 for $4\frac{6}{5}$ yr. @ 6% = 313.60 .. \$313.60

Int. on annual int. 1 yr. = 4.32

Int. on an. int. $3\frac{1}{5} + 2\frac{1}{5} + 1\frac{1}{5} + \frac{1}{5}$, or $7\frac{4}{5}$, yr. = 32.06

Total interest, \$345.66

Add principal, 1200.00

Ans. \$1545.66

(7.) yr. mo. da.

1877 5 1

1872 10 10

4 6 21 = $4\frac{67}{120}$ yr.

$$\begin{array}{r}
\text{Int. on \$1500 for 1 yr. @ 5\%} = \$75.00 \\
\text{Int. on \$1500 for } 4\frac{67}{120} \text{ yr. @ 5\%} = 341.88 \dots \$341.88 \\
\text{Int. on an. int. 1 yr.} = 3.75 \\
\text{Int. on an. int. } 3\frac{67}{120} + 2\frac{67}{120} + 1\frac{67}{120} + \frac{67}{120}, \text{ or} \\
8\frac{7}{30} \text{ yr.} = \underline{30.87} \\
\text{Total interest, } \$372.75 \\
\text{Add principal, } 1500.00 \\
\text{Ans. } \$1872.75
\end{array}$$

(8.) Simple int. 1 yr. on \$1000 @ 6% = \$60: 5 yr. = \$300: int. on int. 1 yr. = \$3.60: for 4 + 3 + 2 + 1, or 10, yr. = \$36.00: annual int. = \$336; simple int. = \$300; difference = \$36, *Ans.*

$$\begin{array}{r}
(9.) \quad \$500 \times 6 = \$3000 \\
\text{Int. on \$3000 for 1 yr. @ 6\%} = \$180.00 \\
\text{Int. on \$3000 for 3 yr. @ 6\%} = 540.00 \dots \$540.00 \\
\text{Int. on int. } \frac{1}{2} \text{ yr.} = 2.70 \\
\text{Int. on int. } 5 + 4 + 3 + 2 + 1, \text{ or } 15, \text{ half-yr.} = \underline{40.50} \\
\text{Total interest, } \$580.50 \\
\text{Add principal, } 3000.00 \\
\text{Ans. } \$3580.50
\end{array}$$

$$\begin{array}{r}
(10.) \quad \text{Int. on \$20000 for 5 yr. @ 4\%} = \$4000.00 \\
\text{Int. on \$20000 for 1 yr.} = \$800.00 \\
\text{Int. on \$20000 for } \frac{1}{4} \text{ yr.} = 200.00 \\
\text{Int. on } \frac{1}{4} \text{ an. int. @ } 1\frac{1}{2}\% \left(\frac{1}{4} \text{ of } 6\%\right) = 3.00 \\
\text{Int. on } \frac{1}{4} \text{ an. int. } 19 + 18 + 17 + 16 + 15 + 14 + \\
13 + 12 + 11 + 10 + 9 + 8 + 7 + 6 \\
+ 5 + 4 + 3 + 2 + 1, \text{ or } 190, \text{ qrs.} = \underline{570.00} \\
\text{Total interest, } \$4570.00 \\
\text{Add to this the premium on gold, } 5\%, = \frac{1}{20}, \underline{228.50} \\
\text{Ans. } \$4798.50
\end{array}$$

Art. 192.

yr.	mo.	da.	(2)
1876	3	1 . . \$44	\$350
1875	7	1	14=int. 8 mo.
8 mo.			\$364
1876	10	1 . . \$10	44
1876	3	1	\$320
7 mo.			16=int. 7+3=10 mo.
1877	1	1 . . \$26	\$336
1876	10	1 \$36 . .	36
3 mo.			\$300
1877	12	1 . . \$15	21.75=int. 11+3½=14½ mo.
1877	1	1	\$321.75
11 mo.			15.00
1878	3	16	\$306.75, <i>Ans.</i>
1877	12	1	
3 15=3½ mo.			

(3.) Amt. of \$200, 1 yr. @ 6% = \$212: \$212 — \$70 = \$142: amt. of \$142, 1 yr. @ 6% = \$150.52, *Ans.*

			(4)
1874	1	1 . . \$109	6% per yr. = 3% per ½ yr.
1873	7	1	\$300 \$6.00
6 mo.			.03 200
1874	7	1	9.00 206
1874	1	1	300 100
6 mo.			309 106
			109 .03
1875	1	1	200 3.18
1874	7	1	.03 106
6 mo.			6.00 \$109.18, <i>Ans.</i>

Key 12.

(5)

1871	9	10	.. \$32	\$150
1870	5	10		<u>12 = int. for 1 yr. 4 mo.</u>
	1	yr. 4 mo.		162
				<u>32</u>
1872	9	10	.. \$6.80	130
1871	9	10		9.10 = int. 1 yr. 2 mo.
	1	yr.		139.10
1872	11	10		6.80
1872	9	10		\$132.30, <i>Ans.</i>
		2 mo.		

(6)

1872	6	5	.. \$20	\$200
1871	3	5		<u>35 = int. 1 yr. 9 mo.</u>
	1	yr. 3 mo.		235
1872	12	5	.. \$50.50	<u>70.50</u>
1872	6	5	\$70.50	164.60
		6 mo.		<u>24.68 = int. 1 yr. 6 mo.</u>
1874	6	5		\$189.18, <i>Ans.</i>
1872	12	5		
	1	yr. 6 mo.		

(7)

1875	6	1	.. \$6	\$250
1875	1	1		<u>17.50 = int. 12 mo.</u>
		5 mo.		267.50
1876	1	1	.. \$21.50	<u>27.50</u>
1875	6	1	\$27.50	240
		7 mo.		<u>8.40 = int. 6 mo.</u>
1876	7	1		\$248.40, <i>Ans.</i>
1876	1	1		
		6 mo.		

(8)

1875	2	1 . . \$25.40
1874	8	1

6 mo.

1875	8	1 . . \$4.30
1875	2	1

6 mo.

1876	1	1 . . \$30
1875	8	1 <u>\$34.30</u>

5 mo.

1876	7	1
1876	1	1

6 mo.

\$180

5.40 = int. 6 mo.

185.40

25.40

160

8.80 = int. 11 mo.

168.80

34.30

134.50

4.035 = int. 6 mo.\$138.54, *Ans.*

(9)

1875	9	1 . . \$10
1875	3	1

6 mo.

1876	1	1 . . \$30
1875	9	1 <u>\$40.</u>

4 mo.

1876	7	1 . . \$11
1876	1	1

6 mo.

1876	9	1 . . \$80
1876	7	1 <u>\$91.</u>

2 mo.

1877	3	1
1876	9	1

6 mo.

\$400

20 = int. 10 mo. (6+4.)

420

40

380

15.10 = int. 8 mo. (6+2.)

395.20

91

304.20

9.126 = int. 6 mo.\$313.33, *Ans.*

(10)

1877 1 1 .. \$20

1876 4 16

8 mo. 15 da.

1877 4 1 .. \$14

1877 1 1

3 mo.

1877 7 16 .. \$31

1877 4 1 \$65

3 mo. 15 da.

1877 12 25 .. \$10

1877 7 16

5 mo. 9 da.

1878 7 4 .. \$18

1877 12 25 \$28

6 mo. 9 da.

1879 6 1

1878 7 4

10 mo. 27 da.

\$450 + \$45 (int. 8 mo. 15 da. + 3 mo. + 3 mo. 15 da.) =
 \$495: \$495 — \$65 = \$430: \$430 + \$64.50 (int. 5 mo. 9
 da. + 6 mo. 9 da. + 10 mo. 27 da.) = \$494.50: \$494.50 —
 \$28 = \$466.50, *Ans.*

(11)

1870 5 1 .. \$18

1870 1 1

4 mo.

1870 9 4 .. \$20

1870 5 1

4 mo. 3 da.

1870 12 16 .. \$15 \$1000

1870 9 4

3 mo. 12 da.

1871 4 10 .. \$21

1870 12 16

3 mo. 24 da.

1871 7 13 .. \$118

1871 4 10 \$192

3 mo. 3 da.

1871 12 23 .. \$324

1871 7 13

5 mo. 10 da.

1873 10 1

1871 12 23

1 yr. 9 mo. 8 da.

92 = int. 18 mo. 12 da.

1092

192

900

24 = int. 5 mo. 10 da.

924

324

600

63.80 = int. 1 yr. 9 mo. 8 da.

\$663.80, *Ans.*

Art. 193.

(1.) Int. \$320, 1 yr. @ 6% = \$19.20

Amount = \$339.20

Amt. of \$50, 8 mo. @ 6% = \$52.00

Amt. of \$100, $1\frac{1}{2}$ mo. @ 6% = $\frac{100.75}{152.75}$ Balance due, \$186.45, *Ans.*

(2.) Time from March 1, 1877, to Jan. 1, 1878, = 10 mo.

Amt. of \$540, 10 mo. @ 8% = \$576.00

Amt. of \$90, 8 mo. = \$94.80

Amt. of \$100, 6 mo. = 104.00

Amt. of \$150, 5 mo. = 155.00

Amt. of \$180, 2 mo. 20 da. = $\frac{183.20}{537.00}$ Balance due, \$39.00, *Ans.***DISCOUNT.****CASE I.****Art. 196.**1st. *When the note does not bear interest.*

(2.) Days in June, 10 Int. of \$1 for 63 da. @

Days in July, 31 6% = \$0.0105.

Days in Aug., 19 $\frac{100 \times .0105 = \$1.05}{60}$ $\frac{100 - \$1.05 = \$98.95}{60}$

To 19th Aug. add 3 da. grace.

Ans. Aug. $\frac{19}{22}$ · \$1.05, \$98.95(3.) Remaining days in Oct., 19: $30 - 19 = \text{Nov. } \frac{11}{14}$:int. on \$1 33, da. @ 8% = \$0.0073+: $\$120 \times .0073+ =$
\$0.88: $\$120 - \$0.88 = \$119.12$ *Ans.* Nov. $\frac{11}{14}$, \$0.88, \$119.12

(4.) Int. of \$1, 4 mo. 3 da. @ 6% = \$0.0205: \$140 \times .0205 = \$2.87: \$140 — \$2.87 = \$137.13.

Ans. May $^{15}/_{18}$, \$2.87, \$137.13

(5.) Int. of \$180, 1 yr. @ 4% = \$7.20: int. of \$180, 6 mo. @ 4% = \$3.60: int. of \$180, 3 da. @ 4% = \$0.06: \$3.60 + \$0.06 = \$3.66: \$180 — \$3.66 = \$176.34

Ans. Oct. $^{10}/_{13}$, \$3.66, \$176.34

(6.) Int. of \$250, 1 yr. @ 8% = \$20.00: int. of \$250, 5 mo. 3 da. = \$8.50: \$250 — \$8.50 = \$241.50

Ans. May $^1/_4$, \$8.50, \$241.50

(7.) Days remaining in Aug., 27, + 3 = Sept. $^3/_6$: 6% on \$1 for 33 da. = \$0.0055: \$375 \times .0055 = \$2.06: \$375 — \$2.06 = \$372.94

Ans. Sept. $^3/_6$, \$2.06, \$372.94

(8.) Int. on \$600 for 2 mo. 3 da. = \$9.45: \$600 — \$9.45 = \$590.55

Ans. Apr. $^{12}/_{15}$, \$9.45, \$590.55

(9.) Remaining days in Feb., 8, March, 31, April, 30 = 69 da.: 90 — 69 = May $^{21}/_{24}$. Int. on \$1200, 1 mo. @ 10% = \$10: for $3\frac{1}{10}$ mo. = \$31: \$1200 — \$31 = \$1169.

Ans. May $^{21}/_{24}$, \$31, \$1169.

(10.) Int. on \$1, 93 da. @ 6% = \$0.0155: \$1780 \times .0155 = \$27.59: days remaining in Jan., 20, + 29 (Feb., leap yr.) + 31 (Mar.) = 80: 90 — 80 = Apr. $^{10}/_{13}$. \$1780

— \$27.59 = \$1752.41

Ans. Apr. $^{10}/_{13}$, \$27.59, \$1752.41

(11.) Due Sept. $\frac{15}{18}$, 1877: number of days from May 21 to Sept. 18 = May, 10, June, 30, July, 31, Aug., 31, Sept., 18 = 120: int. on \$600 for 120 da. (4 mo.) at 10% = \$20: \$600 — \$20 = \$580.

Ans. Sept. $\frac{15}{18}$, 1877, 120 da., \$20, \$580.

(12.) In May, 23 da., June, 30, July, 31 = 84: 90 — 84 = $\frac{6}{9}$ Aug.: June 8 to Aug. 9 = 48 da. = $1\frac{2}{3}$ mo.: int. on \$1000, $1\frac{2}{3}$ mo. @ 6% = \$8: \$1000 — \$8 = \$992.

Ans. Aug. $\frac{6}{9}$, 48 da., \$8, \$992.

(13.) 6 mo. after July 10, 1877, = Jan. $\frac{10}{13}$, 1878: days in Oct., 7*, Nov., 30, Dec., 31, Jan., 13 = 81: 81 da. = 2 mo. 21 da.: int. on \$1500 for this time @ 6% = \$20.25: \$1500 — \$20.25 = \$1479.75

Ans. Jan. $\frac{10}{13}$, 1878, 81 da., \$20.25, \$1479.75

2D. *When the note bears interest.*

(2.) 6 mo. from May 20, 1875, = Nov. $\frac{20}{23}$: amt. of \$150 @ 6% int. 6, mo. 3 da. = \$154.58: Sept. 9 to Nov. 23 = 75 da. or $2\frac{1}{2}$ mo.: discount on \$154.58, $2\frac{1}{2}$ mo. @ 8% = \$2.58: \$154.58 — \$2.58 = \$152.

Ans. Nov. $\frac{20}{23}$, 1875, 75 da., \$2.58, \$152.

* See Rem. 2, page 249, Ray's New Practical Arithmetic.

(3.) 1 yr. from Aug. 5, 1876, = Aug. $\frac{5}{8}$, 1877: amt. of \$300, 1 yr. 3 da. @ 8% int. = \$324.20: Apr. 16 to Aug. 8 = 114 da. or $3\frac{4}{5}$ mo.: discount on \$324.20, $3\frac{4}{5}$ mo. at 6% = \$6.16: \$324.20 — \$6.16 = \$318.04 = proceeds.

Ans. Aug. $\frac{5}{8}$, 1877, 114 da., \$6.16, \$318.04

(4.)	1878	1	4	\$450, 10 mo. @ 6% amounts
	1877	3	4	to \$472.50: Aug. 13, 1877, to
	<hr/>			Jan. 4, 1878, = 144 da. or $4\frac{4}{5}$
		10	mo.	mo.: discount on \$472.50, $4\frac{4}{5}$
				mo. @ 10% = \$18.90: \$472.50 — \$18.90 = \$453.60

Ans. Jan. $\frac{1}{4}$, 1878, 144 da., \$18.90, \$453.60

(5.)	1878	9	4	\$650, 2 yr. 3 mo. 18 da. @
	1876	5	16	9% = \$784.55: Apr. 25, 1878,
	<hr/>			to Sept. 4, 1878, = 132 da.
	2	3	18	or $4\frac{2}{5}$ mo.: discount @ 6%
				on \$784.55 for $4\frac{2}{5}$ mo. = \$17.26: \$784.55 — \$17.26 =
				\$767.29 = proceeds.

Ans. Sept. $\frac{1}{4}$, 1878, 132 da., \$17.26, \$767.29

(6.) Amt. of \$840, 6 mo. 3 da. @ 10% = \$882.70: Dec. 20, 1875, to Mar. 4, 1876 = 75 da. or $2\frac{1}{2}$ mo.: discount on \$882.70, $2\frac{1}{2}$ mo. @ 8% = \$14.71: \$882.70 — \$14.71 = \$867.99 = proceeds.

Ans. Mar. $\frac{1}{4}$, 1876, 75 da., \$14.71, \$867.99

(7.) 1876 5 4 Amt. of \$1400, $9\frac{1}{2}$ mo. @
 1875 7 19 $6\% = \$1466.50$: Jan. 17,
 9 mo. 15 da. 1876, to May 4, 1876, = 108
 da. or $3\frac{2}{3}$ mo.: discount on
 $\$1466.50$, $3\frac{2}{3}$ mo. @ $10\% = \$44.00$: $\$1466.50 - \$44.00 =$
 $\$1422.50 =$ proceeds.

Ans. May $\frac{1}{4}$, 1876, 108 da., \$44, \$1422.50

(8.) 1878 1 4 Amt. of \$2400, 1 yr. 2 mo.
 1876 10 16 18 da. @ $8\% = \$2633.60$:
 1 yr. 2 mo. 18 da. July 26, 1877, to Jan. 4,
 1878 = 162 da. or $5\frac{2}{3}$ mo.:
discount on $\$2633.60$, $5\frac{2}{3}$ mo. @ $10\% = \$118.51$: $\$2633.60$
 $- \$118.51 = \$2515.09 =$ proceeds.

Ans. Jan. $\frac{1}{4}$, 1878, 162 da., \$118.51, \$2515.09

(9.) Amt. of \$3500 @ 6% , 1 yr. 3 da. = \$3711.75:
May 15 to Oct. 18, 1878, = 156 da. or $5\frac{1}{3}$ mo.: discount
on \$3711.75, $5\frac{1}{3}$ mo. @ $9\% = \$144.76$: $\$3711.75 - \144.76
 $= \$3566.99 =$ proceeds.

Ans. Oct. $\frac{15}{18}$, 1878, 156 da., \$144.76, \$3566.99

(10.) Amt. of \$6000, 1 yr. 3 da. @ $8\% = \$6484.00$: Nov.
21, 1875, to May 13, 1876, = 174 da. or $5\frac{4}{5}$ mo.: discount
on \$6484, $5\frac{4}{5}$ mo. @ $10\% = \$313.39$: $\$6484.00 - \313.39
 $= \$6170.61 =$ proceeds.

Ans. May $\frac{10}{13}$, 1876, 174 da., \$313.39, \$6170.61

Art. 197.

(2.) Bank discount on \$1, 63 da. @ $6\% = \$0.0105$:
 $\$1 - \$0.0105 = \$0.9895$: $\$197.90 \div .9895 = \200 , *Ans.*

(3.) Discount on \$1, 93 da. @ $6\% = \$0.0155$: $\$1 -$
 $\$0.0155 = \0.9845 : $\$393.80 \div .9845 = \400 , *Ans.*

(4.) Discount on \$1, 5 mo. 3 da. @ 8% = \$0.034: \$1 — \$0.034 = \$0.966: \$217.35 ÷ .966 = \$225, *Ans.*

(5.) Discount on \$1, 4 mo. 3 da. @ 6% = \$0.0205: \$1 — \$0.0205 = \$0.9795: \$352.62 ÷ .9795 = \$360, *Ans.*

(6.) Discount on \$1, 33 da. @ 6% = \$0.0055: \$1 — \$0.0055 = \$0.9945: \$400 ÷ .9945 = \$402.21+, *Ans.*

(7.) Discount on \$1, 2 mo. 3 da. @ 8% = \$0.014: \$1 — \$0.014 = \$0.986: \$500 ÷ .986 = \$507.10 (nearly), *Ans.*

(8.) Discount on \$1, 6 mo. 3 da. @ 10% = \$0.050833+: \$1 — \$0.050833 = \$0.949166: \$1500 ÷ .949166 = \$1580.33+, *Ans.*

(9.) Oct. 12, 1876, to Jan. 4, 1877, = 2 mo. 24 da., or $2\frac{4}{5}$ mo.: discount on \$1, $2\frac{4}{5}$ mo. @ 6% = \$0.014: \$1 — \$0.014 = \$0.986: \$1055.02 ÷ .986 = \$1070.

1877	1	4	\$1 @ 8% for 10 mo. 15 da. =
1876	2	19	\$0.07: \$1 + \$0.07 = \$1.07: \$1070
<hr/>			
10 mo. 15 da.			÷ 1.07 = \$1000, <i>Ans.</i>

Art. 199.

(3.) Amt. of \$1, 2 yr. @ 6% = \$1.12: \$224 ÷ 1.12 = \$200 = present worth: \$224 — \$200 = \$24 = discount.

(4.) Amt. of \$300 for 2 yr. @ 8% = \$348: amt. of \$1 for 2 yr. @ 6% = \$1.12: \$348 ÷ 1.12 = \$310.71 = present worth: \$348 — \$310.71 = \$37.29 = discount.

(5.) Amt. of \$1, 5 yr. 10 mo. @ 6% = \$1.35: \$675 ÷ 1.35 = \$500 = present worth: \$675 — \$500 = \$175 = discount.

(6.) Amt. of \$1, 5 mo. @ 10% = \$1.04166+: \$368.75 ÷ 1.04166 = \$354 = present worth: \$368.75 — \$354 = \$14.75 = discount.

(7.)
$$\begin{array}{r} 1878 \quad 1 \quad 1 \\ 1876 \quad 9 \quad 10 \\ \hline 1 \quad 3 \quad 21 \end{array}$$
 Amt. of \$800, 1 yr. 3 mo.
 21 da. @ 6% = \$862.80:
 July 19, 1877, to Jan. 1,
 1878 = 5 mo. 12 da.: amt.
 of \$1, 5 mo. 12 da. @ 10% = \$1.045: \$862.80 \div 1.045 =
 \$825.65 = present worth: \$862.80 — \$825.65 = \$37.15 =
 discount.

(8.) Amt. of \$1, 4 mo. @ 10% = \$1.03 $\frac{1}{3}$: \$775 \div 1.03 $\frac{1}{3}$
 = \$750, *Ans.*

(9.) Amt. of \$1, 8 mo. @ 6% = \$1.04: \$260 \div 1.04 =
 \$250, *Ans.*

(10.) \$2480 — its 5% (\$124) = \$2356 = cash cost: amt.
 of \$2356, 4 mo. @ 10% = \$2434.53: \$2480 — \$2434.53 =
 \$45.47, *Ans.*

(11.) $\frac{1}{2}$ of \$956.34 = \$318.78
 Amt. of \$1, 1 yr. @ 5% = \$1.05: \$318.78 \div 1.05 = \$303.60
 Amt. of \$1, 2 yr. @ 5% = \$1.10: \$318.78 \div 1.10 = 289.80
 Amt. of \$1, 3 yr. @ 5% = \$1.15: \$318.78 \div 1.15 = 277.20

$$\begin{array}{r} \text{Ans. } \$870.60 \end{array}$$

(12.) \$535 \times .07 = \$37.45 = bank discount: \$535 \div 1.07
 = \$500: \$535 — \$500 = \$35: \$37.45 — \$35 = \$2.45, *Ans.*

(13.) Amt. of \$1, 10 mo. @ 12% = \$1.10: \$1221 \div 1.10
 = \$1110 = present worth: \$1122 — \$1110 = \$12, *Ans.*

(14.) $\frac{1}{3}$ of \$10296 = \$3432. Amt. of \$1, 1 yr. @ 10%
 = \$1.10: amt. of \$1, 2 yr. @ 10% = \$1.20: amt. of \$1,
 3 yr. @ 10% = \$1.30

$$\begin{array}{r} \$3432 \div 1.10 = \$3120 \\ \$3432 \div 1.20 = 2860 \\ \$3432 \div 1.30 = 2640 \quad \$8620 \\ \hline \text{Cash offer, } 8000 \\ \text{Ans. } \$620 \end{array}$$

(15.) July 4, 1876, to May 1, 1878, = 1 yr. 9 mo. 27 da.
 Amt. of \$2000, 1 yr. 9 mo. 27 da. @ 8% = \$2292: Oct.
 25, 1877, to May 1, 1878, = 6 mo. 6 da.: Amt. of \$1, 6 mo.
 6 da. @ 6% = \$1.031: $\$2292 \div 1.031 = \2223.08 = pres-
 ent worth: $\$2292 - \$2223.08 = \$68.92$ = discount.

EXCHANGE.

Art. 201.

(1.) 1% of \$1400 = \$14: $\frac{1}{2}\% = \$\frac{14}{2} = \7 : $\$1400 + \$7 = \$1407$, *Ans.*

(2.) $\frac{1}{2}\%$ of \$2580 = \$12.90: $\$2580 - \$12.90 = \$2567.10$,
Ans.

(3.) $\$375.87 = 100\% + \frac{1}{8}\%$ of the face: $\$375.87 \div 100\frac{1}{8} = \375.40 , *Ans.*

(4.) $\frac{1}{4}\%$ of \$2785 = \$6.96: $\$2785 - \$6.96 = \$2778.04$,
Ans.

(5.) $100\% - 1\frac{1}{4} = 98\frac{3}{4}\% = .9875$: $\$1852.55 \div .9875 = \1876 , *Ans.*

(6.) Int. of \$5680. for 63 da. @ 6% = \$59.64; $\frac{1}{2}\%$ prem.
 on \$5680. = \$28.40; $\$59.64 - \$28.40 = \$31.24$; $\$5680. - \$31.24 = \$5648.76$, *Ans.*

(7.) Int. of \$1575. for 33 da. @ 6% = \$8.66; $\frac{3}{4}\%$ prem.
 on \$1575. = \$11.81; $\$11.81 - \$8.66 = \$3.15$; $\$1575. + \$3.15 = \$1578.15$, *Ans.*

(8.) Int. of \$2625. for 63 da. @ 6% = \$27.56; $1\frac{1}{2}\%$
 prem. on \$2625. = \$39.37; $\$39.37 - \$27.56 = \$11.81$;
 $\$2625. + 11.81 = \2636.81 , *Ans.*

Art. 202.

$$(3.) \text{ 8s.} = \frac{4}{10}\text{£} : \text{£}890.4 \times 4.86 (\text{\$}) = \$4327.34, \text{ Ans.}$$

$$(4.) \$2130.12 \div 4.88 = 436, \text{ with } 244 \text{ rem.: } 244 \times 20\text{s., } \div 4.88 = 10. \text{ Ans. £}436 \text{ 10s.}$$

$$(5.) 5 \text{ fr. 15 centimes} = \$5\frac{3}{20} \text{ fr.: } 1290 \div 5\frac{3}{20} = \$250.49, \text{ Ans.}$$

$$(6.) \$1657.60 \times 5\frac{16}{100} = 8553 \text{ fr. 22, Ans.}$$

$$(7.) \$12680 \div 4 = 3170, \times .97 = \$3074.90, \text{ Ans.}$$

$$(8.) \text{ If 4 marks} = \$0.98, 1 \text{ m.} = \$0.245 : \$1470 \div .245 = 6000 \text{ m., Ans.}$$

INSURANCE.**Art. 204.**

$$(2.) \frac{3}{4} \text{ of } \$5000 = \$3750 : \frac{1}{2}\% \text{ of } \$3750 = \$18.75, \text{ add } \$1.50 = \$20.25, \text{ Ans.}$$

$$(3.) \frac{2}{3} \text{ of } \$12600 = \$8400, @ \frac{3}{4}\% = \$63.00$$

$$\frac{1}{2} \text{ of } \$14400 = \$7200, @ 2\% = 144.00$$

$$2 \text{ policies } @ \$1.25 = \underline{2.50}$$

$$\text{Ans. } \$209.50$$

$$(4.) \frac{4}{7} \text{ of } \$21000 = \$12000, @ 1\frac{1}{2}\% = \$180.00$$

$$\$7200 @ \frac{3}{4}\% = 54.00$$

$$2 \text{ policies } @ \$1.25 = \underline{2.50}$$

$$\text{Ans. } \$236.50$$

$$(5.) \frac{3}{4} \text{ of } \$5600 = \$4200, \times .01\frac{1}{2} = \$63, \times 20 \text{ (yr.)} = \$1260 : \$4200 - \$1260 = \$2940, \text{ Ans.}$$

$$(6.) \$3600 + \$1600 + \$800 = \$6000 : \frac{7}{8}\% \text{ of } \$6000 = \$52.50, + \$1.25 = \$53.75, \text{ Ans.}$$

(7.) $\$151.25 - \$1.25 = \$150$: $\$150 = 1\frac{1}{2}\%$ of $\frac{2}{3}$ value:
 $\$100 = 1\%$ of $\frac{2}{3}$ value: $\$10000 = 100\%$ of $\frac{2}{3}$ value: $\frac{3}{2}$, or
 the whole value, $= \$15000$, *Ans.*

(8.) $\frac{4}{5}$ of $\$4500 = \3600 : $\$32.75 - \$1.25 = \$31.50$:
 $\$31.50 \div 3600 = .0087\frac{1}{2} = \frac{7}{8}\%$, *Ans.*

(9.) $\$1000 + \$1500 = \$2500$: $\$3.50 \div 2500 = .0014 =$
 $\frac{7}{50}\%$, *Ans.*

Art. 205.

(2.) $\$105.53 \times 10 = \$1055.30 =$ amount paid yearly:
 $\$1055.30 \times 10 = \10553 , *Ans.*

(3.) $\$47.18 \times 8 \times 20 = \7548.80 : $\$60.45 \times 8 \times 20 =$
 $\$9672.00$: $\$9672 - \$7548.80 = \$2123.20$, *Ans.*

(4.) $\$36.46 \times 12 \times 5 = \2187.60 : $\$12000 - \2187.60
 $= \$9812.40$, *Ans.*

(5.) 75 yr. $-$ 21 yr. $=$ 54 yr.: $\$19.89 \times 5 \times 54 =$
 $\$5370.30$, *Ans.*

(6.) $\$104.58 \times 10$ (yr.) $= \$1045.80$ There will be int.
 @ 6% on $\$104.58$, $10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2$
 $+ 1$, or 55, yr. $= \$345.11$: $\$1045.80 + \$345.11 = \$1390.91$,
Ans.

(7.) $\$29.15 \times 6 = \174.90 , $\times 15 = \$2623.50$: int. @
 6% on $\$174.90$ for $15 + 14 + 13 + 12 + 11 + 10 + 9 + 8$
 $+ 7 + 6 + 5 + 4 + 3 + 2 + 1$, or 120, yr. $= \$1259.28$, $+$
 $\$2623.50 = \3882.78 , *Ans.*

TAXES.

Art. 208.

(2.) $\$2500 - \$28 = \$2472$: $2472 \div 618000 = .004$
Ans. 4 mills on $\$1$, or $\frac{2}{5}\%$.

(3.) $18409.44 \div 2876475 = .0064 = 6.4$ mills $=$ *Ans.*

(4.) $656491.61 \div 421285359 = .00156 = 1.56$ mills $=$
Ans.

Art. 209.

[I.] $\$1.25 \times 57 = \$71.25 : \$1373.64 - \$71.25 = \$1302.39 :$
 $1302.39 \div 748500 = .00174 = \text{rate } 1.74 \text{ mills on } \$1.$

(2.) $\$2576 \times .00174 = \$4.48, + \$1.25 \text{ (poll-tax)} =$
 $\$5.73, \text{ Ans.}$

(3.) $\$9265 \times .00174 = \$16.12, + \$3.75 \text{ (3 poll-taxes)} =$
 $\$19.87, \text{ Ans.}$

(4.) $\$4759 \times .00174 = \$8.28, + \$1.25 = \$9.53, \text{ Ans.}$

(5.) $\$8367 \times .00174 = \$14.56, \text{ Ans.}$

[II.] $64375 \div 16869758 = .003816. \text{ Rate } 3.816 \text{ mills}$
on \$1.

TAX TABLE.—Rate, 3.816 mills on \$1.

PROP.	TAX.	PROP.	TAX.	PROP.	TAX.	PROP.	TAX.
\$1	\$0.004	\$10	\$0.038	\$100	\$0.382	\$1000	\$3.816
2	.008	20	.076	200	.763	2000	7.632
3	.011	30	.114	300	1.145	3000	11.448
4	.015	40	.153	400	1.526	4000	15.264
5	.019	50	.191	500	1.908	5000	19.080
6	.023	60	.229	600	2.290	6000	22.896
7	.027	70	.267	700	2.671	7000	26.712
8	.030	80	.305	800	3.053	8000	30.528
9	.034	90	.343	900	3.434	9000	34.344

(1.) $\$56875 \times .003816 = \$217.04, \text{ Ans.}$

(2.) $\$27543 \times .003816 = \$105.10, \text{ Ans.}$

$$(3.) \$83612 \times .003816 = \$319.06, \text{ Ans.}$$

$$(4.) \$72968 \times .003816 = \$278.45, \text{ Ans.}$$

$$(5.) \$69547 \times .003816 = \$265.39, \text{ Ans.}$$

Art. 211.

(1.) 36 sq. mi. contain 23040 A.: 23040 A. @ \$1.25 per acre = \$28800, *Ans.*

(2.) The charge will be the same as for 3 half-ounces. 3 times 3 ct. = 9 ct., *Ans.*

(3.) 1 lb. 5 oz. = 21 oz.: postage same as for 22 oz.: $22 \div 2 = 11$: 11 times 1 ct. = 11 ct., *Ans.*

$$(4.) 70 \text{ ct. times } 40 = \$28, \text{ Ans.}$$

$$(5.) \$5 = 500 \text{ ct.}: \frac{500}{1000} \text{ ct.} = \frac{1}{2} \text{ ct.}, \text{ Ans.}$$

(6.) 30000 bl. @ \$1	= \$30000
250 ret. dlrs. @ \$20 ea.	= 5000
12 wholesale dlrs. @ \$50	= 600
	<hr/>
	\$35600, <i>Ans.</i>

Art. 212.

(1.) $12\frac{1}{2}\% = \frac{1}{8}$: 1760 lb. — its $\frac{1}{8} = 1540$ lb.: 1540 times $\$0.01\frac{3}{4} = \26.95 , *Ans.*

(2.) 40 bales of 400 lb. each = 16000 lb.: 5% tare = 800 lb.: $16000 - 800 = 15200$: 15200 lb. @ 45 ct. = \$6840: 10% ad. val. = \$684: 15200 lb. @ 9 ct. duty = \$1368: $\$684 + \$1368 = \$2052$, *Ans.*

(3.) $365.15 \text{ fr.} + 57.15 \text{ fr.} = 422.30 \text{ fr.}$, to which add 5% com. (21.1150 fr.) = 443.4150 fr.: $443.4150 \times 19\frac{3}{10}$ (ct.) = \$85.58: 40% of \$86 = \$34.40, *Ans.*

(4.) $1317.04 \text{ mk.} + 34.36 \text{ mk.} = 1351.40 \text{ mk.}$: add 6% com. (81.084 mk.) = 1432.484 mk.: 1432.484×23.8 (ct.) = \$340.93: 25% of \$341 = \$85.25, *Ans.*

(5.) 50 ct. per lb. duty on 1500 lb. = \$750: £8 4s. 6d. = £8 $\frac{9}{16}$ or £8.225: £500 + £8.225 = £508.225: add 2 $\frac{1}{2}$ % com. (£12.705+) = £520.93: £520.93 \times 4.8665 (\$) = \$2535.11: 35% of \$2535 = \$887.25: \$887.25 + \$750 = \$1637.25, *Ans.*

RATIO.

Art. 214.

$$(20.) \frac{7}{2} \times \frac{4}{9} = \frac{14}{9} = 1\frac{5}{9}, \text{ Ans.}$$

$$(21.) \frac{35}{6} \times \frac{3}{7} = \frac{5}{2} = 2\frac{1}{2}, \text{ Ans.}$$

$$(22.) \frac{69}{10} \times \frac{5}{23} = \frac{3}{2} = 1\frac{1}{2}, \text{ Ans.}$$

$$(28.) 5 \text{ yd. } 1 \text{ ft.} = 192 \text{ in.: } 5 \text{ ft. } 4 \text{ in.} = 64 \text{ in.: } \frac{192}{64} = 3, \text{ Ans.}$$

Art. 215.

$$(8.) 4 \text{ lb. } 8 \text{ oz.} = 72 \text{ oz.: } \frac{7}{8} \text{ of } 72 \text{ oz.} = 63 \text{ oz.: } 63 \text{ oz.} = 3 \text{ lb. } 15 \text{ oz., Ans.}$$

$$(9.) \$4.00 \times 2.6 = \$10.40, \text{ Ans.}$$

Art. 216.

$$(3.) 42 \times \frac{10}{7} = 60, \text{ Ans.}$$

$$(4.) 23\frac{3}{8} = \frac{187}{8}: \frac{187}{8} \times \frac{4}{11} = \frac{17}{2} = 8\frac{1}{2}, \text{ Ans.}$$

$$(5.) 7\frac{5}{9} = \frac{68}{9}: \$27.20 \times \frac{9}{68} = \$0.40 \times 9 = \$3.60, \text{ Ans.}$$

Art. 217.

$$(2.) \left. \begin{array}{l} 5 \times 6 = 30 \\ 10 \times 9 = 90 \end{array} \right\} 90 \div 30 = 3, \text{ Ans.}$$

$$(3.) \begin{array}{r|l} 6\frac{1}{4} & 12\frac{1}{2} \\ 8\frac{1}{2} & 33\frac{1}{2} \\ \hline & 4 \end{array} 4 \times 2 = 8, \text{ Ans.}$$

Key 13.

$$(4.) \frac{1}{2} \times \frac{5}{4} = \frac{5}{8} : \frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2} : \frac{\frac{1}{2}}{\frac{5}{8}} = \frac{8}{10} = \frac{4}{5}, \text{ Ans.}$$

$$(5.) 2 \times 24 = 48 : 8 \times 12 = 96 : 96 \div 48 = 2, \text{ Ans.}$$

$$(6.) \begin{array}{r|l} \$2.25 & \$6.75 \\ \cancel{3} & \cancel{6} \end{array} \quad \begin{array}{l} 3 \\ 2 \end{array} \quad 3 \times 2 = 6, \text{ Ans.}$$

$$(7.) \begin{array}{r|l} 2 & 5 \\ \cancel{3} & 7 \\ \cancel{5} & 9 \\ & 3 \end{array} \quad \frac{7 \times 3}{2} = \frac{21}{2} = 10\frac{1}{2}, \text{ Ans.}$$

rt. 219.

(2.) Divide by 5.

(5.) Divide by 19.

(3.) Divide by 10.

(6.) Divide by 25.

(4.) Divide by 17.

(7.) Divide by 31.

Art. 220.

$$(2.) \begin{array}{r} 3\frac{3}{4} : 4\frac{2}{5} \\ \hline 20 \\ \hline 75 : 88, \text{ Ans.} \end{array}$$

$$(3.) \begin{array}{r} 7\frac{1}{2} : 10\frac{2}{3} \\ \hline 6 \\ \hline 45 : 64, \text{ Ans.} \end{array}$$

$$(4.) \frac{5}{6} = \frac{15}{18} : \frac{7}{9} = \frac{14}{18}. \quad 15 : 14, \text{ Ans.}$$

$$(5.) \frac{63}{10} = \frac{189}{30} : \frac{97}{15} = \frac{142}{15} = \frac{284}{30}. \quad 189 : 284, \text{ Ans.}$$

PROPORTION.**Art. 223.**

$$(3.) \begin{array}{r} 4 \\ \frac{8 \times 6}{\cancel{2}} = 24, \text{ Ans.} \end{array}$$

$$(4.) \begin{array}{r} 2 \\ \frac{7 \times \cancel{10}}{\cancel{5}} = 14, \text{ Ans.} \end{array}$$

$$(5.) \begin{array}{r} 3 \\ \frac{8 \times \cancel{6}}{\cancel{16}} = 3, \text{ Ans.} \\ 2 \end{array}$$

$$(6.) \begin{array}{r} 2 \\ \frac{5 \times \cancel{12}}{\cancel{6}} = 10, \text{ Ans.} \end{array}$$

$$(7.) \quad \frac{3 \times \cancel{14}}{\cancel{7}} = 6, \text{ Ans.}$$

$$(8.) \quad \frac{\cancel{14} \times 9}{\cancel{7}} = 18. \text{ Ans.}$$

$$(9.) \quad \frac{2 \times \cancel{8} \times \cancel{45}}{\cancel{4} \times \cancel{9}} = 20, \text{ Ans.}$$

$$(10.) \quad \frac{\cancel{2} \times \cancel{10} \times 3 \times 7}{\cancel{5} \times \cancel{4} \times \cancel{4}} = 21, \text{ Ans.}$$

$$(11.) \quad \frac{\cancel{10} \times \cancel{14} \times \cancel{33} \times \cancel{39}}{\cancel{21} \times \cancel{22} \times \cancel{26}} = 15, \text{ Ans.}$$

$$(12.) \quad \frac{3}{4} \times \frac{4}{5} = \frac{3}{5} : \frac{3}{5} \times \frac{3}{2} = \frac{9}{10}, \text{ Ans.}$$

$$(13.) \quad \frac{3}{\cancel{5}} \times \frac{\cancel{5}}{4} = \frac{3}{4} : \frac{\cancel{3}}{4} \times \frac{\cancel{10}}{\cancel{9}} = \frac{5}{6}, \text{ Ans.}$$

$$(14.) \quad \frac{\cancel{14}}{\cancel{2}} \times \frac{\cancel{15}}{\cancel{2}} = 35 : \frac{\cancel{35}}{1} \times \frac{2}{\cancel{21}} = \frac{10}{3} = 3\frac{1}{3}, \text{ Ans.}$$

$$(15.) \quad \frac{6 \times 6}{4} = 9, \text{ Ans.}$$

Art. 224.

$$(3.) \quad 6 : 12 :: 3 : ?$$

$$\frac{\cancel{12} \times 3}{\cancel{6}} = 6, \text{ Ans.}$$

$$(4.) \quad 3 : 6 :: \$8 : ?$$

$$\frac{\cancel{6} \times 8}{\cancel{3}} = \$16, \text{ Ans.}$$

$$(5.) \quad 5 : 3 :: \$30 : ? \quad \frac{3 \times \overset{6}{\cancel{30}}}{\cancel{5}} = \$18, \text{ Ans.}$$

$$(6.) \quad 3 \text{ lb. } 12 \text{ oz.} = 60 \text{ oz.} : 11 \text{ lb. } 4 \text{ oz.} = 180 \text{ oz.}$$

$$60 : 180 :: \$3.50 : ? \quad \frac{\overset{3}{\cancel{180}} \times 3.50}{\cancel{60}} = \$10.50, \text{ Ans.}$$

$$(7.) \quad 2 \text{ lb. } 8 \text{ oz.} = 40 \text{ oz.} \quad \$2 : \$5 :: 40 \text{ oz.} : ?$$

$$\frac{\overset{20}{5} \times \cancel{40}}{\cancel{2}} = 100 \text{ oz.} = 6 \text{ lb. } 4 \text{ oz., Ans.}$$

$$(8.) \quad 4 : 10 :: \$14 : ? \quad \frac{\overset{5}{\cancel{10}} \times \overset{7}{\cancel{14}}}{\cancel{4}} = \$35, \text{ Ans.}$$

$$(9.) \quad 3 : 11 :: 69 \text{ ct.} : ? \quad \frac{\overset{23}{11} \times \cancel{69}}{\cancel{3}} = \$2.53, \text{ Ans.}$$

$$(10.) \quad 4 : 9 :: \$7 : ? \quad \frac{9 \times 7}{4} = \frac{63}{4} = \$15.75, \text{ Ans.}$$

$$(11.) \quad 8 : 12 :: \$32 : ? \quad \frac{\overset{4}{12} \times \cancel{32}}{\cancel{8}} = \$48, \text{ Ans.}$$

$$(12.) \quad 12 : 8 :: \$48 : ? \quad \frac{\overset{4}{\cancel{48}} \times 8}{\cancel{12}} = \$32, \text{ Ans.}$$

$$(13.) \quad \$32 : \$48 :: 8 : ? \quad \frac{\overset{12}{\cancel{48}} \times \cancel{8}}{\cancel{32}} = 12 \text{ yd., Ans.}$$

$$(14.) \quad \$48 : \$32 :: 12 : ? \quad \frac{\overset{8}{\cancel{32}} \times \cancel{12}}{\underset{4}{\cancel{48}}} = 8 \text{ yd., } Ans.$$

$$(15.) \quad 19 : 4 :: \$152 : ? \quad \frac{\overset{8}{4} \times \cancel{152}}{\cancel{19}} = \$32, Ans.$$

$$(16.) \quad 12 : 8 :: 24 : ? \quad \frac{\overset{2}{8} \times \cancel{24}}{\cancel{12}} = 16 \text{ da., } Ans.$$

$$(17.) \quad 2 : 8 :: 60 : ? \quad \frac{\overset{4}{\cancel{8}} \times 60}{\cancel{2}} = 240 \text{ men, } Ans.$$

$$(18.) \quad 6 \text{ lb.} = 96 \text{ oz.} \quad 15 : 96 :: 25 \text{ ct.} : ?$$

$$\frac{\overset{32}{\cancel{96}} \times \overset{5}{\cancel{25}}}{\underset{3}{\cancel{15}}} = \$1.60, Ans.$$

$$(19.) \quad 6 : 26 :: \$2.70 : ? \quad \frac{\overset{.45}{26} \times \cancel{2.70}}{\cancel{6}} = \$11.70, Ans.$$

$$(20.) \quad 585 \text{ lb.} : 3525 \text{ lb.} :: \$42.12 : ?$$

$$\frac{\overset{705}{\cancel{3525}} \times \overset{.36}{\cancel{42.12}}}{\underset{117}{\cancel{585}}} = \$253.80, Ans.$$

$$(21.) \quad \frac{3}{2} : \frac{9}{8} :: \$2.50 : ? \quad \frac{\overset{3}{\cancel{9}} \times 2.50}{\underset{4}{\cancel{8}}} \times \frac{\cancel{2}}{\cancel{3}} = \$1.87\frac{1}{2}, Ans.$$

$$(22.) \quad 90 : 450 :: 6 : ? \quad \frac{\overset{30}{\cancel{450}} \times \cancel{6}}{\underset{\cancel{90}}{6}} = 30 \text{ da., } Ans.$$

$$(23.) \quad 5 : 15 :: 6 : ? \quad \frac{\overset{3}{\cancel{15}} \times 6}{\cancel{5}} = 18 \text{ men, } Ans.$$

$$(24.) \quad 30 : 140 :: 15 : ? \quad \frac{\overset{70}{\cancel{140}} \times \cancel{15}}{\underset{\cancel{30}}{2}} = 70 \text{ bu., } Ans.$$

$$(25.) \quad 325 \text{ lb.} : 1625 \text{ lb.} :: \$22.60 : ?$$

$$\frac{\overset{5}{\cancel{1625}} \times 22.60}{\underset{\cancel{325}}{13}} = \$113.00, \text{ } Ans.$$

$$(26.) \quad 4\frac{1}{2} \text{ ft.} : 180 \text{ ft.} :: 3 \text{ ft.} : ?$$

$$180 \times 3 = 540; \quad \frac{\overset{60}{\cancel{540}}}{\cancel{1}} \times \frac{2}{\cancel{9}} = 120 \text{ ft., } Ans.$$

$$(27.) \quad 12 : 9 :: 60 : ? \quad \frac{\overset{5}{9} \times \cancel{60}}{\cancel{12}} = 45 \text{ da., } Ans.$$

$$(28.) \quad \left. \begin{array}{l} 100 : 60 :: 2200 : ? \quad \frac{\overset{2200 \times 60}{100}}{100} = \$1320, \text{ A's.} \\ 100 : 60 :: 1800 : ? \quad \frac{\overset{1800 \times 60}{100}}{100} = \$1080, \text{ B's.} \end{array} \right\} Ans.$$

$$(29.) \quad \$800.30 + \$250 + \$375.10 + \$500 + \$115 =$$

$$\$2040.40. \quad \$2040.40 : \$612.12 :: \$1.00 : ?$$

$$\$612.12 \div 2040.40 = \$0.30, \text{ } Ans.$$

$$(30.) \quad \$6 : \$8 :: 9 \text{ oz.} : ? \quad \begin{array}{r} 4 \quad 3 \\ \cancel{8} \times \cancel{9} \\ \hline 6 \\ 2 \end{array} = 12 \text{ oz., } Ans.$$

$$(31.) \quad \$300 : \$250 :: 6 \text{ mo.} : ? \quad \begin{array}{r} 5 \\ \cancel{250} \times \cancel{6} \\ \hline \cancel{300} \\ 6 \end{array} = 5 \text{ mo., } Ans.$$

$$(32.) \quad 27 \times 7 = 189; 36 - 27 = 9.$$

$$9 \text{ mi.} : 189 \text{ mi.} :: 1 \text{ da.} : ? \quad \frac{189}{9} = 21 \text{ da., } Ans.$$

$$(33.) \quad 9 \text{ hr.} : 12 \text{ hr.} :: \$15\frac{2}{3} : ? = \$20.88\frac{8}{9}, \text{ or } 1 \text{ mo.'s services when he works 12 hr. a day.}$$

$$\$20.88\frac{8}{9} \times 4\frac{2}{5} = \$91.91\frac{1}{9}, Ans.$$

$$(34.) \quad As \ 5 \text{ lb.} : \frac{3}{4} \text{ lb.} :: \$\frac{5}{8} : \$\frac{3}{32}, Ans.$$

$$(35.) \quad As \ 6 \text{ yd.} : 7\frac{3}{8} \text{ yd.} :: \$5\frac{3}{5} : \$6\frac{53}{60}, Ans.$$

$$(36.) \quad As \ \frac{1}{3} \text{ bu.} : \frac{1}{2} \text{ bu.} :: \$\frac{3}{8} : \$\frac{9}{16}, Ans. \ (\frac{3}{1} \times \frac{1}{2} \times \frac{3}{8} = \frac{9}{16}.)$$

$$(37.) \quad As \ 1\frac{3}{4} \text{ yd.} : 2 \text{ yd.} :: \$\frac{7}{24} : \$\frac{1}{3}, Ans. \ (\frac{4}{1} \times \frac{2}{1} \times \frac{7}{24} = \frac{1}{3}.)$$

$$(38.) \quad As \ \$29\frac{3}{4} : \$31\frac{1}{4} :: 59\frac{1}{2} \text{ yd.} : ? \quad \text{By cancellation,}$$

$$\frac{4}{119} \times \frac{125}{4} \times \frac{119}{2} = \frac{125}{2} = 62\frac{1}{2} \text{ yd., } Ans.$$

$$(39.) \quad As \ .85 \text{ gal.} : .25 \text{ gal.} :: \$1.36 : \$0.40, Ans.$$

$$(40.) \quad As \ 61.3 \text{ lb.} : 1.08 \text{ lb.} :: \$44.9942 : \$0.79, Ans.$$

$$(41.) \quad As \ \frac{5}{7} \text{ yd.} : \frac{9}{11} \text{ yd.} :: \$\frac{3}{5} : \$\frac{189}{275}, Ans.$$

$$(42.) \quad As \ \frac{3}{7} \text{ yd.} : 17\frac{3}{8} \text{ yd.} :: \$4\frac{2}{5} : ?$$

$$\frac{7}{8} \times \frac{139}{8} \times \frac{22}{5} = \$178.38\frac{1}{3}, Ans.$$

$$(43.) \quad As \ 26 \text{ cogs} : 35 \text{ cogs} :: 1 \text{ rev.} : 1\frac{9}{26} \text{ rev.} \quad \text{Hence, the smaller wheel gains } \frac{9}{26} \text{ of a revolution in each revolution of the larger wheel. Then, } \frac{9}{26} \text{ rev} : 10 \text{ rev.} :: 1 \text{ rev. of larger} : 28\frac{8}{9} \text{ revolutions of larger, } Ans.$$

(44.) 1 gal. = 32 gills; $32 - 1 = 31$. As 32 : 31 : : 100 gal. : $96\frac{7}{8}$ gal., *Ans.*

(45.) As 70 p. : 20 p. : : 60 sec. : $17\frac{1}{7}$ sec.
 $1142 \text{ ft.} \times 17\frac{1}{7} = 19577\frac{1}{7} \text{ ft.} = 3 \text{ mi. } 226 \text{ rd. } 2 \text{ yd. } 2\frac{1}{7} \text{ ft., } \textit{Ans.}$

(46.) As 25 ft. : 25 ft. 5.25 in. : : 643 ft. 8 in. : 654 ft. 11.17 in., *Ans.*

Art. 225.

(3.) $\left. \begin{array}{l} 2 \text{ da.} : 10 \text{ da.} \\ 4 \text{ hr.} : 8 \text{ hr.} \end{array} \right\} : : 24 \text{ mi.} : 240 \text{ mi., } \textit{Ans.}$

(4.) As 18 rd. : 72 rd. The more rods, the more men.
 And as 8 da. : 12 da. The less days, the more men.
 : : 16 men : 96 men, *Ans.*

(5.) As 6 p. : 15 p. The more persons, the more [dollars.
 [dollars.
 8 mo. : 20 mo. The more months, the more
 : : \$150 : \$937.50, *Ans.*

(6.) As 7 da. : 9 da. The more days, the more miles.
 6 hr. : 11 hr. The more hours, the more mi.
 : : 217 mi. : $511\frac{1}{2}$ mi., *Ans.*

(7.) As \$100 : \$75. The less dollars, the less interest.
 12 mo. : 9 mo. The less months, the less interest.
 : : \$6 : \$3.375, *Ans.*

(8.) As 10100 lb. : 100 lb. The more lb., the less miles.
 20 ct. : \$60.60 The more money, the more
 : : 20 mi. : 60 mi., *Ans.* [miles.

(9.) As 12 cwt. 75 lb. : 10 T. The more weight, the
 more money.
 400 mi. : 75 mi. The less miles, the less
 money.
 : : \$57.12 : \$168, *Ans.*

(10.) As 20 men : 18 men. The more men, the less days.

40 rd. l. : 87 rd. l. The more length, the more days.

5 ft. h. : 8 ft. h. The more height, the more days.

4 ft. t. : 5 ft. t. The more thickness, the more days.

: : 15 days : $58\frac{29}{40}$ days, *Ans.*

(11.) As 100 men : 180 men. The less men, the more days.

200 yd. l. : 180 yd. l. The less length, the less days.

3 yd. w. : 4 yd. w. The more width, the more days.

2 yd. d. : 3 yd. d. The more depth, the more days.

8 hr. : 10 hr. The less hours, the more days.

: : 6 days : 24.3 days, *Ans.*

Art. 226.

(2.) $\frac{300}{800} = \frac{3}{8}$; $\frac{3}{8}$ of \$232 = \$87, A's share.

$\frac{500}{800} = \frac{5}{8}$; $\frac{5}{8}$ of \$232 = \$145, B's share.

(3.) \$70 + \$150 + \$80 = \$300, whole stock.

$\frac{70}{300} = \frac{7}{30}$; $\frac{7}{30}$ of \$120 = \$28, A's share.

$\frac{150}{300} = \frac{1}{2}$; $\frac{1}{2}$ of \$120 = \$60, B's share.

$\frac{80}{300} = \frac{4}{15}$; $\frac{4}{15}$ of \$120 = \$32, C's share.

(4.) \$200 + \$400 + \$600 = \$1200, whole stock. $\frac{200}{1200} = \frac{1}{6}$, $\frac{400}{1200} = \frac{1}{3}$, $\frac{600}{1200} = \frac{1}{2}$. $\frac{1}{6}$ of \$427.26 = \$71.21, A's share; $\frac{1}{3}$ of \$427.26 = \$142.42, B's share; and $\frac{1}{2}$ of \$427.26 = \$213.63, C's share.

(5.) $1 + 3 + 5 = 9$. $\frac{1}{9}$ of \$90 = \$10; $\frac{3}{9} = \frac{1}{3}$ of \$90 = \$30; $\frac{5}{9}$ of \$90 = \$50, *Ans.*

(6.) $2 + 3 + 5 + 7 = 17$. $\frac{2}{17}$ of \$735.93 = \$86.58; $\frac{3}{17}$ of \$735.93 = \$129.87; $\frac{5}{17}$ of \$735.93 = \$216.45; $\frac{7}{17}$ of \$735.93 = \$303.03, *Ans.*

(7.) $3 + 6 + 9 + 11 + 13 + 17 = 59$.
 $\frac{3}{59}$ of \$22361 = \$1137; $\frac{6}{59}$ of \$22361 = \$2274;
 $\frac{9}{59}$ of \$22361 = \$3411; $\frac{11}{59}$ of \$22361 = \$4169;
 $\frac{13}{59}$ of \$22361 = \$4927; $\frac{17}{59}$ of \$22361 = \$6443, *Ans.*

(8.) $\frac{1}{3}, \frac{3}{5}, \frac{7}{8} = \frac{40}{120}, \frac{72}{120}, \frac{105}{120}$. Since the denominators are the same, the fractions are to each other as their numerators. $40 + 72 + 105 = 217$. $\frac{40}{217}$ of \$692.23 = \$127.60; $\frac{72}{217}$ of \$692.23 = \$229.68; $\frac{105}{217}$ of \$692.23 = \$334.95, *Ans.*

Art. 227.

(1.) \$175 + \$500 + \$600 + \$210 + \$42.50 + \$20 + \$10 = \$1557.50

As \$1557.50 : \$175 : : \$934.50 : \$105.00, A's share.

As \$1557.50 : \$500 : : \$934.50 : \$300.00, B's share.

As \$1557.50 : \$600 : : \$934.50 : \$360.00, C's share.

As \$1557.50 : \$210 : : \$934.50 : \$126.00, D's share.

As \$1557.50 : \$42.50 : : \$934.50 : \$25.50, E's share.

As \$1557.50 : \$20 : : \$934.50 : \$12.00, F's share.

As \$1557.50 : \$10 : : \$934.50 : \$6.00, G's share.

(2.) \$234 + \$175 + \$326 = \$735; \$492.45 \div 735 = \$0.67 = sum paid on each dollar of indebtedness. \$234 \times .67 = \$156.78, A; \$175 \times .67 = \$117.25, B; \$326 \times .67 = \$218.42, C.

(3.) \$25000 — \$4650 = \$20350.

37000 : 20350 : : \$1 : \$0.55, *Ans.*

Art. 228.

(1.) $\frac{48}{108} = \frac{4}{9}$; $\frac{36}{108} = \frac{1}{3}$; $\frac{24}{108} = \frac{2}{9}$. $\frac{4}{9}$ of 45 = 20, A's loss: $\frac{1}{3}$ of 45 = 15, B's loss: $\frac{2}{9}$ of 45 = 10, C's loss.

(2.) $\$10000 + \$15000 = \$25000$. $1125 \div 25000 = .04\frac{1}{2} = 4\frac{1}{2}\%$, gen. av. $\$2150 \times .04\frac{1}{2} = \96.75 , A's loss.

Art. 229.

(3.) $23 \times 27 = 621$; $21 \times 39 = 819$; $621 + 819 = 1440$. $\frac{621}{1440} = \frac{69}{160}$; $\frac{819}{1440} = \frac{91}{160}$; $\frac{69}{160}$ of \$54 = \$23.28 $\frac{3}{4}$, A pays; $\frac{91}{160}$ of \$54 = \$30.71 $\frac{1}{4}$, B pays.

(4.) $\$300 \times 5 = \1500 ; $\$400 \times 8 = \3200 ; $\$500 \times 3 = \1500 . $\$1500 + \$3200 + \$1500 = \6200 . $\frac{1500}{6200} = \frac{15}{62}$; $\frac{3200}{6200} = \frac{16}{31}$. $\frac{15}{62}$ of \$100 = \$24.19 $\frac{11}{31}$, A's and C's loss; $\frac{16}{31}$ of \$100 = \$51.61 $\frac{9}{31}$, B's loss.

(5.) $6 \times 30 = 180$; $5 \times 40 = 200$; $8 \times 28 = 224$. $180 + 200 + 224 = 604$; $\frac{180}{604} = \frac{45}{151}$; $\frac{200}{604} = \frac{50}{151}$; $\frac{224}{604} = \frac{56}{151}$. $\frac{45}{151}$ of \$18.12 = \$5.40, A: $\frac{50}{151}$ of \$18.12 = \$6, B: $\frac{56}{151}$ of \$18.12 = \$6.72, C.

(6.) A, $\$300 \times 8 = \2400 ; $\$300 + \$100 = \$400$;
 $\$400 \times 8 = \3200 . $\$2400 + \$3200 = \$5600$
 B, $\$600 \times 10 = \6000 ; $\$600 - \$300 = \$300$;
 $\$300 \times 6 = \1800 . $\$6000 + \$1800 = \underline{\$7800}$
\$13400

As $\$13400 : \$5600 :: \$442.20 : \184.80 , A's.

$\$13400 : \$7800 :: \$442.20 : \257.40 , B's.

(7.) $\$800 \times 12 = \9600 ; $\$500 \times 12 = \6000 ;
 12 mo. — 7 mo. = 5 mo. $\$9600 - \$6000 = \$3600$; $\$3600 \div 5 = \720 , Ans.

Art. 230.

(2)	(3)
$\$2 \times 4 = \8	$\$8 \times 5 = \40
$\underline{6 \times 8 = 48}$	$\underline{4 \times 8 = 32}$
\$8)	\$12)
\$56(7 mo., Ans.	\$72(6 mo., Ans.

(4)	(5)
$\$250 \times 2 = \500	$\$100 \times 6 = \600
$500 \times 5 = 2500$	$75 \times 8 = 600$
$750 \times 8 = 6000$	$125 \times 12 = 1500$
<u>\$1500)</u>	<u>\$300)</u>
$\$9000$ (6 mo., <i>Ans.</i>	$\$2700$ (9 mo., <i>Ans.</i>

	(6)
$\frac{1}{5}$ of \$200 = \$40	$\$40 \times 0 = 0$
$\frac{2}{5}$ of \$200 = \$80	$80 \times 5 = \$400$
	$80 \times 10 = 800$
	<u>\$200)</u>
	$\$1200$ (6 mo., <i>Ans.</i>

Art. 231.

(2.) Counting from April 2d, it is 90 days to the first payment, and 150 days to the second.

$\$200 \times 90 = \18000	
$300 \times 150 = 45000$	
<u>\$500)</u>	$\$63000$ (126 da. from April 2d = Aug. 6th, <i>Ans.</i>

(3.) Counting from July 6, when first bill is due,

$\$1250 \times 0 = 0$
$4280 \times 73 = 312440$
$675 \times 168 = 113400$
<u>\$6205)</u>
$\$425840$ (68.6+

Counting 69 days from July 6th, brings the time to Sept. 13, *Ans.*

Art. 232.

(2)	(3)
6 lb. at 3 ct. = 18 ct.	25 lb. at 12 ct. = \$3.00
4 lb. at 8 ct. = 32 ct.	25 lb. at 18 ct. = 4.50
<u>10 lb. cost</u>	<u>40 lb. at 25 ct. = 10.00</u>
50 ct.	90 lb. cost
$50 \text{ ct.} \div 10 = 5 \text{ ct., } \textit{Ans.}$	$\$17.50$
	$\$17.50 \div 90 = \$0.19\frac{4}{9}, \textit{Ans.}$

$$\begin{array}{r}
 \text{(4)} \\
 3 \text{ gal. cost} \quad \$0.00 \\
 12 \text{ gal. at } 50 \text{ ct.} = \underline{6.00} \\
 15 \text{ gal. cost} \quad \$6.00 \\
 \$6.00 \div 15 = \$0.40, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{(5)} \\
 10 \text{ at } \$3 = \$30.00 \\
 12 \text{ at } 4 = \underline{48.00} \\
 8 \text{ at } 9 = \underline{72.00} \\
 30 \text{ worth } \$150.00 \\
 \$150 \div 30 = \$5, \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 \text{(6)} \\
 6 \text{ to } 10 = 4 \text{ hr.} \quad 63^\circ \times 4 = 252^\circ \\
 10 \text{ to } 1 = 3 \text{ " } \quad 70^\circ \times 3 = 210^\circ \\
 1 \text{ to } 3 = 2 \text{ " } \quad 75^\circ \times 2 = 150^\circ \\
 3 \text{ to } 7 = 4 \text{ " } \quad 73^\circ \times 4 = 292^\circ \\
 7 \text{ to } 6 = 11 \text{ " } \quad 55^\circ \times 11 = 605^\circ \\
 \hline
 24) \quad 1509^\circ (62\frac{7}{8}, \text{ Ans.}
 \end{array}$$

INVOLUTION.

Art. 234.

- (2.) $65 \times 65 = 4225, \text{ Ans.}$
- (3.) $25 \times 25 \times 25 = 15625, \text{ Ans.}$
- (4.) $12 \times 12 \times 12 \times 12 = 20736, \text{ Ans.}$
- (5.) $10 \times 10 \times 10 \times 10 \times 10 = 100000, \text{ Ans.}$
- (6.) $9 \times 9 \times 9 \times 9 \times 9 \times 9 = 531441, \text{ Ans.}$
- (7.) $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 256, \text{ Ans.}$
- (8.) $\frac{2}{3} \times \frac{2}{3} = \frac{4}{9}, \text{ Ans.}$ (9.) $\frac{3}{4} \times \frac{3}{4} \times \frac{3}{4} = \frac{27}{64}, \text{ Ans.}$
- (10.) $\frac{4}{5} \times \frac{4}{5} \times \frac{4}{5} \times \frac{4}{5} = \frac{256}{625}, \text{ Ans.}$
- (11.) $\frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} = \frac{32}{243}, \text{ Ans.}$
- (12.) $16\frac{1}{2} = \frac{33}{2}. \quad \frac{33}{2} \times \frac{33}{2} = \frac{1089}{4} = 272\frac{1}{4}, \text{ Ans.}$
- (13.) $12\frac{1}{2} = \frac{25}{2}. \quad \frac{25}{2} \times \frac{25}{2} \times \frac{25}{2} = \frac{15625}{8} = 1953\frac{1}{8}, \text{ Ans.}$
- (14.) $.25 \times .25 \times .25 \times .25 = .00390625, \text{ Ans.}$
- (15.) $14 \times 14 \times 14 = 2744, \text{ Ans.}$

$$(16.) 19 \times 19 \times 19 \times 19 = 130321, \text{ Ans.}$$

$$(17.) 2\frac{1}{3} = \frac{7}{3}. \quad \frac{7}{3} \times \frac{7}{3} \times \frac{7}{3} \times \frac{7}{3} \times \frac{7}{3} = \frac{16807}{243} = 69\frac{40}{243}, \text{ Ans}$$

Art. 238.**EVOLUTION.**

<p>(5)</p> $\begin{array}{r} \dot{}\dot{}\dot{} \\ 529(20 + 3 = 23, \text{ Ans.} \\ \underline{400} \\ 20 \overline{)129} \\ \underline{2} \\ 40 \\ \underline{3} \\ 43 \overline{)129} \end{array}$	<p>(6)</p> $\begin{array}{r} \dot{}\dot{}\dot{} \\ 625(25, \text{ Ans.} \\ \underline{4} \\ 45 \overline{)225} \\ \underline{225} \end{array}$
<p>(7)</p> $\begin{array}{r} \dot{}\dot{}\dot{} \\ 6561(81, \text{ Ans.} \\ \underline{64} \\ 161 \overline{)161} \\ \underline{161} \end{array}$	<p>(10)</p> $\begin{array}{r} \dot{}\dot{}\dot{}\dot{}\dot{} \\ 1679616(1296, \\ \underline{1} \text{ Ans.} \\ 22 \overline{)67} \\ \underline{44} \\ 249 \overline{)2396} \\ \underline{2241} \\ 2586 \overline{)15516} \\ \underline{15516} \end{array}$
<p>(8)</p> $\begin{array}{r} \dot{}\dot{}\dot{}\dot{} \\ 56644(238, \text{ Ans.} \\ \underline{4} \\ 43 \overline{)166} \\ \underline{129} \\ 468 \overline{)3744} \\ \underline{3744} \end{array}$	<p>(9)</p> $\begin{array}{r} \dot{}\dot{}\dot{}\dot{} \\ 390625(625, \text{ Ans.} \\ \underline{36} \\ 122 \overline{)306} \\ \underline{244} \\ 1245 \overline{)6225} \\ \underline{6225} \end{array}$
<p>(12)</p> $\begin{array}{r} \dot{}\dot{}\dot{}\dot{}\dot{} \\ 43046721(6561, \text{ Ans.} \\ \underline{36} \\ 125 \overline{)704} \\ \underline{625} \\ 1306 \overline{)7967} \\ \underline{7836} \\ 13121 \overline{)13121} \\ \underline{13121} \end{array}$	<p>(13)</p> $\begin{array}{r} \dot{}\dot{}\dot{}\dot{}\dot{}\dot{}\dot{} \\ 987656329(31427, \\ \underline{9} \text{ Ans.} \\ 61 \overline{)87} \\ \underline{61} \\ 624 \overline{)2665} \\ \underline{2496} \\ 6282 \overline{)16963} \\ \underline{12564} \\ 62847 \overline{)439929} \\ \underline{439929} \end{array}$
<p>(11)</p> $\begin{array}{r} \dot{}\dot{}\dot{} \\ 5764801(2401, \\ \underline{4} \text{ Ans.} \\ 44 \overline{)176} \\ \underline{176} \\ 4801 \overline{)4801} \\ \underline{4801} \end{array}$	

$$\begin{array}{r}
 \text{(14)} \\
 \begin{array}{r}
 \dot{2}8944\dot{2}169(17013, \\
 \underline{1} \\
 27)189 \\
 \underline{189} \\
 3401)4421 \\
 \underline{3401} \\
 34023)102069 \\
 \underline{102069}
 \end{array}
 \end{array}$$

Ans.

$$\begin{array}{r}
 \text{(15)} \\
 \begin{array}{r}
 \dot{2}34.09(15.3, \\
 \underline{1} \\
 25)134 \\
 \underline{125} \\
 303)909 \\
 \underline{909}
 \end{array}
 \end{array}$$

Ans.

$$\begin{array}{r}
 \text{(16)} \\
 \begin{array}{r}
 \dot{1}45.\dot{2}025(12.05, \\
 \underline{1} \\
 22)45. \\
 \underline{44} \\
 2405)12025 \\
 \underline{12025}
 \end{array}
 \end{array}$$

Ans.

$$\begin{array}{r}
 \text{(17)} \\
 \begin{array}{r}
 \dot{9}15.\dot{0}625(30.25, \text{Ans.} \\
 \underline{9} \\
 692)1506 \\
 \underline{1204} \\
 6045)30225 \\
 \underline{30225}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(18)} \\
 \begin{array}{r}
 \dot{.}0196(.14, \text{Ans.} \\
 \underline{1} \\
 24)96 \\
 \underline{96}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(19)} \\
 \begin{array}{r}
 \dot{1}.008016(1.004, \text{Ans.} \\
 \underline{1} \\
 2004)008016 \\
 \underline{8016}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(20)} \\
 \begin{array}{r}
 \dot{.}00822649(.0907, \text{Ans.} \\
 \underline{81} \\
 1807)12649 \\
 \underline{12649}
 \end{array}
 \end{array}$$

$$(21.) \sqrt{25} = 5, \sqrt{729} = 27; \sqrt{\frac{25}{729}} = \frac{5}{27}, \text{Ans.}$$

$$(22.) \frac{847}{1183} = \frac{121}{169}; \sqrt{121} = 11, \sqrt{169} = 13; \text{Ans.} = \frac{11}{13}.$$

$$(23.) 30\frac{1}{4} = \frac{121}{4}; \sqrt{\frac{121}{4}} = \frac{11}{2} = 5\frac{1}{2}, \text{Ans.}$$

$$\begin{array}{r} \text{(24)} \\ \dot{1}0(3.162277+, \\ \underline{9} \quad \text{Ans.} \end{array}$$

$$61)100$$

$$\underline{61}$$

$$626)3900$$

$$\underline{3756}$$

$$6322)14400$$

$$\underline{12644}$$

$$63242)175600$$

$$\underline{126484}$$

$$632447)4911600$$

$$\underline{4427129}$$

$$6324547)48447100$$

$$\underline{44271829}$$

(28)

$$384\frac{4}{7} = 384.5714285714(19.61049+, \text{ Ans.}$$

$$\underline{1}$$

$$29)284$$

$$\underline{261}$$

$$386)2357$$

$$\underline{2316}$$

$$3921)4114$$

$$\underline{3921}$$

$$392204)1932857$$

$$\underline{1568816}$$

$$3922089)36404114$$

$$\underline{35298801}$$

$$\begin{array}{r} \text{(25)} \\ \dot{2}(1.41421+, \\ \underline{1} \quad \text{Ans.} \end{array}$$

$$24)100$$

$$\underline{96}$$

$$281)400$$

$$\underline{281}$$

$$2824)11900$$

$$\underline{11296}$$

$$28282)60400$$

$$\underline{56564}$$

$$282841)383600$$

$$\underline{282841}$$

$$\begin{array}{r} \text{(27)} \\ 6\frac{2}{5} = \dot{6}.4(2.5298+, \\ \underline{4} \quad \text{Ans.} \end{array}$$

$$45)240$$

$$\underline{225}$$

$$502)1500$$

$$\underline{1004}$$

$$5049)49600$$

$$\underline{45441}$$

$$50588)415900$$

$$\underline{404704}$$

(26)

$$\frac{2}{3} = \dot{.666666} + (.81649+, \text{ Ans.}$$

$$\underline{64}$$

$$161)266$$

$$\underline{161}$$

$$1626)10566$$

$$\underline{9756}$$

$$16324)81066$$

$$\underline{65296}$$

$$163289)1577066$$

$$\underline{1469601}$$

Art. 239.

$$(2.) \quad 16 = 2 \times 2 \times 2 \times 2: \quad \sqrt{16} = 2 \times 2 = 4, \text{ Ans.}$$

$$(3.) \quad 36 = 2 \times 2 \times 3 \times 3: \quad \sqrt{36} = 2 \times 3 = 6, \text{ Ans.}$$

$$(4.) \ 100 = 2 \times 2 \times 5 \times 5 : \sqrt{100} = 2 \times 5 = 10, \text{ Ans.}$$

$$(5.) \ 225 = 3 \times 3 \times 5 \times 5 : \sqrt{225} = 3 \times 5 = 15, \text{ Ans.}$$

$$(6.) \ \sqrt{(16 \times 25)} = 4 \times 5 = 20, \text{ Ans.}$$

$$(7.) \ \sqrt{(36 \times 49)} = 6 \times 7 = 42, \text{ Ans.}$$

$$(8.) \ \sqrt{(64 \times 81)} = 8 \times 9 = 72, \text{ Ans.}$$

$$(9.) \ \sqrt{(121 \times 25)} = 11 \times 5 = 55, \text{ Ans.}$$

Art. 240.

(1)	(2)	(3)
$30^2 = 900$	$100^2 = 10000$	$45^2 = 2025$
$40^2 = 1600$	$60^2 = 3600$	$60^2 = 3600$
$\sqrt{2500} = 50, \text{ Ans.}$	$\sqrt{6400} = 80, \text{ Ans.}$	$\sqrt{5625} = 75, \text{ Ans.}$

(4.) $60^2 = 3600$, $37^2 = 1369$; $3600 - 1369 = 2231$; $\sqrt{2231} = 47.2334 + =$ width of street from foot of ladder on one side. $60^2 = 3600$, $23^2 = 529$; $3600 - 529 = 3071$; $\sqrt{3071} = 55.4166 + =$ width of street from foot of ladder on the other side. $47.2344 + 55.4166 = 102.65, \text{ Ans.}$

(5.) $600^2 = 360000$, $140^2 = 19600$; $360000 - 19600 = 340400$; $\sqrt{340400} = 583.43 +$; $100 \div 2 = 50$; $583.43 - 50 = 533.43 +, \text{ Ans.}$

(6)	
<div style="text-align: center;"> $20^2 = 400$ $16^2 = 256$ <hr style="width: 50px; margin: 0 auto;"/> 656 <hr style="width: 50px; margin: 0 auto;"/> </div> <p>Square of base = 656</p> <p>$12^2 = \text{perpendicular}^2 = 144$; $656 + 144 = 800$; $\sqrt{800} = 28.28 +, \text{ Ans.}$</p> <p style="text-align: center;">Key 14.</p>	<p>The square root of 656, will give the length of the diagonal line joining opposite corners of the floor of the room: this is the base of the triangle, of which the hypotenuse is required.</p>

Art. 241.

(1)	(2)
$\begin{array}{r} \dot{6}\dot{2}\dot{4}\dot{1} \text{ (79 rd., } Ans. \\ \underline{49} \\ 149)1341 \\ \underline{1341} \end{array}$	$\begin{array}{r} 8 \text{ sq. ft. } 4 \text{ sq. in.} = 1156 \text{ sq. in.} \\ \dot{1}\dot{1}\dot{5}\dot{6} \text{ (34 in.} = 2 \text{ ft. } 10 \text{ in., } Ans. \\ \underline{9} \\ 64)256 \\ \underline{256} \end{array}$

(3.) $\sqrt{4096} = 64 \text{ yd., } Ans.$

(4.) $4 \times 4 = 16$; $16 \times 9 = 144$; $\sqrt{144} = 12$, *Ans.*
 Or, $\sqrt{(16 \times 9)} = 4 \times 3 = 12 \text{ rd., } Ans.$

(5.) There are 43560 sq. ft. in 1 acre.
 $\sqrt{43560} = 208.71 + \text{ ft., side of acre.}$

Art. 244.

(3)	(4)
$\begin{array}{r} \dot{2}\dot{1}\dot{9}\dot{7} \text{ (13} \\ \underline{1} \\ 300)1197 \\ \underline{90} \\ 9 \\ \underline{399}1197 \\ \underline{13824} \text{ (24} \\ \underline{8} \\ 1200)5824 \\ \underline{240} \\ 16 \\ \underline{1456}5824 \\ \underline{1\frac{3}{24}} \text{, } Ans. \end{array}$	$\begin{array}{r} \dot{.}\dot{8}\dot{0}\dot{0}\dot{0}\dot{0}\dot{0}\dot{0}\dot{0}\dot{0} \text{ (.928, } Ans. \\ \underline{729} \\ 24300)71000 \\ \underline{540} \\ 4 \\ \underline{24844}49688 \\ \underline{2539200}21312000 \\ \underline{22080} \\ 64 \\ \underline{2561344}20490752 \end{array}$

(5)

 $9\dot{1}12\dot{5}$ (45, *Ans.*

64

$$\begin{array}{r}
 4 \times 4 \times 300 = 4800 \\
 4 \times 5 \times 30 = 600 \\
 5 \times 5 = 25 \\
 \hline
 5425
 \end{array}
 \begin{array}{r}
 27125 \\
 27125
 \end{array}$$

(6)

 $19\dot{5}11\dot{2}$ (58,125 *Ans.*

$$\begin{array}{r}
 5 \times 5 \times 300 = 7500 \\
 5 \times 8 \times 30 = 1200 \\
 8 \times 8 = 64 \\
 \hline
 8764
 \end{array}
 \begin{array}{r}
 70112 \\
 70112
 \end{array}$$

(7)

 $91267\dot{3}$ (97, *Ans.*

729

$$\begin{array}{r}
 24300 \\
 1890 \\
 49 \\
 \hline
 26239
 \end{array}
 \begin{array}{r}
 183673 \\
 183673
 \end{array}$$

(8)

 $122504\dot{3}$ (107,1 *Ans.*

$$\begin{array}{r}
 1 \times 1 \times 300 = 300 \\
 10 \times 10 \times 300 = 30000 \\
 10 \times 7 \times 30 = 2100 \\
 7 \times 7 = 49 \\
 \hline
 32149
 \end{array}
 \begin{array}{r}
 225 \\
 225043 \\
 225043
 \end{array}$$

(9)

 $1\dot{3}31\dot{2}05\dot{3}$ (237, *Ans.*

8

$$\begin{array}{r}
 2 \times 2 \times 300 = 1200 \\
 2 \times 3 \times 30 = 180 \\
 3 \times 3 = 9 \\
 \hline
 1389 \\
 23 \times 23 \times 300 = 158700 \\
 23 \times 7 \times 30 = 4830 \\
 7 \times 7 = 49 \\
 \hline
 163579
 \end{array}
 \begin{array}{r}
 531\dot{2} \\
 4167 \\
 1145053 \\
 1145053
 \end{array}$$

(10)

102503232(468, *Ans.*

64

$4 \times 4 \times 300 = 4800$	38503
$4 \times 6 \times 30 = 720$	
$6 \times 6 = 36$	
5556	33336
$46 \times 46 \times 300 = 634800$	5167232
$46 \times 8 \times 30 = 11040$	
$8 \times 8 = 64$	
645904	5167232

(11)

529475129(809, *Ans.*

512

$8 \times 8 \times 300 = 19200$	17475
$80 \times 80 \times 300 = 1920000$	17475129
$80 \times 9 \times 30 = 21600$	
$9 \times 9 = 81$	
1941681	17475129

(12)

958585256(986, *Ans.*

729

$9 \times 9 \times 300 = 24300$	229585
$9 \times 8 \times 30 = 2160$	
$8 \times 8 = 64$	
26524	212192
$98 \times 98 \times 300 = 2881200$	17393256
$98 \times 6 \times 30 = 17640$	
$6 \times 6 = 36$	
2898876	17393256

(13)

 $\dot{1}47\dot{6}0\dot{2}1\dot{3}6\dot{7}\dot{7}$ (2453, *Ans.*

8

$2 \times 2 \times 300 = 1200$	6760
$2 \times 4 \times 30 = 240$	
$4 \times 4 = 16$	
1456	5824
$24 \times 24 \times 300 = 172800$	936213
$24 \times 5 \times 30 = 3600$	
$5 \times 5 = 25$	
176425	882125
$245 \times 245 \times 300 = 18007500$	54088677
$245 \times 3 \times 30 = 22050$	
$3 \times 3 = 9$	
18029559	54088677

(14)

 $\dot{1}28100\dot{2}839\dot{2}\dot{1}$ (5041, *Ans.*

125

$5 \times 5 \times 300 = 7500$	3100
$50 \times 50 \times 300 = 750000$	3100283
$50 \times 4 \times 30 = 6000$	
$4 \times 4 = 16$	
756016	3024064
$504 \times 504 \times 300 = 76204800$	76219921
$504 \times 1 \times 30 = 15120$	
$1 \times 1 = 1$	
76219921	76219921

$$(15) \quad \begin{array}{c} \dot{5}\dot{3}.\dot{1}\dot{5}\dot{7}\dot{3}\dot{7}\dot{6} \\ 27 \end{array} (3.76, \text{Ans.})$$

$$\begin{array}{r|l} 3 \times 3 \times 300 = 2700 & 26157 \\ 3 \times 7 \times 30 = 630 & \\ 7 \times 7 = 49 & \\ \hline & 3379 \\ 37 \times 37 \times 300 = 410700 & 2504376 \\ 37 \times 6 \times 30 = 6660 & \\ 6 \times 6 = 36 & \\ \hline & 417396 \\ \hline & 2504376 \end{array}$$

$$(16) \quad \begin{array}{c} \dot{1}99\dot{1}76\dot{7}04 \\ 125 \end{array} (.584, \text{Ans.})$$

$$\begin{array}{r|l} 5 \times 5 \times 300 = 7500 & 74176 \\ 5 \times 8 \times 30 = 1200 & \\ 8 \times 8 = 64 & \\ \hline & 8764 \\ 58 \times 58 \times 300 = 1009200 & 4064704 \\ 58 \times 4 \times 30 = 6960 & \\ 4 \times 4 = 16 & \\ \hline & 1016176 \\ \hline & 4064704 \end{array}$$

$$(17.) \quad \sqrt[3]{216} = 6. \quad \text{Ans. } \frac{6}{7}.$$

$$(18.) \quad \sqrt[3]{2744} = 14. \quad \text{Ans. } \frac{14}{19}.$$

$$(19.) \quad \begin{array}{r} 48778 \quad 24389 \\ \hline 118638 \quad 59319 \end{array}$$

$$\begin{array}{l} \sqrt[3]{24389} = 29. \\ \sqrt[3]{59319} = 39. \end{array} \quad \text{Ans. } \frac{29}{39}.$$

$$(20.) \quad 5\frac{104}{125} = 7\frac{29}{125}$$

$$\begin{array}{l} \sqrt[3]{729} = 9. \\ \sqrt[3]{125} = 5. \end{array} \quad \text{Ans. } \frac{9}{5} = 1\frac{4}{5}.$$

(21)	$2(1.259+, \text{Ans.})$	1
		1000
$300+60+4=364$		728
$12 \times 12 \times 300=43200$		272000
$12 \times 5 \times 30=1800$		
$5 \times 5 = 25$		
		45025
		225125
$125 \times 125 \times 300=4687500$		46875000
$125 \times 9 \times 30=33750$		
$9 \times 9 = 81$		
		4721331
		42491979

(22)	$9(2.080+, \text{Ans.})$	8
		1000
$2 \times 2 \times 300=1200$		1000000
$20 \times 20 \times 300=120000$		
$20 \times 8 \times 30=4800$		
$8 \times 8 = 64$		
		124864
		998912
$208 \times 208 \times 300=12979200$		1088000

(23)	$200(5.848+, \text{Ans.})$	125
		75000
$5 \times 5 \times 300=7500$		
$5 \times 8 \times 30=1200$		
$8 \times 8 = 64$		
		8764
		70112
$58 \times 58 \times 300=1009200$		4888000
$58 \times 4 \times 30=6960$		
$4 \times 4 = 16$		
		1016176
		4064704
$584 \times 584 \times 300=102316800$		823296000
$584 \times 8 \times 30=140160$		
$8 \times 8 = 64$		
		819656192

$$\begin{array}{r}
 (24) \quad \begin{array}{r} \cdot \cdot \cdot \\ 9\frac{1}{8} = 9.166666 + (2.092 +, \text{Ans.} \end{array} \\
 \quad \quad \quad 8 \\
 \begin{array}{r} 2 \times 2 \times 300 = 1200 \\ 20 \times 20 \times 300 = 120000 \\ 20 \times 9 \times 30 = 5400 \\ 9 \times 9 = 81 \\ \hline 125481 \\ 209 \times 209 \times 300 = 13104300 \\ 209 \times 2 \times 30 = 12540 \\ 2 \times 2 = 4 \\ \hline 13116844 \end{array} \begin{array}{r} \hline 1166 \\ \hline 1166666 \\ \hline \\ \hline 1129329 \\ \hline 37337666 \\ \hline 26233688 \end{array}
 \end{array}$$

Art. 245.

(1.) $\sqrt[3]{1953.125} = 12.5 \text{ ft., Ans.}$

(2.) $64 \times 3 \times 3 \times 3 = 1728 \text{ cu. in.} = 1 \text{ cu. ft., one side of which} = 1 \text{ ft., Ans.}$

(3.) $\sqrt[3]{512} = 8 \text{ half in.} = 4 \text{ in., Ans.}$

(4.) $450 \text{ cu. yd. } 17 \text{ cu. ft.} = 12167 \text{ cu. ft.; } \sqrt[3]{12167} = 23 \text{ ft., Ans.}$

(5.) $288 \times 216 \times 48 = 2985984, \sqrt[3]{2985984} = 144 \text{ ft., Ans.}$

(6.) $1728 \times 3 = 5184, \sqrt[3]{5184} = 17.306 + \text{ in., Ans.}$

MENSURATION.**Art. 247.**

(1.) $17 \text{ ft.} \times 15 \text{ ft.} = 255 \text{ sq. ft., Ans.}$

(2.) $120 \text{ rd.} \times 84 \text{ rd.} = 10080 \text{ sq. rd.} = 63 \text{ A., Ans.}$

(3.) $65 \text{ rd.} \times 65 \text{ rd.} = 4225 \text{ sq. rd.} = 26 \text{ A. } 65 \text{ sq. rd.}$

(4.) $35 \text{ rd.} \times 16 \text{ rd.} = 560 \text{ sq. rd.} = 3 \text{ A. } 80 \text{ sq. rd., Ans.}$

$$\begin{aligned}
 (5.) \quad 30 \text{ ft.} \times 30 \text{ ft.} &= 900 \text{ sq. ft.} = 100 \text{ sq. yd.} \\
 15 \text{ ft.} \times 15 \text{ ft.} &= 225 \text{ sq. ft.,} \times 2 = 450 \text{ sq. ft.} = \underline{50 \text{ sq. yd.}} \\
 \text{Diff.} &= 50 \text{ sq. yd.}
 \end{aligned}$$

$$(7.) \quad 5 \text{ ft. } 6 \text{ in.} = 5\frac{1}{2} \text{ ft.}; \quad 1 \text{ ft. } 8 \text{ in.} = 1\frac{2}{3} \text{ ft.}; \quad 1\frac{1}{2} \text{ ft.} \times \frac{5}{3} \text{ ft.} = \frac{5 \cdot 5}{6} \text{ sq. ft.} = 9\frac{1}{6} \text{ sq. ft., } \textit{Ans.}$$

$$\begin{aligned}
 (8.) \quad 25 \text{ ft. } 9 \text{ in.} &= 25\frac{3}{4} \text{ ft.} = 1\frac{9}{4} \text{ ft.}; \quad 21 \text{ ft. } 3 \text{ in.} = 21\frac{1}{4} \text{ ft.} = \frac{85}{4} \text{ ft.}; \quad 1\frac{9}{4} \times \frac{85}{4} = \frac{8755}{16} \text{ sq. ft.} = 547\frac{3}{16} \text{ sq. ft.} = 60 \text{ sq. yd. } 7 \text{ sq. ft. } 27 \text{ sq. in., } \textit{Ans.}
 \end{aligned}$$

$$(9.) \quad 80 \text{ sq. ft.} \div 10 \text{ ft.} = 8 \text{ ft., } \textit{Ans.}$$

$$(10.) \quad 18 \text{ ft.} \times 15 \text{ ft.} = 270 \text{ sq. ft.} = 30 \text{ sq. yd.}; \quad 30 \text{ sq. yd.} \div 1\frac{1}{2} \text{ yd.} = 20 \text{ yd., } \textit{Ans.}$$

$$(11.) \quad 3 \text{ yd.} \times 1\frac{1}{2} \text{ yd.} = 4\frac{1}{2} \text{ sq. yd.}; \quad 4\frac{1}{2} \div \frac{3}{4} = \frac{9}{2} \times \frac{4}{3} = 6 \text{ yd., } \textit{Ans.}$$

$$\begin{aligned}
 (12.) \quad 21 \text{ ft. } 3 \text{ in.} &= 21.25 \text{ ft.}; \quad 13 \text{ ft. } 6 \text{ in.} = 13.5 \text{ ft.}; \\
 21.25 \text{ ft.} \times 13.5 \text{ ft.} &= 286.875 \text{ sq. ft.}; \quad 1\frac{1}{4} \text{ yd.} = 3\frac{3}{4} = 3.75 \text{ ft.}; \\
 286.875 \text{ sq. ft.} \div 3.75 \text{ ft.} &= 76.5 \text{ ft.} = 25.5 \text{ yd.} = 25\frac{1}{2} \text{ yd.}
 \end{aligned}$$

$$(13.) \quad 160 \text{ sq. rd. in } 1 \text{ A.} \quad 160 \div 15 = 10\frac{2}{3} \text{ rd., } \textit{Ans.}$$

Art. 248.

$$\begin{array}{rcl}
 (1.) \quad \text{ft.} & \text{in.} & 61 \text{ in.} \div 2 = 30\frac{1}{2} \text{ in.,} \times 11 \text{ in.} = 335\frac{1}{2} \\
 & 2 & \text{sq. in.: } 335\frac{1}{2} \text{ sq. in.} \div 144 = 2 \text{ sq. ft. } 47\frac{1}{2} \\
 & 2 & \text{sq. in., } \textit{Ans.} \\
 & \hline
 & 5 & 1 = 61 \text{ in.}
 \end{array}$$

$$(2.) \quad 25 \text{ rd.} + 19 \text{ rd.} = 44 \text{ rd.}; \quad 44 \text{ rd.} \div 2 = 22 \text{ rd.,} \times 32 \text{ rd.} = 704 \text{ sq. rd.,} \div 160 = 4 \text{ A. } 64 \text{ sq. rd., } \textit{Ans.}$$

$$\begin{aligned}
 (3.) \quad 10 \text{ ft. } 8 \text{ in.} &= 128 \text{ in.}; \quad 6 \text{ ft. } 2 \text{ in.} = 74 \text{ in.}; \quad 128 + 74 = 202 \text{ in.,} \div 2 = 101 \text{ in.}; \quad 12 \text{ ft.} = 144 \text{ in.}; \quad 101 \times 144 = 14544 \text{ sq. in.} = 101 \text{ sq. ft.} = 11 \text{ sq. yd. } 2 \text{ sq. ft., } \textit{Ans.}
 \end{aligned}$$

Art. 249.

$$(1.) \quad 15 \text{ ft.} \times 12 \text{ ft.} = 180 \text{ sq. ft.,} \div 2 = 90 \text{ sq. ft., } \textit{Ans.}$$

(2.) $44 \text{ rd.} \times 18 \text{ rd.} = 792 \text{ sq. rd.}, \div 2 = 396 \text{ sq. rd.} : 396 \text{ sq. rd.} \div 160 = 2 \text{ A. } 76 \text{ sq. rd.}, \text{Ans.}$

(3.) $12\frac{1}{2} \text{ ft.} \times 16\frac{3}{4} \text{ ft.} = 16\frac{75}{8} \text{ sq. ft.} = 209\frac{3}{8} \text{ sq. ft.}; 209\frac{3}{8} \div 2 = 104\frac{11}{16} \text{ sq. ft.} = 11 \text{ sq. yd. } 5 \text{ sq. ft. } 99 \text{ sq. in.}, \text{Ans.}$

(4.) $13 + 14 + 15 = 42, \div 2 = 21. \quad 21 - 13 = 8, \quad 21 - 14 = 7, \quad 21 - 15 = 6. \quad 21 \times 8 \times 7 \times 6 = 7056 : \text{its square root} = 84 \text{ sq. ft.}, \text{Ans.}$

(5.) $30 + 40 + 50 = 120, \div 2 = 60. \quad 60 - 30 = 30, \quad 60 - 40 = 20, \quad 60 - 50 = 10. \quad 60 \times 30 \times 20 \times 10 = 360000 : \sqrt{360000} = 600 \text{ sq. ft.} : 600 \text{ sq. ft.} = 66 \text{ sq. yd. } 6 \text{ sq. ft.}, \text{Ans.}$

Art. 250.

(1.) $50 \text{ rd.} \times 30 \text{ rd.} = 1500 \text{ sq. rd.}, \div 2 = 750 \text{ sq. rd.} : 50 \text{ rd.} \times 20 \text{ rd.} = 1000 \text{ sq. rd.}, \div 2 = 500 \text{ sq. rd.}; 750 \text{ sq. rd.} + 500 \text{ sq. rd.} = 1250 \text{ sq. rd.} = 7 \text{ A. } 130 \text{ sq. rd.}, \text{Ans.}$

Art. 251.

(1.) $48 \text{ ft.} \times 3.1416 = 150.7968 \text{ ft.} = 150 \text{ ft. } 9.56 \text{ in.}$

(2.) $15 \text{ ft.} \div 3.1416 = 4.7746 \text{ ft.} = 4 \text{ ft. } 9.3 \text{ in. nearly.}$

(3.) $4 \times 3.1416 = 12.5664 \text{ ft.} = 12 \text{ ft. } 6.8 \text{ in. nearly.}$

(4.) $12 \text{ ft. } 5 \text{ in.} = 12.4166\frac{1}{2} \text{ ft.}; 12.4166 \text{ ft.} \div 3.1416 = 3.952338 \text{ ft.} = 3 \text{ ft. } 11.43 \text{ in. nearly, Ans.}$

(5.) $7912 \text{ mi.} \times 3.1416 = 24856\frac{1}{2} \text{ mi.}, \text{Ans.}$

Art. 252.

(1.) $21 \times 21 = 441 : 3.1416 \times 441 = 1385.4456 \text{ sq. ft.} = 153 \text{ sq. yd. } 8 \text{ sq. ft. } 64 \text{ sq. in.}, \text{Ans.}$

NOTE.—To find the diameter when the area is given, divide the area by .7854; the square root of the quotient will be the diameter.

(2.) $6 \text{ sq. ft. } 98.115 \text{ sq. in.} = 962.115 \text{ sq. in.}; 962.115 \div .7854 = 1225 : \sqrt{1225} = 35 \text{ in.}, = 2 \text{ ft. } 11 \text{ in.} = \text{diameter. } 35 \text{ in.} \times 3.1416 = 109.956 \text{ in.} = 9 \text{ ft. } 1.9\frac{1}{2} \text{ in.} = \text{circum.}$

$$(3.) 160 \text{ rd.} \div .7854 = 203.71785077 + ; \sqrt{203.71785077} = 14.2729 ; 14.2729 \div 2 = 7.1364 \text{ rd.} = 7 \text{ rd. } 2 \text{ ft. } 3 \text{ in., } Ans.$$

$$(4.) 10 \div 2 = 5 = \text{one radius} ; 5^2 = 25 : 16 \div 2 = 8 = \text{one radius} ; 8^2 = 64. \quad 25 \times 3.1416 = 78.5400 ; 64 \times 3.1416 = 201.0624 : 201.0624 - 78.5400 = 122.5224 \text{ sq. ft.} ; .5224 \times 144 = 75 \text{ sq. in. } Ans. 122 \text{ sq. ft. } 75 \text{ sq. in.}$$

$$(5.) 1 \text{ sq. ft.} = 144 \text{ sq. in.} \quad 144 \div .7854 = 183.3460 \text{ sq. in.} : \sqrt{183.3460} = 13.54 \text{ in., } Ans.$$

Art. 254.

$$(1.) 37 \times 37 \times 6 = 8214 \text{ sq. in.} = 6 \text{ sq. yd. } 3 \text{ sq. ft. } 6 \text{ sq. in., } Ans.$$

$$(2.) 4 + 4 + 4 = 12 \text{ ft., } \times 5 \text{ ft.} = 60 \text{ sq. ft.} = \text{convex surface.}$$

$$\left. \begin{array}{l} 6 - 4 = 2 \\ 6 - 4 = 2 \\ 6 - 4 = 2 \end{array} \right\} 6 \times 2 \times 2 \times 2 = 48.$$

$$\frac{4+4+4}{2} = 6.$$

$$\sqrt{48} = 6.92 + ; 6.92 + \times 2 = 13.85 \text{ sq. ft.} = \text{area of 2 bases. } 60 \text{ sq. ft.} + 13.85 \text{ sq. ft.} = 73.85 + \text{ sq. ft., } Ans.$$

$$(3.) \left. \begin{array}{l} 3 \text{ ft. } 6 \text{ in.} = 3\frac{1}{2} \text{ ft.} = \frac{7}{2} ; \frac{7}{2} \times 2 = 7 \\ 2 \text{ ft. } 9 \text{ in.} = 2\frac{3}{4} \text{ ft.} = \frac{11}{4} ; \frac{11}{4} \times 2 = 5\frac{1}{2} \\ 1 \text{ ft. } 10 \text{ in.} = 1\frac{5}{6} \text{ ft.} = \frac{11}{6} \end{array} \right\} = 12\frac{1}{2} \text{ or } \frac{25}{2}.$$

$$\frac{25}{2} \times \frac{11}{6} = \frac{275}{12} = \text{convex surface} ; \frac{7}{2} \times \frac{11}{4} \times 2 = \frac{77}{4} \text{ or } \frac{231}{12} = \text{areas of 2 bases} : \frac{275}{12} + \frac{231}{12} = \frac{506}{12} = 42\frac{1}{6} \text{ sq. ft., } Ans.$$

$$(4.) 3.1416 \times 4 \text{ ft. (diameter)} = 12.5664 = \text{circumference.}$$

$$12.5664 \times 5 = 62.8320 = \text{convex surface.}$$

$$2 \times 2 \times 3.1416 \times 2 = 25.1328 = \text{areas of 2 bases.}$$

$$87.96 + \text{ sq. ft., } Ans.$$

Art. 255.

$$(2.) 24 \text{ ft.} \times 18\frac{1}{2} \text{ ft.} \times 10\frac{7}{12} \text{ ft.} = 4699 \text{ cu. ft.} = 174 \text{ cu. yd. } 1 \text{ cu. ft., } Ans.$$

(3.) Area of base $= 1.73 +$ sq. ft.; 1.73 sq. ft. $\times 14$ ft. $= 24\frac{1}{4}$ cu. ft. nearly, *Ans.*

(4.) $2 \times 2 \times 3.1416 \times 12 = 150.8$ cu. ft., *Ans.*

(5.) $9\frac{1}{4}$ in. $= \frac{37}{4}$; $\frac{1}{2}$ of $\frac{37}{4} = \frac{37}{8}$; $(\frac{37}{8})^2 \times 3.1416 \times 8 = 537.6$ cu. in., *Ans.*

Art. 256.

(1.) 5 ft. 4 in. $= 5\frac{1}{3}$ ft.; $5\frac{1}{3}$ ft. $\times 3 = 16$ ft. = perimeter of base. $7\frac{1}{2}$ ft. $\times 16 = 120$ sq. ft.; 120 sq. ft. $\div 2 = 60$ sq. ft. = area of 3 sides. $5\frac{1}{3} \times 3 = 16$. $16 \div 2 = 8$; $8 - 5\frac{1}{3} = 2\frac{2}{3}$; $2\frac{2}{3} = \frac{8}{3}$; $8 \times \frac{8}{3} \times \frac{8}{3} \times \frac{8}{3} = \frac{4096}{27} = 151.70 +$. $\sqrt{151.70} = 12.3 +$ sq. ft. = area of base. 60 sq. ft. $+ 12.3 +$ sq. ft. $= 72.3 +$ sq. ft., *Ans.*

(2.) $8\frac{1}{2}$ ft. $\times 3.1416 = 26.7036$ ft. = circum. of base. $26.7036 \times 25 \div 2 = 333.79 +$, *Ans.*

(3.) $2\frac{1}{2}$ ft. $\times 3.1416 \times 4\frac{7}{2}$ ft. $\div 2 = 21.008$ sq. ft. = convex surface. $2\frac{1}{2}$ ft. $= \frac{5}{2}$, $\div 2 = \frac{5}{4}$; $(\frac{5}{4})^2 \times 3.1416 = 6.68$ sq. ft. = area of base. $21.008 + 6.68 = 27.6 +$ sq. ft., *Ans.*

Art. 257.

(1.) 5 ft. $\times 5$ ft. $= 25$ sq. ft. = area of base. 25 sq. ft. $\times 21$ ft. $\div 3 = 175$ cu. ft., *Ans.*

(2.) $(5)^2 \times 3.1416 \times 15 \div 3 = 392.7$ cu. ft., *Ans.*

(3.) 720 ft. $= 240$ yd.; 477 ft. $= 159$ yd.; $(240 \text{ yd})^2 \times 159 \text{ yd.} \div 3 = 3052800$ cu. yd., *Ans.*

(4.) $37\frac{2}{3}$ ft. $= \frac{113}{3}$, $\div 2 = \frac{113}{6}$; $(\frac{113}{6})^2 \times 3.1416 = 1114.3 +$ sq. ft. = area of base. $1114.3 +$ sq. ft. $\times 79\frac{3}{4}$ ft., $\div 3 = 29622 +$ cu. ft., *Ans.*

Art. 258.

(2.) $(4\frac{1}{2} \text{ ft.})^2 \times 3.1416 = 63.6 +$ sq. ft., *Ans.*

(3.) $(7912)^2 \times 3.1416 = 196663355.75$ sq. mi., *Ans.*

Art. 259.

$$(1.) 13 \times 13 \times 13 \times .5236 = 1150.3+ \text{ cu. ft., } Ans.$$

$$(2.) 2\frac{1}{2} \text{ ft.} = \frac{5}{2}: \frac{5}{2} \times \frac{5}{2} \times \frac{5}{2} \times .5236 = 8.18+ \text{ cu. ft., } Ans.$$

$$(3.) 1 \text{ cu. ft.} = 1728 \text{ cu. in.}; 1728 \div .5236 = 3300.229; \sqrt[3]{3300.229} = 14.9 \text{ in. nearly, } Ans.$$

Art. 260.

(1.) $20\frac{1}{2} \times 16\frac{1}{4} =$ area of ceiling; $20\frac{1}{2} \times 10\frac{1}{2} \times 2 =$ area of 2 sides; $16\frac{1}{4} \times 10\frac{1}{2} \times 2 =$ area of other 2 sides. Add these amounts together, and deduct $6\frac{1}{4} \times 4\frac{1}{6}$, fire-place; $7 \times 4\frac{1}{6}$, door; $6 \times 3\frac{1}{4} \times 2$, two windows.

(2.) $20 \times 10\frac{1}{3} \times 2 =$ area of two sides; $14\frac{1}{2} \times 10\frac{1}{3} \times 2 =$ area of other 2 sides. Deduct $4 \times 4\frac{1}{3}$, fire-place; $6 \times 3\frac{1}{6} \times 2$, two windows. The remainder is in sq. ft. Divide by 9, and multiply by 27 ct. = \$19.73+, *Ans.*

$$(3.) \begin{array}{rcl} 21 \text{ yd.} \times 15 \text{ yd.} & = & 315 \text{ sq. yd.} \\ 5 \text{ ft.} = 1\frac{2}{3} \text{ yd.} & 21 \text{ yd.} \times 1\frac{2}{3} \text{ yd.} & = \underline{35 \text{ sq. yd.}} \\ & & 280 \text{ sq. yd.} \end{array}$$

$$35 \times .36 = \$12.60; 280 \times .24 = \$67.20; \$12.60 + \$67.20 = \$79.80, \text{ } Ans.$$

$$(4.) 15\frac{1}{2} \text{ ft.} \times 12\frac{1}{2} \text{ ft.} \times 2 = 387.5 \text{ sq. ft.} = 43.06 \text{ sq. yd.}; 43.06 \text{ sq. yd.} @ 10 \text{ ct.} = \$4.31, \text{ } Ans.$$

$$(5.) 6 \text{ ft. } 11 \text{ in.} + 5 \text{ ft. } 4 \text{ in.} + 4 \text{ ft. } 3 \text{ in.}, \times 7 = 115\frac{1}{2} \text{ ft.}, \times 3\frac{1}{2} \text{ ft.} = 404\frac{1}{4} \text{ sq. ft.}, \times 16 \text{ ct.} = \$64.68, \text{ } Ans.$$

$$(6.) 36\frac{1}{4} \text{ ft.} \times 16\frac{1}{2} \text{ ft.} = 598 \text{ sq. ft.} = 5.98 \text{ squares}; 5.98 \times \$3.00 = \$17.94, \text{ } Ans.$$

$$(7.) 40 \text{ ft.} \times 18\frac{1}{2} \text{ ft.} \times 2 = 1480 \text{ sq. ft.} = 14.80 \text{ squares}; 14.80 \times \$3.50 = \$51.80, \text{ } Ans.$$

Art. 261.

$$(1.) 16 \times 1\frac{1}{4} = 20 \text{ ft., } Ans.$$

$$(2.) 12\frac{1}{2} \times 2\frac{1}{4} \times 2 = 56\frac{1}{4} \text{ ft., } Ans.$$

$$(3.) 15 \times \frac{1}{3} \times 3 = 15 \text{ ft., } Ans.$$

$$(4.) 12 \times 2 \times 24 = 576 \text{ ft., } Ans.$$

$$(5.) 1 \text{ ft. } 3 \text{ in.} + 11 \text{ in.} = 2\frac{1}{6} \text{ ft., } \div 2 = 1\frac{1}{12} \text{ ft.} = \text{average width. } 12\frac{1}{2} \times 1\frac{1}{12} = 13\frac{13}{24} \text{ ft., } Ans.$$

Art. 262.

$$(1.) 97 \text{ ft. } 5 \text{ in.} = 97.416\frac{1}{3} \text{ ft.; } 18 \text{ ft. } 3 \text{ in.} = 18.25 \text{ ft.; } 2 \text{ ft. } 3 \text{ in.} = 2.25 \text{ ft.: } 97.416 \text{ ft.} \times 18.25 \text{ ft.} \times 2.25 \text{ ft.} = 4000.1445 \text{ cu. ft. } 4000.1445 \div 24.75 = 161.6\frac{1}{3} \text{ P., } Ans.$$

$$(2.) 53 \text{ ft. } 6 \text{ in.} = 53.5 \text{ ft.; } 12 \text{ ft. } 6 \text{ in.} = 12.5 \text{ ft.; } 53.5 \times 12.5 \times 2 = 1337.5 \text{ cu. ft.} = 54.0404\frac{1}{3} \text{ P. } 54.0404 \times \$2.25 = \$121.59\frac{1}{3}, Ans.$$

$$(3.) 48\frac{1}{3} \times 16\frac{1}{2} \times 1\frac{1}{2} = \frac{145}{3} \times \frac{33}{2} \times \frac{3}{2} = \frac{14355}{12} = 1196\frac{1}{4} \text{ cu. ft.; } 1196\frac{1}{4} \times 20 = 23925 \text{ bricks, } Ans.$$

$$(4.) 120 \times 8 \times 1\frac{1}{2} = 1440 \text{ cu. ft.} = 2488320 \text{ cu. in. in wall; } 8 \times 4 \times 2.25 = 72 \text{ cu. in. in each brick; } 2488320 \div 72 = 34560 \text{ bricks, } Ans.$$

$$(5.) 240 \times 6 \times 3 = 4320 \text{ cu. ft.} = 7464960 \text{ cu. in. in wall; } 9 \times 4 \times 2 = 72 \text{ cu. in. in brick; } 7464960 \div 72 = 103680 \text{ bricks; } 103680 \div 1000 = 103.68; \$3.25 \times 103.68 = \$336.96, Ans.$$

Art. 263.

$$(1.) 15 \text{ ft.} \times 5 \text{ ft.} \times 4 \text{ ft.} = 300 \text{ cu. ft.} = 518400 \text{ cu. in.; } 518400 \div 2150.4 = 241\frac{1}{3} \text{ bu., } Ans.$$

$$(2.) 10 \text{ ft.} = 120 \text{ in.; } 5 \text{ ft.} = 60 \text{ in.; } 4 \text{ ft.} = 48 \text{ in.; } 120 \times 60 \times 48 = 345600 \text{ cu. in.; } 345600 \div 231 = 1496\frac{1}{3} \text{ gal., } Ans.$$

$$(3.) (6)^2 \times .7854 = 28.2744 = \text{area of end; } 28.2744 \times 8 = 226.1952 \text{ cu. ft.} = 390865.3056 \text{ cu. in. This divided by } 2150.4 = 181.76\frac{1}{3} \text{ bu., } Ans.$$

$$\begin{aligned}
 (48)^2 &= 2304; 2304 \times .7854 \times 72 = 130288.4352 \text{ cu. in.}; 130288.4352 \div 231 \\
 &= 564.019 + \text{gal.}; 564.019 \div 31\frac{1}{2} = 17.9 + \text{bl.}, \text{Ans.}
 \end{aligned}$$

PROGRESSIONS.

ARITHMETICAL PROGRESSION.

CASE I.

Art. 265.

$$(3.) 50 - 1 = 49; 49 \times 3 + 2 = 149, \text{Ans.}$$

$$(4.) 54 - 1 = 53; 53 \times 2 = 106; 140 - 106 = 34, \text{Ans.}$$

$$(5.) 99 - 1 = 98; 98 \times \frac{7}{8} = 85\frac{3}{4}; 329 - 85\frac{3}{4} = 243\frac{1}{4}, \text{Ans.}$$

CASE II.

Art. 266.

$$(2.) 300 - 3 = 297; 10 - 1 = 9; 297 \div 9 = 33, \text{Ans.}$$

$$(3.) 50 - 5 = 45; 10 - 1 = 9; 45 \div 9 = 5 \text{ miles,}$$

Ans.

CASE III.

Art. 267.

$$(2.) 50 + 2 = 52; 52 \times 24 = 1248; 1248 \div 2 = 624,$$

Ans.

$$(3.) 1 + 12 = 13; 13 \times 12 = 156; 156 \div 2 = 78$$

strokes, *Ans.*

$$\begin{aligned}
 (4.) \text{ The number of terms is evidently 100. The boy travels 6 yards to put the first apple in the basket, 12 the second, and so on; hence, the first term is 6, and the common difference 6. } 100 - 1 = 99; 99 \times 6 + 6 = 600, \text{ last term. } 6 + 600 = 606; 606 \times 100 = 60600; \\
 60600 \div 2 = 30300 \text{ yd.}; 30300 \text{ yd.} = 17 \text{ mi. } 69 \text{ rd. } \frac{1}{2} \text{ yd.,} \\
 \text{Ans.}
 \end{aligned}$$

(5.) Common difference $= 193 \times 2 = 386$ in. $60 - 1 = 59$; $386 \times 59 + 193 = 22967$ in., distance fallen in the last second. 193 in. $+ 22967$ in. $= 23160$ in.; $23160 \times 60 = 1389600$; 1389600 in. $\div 2 = 694800$ in. $= 57900$ ft., *Ans.*

GEOMETRICAL PROGRESSION.

CASE I.

Art. 269.

(3.) $2^{12} = 4096$; $4096 \times 2 = 8192$, *Ans.*

(4.) $4^8 = 65536$; $262144 \div 65536 = 4$, *Ans.*

(5.) Ratio $= 3$; $3^9 = 19683$; $19683 \times 10 = 196830$, *Ans.*

CASE II.

Art. 270.

(2.) $3^6 = 729$; $729 \times 10 = 7290$, last term. $7290 \times 3 = 21870$; $21870 - 10 = 21860$; $21860 \div 2 = 10930$, *Ans.*

(3.) $2^{11} = 2048$; $2048 \times 1 = 2048$, last term. $2048 \times 2 = 4096$; $4096 - 1 = 4095$, and $4095 \div 1 = 4095$, *Ans.*

(4.) $4^{11} \times 4194304$; $4194304 \times 1 = 4194304$, last term. $4194304 \times 4 = 16777216$; $16777216 - 1 = 16777215$; $4 - 1 = 3$; $16777215 \div 3 = 5592405$ ct. $= \$55924.05$, *Ans.*

(5.) $.3 \times 10 = 3$; $10 - 1 = 9$; $3 \div 9 = \frac{1}{3}$, *Ans.*

(6.) Ratio $= 3$; $\frac{1}{3} \times 3 = 1$; $3 - 1 = 2$; $1 \div 2 = \frac{1}{2}$, *Ans.*

(7.) Ratio $= 2$; $\frac{1}{2} \times 2 = 1$; $2 - 1 = 1$; $1 \div 1 = 1$, *Ans.*