ECLECTIC EDUCATIONAL SERIES.

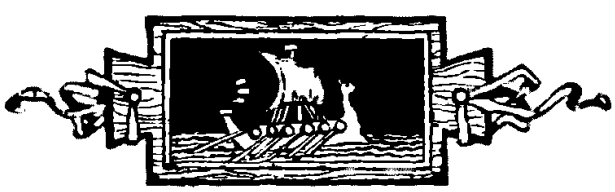
KEY

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.
(3.) 5000000; 60000000; 700000000.
(4.) 8000000000; 90000000000; 100000000000.
(5.) 1200; 2100.
(6.) 3450; 6789.
(7.) 12345.
(8.) 678912.
(9.) 1357924.
(10.) 68143792.
(11.) 1001; 1010; 1100.
(12.) 1101; 1110; 1111.
(13.) 2003; 4050.
(14.) 45026.
(15.) 80201.

(16.) 90001.
(17.) 410205.
(18.) 100010.
(19.) 3070509.
(20.) 45083026.
(21.) 909090000.
(22.) 700010002.
(23.) 40000200005.
(24.) 726050001243.
(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 + 142 + 35 = \$387

(4.) 50230 + 3105 + 423 = 53758

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	15967521
80079	4002347	49003	
320600	5851840	990019919	
753420		2155513020	

(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	\$23702	3500	25
140	2650		\$33760	25
120	\$22350			20
115				20
\$2700				200 yd.

SUBTRACTION.

Art. 26.

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

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

(20)	(21)	(22)	(23)
2020930	2000687	17102102	$30000
1009006	405022	13000201	26967
1011924	1595665	4101901	$3033

(24)	(25)
18126402	19900900900
9238715	9909090009
8887687	9991810891

Addition and Subtraction.

(1)	(2)	(3)		(4)
275	6723	$2675	$3000	$250
381	479	4375	4947	650
625	6244	1897	$7947	$900
1281	347	$8947		
1098	5897	7947		$1300
183	228	$1000, *Ans.*		900
	5669			$400

(5)

\$450	
725	
1235	
4675	\$5935
1727	877
\$8812	\$6812
6812	
\$2000, *Ans.*	

(6)

\$350
125
375
150
\$1000
\$2300
1000
\$1300, *Ans.*

(7)

\$4875
4875 }
2250 }
3725
\$15725
\$20838
15725
\$5113, *Ans.*

(8)

\$16785	\$49570
24937	41722
\$41722	\$7848, *Ans.*

(9)

\$7895	\$10093
175	8073
3	\$2020, *Ans.*
\$8073	

(10)

\$5750	\$10000
925	8925
1575	\$1075, *Ans.*
675	
\$8925	

(11)

\$4625	\$6955	\$9395
3785	895	9225
985	1375	\$170, *Ans.*
\$9395	\$9225	

(12)

Received, \$50	Spent, \$25	\$100
50	7	91
\$100	2	\$9, *Ans.*
	5	
	35	
	7	
	2	
	8	
	\$91	

MULTIPLICATION.

Art. 31.

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

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

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

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

(43)
6874
829
61866
13748
54992
5698546

(44)
2873
1823
8619
5746
22984
2873
5237479

(45)
4786
3497
33502
43074
19144
14358
16736642

(46)
87603
9865
438015
525618
700824
788427
864203595

(47)
83457
6835
417285
250371
667656
500742
570428595

(48)
31624
7138
252992
94872
31624
221368
225732112

(51)
675
13
2025
675
8775 ct.

(52)
496
24
1984
992
11904 ct.

(53)
152
28
1216
304
4256 mi.

(54)
1760
209
15840
3520
367840 yd.

(55)
365
24
1460
730
8760
8
70080 mi.

(56)
2029
1007
14203
2029
2043203

(57)
80401
60007
562807
482406
4824622807

(58)
101032
20001
101032
202064
2020741032

(60)
36 36
45 55
180 180
144 180
1620 1620

Ans. 360 ct.

(61)

95 ct. — 2 ct. = 93 ct.

2650
93
7950
23850
246450 ct.

(62)

$75 × 6 = $450
125 × 5 = 625
$1075

$150 × 11 = $1650
$1650 — $1075 = $575, *Ans.*

(63)

$250
$325 × 2 = 650
175 × 3 = 525
$1425
356
$1781, *Ans.*

(64)

24 × $5 = $120
36 × 14 = 504
9 × 45 = 405
$1029
275
$754, *Ans.*

(65)

75 85
37 54
525 340
225 425
2775 4590
4590
7365
5284
2081, *Ans.*

(66)

69 48
53 27
207 336
345 96
3657 1296
3657
4953
4279
674, *Ans.*

(67)

63 lb.
50
3150 lb.

3150
34 ct.
12600
9450
107100 ct., *Ans.*

Art. 32.

(2)

\$124		\$124
6		8
\$744	or	\$992
4		3
\$2976		\$2976

(3)

1512 mi.
8
12096 mi.
7
84672 mi.

(4)

2873 lb.
9
25857 lb.
6
155142 lb.

(5)

2874
9
25866
8
206928

(6)

8074
12
96888
9
871992

Art. 33.

(1)

245
100
24500

(2)

138
1000
138000

(3)

428
10000
4280000

(4)

872
100000
87200000

(5)

9642
1000000
9642000000

(6)

10045
1000000
10045000000

Art. 34.

(3)

2350
60
141000

(4)

80300
450
4015
3212
36135000

(5)

10240
3200
2048
3072
32768000

(6)

9600
2400
384
192
23040000

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

(10)	(11)	(12)
80600	70302	904000
7002	80300	10200
1612	210906	1808
5642	562416	904
564361200	5645250600	9220800000

SHORT DIVISION.

Art. 41.

(24) 3)894 = 298

(25) 4)140 = 35

(29) 4)321276 = 80319

(32) 11)495 = 45

(33) 9)3582 = 398

(46) 4)144, 3)36 = 12 *Ans.*

(47) 5)195 = 39; 3)39 = 13, *Ans.*

(48) 8)192 = 24; 11)275 = 25; 25 − 24 = 1, *Ans.*

LONG DIVISION.

Art. 42.

(5)

14) 11577 (826$\frac{13}{14}$, *Ans.*

112

37

28

97

84

13

(6)

15) 48690 (3246

45

36

30

69

60

90

90

(7)

23) 1110960 (48302$\frac{14}{23}$

92

190

184

69

69

60

46

14

(8)

67) 122878 (1834

67

558

536

227

201

268

268

(9)

53) 12412 (234$\frac{10}{53}$

106

181

159

222

212

10

(10)

72) 146304 (2032

144

230

216

144

144

(11)

54) 47100 (872$\frac{12}{54}$

432

390

378

120

108

12

(12)

88) 71104 (808

704

704

704

(13)

66) 43956 (666

396

435

396

396

396

Key 5.

(14)

99) 121900 (1231 $\frac{31}{99}$
99
229
198
310
297
130
99
31

(15)

112) 25312 (226
224
291
224
672
672

(16)

123) 381600 (3102 $\frac{54}{123}$
369
126
123
300
246
54

(17)

204) 105672 (518
1020
367
204
1632
1632

(18)

1234) 600000 (486 $\frac{276}{1234}$
4936
10640
9872
7680
7404
276

(19)

4321) 1234567 (285 $\frac{3082}{4321}$
8642
37036
34568
24687
21605
3082

(20)

7819) 50964242 (6518
46914
40502
39095
14074
7819
62552
62552

(21)

9876) 48905952 (4952
39504
94019
88884
51355
49380
19752
19752

(22)

12345) 4049160 (328
37035
34566
24690
98760
98760

(23)

973) 552160000 (567482$\frac{14}{973}$
4865
6566
5838
7280
6811
4690
3892
7980
7784
1960
1946
14

(24)

15) 3465 (231
30
46
45
15
15

(25)

26) 364 (14 days.
26
104
104

(26)

19) 1083 (57 dollars.
95
133
133

(27)

107) 9523 (89 bu.
856
963
963

(28)

63) 14868 (236 hhd.
126
226
189
378
378

(29)

365) 50000 (136
365
1350
1095
2550
2190
360

Ans. \$136 and \$360 over.

(30)

365) 379600 (\$1040
365
1460
1460
0

(31)

1235) 6571435 (5321
6175
3964
3705
2593
2470
1235
1235

(32)

405) 1247400 (3080
1215
3240
3240
0

(33)

1006) 10401000 (10338$\frac{972}{1006}$
1006
3410
3018
3920
3018
9020
8048
972

(34)

684) 109440 (160 A.
684
4104
4104
0

(35)

56) 8288 (148 A.
56
268
224
448
448

(36)

269) 262275 (975 dollars.
2421
2017
1883
1345
1345

(37)

24) 24899 (1037$\frac{11}{24}$ mi.
24
89
72
179
168
11

(38)

238) 3731840 (15680
238 dollars.
1351
1190
1618
1428
1904
1904
0

(39)

24) 27048 (1127 ft.
24
30
24
64
48
168
168

(40)

11520000) 92160000 (8 min.
92160000

(41)

94231
86247
16) 7984 (499, *Ans.*
64
158
144
144
144

(42)

46712
6848

104) 53560 (515
520

156
104

520
520

(43)

497
583

1491
3976

2485

71) 289751 (4081
284

575
568

71
71

(44)

2832
987

1845
678

87) 2523 (29
174

783
783

(45)

4896
2384

2512
49

22608
10048

112) 123088 (1099
112

1108
1008

1008
1008

(46)

228
786

1014
95

5070
9126

114) 96330 (845
912

513
456

570
570

(47)

478 478
296 296

182 774
182

1548
6192
774

387) 140868 (364
1161

2476
2322

1548
1548

(48)

7560
3885

175) 3675 (21 horses.
350

175
175

(49)

7350
4655

49) 12005 (245 A.
98
220
196
245
245

(50)

58
77
406
406
4466

5742
4466

58) 1276 (22 dollars
116
116
116

(51)

240
26
1440
480
6240
2820

180) 3420 (19 horses.
180
1620
1620

(52)

125 lots.
250 dolls. each.
6250
250
31250
10625
$20625, whole gain.

25) 20625 (825 dolls., gain per acre.
200
62
50
125
125

125) 20625 (165 dolls., gain on each lot.
125
812
750
625
625

Art. 43.

(3)

9) 2583
7) 287
Ans. 41

(4)

4) 6976
8) 1744
Ans. 218

(5)

4) 2744
7) 686
Ans. 98

(6)

6) 6145
7) 1024—1 rem.
146—2
$6 \times 2 + 1 = 13$ rem.
Ans. $146\frac{13}{42}$

(7)

11)19008

12)1728

Ans. 144

(8)

8)7840 *Ans.*

8)980 $122\frac{32}{64}$

122—4

$8 \times 4 = 32$ rem.

(9)

8)14771 *Ans.*

9)1846—3 $205\frac{11}{72}$

205—1

$8 \times 1 + 3 = 11$ rem.

(10)

9)10206

9)1134

Ans. 126

11)81344

11)7394—10

672— 2

$2 \times 11 + 10 = 32$

Ans. $672\frac{32}{121}$

(11)

121)81344 ($672\frac{32}{121}$

or

726

874

847

274

242

32

9)98272

12)10919—1

909—11

$11 \times 9 + 1 = 100$

Ans. $909\frac{100}{108}$

(12)

108)98272 ($909\frac{100}{108}$, *Ans.*

or

972

1072

972

100

Art. 44.

(2)

1|0)268|2

$268\frac{2}{10}$

(3)

1|00)47|00

47

(4)

1|00)372|01

$372\frac{1}{100}$

(5)

1|00)462|50

$462\frac{50}{100}$

(6)

1|000)18|003

$18\frac{3}{1000}$

Art. 45.

(4)

4|000)73|005

$18\frac{1005}{4000}$

(5)

9|000)36|001

$4\frac{1}{9000}$

(6)

11|000)1078|000

98

(7)

18|0)4016|7(223$\frac{27}{180}$
36
41
36
56
54
2

(8)

21|00)9072|37(432$\frac{37}{2100}$
84
67
63
42
42

(9)

64|00)3640|06(56$\frac{5606}{6400}$
320
440
384
56

(10)

25|0000)7654|6037(306$\frac{46037}{250000}$
75
154
150
4

(11)

634|00)435637|54(687$\frac{7954}{63400}$
3804
5523
5072
4517
4438
79

Art. 49.

(1)

\$96 \$500
120 271
55 \$229, *Ans.*
\$271

\$243 1st.
61
\$304 2d.
79
\$225 3d.

(2)

\$243 \$1265
304 772
225 \$493, *Ans.*
\$772

(3)

157 428
264 186
305 614
97
123
946
614
332, *Ans.*

(4)

9503 57068
586 16967
4794 40101, *Ans.*
1234
850
16967

(5)

\$12307
8706
\$21013, am't with gain.

\$237
301
5380
\$5918, am't spent.

\$21013
5918
\$15095, *Ans.*

(6)

86) 31173 (362 41/86
258
537
516
213
172
41

(7)

28
3 \$
25) 1400 (56 dolls.
125
150
150

(8)

63 gallons.
5
15) 315 (21, *Ans.*
30
15
15

(9)

73900
70
214) 73830 (345, *Ans.*
642
963
856
1070
1070

(10)

148 148
56 56
92 204, sum.
92, diff.
408
1836
23) 18768 (816, *Ans.*
184
36
23
138
138

(11)

\$60
8
\$480
630
6) 1110
185

\$45
14
180
45
\$630
Ans., 185 yards.

(12)

$30	$6000		156 acres.
70	2100	3900 ÷ 25 = 156	70 acres.
$2100	$3900		226 acres, *Ans.*

(13)

$360			yr.
300	$1800	800) 10400	(13, *Ans.*
150	1000	800	
100	$800, saved each yr.	2400	
90		2400	
$1000, spent each yr.			

(14)

40 × $15 = $600
80 × 25 = 2000
Amt. pd., $2600

120 — 90 = 30 acres.
30 × 60 = 1800
$4500 + $1800 = $6300, 1*st Ans.*

(15)

275 × $4 = $1100

250 × $5 = $1250
25 × 6 = 150
$1400
1100
$300, *Ans.*

$6300
2600
$3700, gain.

(16)

125	75	175) 19250	(110, *Ans.*
$85	$115	175	
625	375	175	
1000	75	175	
$10625	75	0	
	$8625		
	10625		
	$19250		

(17)

$150	$125
15	20
750	$2500
150	
$2250	$45
2500	50
$4750	$2250
2250	
$2500	
95	
$2405, *Ans.*	

COMPOUND NUMBERS.

U. S. Money.

EXAMPLES TO BE WRITTEN.

Art. 53.

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

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	$222.199	718.07
$68.45		$1077.58

(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
$311.61	$2222.22	1000.100
		40.004
		64.587
		$2000.000

SUBTRACTION.

Art. 57.

(2)	(3)	(4)	(5)
$29.342	$46.28	$20.05	$3.00
17.265	17.75	5.50	.03
$12.077	$28.53	$14.55	$2.97

(6)	(7)	(8)	(9)
$10.000	$50.000	$1000.000	$1000.43
.001	.505	1.011	900.68
$9.999	$49.495	$998.989	$99.75

MULTIPLICATION.

Art. 58.

(2)	(3)	(4)
$7.835	$12.093	$23.018
8	9	16
$62.680	$108.837	138108
		23018
		$368.288

(5)	(6)	(7)
$35.14	$125.02	$40.04
53	62	102
10542	25004	8008
17570	75012	4004
$1862.42	$7751.24	$4084.08

(8)
$0.125
17
875
125
$2.125

(9)
$3.28
38
2624
984
$124.64

(10)
$1.06
338
848
318
318
$358.28

(11)
$5.75
38
4600
1725
$218.50

(13)
$0.34
89
306
272
$30.26

(14)
$5.67
24
2268
1134
$136.08

(15)
$2.69
169
2421
1614
269
$454.61

(16)
$1.25
691
125
1125
750
$863.75

(17)
73
63 gal.
219
438
4599 gal.
$0.55
22995
22995
$2529.45

(18)
281 lb.
4
1124 lb.
$0.065
5620
6744
$73.060

(19)
35
10 yd.
350 yd.
$0.01
$3.50

(20)
312
11 hr.
3432 hr.
3432
$0.13
10296
3432
$446.16, *Ans.*

(21)
18
3 bu.
54 bu.
$1.25
54
500
625
Ans. $67.50

(22)

\$10.001
150
500050
10001
\$1500.150

(23)

17
51 lb.
17
85
867 lb.

\$0.247
867
1729
1482
1976
\$214.149, *Ans.*

DIVISION.

Case I.

Art. 59.

(2)

9)72
8 lb.

(3)

375)6000(16
375
2250
2250

(4)

8)280
35 yd.

(5)

25)300(12 yd.
25
50
50

(6)

805)16100(20 bbl.
1610
0

(7)

75)1200(16
75
450
450

(8)

1125)234000(208 bu.
2250
9000
9000

Case II.

(3)

8)\$65.000
\$8.125

(4)

23)\$29.610(\$1.287+
23
66
46
201
184
170
161
9

(5)

4)\$92.250
\$23.062+

(6)

8)\$57.500
\$7.187+

(7)

16)$25.76($1.61
16
97
96
16
16

(8)

755)$328.425($0.435
3020
2642
2265
3775
3775

(9)

313)$800.000($2.555+
626
1740
1565
1750
1565
1850
1565
285

(10)

133)$10000.000($75.187+
931
690
665
250
133
1170
1064
1060
931
129

(11)

154)$2705.010($17.565
154
1165
1078
870
770
1001
924
770
770

(12)

25
15 lb.
125
25
lb. 375)$60.00($0.16
375
2250
2250

(13)

235 lb.
8
lb. 1880)$122.200($0.065
11280
9400
9400

Art. 60.

(1)

$$\begin{array}{r} \$47.50 \\ 38.45 \\ 15.47 \\ 19.43 \\ \hline \$120.85 \end{array}$$

(2)

$$\begin{array}{r} \$35.25 \\ 23.75 \\ \hline \$59.00 \\ 59.00 \\ 1.00 \\ \hline \$119.00 \end{array}$$

(3)

$$\begin{array}{r} \$18.38 \\ 81.62 \\ \hline \$100.00 \\ 200.00 \\ \hline \$300.00 \end{array}$$

(4)

$$\begin{array}{r} \$0.75 \\ .35 \\ .50 \\ 1.50 \\ \hline \$3.10 \end{array} \qquad \begin{array}{r} \$5.00 \\ 3.10 \\ \hline \$1.90, \textit{Ans.} \end{array}$$

(5)

$$\begin{array}{r} \$8.10 \\ 5.65 \\ 2.00 \\ 4.00 \\ \hline \$19.75 \end{array}$$

$\$0.25 \times 8 =$

$$\begin{array}{r} \$20.00 \\ 19.75 \\ \hline \$0.25, \textit{Ans.} \end{array}$$

(6)

$$\begin{array}{r} \$50.00 \\ 30.50 \\ \hline \$19.50 \\ 6 \\ \hline \$117.00 \end{array}$$

(7)

$$\begin{array}{r} \$3.85 \\ 1.25 \\ 2.50 \\ 1.50 \\ \hline \$9.10 \end{array}$$

$$\begin{array}{r} \$21.75 \\ 9.10 \\ \hline \$12.65, \textit{Ans.} \end{array}$$

(8)

$$\begin{array}{r} \$37.06 \\ 200.85 \\ 400.00 \\ 236.75 \\ 124.34 \\ \hline \$999.00 \\ 889.25 \\ \hline \$109.75 \end{array}$$

(9)

$$\begin{array}{r} 143 \\ 23 \text{ ct.} \\ \hline 429 \\ 286 \\ \hline \$32.89 \\ 12.60 \\ \hline \$20.29 \end{array}$$

(10)

$$\begin{array}{r} 435 \\ 45 \text{ ct.} \\ \hline 2175 \\ 1740 \\ \hline \$195.75 \end{array}$$

$$\begin{array}{r} \$400.00 \\ 195.75 \\ \hline \textit{Ans.}\ \$204.25 \end{array}$$

(11)

$$\begin{array}{r} 365 \\ 65 \text{ ct.} \\ \hline 1825 \\ 2190 \\ \hline \$237.25 \end{array}$$

$$\begin{array}{r} \$400.00 \\ 237.00 \\ \hline \$162.75, \textit{Ans.} \end{array}$$

(12)

$$\begin{array}{r} 21 \\ 3 \text{ bu.} \\ \hline 63 \text{ bu.} \end{array}$$

$$\begin{array}{r} 63 \\ 35 \text{ ct.} \\ \hline 315 \\ 189 \\ \hline \textit{Ans.}\ \$22.05 \end{array}$$

(13)

19 yd. 76
4 23 ct.
76 yd. 228
152
$17.48, *Ans.*

(14)

$2000.00
163.75
$1836.25

5)$1836.25
5)$367.25
$73.45, *Ans.*

(15)

4)$516.00
4)$129.00
43)$32.25($0.75, *Ans.*
301
215
215

(16)

4|0)$9|0.00
10)$2.25
$0.225, *Ans.*

(17)

$22 = 2 \times 11$

$1000.00
500.00
2)$1500.00
11)$750.00
Ans. $68.18+

MERCHANTS' BILLS.

(18.)

9	lb.	@ $0.32 =	$2.88	
4	"	" 1.25 =	5.00	
45	"	" .09 =	4.05	
17	"	" .20 =	3.40	$15.33

(19.)

22	yd.	@ $1.75 =	$38.50	
18	"	" .15 =	2.70	
25	"	" .65 =	16.25	
6	"	" .18 =	1.08	$58.53

(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	$11.54

(21.) 43 yd. @ \$0.13 = \$5.59
28 " " .09 = 2.52
23 " " .23 = 5.29 \$13.40

Dry Measure.

Art. 63.

(5.) 4 bu. × 4 + 2 pk. = 18 pk.: 18 pk. × 8 + 1 qt. = 145 qt.: 145 qt. × 2 = 290 pt., *Ans.*

(6.) 7 bu. × 4 + 3 pk. = 31 pk.: 31 pk. × 8 + 7 qt. = 255 qt.: 255 qt. × 2 + 1 pt. = 511 pt., *Ans.*

(7.) 3 bu. × 4 = 12 pk.: 12 pk. × 8 = 96 qt.: 96 qt. × 2 + 1 pt. = 193 pt., *Ans.*

(8.) 384 pt. ÷ 2 = 192 qt.: 192 qt. ÷ 8 = 24 pk.: 24 pk. ÷ 4 = 6 bu., *Ans.*

(9.) 47 pt. ÷ 2 = 23 qt. 1 pt.: 23 qt. ÷ 8 = 2 pk. 7 qt. *Ans.* 2 pk. 7 qt. 1 pt.

(10.) 95 pt. ÷ 2 = 47 qt. 1 pt.: 47 qt. ÷ 8 = 5 pk. 7 qt.: 5 pk. ÷ 4 = 1 bu. 1 pk. Collecting the different remainders, the *Ans.* is 1 bu. 1 pk. 7 qt. 1 pt.

(11.) 508 pt. ÷ 2 = 254 qt.: 254 qt. ÷ 8 = 31 pk. 6 qt.: 31 pk. ÷ 4 = 7 bu. 3 pk. *Ans.* 7 bu. 3 pk. 6 qt.

Liquid Measure.

Art. 64.

(1.) 17 gal. × 4 × 2 = 136 pt., *Ans.*

(2.) 13 gal. × 4 × 2 × 4 = 416 gi., *Ans.*

(3.) 126 gal. × 4 × 2 = 1008 pt., *Ans.*

(4.) 1260 gal. × 4 × 2 × 4 = 40320 gi., *Ans.*

(5.) 1120 gi. ÷ 4 = 280, ÷ 2 = 140, ÷ 4 = 35 gal., *Ans.*

(6.) 1848 cu. in. ÷ 231 = 8 gal., *Ans.*

(7.) 138138 cu. in. ÷ 231 = 598 gal., *Ans.*

Avoirdupois Weight.

Art. 65.

(1.) 2 cwt. × 4 × 25 = 200 lb., *Ans.*

(2.) 3 cwt. × 100 = 300 lb. + 75 lb. = 375 lb., *Ans.*

(3.) 1 T. × 20 + 2 cwt. = 22 cwt. × 100 = 2200 lb., *Ans.*

(4.) 3 T. × 20 × 100 = 6000 lb. + 75 lb. = 6075 lb., *Ans.*

(5.) 4 cwt. × 100 + 44 lb. = 444 lb., *Ans.*

(6.) 5 T. × 20 × 100 + 90 lb. = 10090 lb., *Ans.*

(7.) 2 cwt. × 100 + 77 lb. = 277 lb.: 277 lb. × 16 + 12 oz. = 4444 oz., *Ans.*

(8.) 2 cwt. × 100 + 17 lb. = 217 lb.: 217 lb. × 16 + 3 oz. = 3475 oz., *Ans.*

(9.) 1 T. × 20 + 6 cwt. = 26 cwt., × 100 + 4 lb. = 2604 lb., × 16 + 2 oz. = 41666 oz., *Ans.*

(10.) 4803 lb. ÷ 100 = 48 cwt. and 3 lb. over, *Ans.*

(11.) 22400 lb. ÷ 100 ÷ 20 = 11 T. and 4 cwt., *Ans.*

(12.) 2048000 ÷ 16 = 128000 lb., ÷ 100 = 1280 cwt., ÷ 20 = 64 T., *Ans.*

(13.) 64546 oz. ÷ 16 = 4034 lb. 2 oz.: 4034 ÷ 100 = 40 cwt. 34 lb. *Ans.* 40 cwt. 34 lb. 2 oz.

(14.) 97203 oz. ÷ 16 = 6075 lb. 3 oz.: 6075 ÷ 100 = 60 cwt. 75 lb.: 60 ÷ 20 = 3 T. *Ans.* 3 T. 75 lb. 3 oz.

(15.) 544272 oz. ÷ 16 = 34017 lb., ÷ 100 = 340 cwt. 17 lb.: 340 ÷ 20 = 17 T. *Ans.* 17 T. 17 lb.

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

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

Long Measure.

Art. 66.

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

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

(3.) 12 mi. $\times 320 = 3840$ rd., *Ans.*

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

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

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

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

(8.) 2240 rd. $\div 320 = 7$ mi., *Ans.*

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

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

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

Square Measure.

Art. 67.

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

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

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

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

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

(6.) 960 sq. rd. ÷ 160 = 6 A., *Ans.*

(7.) 3888 sq. in. ÷ 144 = 27 sq. ft.: 27 sq. ft. ÷ 9 = 3 sq. yd., *Ans.*

(8.) 20000 sq. rd. ÷ 160 = 125 A., *Ans.*

(9.) 515280 sq. rd. ÷ 160 ÷ 640 = 5 sq. mi. 20 A. 80 sq. rd., *Ans.*

(10.) 4176 sq. in. ÷ 144 = 29 sq. ft.: 29 sq. ft. ÷ 9 = 3 sq. yd. 2 sq. ft., *Ans.*

Art. 68.

(2.) 16 ft. × 12 ft. = 192 sq. ft., *Ans.*

(3.) 5 yd. × 4 yd. = 20 sq. yd., *Ans.*

(4.) 18 ft. ÷ 3 = 6 yd.: 12 ft. ÷ 3 = 4 yd.: 21 ft. ÷ 3 = 7 yd.: 15 ft. ÷ 3 = 5 yd. 6 yd. × 4 yd. = 24 sq. yd.: 7 yd. × 5 yd. = 35 sq. yd.: 24 sq. yd. + 35 sq. yd. = 59 sq. yd., *Ans.*

(5.) 18 ft. × 14 ft. = 252 sq. ft.: 252 sq. ft. ÷ 9 = 28 sq. yd., *Ans.*

(6.) 35 rd. × 32 rd. = 1120 sq. rd.: 1120 sq. rd. ÷ 160 = 7 A., *Ans.*

(7.) 18 ft. ÷ 3 = 6 yd.: 15 ft. ÷ 3 = 5 yd. 5 yd. × 6 yd. × 2 = 60 sq. yd.: 60 × $1.25 = $75, *Ans.*

(8.) 21 ft. = 7 yd.: 18 ft. = 6 yd.; 7 yd. × 6 yd. = 42 sq. yd.: 42 × $0.17 = $7.14, *Ans.*

Art. 69.

(1.) 132 sq. ft. ÷ 11 ft. = 12 ft., *Ans.*

(2.) 30 sq. yd. × 9 = 270 sq. ft.: 270 sq. ft. ÷ 18 ft. = 15 ft., *Ans.*

(3.) 9 A. × 160 = 1440 sq. rd.: 1440 sq. rd. ÷ 45 rd. = 32 rd., *Ans.*

(4.) 21 A. × 160 = 3360 sq. rd.: 3360 sq. rd. ÷ 35 rd. = 96 rd., *Ans.*

Cubic Measure.

Art. 70.

(1.) 2 cu. yd. × 27 × 1728 = 93312 cu. in., *Ans.*

(2.) 28 C. × 128 = 3584 cu. ft., *Ans.*

(3.) 34 C. × 128 × 1728 = 7520256 cu. in., *Ans.*

(4.) 1 C. × 128 × 1728 = 221184 cu. in., *Ans.*

(5.) 63936 cu. in. ÷ 1728 = 37 cu. ft.: 37 cu. ft. ÷ 27 = 1 cu. yd. 10 cu. ft., *Ans.*

(6.) 8 ft. × 5 ft. × 4 ft. = 160 cu. ft., *Ans.*

(7.) 8 yd. × 5 yd. × 2 yd. = 80 cu. yd., *Ans.*

(8.) 18 ft. × 15 ft. × 7 ft. = 1890 cu. ft.: 1890 cu. ft. ÷ 27 = 70 cu. yd., *Ans.*

(9.) 40 ft. × 12 ft. × 8 ft. = 3840 cu. ft.: 3840 cu. ft. ÷ 128 = 30 C., *Ans.*

(10.) 80 ft. × 8 ft. × 4 ft. = 2560 cu. ft.: 2560 cu. ft. ÷ 128 = 20 C.: 20 × $5.50 = $110, *Ans.*

(11.) 24 ft. = 8 yd., 15 ft. = 5 yd., 6 ft. = 2 yd.: 8 yd. × 5 yd. × 2 yd. = 80 cu. yd.: 80 × $1.25 = $100, *Ans.*

Time Measure.

Art. 71.

(1.) 2 hr. × 60 × 60 = 7200 sec., *Ans.*

(2.) 7 da. × 24 × 60 = 10080 min., *Ans.*

(3.) 1 da. × 24 + 3 hr. = 27 hr.: 27 hr. × 60 + 44 min. = 1664 min.: 1664 min. × 60 + 3 sec. = 99843 sec., *Ans.*

(4.) 9 wk. × 7 + 6 da. = 69 da.: 69 da. × 24 + 10 hr. = 1666 hr.: 1666 hr. × 60 + 40 min. = 100000 min., *Ans.*

(5.) 4 wk. × 7 + 3 da. = 31 da.: 31 da. × 24 = 744 hr.: 744 hr. × 60 + 4 min. = 44644 min., *Ans.*

(6.) 10800 sec. ÷ 60 = 180 min.: 180 min. ÷ 60 = 3 hr., *Ans.*

(7.) 432000 sec. ÷ 60 = 7200 min.: 7200 min. ÷ 60 = 120 hr.: 120 hr. ÷ 24 = 5 da., *Ans.*

(8.) 7322 sec. ÷ 60 = 122 min. 2 sec.: 122 min. ÷ 60 = 2 hr. 2 min. *Ans.* 2 hr. 2 min. 2 sec.

(9.) 4323 min. ÷ 60 = 72 hr. 3 min.: 72 hr. ÷ 24 = 3 da. *Ans.* 3 da. 3 min.

(10.) 20280 min. ÷ 60 = 338 hr.: 338 hr. ÷ 24 = 14 da. 2 hr.: 14 da. ÷ 7 = 2 wk. *Ans.* 2 wk. 2 hr.

(11.) 41761 min. ÷ 60 = 696 hr. 1 min.: 696 hr. ÷ 24 = 29 da.: 29 da. ÷ 7 = 4 wk. 1 da.: 4 wk. ÷ 4 = 1 mo. *Ans.* 1 mo. 1 da. 1 min.

Miscellaneous Tables.

Art. 73.

(1.) 5 lb. × 12 + 4 oz. = 64 oz., *Ans.*

(2.) 9 lb. × 12 + 3 oz. = 111 oz.: 111 oz. × 20 + 5 pwt. = 2225 pwt., *Ans.*

(3.) 8 lb. × 12 + 9 oz. = 105 oz.: 105 oz. × 20 + 13 pwt. = 2113 pwt.: 2113 pwt. × 24 + 17 gr. = 50729 gr., *Ans.*

(4.) 805 pwt. ÷ 20 = 40 oz. 5 pwt.: 40 oz. ÷ 12 = 3 lb. 4 oz. *Ans.* 3 lb. 4 oz. 5 pwt.

(5.) 12530 gr. ÷ 24 = 522 pwt. 2 gr.: 522 pwt. ÷ 20 = 26 oz. 2 pwt.: 26 oz. ÷ 12 = 2 lb. 2 oz. *Ans.* 2 lb. 2 oz. 2 pwt. 2 gr.

(6.) 4 ℔. × 12 + 5 ℥ = 53 ℥: 53 × 8 × 3 × 20 + 2 gr. = 25442 gr., *Ans.*

(7.) 7 ℔. × 12 + 2 ℥ = 86 ℥: 86 ℥ × 8 = 688 ʒ: 688 ʒ × 3 + 1 ℈ = 2065 ℈: 2065 ℈ × 20 = 41300 gr., *Ans.*

(8.) 431 ʒ ÷ 8 = 53 ℥ 7 ʒ: 53 ℥ ÷ 12 = 4 ℔. 5 ℥. *Ans.* 4 lb. 5 ℥ 7 ʒ.

(9.) 975 ℈ ÷ 3 = 325 ʒ: 325 ʒ ÷ 8 = 40 ℥ 5 ʒ: 40 ℥ ÷ 12 = 3 ℔. 4 ℥. *Ans.* 3 ℔. 4 ℥ 5 ʒ.

(10.) 6321 gr. ÷ 20 = 316 ℈ 1 gr.: 316 ℈ ÷ 3 = 105 ʒ 1 ℈: 105 ʒ ÷ 8 = 13 ℥ 1 ʒ: 13 ℥ ÷ 12 = 1 ℔. 1 ℥. *Ans.* 1 ℔. 1 ℥ 1 ʒ 1 ℈ 1 gr.

(11.) 4 cong. × 8 × 16 + 7 f. ℥ × 8 = 4152 f. ʒ., *Ans.*

(12.) 5 O. × 16 + 6 f. ℥ = 86 f. ℥: 86 f. ℥ × 8 + 3 f. ʒ = 691 f. ʒ: 691 × 60 = 41460 minims, *Ans.*

(13.) 2469 f. ʒ ÷ 8 = 308 f. ℥ 5 f. ʒ: 308 ÷ 16 = 19 O. 4 f. ℥: 19 ÷ 8 = 2 cong. 3 O. *Ans.* 2 cong. 3 O. 4 f. ℥ 5 f. ʒ.

(14.) 3 yd. × 3 = 9 ft., × 12 = 108 in., × 3 = 324 barleycorns, *Ans.*

(15.) 1 ft. × 12 + 6 in. = 18 in.: 18 × 12 = 216 lines, *Ans.*

(16.) 16½ hands × 4 = 66 in.: 66 ÷ 12 = 5 ft. 6 in., *Ans.*

(17.) 24 chains × 4 = 96 rd.: 15 chains × 4 = 60 rd.: 96 rd. × 60 rd. = 5760 sq. rd.: 5760 ÷ 160 = 36 A., *Ans.*

(18.) 267 cu. ft. × 1728 + 624 cu. in. = 462000 cu. in.: 462000 ÷ 231 = 2000 gal., *Ans.*

(19.) 8° × 60 + 41′ = 521′: 521′ × 60 + 45″ = 31305″, *Ans.*

(20.) 61° × 60 + 59′ = 3719′: 3719′ × 60 + 28″ = 223168″, *Ans.*

(21.) $915' \div 60 = 15°\ 15'$, *Ans.*

(22.) $3661'' \div 60 = 61'\ 1''$: $61' \div 60 = 1°\ 1'$. *Ans.* $1°\ 1'\ 1''$.

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

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

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

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

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

Art. 74.

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

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

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

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

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

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

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

(7.) 15 lb. × 16 + 12 oz. = 252 oz.: 252 ÷ 4 = 63, *Ans.*

(8.) 44 cwt. 52 lb. = 71232 oz.: 9 lb. 15 oz. = 159 oz.: 71232 ÷ 159 = 448, *Ans.*

(9.) 14 cwt. 28 lb. = 1428 lb.: 1428 ÷ 84 = 17, *Ans.*

(10.) 7 cwt. 56 lb. = 756 lb.: 756 ÷ 12 = 63, *Ans.*

(11.) 6 cwt. 10 lb. = 9760 oz.: 3 lb. 13 oz. = 61 oz.: 9760 ÷ 61 = 160, *Ans.*

(12.) 2 A. 125 sq. rd. = 445 sq. rd.: 20 ct. × 445 = 8900 ct. = $89, *Ans.*

(13.) 16 A. 53 sq. rd. = 2613 sq. rd.: 1 A. 41 sq. rd. = 201 sq. rd.: 2613 ÷ 201 = 13, *Ans.*

(14.) 2 ft. × 2 ft. × 2 ft. = 8 cu. ft.: 8 cu. ft. × 1728 = 13824 cu. in., *Ans.*

(15.) 1000 oz. × 5 = 5000 oz. = 312 lb. 8 oz., *Ans.*

(16.) 1000 oz. × 128 = 128000 oz. = 4 T., *Ans.*

(17.) 2 C. × 128 = 256 cu. ft.: 950 oz. × 256 = 243200 oz. = 7 T. 12 cwt., *Ans.*

(18.) 63 gal. × 4 × 2 = 504 pt.: 20 ct. × 504 = 10080 ct. = $100.80, *Ans.*

(19.) 31 gal. 2 qt. = 126 qt.: 126 qt. × 5 = 630 qt.: 10 ct. × 630 = 6300 ct. = $63, *Ans.*

(20.) $2 = 200 ct.: 200 ÷ 5 = 40 pt.: 40 pt. = 5 gal., *Ans.*

(21.) 63 gal. = 504 pt.: 3 qt. 1 pt. = 7 pt.: 7 pt. × 12 = 84 pt. in 1 doz. bottles: 504 ÷ 84 = 6 doz., *Ans.*

(22.) 4 gal. 3 qt. 1 pt. = 39 pt.: 58 gal. 2 qt. = 468 pt.: 468 ÷ 39 = 12, *Ans.*

(23.) 1 da. = 1440 min.: 70 beats × 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. × 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 × 11 = \$40.15, *Ans.*

(27.) 40 bbl. × 196 = 7840 lb. The gain equals 5 ct. — 3 ct., or 2 ct., a pound. 7840 × 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)

bu.	pk.
21	3
14	1
23	2
18	1
22	1
100	0

(19)

bu.	pk.
200	3
143	1
400	3
255	1
1000	0

(20)

cwt.	lb.
8	36
4	64
5	19
7	75
7	84
33	78

(21)

lb.	oz.
13	11
17	13
14	14
16	0
19	7
17	9
99	6

(22)

mi.	rd.
104	50
95	270
200	0

(23)

A.	sq. rd.
186	134
286	17
113	89
586	80

(24)

sq. yd.	sq. ft.	sq. in.
17	3	119
18	0	141
23	7	0
29	5	116
88	8	88

(25)

C.	cu. ft.
7	78
16	24
35	127
29	10
88	111

(26)

hhd.	gal.	qt.	pt.
	4642	3	1
	945	0	0
	1707	0	1
	10206	1	0
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
1	2	7

(17)

bu.	pk.	qt.	pt.
100	0	0	0
24	0	0	1
75	3	7	1

(18)

lb.	oz.
46	4
19	8
26	12

(19)

cwt.	lb.
32	66
8	67
23	99

(20)

mi.	rd.
24899	0
100	41
24798	279

(21)

A.	sq. rd.
146	80
86	94
59	146

(22)

C.	cu. ft.
8	50
3	75
4	103

(23)

gal.	qt.	pt.	gi.
63	0	0	0
51	1	0	2
11	2	1	2

(24)

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

Art. 77.

(2)

yr.	mo.	da.
1876	9	1
1776	7	4
100	1	27

(3)

yr.	mo.	da.
1191	7	12
1099	7	15
91	11	27

(4)

yr.	mo.	da.
1587	2	8
1215	6	15
371	7	23

(5)

yr.	mo.	da.
1688	11	5
1066	10	14
622	0	21

(6)

yr.	mo.	da.
1815	6	18
1805	12	2
9	6	16

Art. 78.

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

Art. 79.

(2)

bu.	pk.	qt.	pt.
2	1	1	1
			6
13	3	1	0

(3)

bu.	pk.	qt.
2	2	2
		9
23	0	2

(4)

bu.	pk.	qt.	pt.
4	3	3	1
			12
58	1	2	0

(5)

T.	cwt.	lb.
	8	62
		9
3	17	58

(6)

T.	cwt.	lb.
	10	89
		7
3	16	23

(7)

mi.	rd.
208	176
	15
3128	80

(8)

cu. yd.	cu. ft.	cu. in.
23	9	228
		12
280	1	1008

(9)

T.	cwt.	lb.
	16	74
		119
99	12	6

(10)

gal.	qt.	pt.
47	3	1
		59
2824	2	1

(11)

mi.	rd.
27	155
	31
852	5

(12)

C.	cu. ft.
7	98
	17
132	2

(13)

mo.	wk.	da.	hr.	min.	sec.
	2	4	13	48	39
					75
49	3	0	3	48	45

(14)

cwt.	lb.
10	84
	75
813	0

813 cwt. = 81300 lb.

8 ct. − 6 ct. = 2 ct., gain on 1 lb.

2 ct. × 81300 = 162600 ct. = $1626, *Ans.*

(15)

4 cwt. 85 lb. = 485 lb.

485 lb. × 425 = 206125 lb.

206125 × 13 ct. = $26796.25

$26796.25 − $24735 = $2061.25, *Ans.*

DIVISION.

Art. 80.

(4)

bu.	pk.	qt.	pt.
5)67	3	4	1
13	2	2	1

(5)

cwt.	lb.	oz.
11)35	44	12
3	22	4

(6)

mi.	rd.
7)39	288
5	224

(7)

A. sq. rd.

16)69 64

4 54

(8)

bu. pk. qt.

10)490 2 4

10)49 0 2

Ans. 4 3 5

(9)

lb. oz.

5)265 10

10)53 2

Ans. 5 5

(10)

T. cwt.

17)45 18

2 14

(11)

dr. hr. min. sec.

6)114 22 45 18

9)19 3 47 33

Ans. 2 3 5 17

(12)

lb. oz.

27 13

10 cwt. = 1000

23)1027(44 lb.

92

107

92

15

$15 \times 16 + 13$ oz. $\div 23 = 11$ oz.

Ans. 44 lb. 11 oz.

(13)

bu. pk. qt. bu. pk. qt.

78)309 2 2 (3 3 7, *Ans.*

234

75

4

78)302(3 pk.

234

68

8

78)546(7 qt.

546

(14)

gal. qt. pt. gi.

63)127 3 1 3

gal. 2 . . 1

4 qt. qt.

4+3=7

pt. 2 pt. pt.

15 14+1=15

4

60+3gi.=63 gi.

63÷63=1 gi.

Ans. 2 gal. 1 gi.

(15)

mi. rd. mi. rd.

319)788 169 (2 151, *Ans.*

638

150×320=48000 rd.

169

319)48169(151 rd.

319

1626

1595

319

319

(16)

A. sq. rd.

104 117

87 78

191 195

40 40

3)151 155

50 . . 1=160 sq. rd.

160 sq. rd.+155 sq. rd.=315 sq. rd.

315 sq. rd.÷3=105 sq. rd.

Ans. 50 A. 105 sq. rd.

(17)

bu. pk.

5000 3

7245 2

12245 5

8022 1

4223 4=4224 bu.

4224 ÷ 8=528 bu., *Ans.*

(18)

A. sq. rd.

4 80

160

640+80=720 sq. rd.

720 sq. rd.×6=4320 sq. rd.

54)4320(80 sq. rd. in each lot.

432

0

80×$5=$400, *Ans.*

(19)

lb. oz.

35 9

75 14

85 15

195 38

186 14

9 24

8

72 192=84 lb.

84 lb.÷64=1 lb. 5 oz., *Ans.*

Art. 81.

(1)

15)18° 25′ 30″

1 hr. 13 min. 42 sec.

(2)

30° ÷ 15 = 2. *Ans.* 2 hr.

(3)

15)71° 4′ 0″

4 hr. 44 min. 16 sec.

(4)

15)10° 35′ 0″

0 hr. 42 min. 20 sec.

(5)

min.	sec.
37	20
	15
9° 20′	0″

(6)

hr.	min.	sec.
1	4	56
		15
16°	14′	0″

(7)

hr.	min.	sec.
5	8	4
		15
77°	1′	0″

Art. 82.

(8)

	hr.	min.	sec.	
Time at C.	12	0	0	
Add diff.		37	20	
	12	37	20	

(See Ex. 5, Art. 81.)

(9)

	hr.	min.	sec.	
Time at N. Y.	11	0	0	A. M.
30° =	2	0	0	to be added.
	1	0	0	P.M.

(10)

	hr.	min.	sec.	
Time at Ph.	12	0	0	
Subtr. diff.		37	20	
	11	22	40	A. M.

(11)

	hr.	min.	sec.	
Time at N. Y.	11	0	0	
Subtr. diff.	1	4	56	
	9	55	4	A.M.

(See Ex. 6, Art. 81.)

(12)

124°—80° 42′=43° 18′: 43° 18′÷15=2 hr. 53 min. 12 sec.

	hr.	min.	sec.	
Time at W.	1	0	0	
Subtr. diff.	2	53	12	
Ans.	10	6	48	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., the remainder is the 10th hr. from midnight, or 10 A. M.

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		

2×2×2=8, 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	

2×2×3=12, G. C. D.

(4)

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

2×3×3=18, G. C. D.

(5)

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

2×2×5=20, G. C. D.

(6)

3)54 81 108
3)18 27 36
3)6 9 12
2 3 4

3×3×3=27, G. C. D.

(7)

2)60 90 120
3)30 45 60
5)10 15 20
2 3 4

2×3×5=30, G. C. D.

(8)

2)32 48 80 112
2)16 24 40 56
2)8 12 20 28
2)4 6 10 14
2 3 5 7

2×2×2×2=16, G. C. D.

(9)

2)48 72 96 120
2)24 36 48 60
2)12 18 24 30
3)6 9 12 15
2 3 4 5

2×2×2×3=24, G. C. D.

(10)

2)72 108 144 180
2)36 54 72 90
3)18 27 36 45
3)6 9 12 15
2 3 4 5

2×2×3×3=36, G. C. D.

(11)

(By 2d method.)

62)93(1
62
31)62(2
62

31 = G. C. D.

(12)

78)130(1
78
52)78(1
52
26)52(2
52

26 = G. C. D.

(13)

161)253(1
161
92)161(1
92
69)92(1
69
23)69(3
69

23 = G. C. D.

(14)

247)323(1
247
76)247(3
228
19)76(4
76

19 = G. C. D.

(16)

2145)3471(1
2145
1326)2145(1
1326
819)1326(1
819
507)819(1
507
312)507(1
312
195)312(1
195
117)195(1
117
78)117(1
78
39)78(2
78

39 = G. C. D.

(15)

391)697(1
391
306)391(1
306
85)306(3
255
51)85(1
51
34)51(1
34
17)34(2
34

17 = G. C. D.

(17)

16571)38363(2
33142
5221)16571(3
15663
908)5221(5
4540
681)908(1
681
227)681(3
681

227 = G. C. D.

(18)

72)120(1
72
48)72(1
48
24)48(2
48

(19)

75)125(1
75
50)75(1
50
25)50(2
50

(20)

2)64 96 112 136
2)32 48 56 68
2)16 24 28 34
8 12 14 17

2×2×2=8, G. C. D.

24)132(5
120
12)24(2
24

12 = G. C. D.

25)165(6
150
15)25(1
15
10)15(1
10
5)10(2
10

5 = G. C. D.

Art. 90.

(2)

2)4 6 8
2)2 3 4
2)3 2
3

2×2×2×3=24, L. C. M.

(3)

3)6 9 12
2)2 3 4
3 2

3×2×3×2=36, L. C. M.

(4)

2)4 8 10
2)2 4 5
2 5

2×2×2×5=40, L. C. M.

(5)

5)6 10 15
3)6 2 3
2)2 2

5×3×2=30, L. C. M.

(6)

3)6 8 9 12
2)2 8 3 4
2)4 3 2
2 3

3×2×2×2×3=72, L. C. M.

(7)

5)10 12 15 20
2)2 12 3 4
3)6 3 2
2)2 2

5×2×3×2=60, L. C. M.

(8)

3)9 15 18 30
5)3 5 6 10
3)3 6 2
2)2 2

3×5×3×2=90, L. C. M.

(9)

3)12 18 27 36
3)4 6 9 12
2)4 2 3 4
2)2 3 2
3

3×3×2×2×3=108, L. C. M.

(10)

5)15 25 30 50
5)3 5 6 10
2)3 2 2
3

$5\times5\times2\times3=150$, L. C. M.

(11)

7)14 21 30 35
5)2 3 30 5
3)2 3 6
2)2 2

$7\times5\times3\times2=210$, L. C. M.

(12)

7)15 20 21 28
5)15 20 3 4
3)3 4 3 4
2)4 4
2)2 2

$7\times5\times3\times2\times2=420$, L. C. M.

(13)

5)20 24 28 30
3)4 24 28 6
2)4 8 28 2
2)2 4 14
2 7

$5\times3\times2\times2\times2\times7=840$, L. C. M.

(14)

7)45 30 35 42
5)45 30 5 6
3)9 6 6
2)3 2 2
3

$7\times5\times3\times2\times3=630$, L. C. M.

(15)

5)36 40 45 50
3)36 8 9 10
2)12 8 3 10
2)6 4 3 5
3)3 2 3 5
2 5

$5\times3\times2\times2\times3\times2\times5=1800$, L. C. M.

(16)

7)42 56 63
3)6 8 9
2)2 8 3
2)4 3
2 3

$7\times3\times2\times2\times2\times3=504$, L. C. M.

(17)

13)78 104 117
3)6 8 9
2)2 8 3
2)4 3
2 3

$13\times3\times2\times2\times2\times3=936$, L. C. M.

(18)

5)125 150 200
5)25 30 40
2)5 6 8
2)5 3 4
5 3 2

5×5×2×2×5×3×2=3000, L. C. M.

(19)

5)10 24 25 32 45
3)2 24 5 32 9
2)2 8 5 32 3
2)4 5 16 3
2)2 5 8 3
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)

3)16 27 42 108
2)16 9 14 36
3)8 9 7 18
3)8 3 7 6
2)8 7 2
2)4 7
2 7

3×2×3×3×2×2×2×7=3024, L. C. M.

(22)

13)13 29 52 87
29)29 4 87
2)4 3
2 3

13×29×2×2×3=4524, L. C. M.

(23)

5)	120	360	144	720	72
3)	24	72	144	144	72
3)	8	24	48	48	24
2)	8	8	16	16	8
2)	4	4	8	8	4
2)	2	2	4	4	2
			2)	2	2

$5\times3\times3\times2\times2\times2\times2=720$, L. C. M.

Cancellation.

Art. 91.

(4.) $\dfrac{\cancel{13}\times 4}{\cancel{13}} = 4$, *Ans.*

(5.) $\dfrac{\overset{3}{\cancel{17}\times\cancel{18}}}{\cancel{6}} = 51$, *Ans.*

(6.) $\dfrac{\overset{2}{\cancel{15}\times\cancel{8}}}{\cancel{4}} = 30$, *Ans.*

(7.) $\dfrac{\overset{3}{\cancel{24}\times 4}}{\cancel{8}} = 12$, *Ans.*

(8.) $\dfrac{\overset{3}{\cancel{37}\times\cancel{15}}}{\cancel{5}} = 111$, *Ans.*

(9.) $\dfrac{\overset{6}{\cancel{36}}\times\overset{5}{\cancel{40}}}{\cancel{30}\times\cancel{8}} = 6$, *Ans.*

(10.) $\dfrac{\overset{12}{\cancel{36}}\times\cancel{5}}{\cancel{15}} = 12$, *Ans.*

(11.) $\dfrac{\overset{2}{\cancel{42}}\times\overset{5}{\cancel{25}}\times\overset{6}{\cancel{18}}}{\cancel{21}\times\cancel{15}} = 60$, *Ans.*

(12.) $\dfrac{\overset{2}{\cancel{23}\times\cancel{10}}}{\cancel{5}} = 46$, *Ans.*

(13.) $\dfrac{\overset{3}{\cancel{15}}\times\overset{2}{\cancel{14}}}{\cancel{35}} = 6$, *Ans.*

(14.) $\dfrac{\overset{3}{\cancel{21}} \times 11 \times \overset{3}{\cancel{6}} \times \overset{2}{\cancel{26}}}{\underset{2}{\cancel{13}} \times \underset{1}{\cancel{3}} \times \underset{2}{\cancel{14}} \times \underset{1}{\cancel{2}}} = 33$, *Ans.*

(15.) $\dfrac{\overset{7}{\cancel{21}} \times \overset{3}{\cancel{15}} \times \overset{3}{\cancel{33}} \times \overset{2}{\cancel{8}} \times \overset{7}{\cancel{14}} \times \overset{17}{\cancel{17}}}{\underset{4}{\cancel{20}} \times \underset{17}{\cancel{34}} \times \underset{2}{\cancel{22}} \times \underset{9}{\cancel{27}}} = 49$, *Ans.*

(16.) $\dfrac{\overset{3}{\cancel{21}} \times \overset{19}{\cancel{95}} \times \overset{2}{\cancel{6}}}{\underset{5}{\cancel{35}} \times \underset{3}{\cancel{9}}} = 38$, *Ans.*

(17.) $\dfrac{\overset{2}{\cancel{35}} \times \overset{3}{\cancel{39}} \times \overset{4}{\cancel{40}}}{\underset{2}{\cancel{26}} \times \underset{3}{\cancel{30}} \times \underset{3}{\cancel{42}}} = \frac{5}{3} = 1\frac{2}{3}$, *Ans.*

(18.) $\dfrac{\overset{13}{\cancel{26}} \times \overset{11}{\cancel{33}} \times \overset{7}{\cancel{35}}}{\underset{2}{\cancel{4}} \times \underset{3}{\cancel{9}} \times \underset{5}{\cancel{25}}} = \dfrac{13 \times 11 \times 7}{2 \times 3 \times 5} = \frac{1001}{30} = 33\frac{11}{30}$, *Ans.*

(19.) $\dfrac{\overset{3}{\cancel{6}} \times 9 \times \overset{3}{\cancel{15}} \times \overset{7}{\cancel{21}}}{4 \times \underset{2}{\cancel{6}} \times \underset{2}{\cancel{10}} \times \underset{2}{\cancel{14}}} = 5\frac{1}{16}$, *Ans.*

(20.) $\dfrac{\overset{2}{\cancel{3}} \times \overset{4}{\cancel{24}} \times \overset{7}{\cancel{28}} \times \overset{7}{\cancel{35}}}{\underset{2}{\cancel{14}} \times \underset{3}{\cancel{18}} \times \underset{5}{\cancel{20}} \times \underset{5}{\cancel{25}}} = \frac{98}{25} = 3\frac{23}{25}$, *Ans.*

FRACTIONS.

Art. 103.

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

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

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

(3)
3)6
2

(4)
4)12
3

(5)
4)15
$3\frac{3}{4}$

(6)
5)17
$3\frac{2}{5}$

(7)
7)19
$2\frac{5}{7}$

(8)
10)23
$2\frac{3}{10}$

(13)
24)611(25$\frac{11}{24}$
48
131
120
11

(14)
75)3000(40
300
0

(15)
25)775(31
75
25
25

(16)
12)171
$14\frac{3}{12}$

(17)
11)509($46\frac{3}{11}$
44
69
66
3

(18)
298)6437($21\frac{178}{298}$
596
477
298
179

(19)
125)7536($60\frac{36}{125}$
750
36

(20)
19)3781(199
19
188
171
171
171

(21)
101)1325($13\frac{12}{101}$
101
315
303
12

Art. 106.

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

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

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

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

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

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

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

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

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

(11.) 2Ø)72Ø; $\frac{9}{20} \times \frac{36}{36} = \frac{324}{720}$, *Ans.*
36

(12.) 14)2016(144; $\frac{13}{24} \times \frac{144}{144} = \frac{1872}{2016}$, *Ans.*
14
61
56
56
56

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

172

215

215

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

41

401

369

328

328

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

51

34

34

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

162

712

648

648

648

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

21

44

42

21

21

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.) $2)\frac{126}{198} = \frac{63}{99}$: $9)\frac{63}{99} = \frac{7}{11}$, *Ans.*

(11.) $2)\frac{182}{196} = \frac{91}{98}$: $7)\frac{91}{98} = \frac{13}{14}$, *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.) $5)\frac{6465}{73335} = \frac{1293}{14667}$, $\div 3 = \frac{431}{4889}$, *Ans.*

Art. 108.

(2.) $2)\underline{2 \quad 3 \quad 4}$

$1 \quad 3 \quad 2$; $2 \times 3 \times 2 = 12$, L. C. Denominator. Each must be changed to twelfths. If there are $\frac{12}{12}$ in 1, in $\frac{1}{2}$ there are $\frac{1}{2}$ of $\frac{12}{12} = \frac{6}{12}$: $\frac{1}{3}$ of $\frac{12}{12} = \frac{4}{12}$, and $\frac{2}{3} = \frac{8}{12}$: $\frac{1}{4}$ of $\frac{12}{12} = \frac{3}{12}$, 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: $\frac{1}{8} = \frac{1}{8}$ of $\frac{40}{40} = \frac{5}{40}$, and $\frac{3}{8} = \frac{15}{40}$: $\frac{1}{5} = \frac{1}{5}$ of $\frac{40}{40} = \frac{8}{40}$, and $\frac{4}{5} = \frac{32}{40}$: $\frac{1}{10} = \frac{1}{10}$ 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 $4 = \frac{120}{80}$: $\frac{1}{6} = \frac{5}{30}$, 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 $\frac{10}{3} = \frac{40}{12}$: $\frac{1}{4} = \frac{8}{12}$, 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.) $\frac{3}{11} + \frac{7}{11} + \frac{8}{11} + \frac{10}{11} = \frac{28}{11} = 2\frac{6}{11}$, *Ans.*

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

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

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

(10.) $\frac{12}{25} + \frac{16}{25} + \frac{18}{25} + \frac{24}{25} = \frac{70}{25} = 2\frac{20}{25} = 2\frac{4}{5}$, *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; $\frac{1}{2} = \frac{5}{10}$, $\frac{3}{5} = \frac{6}{10}$: $\frac{6}{10} + \frac{5}{10} = \frac{11}{10} = 1\frac{1}{10}$, *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. $= 12$; $\frac{2}{3} = \frac{8}{12}$, $\frac{3}{4} = \frac{9}{12}$, $\frac{5}{6} = \frac{10}{12}$: $\frac{8+9+10}{12} = \frac{27}{12} = 2\frac{3}{12} = 2\frac{1}{4}$, *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)

$\frac{7}{12}$	$\frac{7}{12} = \frac{42}{72}$
$2\frac{5}{6}$	$\frac{5}{6} = \frac{60}{72}$
$3\frac{3}{8}$	$\frac{3}{8} = \frac{27}{72}$
$3\frac{4}{9}$	$\frac{4}{9} = \frac{32}{72}$
8	$\frac{161}{72} = 2\frac{17}{72}$
$2\frac{17}{72}$	

$10\frac{17}{72}$, *Ans.*

(16)

$16\frac{2}{3}$	$\frac{2}{3} = \frac{40}{60}$
$12\frac{3}{4}$	$\frac{3}{4} = \frac{45}{60}$
$8\frac{3}{5}$	$\frac{3}{5} = \frac{36}{60}$
$2\frac{1}{4}$	$\frac{1}{4} = \frac{15}{60}$
38	$\frac{136}{60} = 2\frac{4}{15}$
$2\frac{4}{15}$	

$40\frac{4}{15}$, *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.*

Art. 113.

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

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

(8)

$8\frac{1}{3}$ $\quad \frac{1}{3} + \frac{3}{3} = \frac{4}{3}$

$3\frac{2}{3}$ $\quad \frac{4}{3} - \frac{2}{3} = \frac{2}{3}$

$4\frac{2}{3}$, *Ans.*

(9)

$23\frac{7}{20}$ $\quad \frac{7}{20} + \frac{20}{20} = \frac{27}{20}$

$17\frac{11}{20}$ $\quad \frac{27}{20} - \frac{11}{20} = \frac{16}{20} = \frac{4}{5}$

$5\frac{4}{5}$, *Ans.*

Art. 114.

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

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

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

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

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

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

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

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

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

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

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

Art. 115.

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

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

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

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

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

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

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

(13.) $\frac{\cancel{8}}{13} \times \frac{11}{\cancel{16}\ 2} = \frac{11}{26}$, *Ans.*

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

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

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

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

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

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

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

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

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

(25.) $17\frac{3}{11} = \frac{190}{11}$: $\frac{9}{\cancel{10}} \times \frac{\cancel{190}\ 19}{11} = \frac{171}{11} = 15\frac{6}{11}$, *Ans.*

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

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

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

(29.)

$$2\tfrac{2}{11} = \tfrac{24}{11}: \quad \frac{\cancel{5}}{\cancel{12}_{4}} \times \frac{\cancel{9}}{\cancel{16}_{2}} \times \frac{\cancel{24}^{3}}{11} = \tfrac{45}{88}, \textit{ Ans.}$$

(30.)

$$2\tfrac{1}{16} = \tfrac{33}{16}: \quad \frac{\cancel{33}^{\cancel{3}}}{\cancel{16}} \times \frac{\cancel{3}}{\cancel{11}} \times \frac{\cancel{16}}{\cancel{9}_{\cancel{3}}} = 1, \textit{ Ans.}$$

(31.)

$$\frac{\cancel{27}^{3}}{\cancel{4}_{2}} \times \frac{\cancel{26}^{13}}{\cancel{9}} \times \frac{21}{1} = \tfrac{819}{2} = 409\tfrac{1}{2}, \textit{ Ans.}$$

(32.)

$$\frac{5}{\cancel{2}} \times \frac{11}{3} \times \frac{19}{\cancel{4}} \times \frac{\cancel{8}^{2}}{7} = \tfrac{1045}{21} = 49\tfrac{16}{21}, \textit{ Ans.}$$

(33.)

$$\frac{\cancel{11}}{\cancel{5}} \times \frac{\cancel{55}^{11}}{\cancel{26}_{\cancel{2}}} \times \frac{\cancel{13}}{\cancel{4}} \times \frac{\cancel{16}^{\cancel{4}}}{\cancel{11}^{2}} = 22, \textit{ Ans.}$$

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

(35.)

$$\frac{\cancel{1}}{\cancel{4}_{\cancel{2}}} \times \frac{\cancel{9}}{\cancel{7}} \times \frac{\cancel{4}}{\cancel{5}} \times \frac{\cancel{7}}{\cancel{9}} \times \frac{\cancel{5}}{\cancel{4}} \times \frac{\cancel{2}}{\cancel{3}} \times \frac{\cancel{6}^{\cancel{2}}}{\cancel{1}} = 1, \textit{ Ans.}$$

(36.)
$$\frac{\cancel{6}}{\cancel{7}}\times\frac{4}{9}\times\frac{\cancel{7}}{\cancel{4}}\times\frac{\cancel{1}}{\cancel{6}_{\cancel{3}}}\times\frac{\cancel{3}}{\cancel{4}}\times\frac{\cancel{5}}{\cancel{6}}\times\frac{2}{\cancel{5}}\times\frac{\cancel{20}^{5}}{\cancel{1}}=\tfrac{5}{9},\ \textit{Ans.}$$

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

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 $12=2$: $\frac{5}{6}=2\times5=10$, *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 $27=\frac{135}{12}=11\frac{3}{12}=11\frac{1}{4}$, *Ans.*

(10.) $\frac{7}{12}$ of $28=\frac{196}{12}=16\frac{4}{12}=16\frac{1}{3}$, *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.) $\frac{\cancel{2}}{\cancel{3}}$ of $\frac{\cancel{3}}{\cancel{4}}$ of $\frac{4}{5}=\frac{2}{5}$, *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.) $\frac{\cancel{3}}{5}$ of $\frac{4}{\cancel{9}}$ of $\frac{7}{\cancel{12}_{\cancel{3}}}$ of $\frac{\cancel{18}^{2}}{\cancel{35}_{5}} = \frac{2}{25}$, *Ans.*

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

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

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

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

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

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

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

Art. 118.

(1.) $2\frac{1}{3} = \frac{7}{3}$, $13\frac{1}{5} = \frac{66}{5}$: $\frac{7}{\cancel{3}} \times \frac{\cancel{66}^{22}}{5} = \frac{154}{5} = 30\frac{4}{5}$ ct., *Ans.*

(2.) 3 times $\frac{2}{3} = \frac{6}{3} = \$2$: 5 times $\frac{2}{3} = \frac{10}{3} = \$3\frac{1}{3}$: 7 times $\frac{2}{3} = \frac{14}{3} = \$4\frac{2}{3}$: $\frac{\overset{13}{\not 2}}{} \times \frac{2}{3} = \frac{13}{3} = \$4\frac{1}{3}$: $\frac{\overset{23}{\not 4}}{\underset{2}{}} \times \frac{2}{3} = \frac{46}{6} = \$3\frac{5}{6}$.

(3.) $\frac{\overset{2}{\not 10}}{\not 3} \times \frac{\overset{8}{\not 24}}{\not 5} = 16$ ct., *Ans.*

(4.) $\frac{\overset{4}{\not 16}}{\not 5} \times \frac{\overset{15}{\not 75}}{\not 4} = \$60$, *Ans.*

(5.) $\frac{\not 5}{\not 3} \times \frac{\not 3}{\not 20} = \$1\frac{1}{4}$, *Ans.*

(6.) $\frac{\not 5}{\not 2} \times \frac{\overset{2}{\not 4}}{\not 5} = \$2$, *Ans.*

(7.) $\frac{\overset{10}{\not 50}}{\not 9} \times \frac{\overset{2}{\not 6}}{\not 5} = \frac{20}{3} = \$6\frac{2}{3}$, *Ans.*

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

(9.) $\frac{\not 3}{5}$ of $\frac{2}{\not 3} = \frac{2}{5}$, *Ans.*

(10.) $\frac{2}{9}$ of $\frac{11}{2} = \frac{11}{9}$: $\frac{11}{\not 9} \times \frac{\overset{3}{\not 27}}{4} = \frac{33}{4} = \$8\frac{1}{4}$, *Ans.*

(11.) $\frac{\not 3}{7} \times \frac{5}{\underset{3}{\not 9}} \times \frac{\overset{11}{\not 33}}{\not 2} \times \frac{2}{\not 3} \times \frac{7}{8} \times \frac{\overset{5}{\not 15}}{1} = \frac{275}{8} = 34\frac{3}{8}$, *Ans.*

(12.) $\frac{2}{3} = \frac{8}{12}$, $\frac{3}{4} = \frac{9}{12}$: $\frac{8}{12} + \frac{9}{12} = \frac{17}{12}$: $\frac{\not 2}{\not 3} \times \frac{\not 3}{\underset{2}{\not 4}} = \frac{1}{2}$: $\frac{1}{2} = \frac{6}{12}$: $\frac{17}{12} \times \frac{6}{12} = \frac{23}{12} = 1\frac{11}{12}$, *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.) 1 yd. will cost $\frac{1}{4}$ of $\$\frac{8}{9} = \$\frac{2}{9}$, *Ans.*

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

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

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

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

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

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

(14.) $2\frac{2}{5} = \frac{12}{5}$: $\frac{1}{\cancel{6}_{2}}$ of $\frac{\cancel{12}}{5} = \frac{2}{5}$, *Ans.*

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

(16.) $\frac{5}{\cancel{2}} \times \frac{\overset{8}{\cancel{16}}}{1} = 40$, *Ans.*

(17.) $\frac{\overset{3}{\cancel{24}}}{5} \times \frac{1}{\cancel{8}} = \frac{3}{5}$, *Ans.*

(18.) $\frac{\cancel{6}}{1} \times \frac{5}{\overset{2}{\cancel{12}}} = \frac{5}{2} = 2\frac{1}{2}$, *Ans.*

(19.) $\frac{19}{\cancel{4}} \times \frac{\overset{2}{\cancel{8}}}{41} = \frac{38}{41}$, *Ans.*

(20.) $\frac{\overset{8}{\cancel{8}}\cancel{8}}{7} \times \frac{1}{\cancel{11}} = \frac{8}{7} = 1\frac{1}{7}$, *Ans.*

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

(22.) $\frac{\overset{3}{\cancel{9}}}{\underset{2}{\cancel{4}}} \times \frac{\cancel{2}}{\underset{5}{\cancel{15}}} = \frac{3}{10}$, *Ans.*

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

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

(25.) $\frac{1}{2} \times \frac{\overset{25}{\cancel{50}}}{1} = 25$, *Ans.*

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

(27.) $\frac{\overset{8}{\cancel{56}}}{1} \times \frac{9}{\underset{7}{\cancel{49}}} = \frac{72}{7} = 10\frac{2}{7}$, *Ans.*

(28.) $\frac{\overset{2}{\cancel{14}}}{15} \times \frac{1}{\underset{3}{\cancel{21}}} = \frac{2}{45}$, *Ans.*

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

(31.)
$$\frac{\cancel{3}}{5} \times \frac{\overset{4}{\cancel{8}}}{\underset{3}{\cancel{9}}} \times \frac{7}{\underset{3}{\cancel{6}}} \times \frac{4}{3} = 1\frac{12}{35}, \text{ Ans.}$$

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

(33.)
$$\frac{\cancel{5}}{\underset{6}{\cancel{18}}} \times \frac{\cancel{2}}{\cancel{5}} \times \frac{\overset{3}{\cancel{123}}}{\underset{2}{\cancel{10}}} \times \frac{\cancel{5}}{1} \times \frac{5}{\cancel{41}} = \frac{5}{6}, \text{ Ans.}$$

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

(35.)
$$\frac{\cancel{5}}{\underset{6}{\cancel{18}}} \times \frac{\cancel{2}}{\cancel{5}} \times \frac{\overset{3}{\cancel{123}}}{\cancel{10}} \times \frac{\cancel{5}}{1} \times \frac{\cancel{10}}{\cancel{41}} \times \frac{1}{\underset{2}{\overset{4}{\cancel{20}}}} = \frac{1}{12}, \text{ Ans.}$$

Art. 120.

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

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

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

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

(10.)
$$\frac{5}{\underset{2}{\cancel{6}}} \times \frac{\overset{3}{\cancel{9}}}{8} = \frac{15}{16}, \text{ Ans.}$$

(11.) $\frac{\cancel{7}7}{\cancel{9}} \times \frac{1}{\cancel{11}} = \frac{7}{9}$, *Ans.*

(12.) $\frac{\cancel{3}}{\cancel{21}_{\cancel{32}_{\cancel{4}}}} \times \frac{\cancel{6}}{\cancel{48}_{\cancel{35}_{5}}} = \frac{9}{10}$, *Ans.*

Art. 121.

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

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

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

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

(6.) $\frac{7}{3} \times \frac{2}{9} = \frac{14}{27}$, *Ans.*

(7.) $\frac{\cancel{15}}{\cancel{4}} \times \frac{\cancel{8}^{2}}{\cancel{45}_{3}} = \frac{2}{3}$, *Ans.*

(8.) $\frac{\cancel{88}^{8}}{\cancel{9}} \times \frac{\cancel{27}^{3}}{\cancel{55}_{5}} = \frac{24}{5} = 4\frac{4}{5}$, *Ans.*

(9.) $\frac{\cancel{35}^{7}}{\cancel{4}} \times \frac{\cancel{8}^{2}}{\cancel{45}_{9}} = 1\frac{5}{9}$, *Ans.*

(10.) $\frac{476}{} \times \frac{11}{97} = \frac{5178}{532}$, *Ans.*

Art. 122.

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

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

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

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

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

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

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

(8.) $\frac{\cancel{113}}{\cancel{15}} \times \frac{\overset{4}{\cancel{12}}}{\cancel{113}} \times \frac{19}{\cancel{9}} \times \frac{\cancel{15}}{47} \times \frac{\cancel{5}}{\cancel{4}} \times \frac{\overset{2}{\cancel{6}}}{\cancel{5}} = \frac{38}{47}$, *Ans.*
$\cancel{3}$

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

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

Art. 123.

(1)	(2)	(3)	(4)	(5)
$\$16\frac{1}{16}$	$\$9\frac{1}{8}$	$\$50\frac{1}{4}$	$\$32.31\frac{1}{4}$	$\$5.81\frac{1}{4}$
$9\frac{1}{8}$	$4\frac{7}{16}$	$27\frac{3}{16}$	$15.12\frac{1}{2}$	$1.18\frac{3}{4}$
$5\frac{7}{16}$	$0\frac{3}{8}$	$\$23\frac{1}{16}$	$\$17.18\frac{3}{4}$	$\$4.62\frac{1}{2}$
$21\frac{3}{16}$	$1\frac{5}{8}$			
$\$33\frac{7}{16}$	$\$15\frac{9}{16}$			

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

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

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

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

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

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

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

(13.) $17\frac{2}{3} = \frac{53}{3}$: $\frac{375}{1} \times \frac{53}{3} = 125 \times 53 = 6625$ ct. = $66.25, *Ans.*

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

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

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

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

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

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

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

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

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

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

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

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

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

(28.) $40\frac{1}{2} = \frac{81}{2}$: $\frac{81}{2} \times \frac{32}{1} = 81 \times 16 = 1296$ sq. rd.: 1296 sq. rd. $\div$ 160 = 8 A. 16 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.) $\$\frac{3}{850} \times 100 = \frac{300}{850} = \frac{6}{7}$ 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.) $\frac{3}{320}$ bu. $\times 4 = \frac{3}{80}$ pk.: $\frac{3}{80}$ pk. $\times 8 = \frac{3}{10}$ qt.: $\frac{3}{10}$ qt. $\times 2 = \frac{3}{5}$ 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.) $\frac{5}{8}$ A. $\times$ 160 $= \frac{800}{8}$ sq. rd. $= 100$ sq. rd., *Ans.*

(8.) $\frac{1}{8}$ of 63 gal. $= 7\frac{7}{8}$, and $\frac{7}{8} = 55\frac{1}{8}$ gal.: $\frac{1}{8}$ gal. $\times 4 = \frac{4}{8}$ or $\frac{1}{2}$ qt.: $\frac{1}{2}$ qt. $\times 2 = \frac{2}{2}$ or 1 pt. *Ans.* 55 gal. 1 pt.

Art. 126.

(2.) $\frac{\cancel{4}}{5} \times \frac{1}{8} \times \frac{1}{\cancel{4}} = \frac{1}{40}$ bu., *Ans.*

(3.) $\frac{4}{5} \times \frac{2}{33} = \frac{8}{165}$ rd., *Ans.* ($16\frac{1}{2}$ ft. in a rd. $= \frac{33}{2}$ ft.)

(4.) $\frac{3}{80} \times \frac{1}{16} = \frac{3}{1280}$ lb., *Ans.*

(5.) $\frac{\cancel{4}}{9} \times \frac{1}{100} \times \frac{1}{\cancel{20}\ 5} = \frac{1}{4500}$ T., *Ans.*

(6.) $\frac{3}{5} \times \frac{1}{2} \times \frac{1}{8} \times \frac{1}{4} = \frac{3}{320}$ bu., *Ans.*

(7.) $\frac{\cancel{4}}{7} \times \frac{1}{\cancel{16}\ 4} \times \frac{1}{100} = \frac{1}{2800}$ cwt., *Ans.*

(8.) $\frac{\cancel{3}}{\cancel{4}\ 2} \times \frac{1}{12} \times \frac{\cancel{2}}{\cancel{22}\ 11} = \frac{1}{264}$ rd., *Ans.*

(9.) $\frac{\cancel{8}}{9} \times \frac{1}{60} \times \frac{1}{\cancel{24}\ 3} = \frac{1}{1620}$ da., *Ans.*

(10.) $\frac{\cancel{5}}{112} \times \frac{1}{16} \times \frac{1}{\cancel{100}\ 20} = \frac{1}{35840}$ cwt., *Ans.*

Art. 127.

(2.) 2 ft. 6 in. $=$ 30 in.: 6 ft. 8 in. $=$ 80 in.: $\frac{30}{80} = \frac{3}{8}$, *Ans.*

(3.) 2 pk. 4 qt. $=$ 20 qt.: 1 bu. $=$ 32 qt.: $\frac{20}{32} = \frac{5}{8}$, *Ans.*

(4.) 2 yd. 9 in. = 81 in.: 8 yd. 2 ft. 3 in. = 315 in.: $\frac{81}{315} = \frac{9}{35}$, *Ans.*

(5.) 13 hr. 30 min. = 810 min.: 1 da. × 24 × 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.) $\frac{\cancel{64}^{4}}{9}$ oz. $\times \frac{1}{\cancel{16}} = \frac{4}{9}$, *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.: $\frac{16}{\cancel{3}} \times \frac{\cancel{3}}{203} = \frac{16}{203}$, *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

(5)

	da.	hr.	min.	sec.
$\frac{2}{3}$ wk. =	4	16	0	0
$\frac{5}{9}$ da. =		13	20	0
$\frac{2}{3}$ hr. =			40	0
$\frac{2}{3}$ min. =				40
Ans.	5	6	0	40

(6)

	qt.	pt.	gi.
$\frac{11}{12}$ gal. =	3	1	$1\frac{1}{3}$
$\frac{1}{12}$ qt. =		0	$\frac{2}{3}$
Ans.	3	1	2

(7)

	hr.	min.	sec.
$\frac{7}{9}$ da. =	18	40	0
$\frac{1}{18}$ hr. =		3	20
Ans.	18	36	40

(8)

	ct.
\$ $\frac{5}{8}$ =	$62\frac{1}{2}$
\$ $\frac{3}{40}$ =	$7\frac{1}{2}$
Ans.	55

(9.) $\frac{3}{8}$ lb. = 6 oz.: 6 oz. − $\frac{7}{8}$ oz. = $5\frac{1}{8}$ oz., *Ans.*

(10.) $\frac{1}{7}$ da. = $\frac{24}{7}$ hr.: $\frac{24}{7} - \frac{6}{7} = \frac{18}{7} = 2\frac{4}{7}$ hr.: $\frac{4}{7}$ hr. × 60 = $\frac{240}{7}$ or $34\frac{2}{7}$ min.: $\frac{2}{7}$ min. × 60 = $\frac{120}{7}$ or $17\frac{1}{7}$ sec. *Ans.* 2 hr. 34 min. $17\frac{1}{7}$ sec.

Promiscuous Examples.

Art. 129.

(1.) $\frac{3}{5}\frac{2}{6}\frac{9}{9}\frac{8}{8}\frac{9}{1} = \frac{2999 \times 11}{2999 \times 19} = \frac{11}{19}$, *Ans.*

(2.) $2 + 3 = 5$: $\frac{1}{2} + \frac{2}{3} + \frac{5}{14} + \frac{8}{21} = \frac{21}{42} + \frac{28}{42} + \frac{15}{42} + \frac{16}{42} = \frac{80}{42} = \frac{40}{21} = 1\frac{19}{21}$: $5 + 1\frac{19}{21} = 6\frac{19}{21}$, *Ans.*

(3.) $\frac{25}{7} = \frac{125}{35}$: $\frac{9}{5} = \frac{63}{35}$: $\frac{125-63}{35} = \frac{62}{35} = 1\frac{27}{35}$, *Ans.*

(4.) $3\frac{5}{8} = \frac{29}{8}$: $\frac{1}{3}$ of $3\frac{1}{2} = \frac{1}{3}$ of $\frac{7}{2} = \frac{7}{6}$: $\frac{29}{8} - \frac{7}{6} = \frac{87}{24} - \frac{28}{24} = \frac{59}{24} = 2\frac{11}{24}$, *Ans.*

(5.) $\frac{5}{9}$ of $\frac{7}{10} = \frac{7}{18}$: $\frac{2}{5}$ of $\frac{7}{12} = \frac{7}{30}$: $\frac{7}{18} + \frac{7}{30} = \frac{35}{90} + \frac{21}{90} = \frac{56}{90} = \frac{28}{45}$, *Ans.*

(6.)

$$1\tfrac{3}{4} \div 2\tfrac{1}{2} = \frac{\cancel{7}}{\cancel{4}_{2}} \times \frac{\cancel{2}}{5} = \tfrac{7}{10}: \quad 5\tfrac{1}{2} \div 3\tfrac{1}{8} = \frac{11}{\cancel{2}} \times \frac{\cancel{8}^{4}}{25} = \tfrac{44}{25}:$$

$\frac{7}{10} + \frac{44}{25} = \frac{35}{50} + \frac{88}{50} = \frac{123}{50} = 2\frac{23}{50}$, *Ans.*

(7.) $10 \times \frac{3}{5} = \frac{30}{5} = 6$, *Ans.*

(8.) $10 \div \frac{3}{5} = 10 \times \frac{5}{3} = \frac{50}{3} = 16\frac{2}{3}$, *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.) $\frac{2}{3}$ of $2 = \frac{4}{3} = 1\frac{1}{3}$: $\dfrac{1\frac{1}{3}}{3} = \frac{4}{3} \times \frac{1}{3} = \frac{4}{9}$, *Ans.*

(14.) $\frac{176}{368} = \dfrac{16 \times 11}{16 \times 23} = \frac{11}{23}$, *Ans.*

(15.) $\frac{1}{8} + \frac{1}{18} + \frac{13}{111} = \frac{333}{2664} + \frac{148}{2664} + \frac{312}{2664} = \frac{793}{2664}$: $\frac{25}{37} - \frac{793}{2664} = \frac{1800}{2664} - \frac{793}{2664} = \frac{1007}{2664}$, *Ans.*

(16.)

$$4\tfrac{9}{14} = \tfrac{65}{14}: \quad \frac{\cancel{3}}{\cancel{10}_{2}} \text{ of } \frac{\cancel{7}}{\cancel{12}_{4}} \text{ of } \frac{\cancel{65}^{13}}{\cancel{14}_{2}} = \tfrac{13}{16}: \quad 1 - \tfrac{13}{16} = \tfrac{3}{16}, \textit{ Ans.}$$

(17.) $\frac{2}{3} \div \frac{5}{7} = \frac{2}{3} \times \frac{7}{5} = \frac{14}{15}$: $\frac{5}{8} \div \frac{10}{11} = \frac{\cancel{5}}{8} \times \frac{11}{\cancel{10}} = \frac{11}{16}$: $\frac{14}{15} - \frac{11}{16} = \frac{224}{240} - \frac{165}{240} = \frac{59}{240}$, *Ans.* 2

(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.) $1\frac{1}{4}$ ft. = 15 in. = $\frac{45}{3}$: $3\frac{1}{3} = \frac{10}{3}$: $\frac{10}{45} = \frac{2}{9}$, *Ans.*

(20.) $3\frac{1}{5} + 3\frac{2}{3} = \frac{16}{5} + \frac{11}{3} = \frac{48}{15} + \frac{55}{15} = \frac{103}{15}$. *Ans.* $\frac{48}{103}$ 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 $\frac{12}{12}$, the elder one's share = \$5280; if \$5280 are $\frac{16}{35}$ of the whole estate, $\frac{1}{35}$ is \$330, and $\frac{35}{35}$ = \$11550; \$2200 + \$5280 = \$7480; \$11550 − \$5280 = \$4070; each daughter had $\frac{1}{3}$ of \$4070 = \$1356$\frac{2}{3}$, *Ans.*

PRACTICE.

Art. 130.

(3.) $12\frac{1}{2} = \frac{25}{2}$: $18\frac{3}{4}$ ct. = \$$\frac{3}{16}$: $\frac{25}{2} \times \frac{3}{16} = \$\frac{75}{32} = \$2.34\frac{3}{8}$, *Ans.*

(4.)
$$\$2.25 = \$2\tfrac{1}{4} = \frac{\cancel{9}^{3}}{\cancel{4}} \times \frac{\cancel{16}^{4}}{\cancel{3}} = 12 \text{ yd., } \textit{Ans.}$$

(5.) $\frac{11}{2} \times \frac{5}{8} = \frac{55}{16}$: \$$\frac{1}{16}$ = $6\frac{1}{4}$ ct.; \$$\frac{55}{16}$ = \$3.43$\frac{3}{4}$, *Ans.*

(6.) $\$66.25 = \frac{265}{4}$: $\$3.75 = 3\frac{3}{4} = \frac{15}{4}$: $\frac{\cancel{265}^{53}}{\cancel{4}} \times \frac{\cancel{4}}{\cancel{15}_{3}} = \frac{53}{3} = 17\frac{2}{3}$ doz., *Ans.*

(7.) $\$2.37\frac{1}{2} = 2\frac{3}{8} = \frac{19}{8}$: $\frac{19}{\cancel{8}} \times \frac{\cancel{80}^{10}}{1} = \$190$, *Ans.*

(8.) $\$4.87\frac{1}{2} = 4\frac{7}{8} = \frac{39}{8}$: $\frac{\cancel{39}}{1} \times \frac{8}{\cancel{39}} = 8$ men, *Ans.*

(9.) $\$8.33\frac{1}{3} = 8\frac{1}{3} = \frac{25}{3}$: $\frac{25}{\cancel{3}} \times \frac{\cancel{36}^{12}}{1} = \$300$, *Ans.*

(10.) $\$246.66\frac{2}{3} = 246\frac{2}{3} = \frac{740}{3}$: $\$1.33\frac{1}{3} = 1\frac{1}{3} = \frac{4}{3}$: $\frac{\cancel{740}^{185}}{\cancel{3}} \times \frac{\cancel{3}}{\cancel{4}} = 185$ yd., *Ans.*

(12.) $\$18\frac{1}{3} = \frac{55}{3}$: $\$229\frac{1}{6} = \frac{1375}{6}$: $\frac{\cancel{1375}^{275}}{\cancel{6}_{2}} \times \frac{\cancel{3}}{\cancel{55}_{11}} = \frac{275}{22} = 12\frac{1}{2}$, *Ans.*

(13.) 120 sq. rd. $= \frac{3}{4}$ A. $\$125.60 \times 11 = \$1381.60 =$ cost of 11 A.: $\frac{3}{4}$ of $\$125.60 = \$94.20 =$ cost of 120 sq. rd.: $\$1381.60 + \$94.20 = \$1475.80$, *Ans.*

(14.) $\frac{10000}{250} = 40$ lots. 50 ft. $\times$ 150 ft. $= 7500$ sq. ft.: 7500 sq. ft. $\times 40 = 300000$ sq. ft., $\div 9 = 33333$ sq. yd. $+ 3$ sq. ft.: 33333 sq. yd. $\div 30\frac{1}{4} = 1101$ sq. rd. $+ 27\frac{3}{4}$ sq. yd.: $\frac{3}{4}$ sq. yd. $= \frac{27}{4}$ sq. ft. $= 6$ sq. ft. $+ \frac{3}{4}$; $\frac{3}{4}$ sq. ft. $\times 144 = 108$ sq. in.; 6 sq. ft. $+ 3$ sq. ft. $= 9$ sq. ft. $= 1$ sq. yd., which added to $27 = 28$ sq. yd.: 1101 sq. rd. $\div 160 = 6$ A. 141 sq. rd. *Ans.* 6 A. 141 sq. rd. 28 sq. yd. 108 sq. in.

(15.) 2 qt. $= \frac{1}{4}$ pk. $= \frac{1}{16}$ bu.: 3 pk. $= \frac{3}{4}$ or $\frac{12}{16}$ bu.: \$6.20 $= \$6\frac{1}{5} = \frac{31}{5}$: $83\frac{13}{16} = \frac{1341}{16}$; $\times \frac{31}{5} = \frac{41571}{80} = \$519.63\frac{3}{4}$, *Ans.*

(16.)
$$167\tfrac{1}{2} = \tfrac{335}{2}: \quad \frac{335}{\cancel{2}} \times \frac{\overset{2}{\cancel{4}}}{3} = \tfrac{670}{3} = 223\tfrac{1}{3} \text{ bu.}: \tfrac{1}{3} \text{ bu.} = \tfrac{4}{3}$$
or $1\frac{1}{3}$ pk.: $\frac{1}{3}$ pk. $= \frac{8}{3}$ or $2\frac{2}{3}$ qt.: $\frac{2}{3}$ qt. $= \frac{4}{3}$ or $1\frac{1}{3}$ pt. *Ans.* 223 bu. 1 pk. 2 qt. $1\frac{1}{3}$ pt.

(17.) \$1.75 $= 1\frac{3}{4}$ or $\frac{7}{4}$: $\frac{7}{2} \times \frac{7}{4} = \frac{49}{8} = \$6.12\frac{1}{2}$, *Ans.*

(18.)
$$\$1.50 = \tfrac{3}{2}; \ \$7.12\tfrac{1}{2} = \tfrac{57}{8}: \quad \frac{\overset{19}{\cancel{57}}}{\underset{4}{\cancel{8}}} \times \frac{\cancel{2}}{\cancel{3}} = \tfrac{19}{4} = 4\tfrac{3}{4} \text{ yd., } \textit{Ans.}$$

(19.) 12 oz. $= \frac{12}{16}$ or $\frac{3}{4}$ lb.: $45\frac{3}{4}$ lb. $= \frac{183}{4}$: $\frac{183}{4} \times \frac{3}{8} = \frac{5493}{32} = \$17.15\frac{5}{8}$, *Ans.*

(20.) $\$0.93\frac{3}{4} = \left\{ \begin{matrix} 87\frac{1}{2} = \frac{7}{8} = \frac{14}{16} \\ 6\frac{1}{4} \qquad = \frac{1}{16} \end{matrix} \right\} = \frac{15}{16}$: $\$2\frac{15}{16} = \$\frac{47}{16}$:
$$\frac{\overset{47}{\cancel{16}}}{\underset{2}{\cancel{8}}} \times \frac{\cancel{8}}{1} = \tfrac{47}{2} = 23\tfrac{1}{2} \text{ lb., } \textit{Ans.}$$

(21.) 2 T. 9 cwt. $= 49$ cwt.: $37\frac{1}{2}$ ct. per lb. $= \$37\frac{1}{2}$ per cwt.: $\frac{49}{1} \times \frac{75}{2} = \$1837.50$, *Ans.*

(22.)
$$\$3.90 = 3\tfrac{9}{10} = \tfrac{39}{10}: \quad \frac{\overset{5}{\cancel{10}}\ \overset{2}{\cancel{100}}}{\underset{4}{\cancel{12}}} \times \frac{\overset{13}{\cancel{39}}}{\cancel{10}} = \$32.50, \textit{ Ans.}$$

(23.)
$$3\tfrac{3}{4} = \tfrac{15}{4}; \ \$5.40 = 5\tfrac{4}{10} = \tfrac{54}{10}: \quad \frac{\overset{3}{\cancel{15}}}{\underset{2}{\cancel{4}}} \times \frac{\overset{27}{\cancel{54}}}{\underset{2}{\cancel{10}}} = \$20.25, \textit{ Ans.}$$

(24.) $\frac{13}{\cancel{2}} \times \frac{1}{\cancel{3}} \times \frac{\cancel{12}}{1}$ (1 doz.) $= \$26.$

$\frac{75}{2} \times \frac{3}{8} = \frac{225}{16} = \$14.06\frac{1}{4}$ $\Big\} = \$40.06\frac{1}{4}$:

$\$40.06\frac{1}{4} - \$36 = \$4.06\frac{1}{4} = \$4\frac{1}{16} = \$\frac{65}{16}$: $\frac{65}{\cancel{16}} \times \frac{\cancel{8}}{1} = \frac{65}{2} =$

$32\frac{1}{2}$ 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
(6.) .35
(7.) .87
(8.) 4.19
(9.) .005
(10.) .054
(11.) .304
(12.) 7.293
(13.) 25.047
(14.) .0205
(15.) .4125

(16.) .00009
(17.) .900
(18.) .00605
(19.) .20304
(20.) .000007
(21.) .000203
(22.) .300004
(23.) .0000024
(24.) .0080006
(25.) .000200
(26.) .00000002

(27.) .00000907
(28.) .20020003
(29.) 1.010100
(30.) .01010001
(31.) 106.037
(32.) 1000.001
(33.) .225
(34.) 200.025
(35.) .002929
(36.) 2900.000029
(37.) .001000005
(38.) .0000000202
(39.) 200.0000000002
(40.) 65.006005
(41.) .3 .7 .09 .17 .23 .41 .53
(42.) .87 .97 .123. .289 .487 .733
(43.) .003 .0101 .00053 .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.) $\frac{9}{10}$; $\frac{13}{100}$; $\frac{19}{100}$; etc.

(17.) $\frac{91}{100}$; $\frac{347}{1000}$; $\frac{513}{1000}$; 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.) $\frac{1}{1000}$; $\frac{5302}{10000}$; $8\frac{1}{100}$; $\frac{53}{1000000}$.

Art. 141.

(2.) $.6 = \frac{6}{10} = \frac{3}{5}$, *Ans.* (3.) $.25 = \frac{25}{100} = \frac{1}{4}$, *Ans.*

(4.) $.375 = \frac{375}{1000} = \frac{3}{8}$, *Ans.*

(5.) $.035 = \frac{35}{1000} = \frac{7}{200}$, *Ans.*

(6.) $.5625 = \frac{5625}{10000} = \frac{9}{16}$, *Ans.*

(7.) $.34375 = \frac{34375}{100000} = \frac{11}{32}$, *Ans.*

(8.) $.1484375 = \frac{1484375}{10000000} = \frac{19}{128}$, *Ans.*

(9.) $4.02 = 4\frac{2}{100} = 4\frac{1}{50}$, *Ans.*

(10.) $8.415 = 8\frac{415}{1000} = 8\frac{83}{200}$, *Ans.*

Art. 142.

(2.) $\frac{4}{5} = \frac{4.0}{5} = .8$, *Ans.* (3.) $\frac{5}{8} = \frac{5.000}{8} = .625$, *Ans.*

(4.) $\frac{7}{25} = \frac{7.00}{25} = \frac{1.40}{5} = .28$, *Ans.*

(5.) $\frac{3}{40} = \frac{3.000}{40} = .075$, *Ans.*

(6.) $\frac{15}{16} = \frac{15.0000}{16} = .9375$, *Ans.*

(7.) $\frac{1}{1250} = \frac{1.0000}{1250} = .0008$, *Ans.*

(8.) $\frac{9}{400} = \frac{9.0000}{400} = .0225$, *Ans.*

(9.) $\frac{1}{256} = \frac{1.00000000}{256} = .00390625$, *Ans.*

(10.) $\frac{5}{6} = \frac{5.0000}{6} = .8333+$, *Ans.*

(11.) $\frac{1}{11} = \frac{1.000000}{11} = .090909+$, *Ans.*

(12.) $\frac{4}{33} = \frac{4.000000}{33} = .121212+$, *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
485.08983	40.19944		

(6)	(7)	(8)	(9)
6.61	4.8	45.019	432.432
636.1	43.31	7.00071	61.0793
6516.14	74.019	93.4327	100.07794
67.1234	11.204	6.0401	6.009
5.1233	133.333	151.49251	1000.1001
7231.0967			1599.69834

(10)	(11)	(12)
16.041	204.0009	.0035
9.000094	103.00000009	.00035
33.27	42.009099	.000035
8.969	430.99	.0000035
32.719906	220.0000009	.0038885
100.000000	999.99999999	

Art. 144.

(2)	(3)	(4)	(5)
97.5168	20.014	5.03	24.0042
38.25942	7.0021	2.115	13.7013
59.25738	13.0119	2.915	10.3029

(6)	(7)	(8)	(9)
170.0035	.0142	.05	13.5
68.00181	.005	.0024	8.037
102.00169	.0092	.0476	5.463

(10)	(11)	(12)
3.00000	29.0029	5.000
.00003	19.003	.125
2.99997	9.9999	4.875

(13)	(14)	(15)
1000.0000	1.000000	.025
.0001	.000001	.000025
999.9999	.999999	.024975

Art. 147.

(4)	(5)	(6)	(7)
33.21	32.16	.125	.35
4.41	22.5	9	7
3321	16080	1.125	2.45
13284	6432		
13284	6432		
146.4561	723.600		

(10.) $.15 \times .7 = \frac{15}{100} \times \frac{7}{10} = \frac{105}{1000} = .105$, *Ans.*

(13.) $1.035 \times 17 = 17.595$, *Ans.*

(14)	(15)	(16)	(17)
19	4.5	.625	61.76
.125	4	64	.0071
95	18.0	2500	6176
38		3750	43232
19		40.000	.438496
2.375			

(18)

1.325
.0716
7950
1325
9275
.0948700

(24)

.1
.01
.001

(25)

100
.0001
00.0100 = .01, *Ans.*

(26)

.043
.0021
43
86
.0000903

(27)

40000
.000001
.040000

(28)

.09375
1.064
37500
56250
93750
.09975000

Art. 150.

SUGGESTIONS TO TEACHERS.—The division of decimals is generally a troublesome subject to pupils; this arises from a want of attention to the rule. Should the pupil be at a loss to understand why, in some cases, when the divisor and dividend are both decimals, the quotient should be a whole number, let him read the remarks on the division of fractions, page 120. When the divisor contains more decimal places than the dividend, it is best, before commencing the division, to reduce them both to the same denomination, that is, to make the number of decimal places the same in both; the quotient will then be a whole number.

(7)

.03)1.125
37.5, *Ans.*

(8)

27.5)86.075(3.13, *Ans.*
825
357
275
825
825

(9)

3.44)24.73704(7.191, *Ans.*
2408
657
344
3130
3096
344
344

(10)

4.123)206.166492(50.004, *Ans.*
20615
16492
16492

(13)

.5)21.0(42, *Ans.*
20
10
10

(14)

.008)2.000
250, *Ans.*

(15)

5)37.20
7.44, *Ans.*

(16)

454)100.8788(.2222, *Ans.*
908
1007
908
998
908
908
908

(18)

.108649)9811.004700(90300, *Ans.*
977841
325947
325947
00

(19)

.19).21318(1.122, *Ans.*
19
23
19
41
38
38
38

(20)

.3189)102048.0000(320000, *Ans.*
9567
6378
6378
0000

(21)

3189).102048(.000032, *Ans.*
9567
6378
6378

(22)

.0225)9.9000(440, *Ans.*
900
900
900
0

(26) 10)$\overline{.10}$ .01, *Ans.*

(27) .1)$\overline{1.0}$ 10, *Ans.*

(28) .01)$\overline{10.00}$ 1000, *Ans.*

(29.) $\frac{1.7}{64} = \frac{1.7000000}{64} = .0265625$, *Ans.*

(30) 80)$\overline{.080}$ .001, *Ans.*

(31) 7)$\overline{1.5000000}$ .2142857+, *Ans.*

(32)

32.76)11.100000000(.3388278+ *Ans.*

9828

12720

9828

28920

26208

27120

26208

9120

6552

25680

22932

27480

26208

(33)

3.21).0123000000(.00383177+ *Ans.*

963

2670

2568

1020

963

570

321

2490

2247

2430

2247

Art. 151.

(2.) .035 pk. × 8 = .280 qt.: .28 qt. × 2 = .56 pt., *Ans.*

(3.) .0075 bu. × 4 = .0300 pk.: .03 pk. × 8 = .24 qt., *Ans.*

(4.) .005 yd. × 3 = .015 ft., × 12 = 0.180 in. = .18 in., *Ans.*

(5.) .00546875 A. × 160 = 00.87500000 sq. rd. = .875 sq. rd., *Ans.*

Art. 152.

(2.) .75 yd. $\times$ 3 = 2.25 ft.: .25 ft. $\times$ 12 = 3.00 in. *Ans.* 2 ft. 3 in.

(3.) .3375 A. $\times$ 160 = 54.0000 sq. rd. = 54 sq. rd., *Ans.*

(4.) .7 lb. $\times$ 12 = 8.4 oz.: .4 oz. $\times$ 20 = 8.0 pwt. = 8 pwt. *Ans.* 8 oz. 8 pwt.

(5.) .8125 bu. $\times$ 4 = 3.2500 pk.: .25 pk. $\times$ 8 = 2.00 qt. = 2 qt. *Ans.* 3 pk. 2 qt.

(6.) .44 mi. $\times$ 320 = 140.8 rd.: .8 rd. $\times$ $5\frac{1}{2}$ = 4.4 yd.: .4 yd. $\times$ 3 = 1.2 ft.: .2 ft. $\times$ 12 = 2.4 in. *Ans.* 140 rd. 4 yd. 1 ft. 2.4 in.

(7.) .33625 cwt. $\times$ 100 = 33.625 lb.: .625 lb. $\times$ 16 = 10.000 oz. = 10 oz. *Ans.* 33 lb. 10 oz.

Art. 153.

(2.) .72 qt. $\div$ 8 = .09 pk., $\div$ 4 = .0225 bu., *Ans.*

(3.) .77 yd. $\div$ $5\frac{1}{2}$ = .14 rd., $\div$ 320 = .0004375 mi., *Ans.*

(4.) .25 pt. $\div$ 2 = .125 qt., $\div$ 4 = .03125 gal., *Ans.*

(5.) .6 pt. $\div$ 2 = .3 qt., $\div$ 8 = .0375 pk. $\div$ 4 = .009375 bu., *Ans.*

(6.) .7 rd. $\div$ 320 = .0021875 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 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.: $\$0.625 \times 14.857 = \$9.296875$, *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 $\$\frac{49}{63} = \$\frac{7}{9} = \$0.77\frac{7}{9}$: $464 \times .77\frac{7}{9} = \$360.88$, *Ans.*

(12.) .34 yd. $\times 3 = 1.02$ ft.:
.02 ft. $\times 12 = .24$ in.:
1.07 ft.: .07 ft. $\times 12 = .84$ in.

	ft.	.in
	1	.24
	1	.84
		8.92
Ans.	2	10.00

(13.) .625 gal. $\times 4 = 2.500$ qt.:
.5 qt. $\times 2 = 1.0$ pt.:
.75 qt. $\times 2 = 1.5$ pt.

	qt.	pt.
	2	1
		1.5
Ans.	3	.5

(14.) 1.53 yd. $\times 3 = 4.59$ ft.:
.59 ft. $\times 12 = 7.08$ in.

	ft.	in.
	4	7.08
	2	3.08
Ans.	2	4

(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 da. $\times$ .3 = 109.575 da.: .575 da. $\times$ 24 = 13.8 hr.: .8 hr. $\times$ 60 = 48 min. *Ans.* 109 da. 13 hr. 48 min.

(18.) 3 in. = $\frac{1}{4}$ ft.: $2\frac{1}{4}$ or $\frac{9}{4}$ ft. = $\frac{3}{4}$ yd.: $343\frac{3}{4} \times \$0.16 = \$55.00$, *Ans.*

(19.) 17 mi. 135 rd. = 17.421875 mi.: $\$690.35 \times 17.421875 = \$12027.19140625$, *Ans.*

THE METRIC SYSTEM.

Art. 160.

(3.) 20 Km. $\times$ .62137 = 12.42740 mi., *Ans.*

(4.) 160 acres $\div$ 2.471 = 64.75+ Ha., *Ans.*

(5.) 49 m. $\times$ 39.37 = 1929.13 in., $\div$ 12 = 160 ft. 9.13 in.: 160 ft. $\div$ 3 = 53 yd. 1 ft.: 53 yd. $\div 5\frac{1}{2} = 9$ rd. $3\frac{1}{2}$ yd.: $\frac{1}{2}$ yd. = $\frac{3}{2}$ or $1\frac{1}{2}$ ft.; $\frac{1}{2}$ ft. = 6 in.; 9.13 in. + 6 in. = 15.13 in. = 1 ft. 3.13 in.; 1 + 1 + 1 = 3 ft. = 1 yd.; 3 yd. + 1 yd. = 4 yd. *Ans.* 9 rd. 4 yd. 3.13 in.

(6.) 15 g. $\times$ 15.432 = 231.480 gr. T., $\div$ 24 = 9 pwt. 15.48 gr., *Ans.*

(7.) 42 bu. $\div$ 2.8375 = 14.8+ Hl., *Ans.*

(8.) 500 sters $\times$ .2759 = 137.95 C., *Ans.*

(9.) 9 m. $\times$ 5 m. = 4.5 m^2., $\times$ 1.196 = 5.382 sq. yd., *Ans.*

(10.) 32 l. $\times$ 1.0567 = 33.8144 qt., $\div$ 4 = 8.4536 gal., *Ans.*

Art. 161.

(1.) 127 dl. + 234.5 dl. = 361.5 dl., $\div$ 10 = 36.15 l.: 1563 cl. $\div$ 100 = 15.63 l.: 4.87 l. + 36 15 l. + 15.63 l. = 56.65 l., *Ans.*

(2.) 45 Ha. = 4500 a., @ \$3.32 = \$14940, *Ans.*

(3.) $457.92 \div 3 = 152.64$ m., *Ans.*

(4.) $.72 \times .48 \times .5 = .1728$: \$.8640 $\div .1728 =$ \$5, *Ans.*

(5)

380)454.10(1.195
380 *Ans.* \$1.195
741
380
3610
3420
1900
1900

(6)

4685
1.6
28110
4685
7496.0

Ans. 7496 Hl.

(7)

346.75)194.1800(0.56
173375
208050
208050

Ans. \$0.56

(8.) 1 M. $\times 100 = 100$ cm.: $100 \div 2 = 50$, the number of coins: 50×5 g. $= 250$ g., *Ans.*

(9.) $1.25 \times 6.5 = 8.125, \div 1.85 = 4.39+$ m., *Ans.*

(10.) 60 mi. $\div .62137 = 96.56+$ Km., *Ans.*

(11.) 29 Mm. $\times$ 22.4 Mm. $= 649.6$ Mm^2, *Ans.*

(12.) 13.24 Km. $\times$ 1000 $=$ 13240 m., $\div .715$ m. $=$ 18517+, which would, of course, necessitate his taking 18518 steps, *Ans.*

NOTE.—The answer to the example given here is also 18517+ steps.

PERCENTAGE.

Art. 164.

(6)

165
$.03\frac{1}{3}$
495
55
5.50, *Ans.*

(7.) $240 \times .03\frac{3}{4} = 9$, *Ans.*

(14.) $8\frac{1}{3}\% = \frac{1}{12}$: $\frac{1}{12}$ of $384 = 32$, *Ans.*

(16.) $12\frac{1}{2}\% = \frac{1}{8}$: $\frac{1}{8}$ of $292 = 36.5$, *Ans.*

(19.) $18\frac{3}{4} = \frac{3}{16}$: $\frac{\overset{.7}{\not 11.2}}{1} \times \frac{3}{\not 16} = 2.1$, *Ans.*

(20.) $20\% = \frac{1}{5}$: $\frac{\overset{1.97}{\not 9.85}}{1} \times \frac{1}{\not 5} = 1.97$, *Ans.*

(21.) $25\% = \frac{1}{4}$: $\frac{1}{4}$ of $43 = 10.75$, *Ans.*

(22.) $33\frac{1}{3}\% = \frac{1}{3}$: $\frac{1}{3}$ of $6.93 = 2.31$, *Ans.*

(23.) $45 \times 5.7 = 2.565$, *Ans.*

(24.) $50\% = \frac{1}{2}$: $\frac{1}{2}$ of $38.75 = 19.375$, *Ans.*

(25.) $\frac{1}{2}\% = \frac{1}{200}$: $\frac{1}{200}$ of $456 = 2.28$, *Ans.*

(26.) $\frac{3}{8}\% = .00375$: $464 \times .00375 = 1.74$, *Ans.*

(27.) $\frac{7}{16} = .4375$: $144 \times .4375 = 63$, *Ans.*

(28.) $125\% = \frac{5}{4}$: $\frac{5}{4}$ of $36 = 45$, *Ans.*

(29.) 208% of $650 = 650 \times 2.08 = 1352$, *Ans.*

(30.) $4\frac{1}{2}$ times $12 = 48 + 6 = 54$, *Ans.*

(31.) 10 times $24.75 = 247.5$, *Ans.*

Art. 165.

(3.) 3 is $\frac{1}{5}$ of 15: $\frac{1}{5} = 20\%$, *Ans.*

(4.) 6 is $\frac{3}{25}$ of 50: $\frac{3}{25} = .12 = 12\%$, *Ans.*

(5.) 4.5 is $\frac{4.5}{75}\%$ of $75 = \frac{3}{5} = .6 = 6\%$, *Ans.*

(11)

$$243)8.505(.035 = 3\tfrac{1}{2}\%, \textit{ Ans.}$$
$$729$$
$$1215$$
$$1215$$

(12.) $.002$ of $2 = .002 \div 2 = .001 = \frac{1}{10}$ of 1%, *Ans.*

(13.) $13.245 \div 3532 = .00375 = \frac{375}{100000} = \frac{3}{8}\%$, *Ans.*

(14.) $\frac{\cancel{3}}{\cancel{25}\ 5} \times \frac{\cancel{5}}{4} = \frac{3}{20} = 15\%$, *Ans.*

(15.) $\frac{\cancel{2}}{\cancel{15}\ 5} \times \frac{\cancel{3}}{\cancel{2}} = \frac{1}{5} = 20\%$, *Ans.*

(16.) $\frac{\cancel{2}}{\cancel{7}} \times \frac{\overset{3}{\cancel{21}}}{\cancel{16}\ 8} = \frac{3}{8} = 37\frac{1}{2}\%$, *Ans.*

(17.) $\frac{\overset{3}{\cancel{21}}}{4} \times \frac{3}{\cancel{35}\ 5} = \frac{9}{20} = 45\%$, *Ans.*

(18.) $\frac{\cancel{65}}{\cancel{6}\ 2} \times \frac{\overset{3}{\cancel{9}}}{\cancel{520}\ 8} = \frac{3}{16} = 18\frac{3}{4}\%$, *Ans.*

Art. 166.

(3.) $20\% = \frac{1}{5}$: $60 \times 5 = 300$, *Ans.*

(4.) $75\% = \frac{3}{4}$. If 90 is $\frac{3}{4}$, $\frac{1}{4} = 30$, and $\frac{4}{4} = 120$, *Ans.*

(5.) $125\% = \frac{5}{4}$. If 85 is $\frac{5}{4}$, $\frac{1}{4} = 17$, and $\frac{4}{4} = 68$, *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 $45\% = \frac{270}{10} = 27\%$: $540 \div .27 = 2000$ A., *Ans.*

(13.) $371.29 \div 1.07 = \$347$, *Ans.*

(14.) $18 + 15 + 23 + 12 = 68\%$: $100 - 68 = 32\%$: $\$800 \times .32 = \$256$, *Ans.*

(15.) $\frac{1}{20} = 5\%$: $\frac{17}{20} = 17 \times 5 = 85\%$, *Ans.*

(16.) $33\frac{1}{3}\% = \frac{1}{3}$: 2 bu. 3 pk. $= \frac{1}{3}$ of 6 bu. 9 pk. $= 8$ bu. 1 pk., *Ans.*

(17.) 100% less $7\frac{1}{2}\% = 92\frac{1}{2}\%$: $37 \div .925 = 40$, *Ans.*

(18.) $25.8 - 2.58$ $(10\%) = 23.22$ 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 × .05 = \$12, *Ans.*

(2.) 11.50 ÷ 460 = .02½ = 2½%, *Ans.*

(3.) \$8.12½ = 2½% of the selling price: \$8.12½ ÷ .02½ = \$325, selling price: 1 barrel sold for $\frac{1}{25}$ of \$325 = \$13, *Ans.*

(4.) 210 ÷ 1.05 = \$200, *Ans.*

(5.) \$180 × .04 = \$7.20: \$180 — \$7.20 = \$172.80, *Ans.*

(6.) If \$11.25 = $\frac{1}{20}$ (5%), $\frac{20}{20}$ = \$225, *Ans.*

(7.) \$1323.54 ÷ 1.08 = \$1225.50, cost of goods: \$1323.54 — \$1225.50 = \$98.04, commission, *Ans.*

(8.)
$$\left.\begin{array}{rrr} 250 \times & \$15 & = \$3750 \\ 175 \times & \$7 & = 1225 \\ 1456 \times & \$0.25 & = 364 \end{array}\right\} = \$5339$$

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, × .05 = 24.17+: \$483.44 — \$24.17 = \$459.27, *Ans.*

(3.) 100% — 3% = 97%: 1430.75 ÷ .97 = \$1475, *Ans.*

(4.) 100% — 5% = 95%: \$390.45 ÷ .95 = \$411: 100% — 25% = 75%: \$411 ÷ .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 ÷ .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 (7½%) = \$29.97, *Ans.*

(7.) \$50 less 50% = \$25, less 10% = \$22.50, less 10% = \$20.25, less 2% = \$19.845, ÷ 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 ÷ .04 = \$382.50, *Ans.*

(5.) $37\frac{1}{2}\% = \frac{3}{8}$: \$8 + 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 × 16 = \$4, *Ans.*

(9.) \$1.35 = $\frac{9}{10}$ of the cost, $\frac{1}{10}$ = \$0.15, and $\frac{10}{10}$ = \$1.50 = 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 ct. × 10000 = \$6000, cost of the corn: 65 ct. × 7000 = \$4550: 10000 — 7000 = 3000: 55 ct. × 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 $\frac{3}{3} =$ \$9000 = cost of house and lot. The profit was \$3000. On the city lots he lost $\frac{1}{3}$. $\frac{1}{3}$ of 12000 = 4000: \$4000 — \$3000 = \$1000, *Ans.*

Art. 175.

(1.) $100\% - 20\% = 80\%$, cost price. If he 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$\frac{1}{4}$ = cost per pair: \$4.25 — \$3.56$\frac{1}{4}$ = \$0.68$\frac{3}{4}$ = gain per pair: $5 \times 12 =$ 60 = number of pairs: $60 \times$ \$0.68$\frac{3}{4}$ = \$41.25, *Ans.*

(4.) The profit on 36 hats equals 36 times $37\frac{1}{2}$ ct., which is \$13.50. If \$13.50 $= \frac{1}{8}$ of the cost, $\frac{8}{8}$ are 8 times \$13.50 = \$108: \$108 $= \frac{9}{10}$ of the list price: $\frac{1}{10} =$ \$12, $\frac{10}{10} =$ \$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 $2\frac{1}{2}\% =$ \$926.25, 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.) 60×70 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. $139\frac{3}{4} \times 75 = \$10481.25$
$\frac{1}{4}\%$ brokerage on \$7500 = 18.75
\$10500.00, *Ans.*

(2.) $\$8000 \times 1.10 = \$8800$
$\frac{1}{8}\%$ brokerage on \$8000 = 10
\$8810, *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.) $\$25000 \times 1.14\frac{1}{4} = \$28562.50$
$\frac{1}{8}\%$ brokerage on \$25000 = 31.25
\$28593.75, *Ans.*

(5.) $19\frac{1}{4} + \frac{1}{4} = 19\frac{1}{2}$ or 19.5: $\$1560 \div 19.5 = 80$, *Ans.*

(6.) $100 \div 1.05 = 95\frac{5}{21}$ ct., *Ans.*

(7.) $1.12\frac{1}{2} = 1\frac{1}{8} = \frac{9}{8}$: $100 \times \frac{8}{9} = \frac{800}{9} = 88\frac{8}{9}$ ct., *Ans.*

(8.) $35\frac{5}{7} = \frac{250}{7}$: $100 \times \frac{7}{250} = 2.80 = 280$, *Ans.*

(9.) $\$8946.25 \div 1.0525 = \$8500$, *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: $\$750 \div 25000 = .03 =$ gold premium: $103 =$ *Ans.*

Art. 180.

(1.) $\$39900 \times .06 = \$2394$, *Ans.*

(2.) $\$39900 \div 1.05 = \$38000$: $\$38000 \times .06 = \$2280$, *Ans.*

(3.) $\$39900 \div .95 = \$42000$: $42000 \times .06 = \$2520$, *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 ÷ 1.16 = $4500 = amount in bonds; $4500 × .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. $4.5 + (\frac{1}{20}$ of $4.5)$ or .225 = 4.725: 4.725 ÷ 1.08 = $4\frac{3}{8}$%, *Ans.*

(7.)
$$37\tfrac{1}{2}\% = \tfrac{3}{8}: \quad \frac{\cancel{6}\,\%}{1} \times \frac{8}{\cancel{3}} = 16\%, \text{ Ans.}$$

(8.) $1921 ÷ 1.13 = $1700 = annual income in gold. $1700 ÷ .05 = $34000: $34000 × 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 ÷ .0925 = $10000 = 100 shares, *Ans.*

(10.) $6 = \frac{3}{4}$ of 8: $\frac{3}{4} = 75\%$, *Ans.*

(11.) $4982 ÷ 1.06 = $4700 = amount of bonds that can be bought: 4% on $4700 = $188, *Ans.*

(12.) $7 ÷ .87\frac{1}{2} = .08 = 8\%$, *Ans.*

(13.) $.07 ÷ .06 = 116\frac{2}{3}$, *Ans.*

INTEREST.

Simple Interest.

Art. 183.

1*st. When the time is one year.*

(7.) $6\frac{1}{4}\% = \frac{1}{16}$: $7200 ÷ 16 = $450, *Ans.*

(8.) $8\frac{1}{3}\% = \frac{1}{12}$: $28.20 ÷ 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 × .05$\frac{1}{3}$ = \$22.40, + \$420 = \$442.40, *Ans.*

(11.) \$857 × .09 = \$77.13, + \$857 = \$934.13, *Ans.*

(12.) \$96 × .08$\frac{1}{2}$ = \$8.16, + \$96 = \$104.16, *Ans.*

(13.) \$2000 × .04$\frac{1}{2}$ = \$90, + \$2000 = \$2090, *Ans.*

(14.) $12\frac{1}{2}\% = \frac{1}{8}$: \$164 ÷ 8 = \$20.50, + \$164 = \$184.50, *Ans.*

2d. When the time is two or more years.

(8.) \$45 × .08 = \$3.60: \$3.60 × 2 = \$7.20: \$7.20 + \$45 = \$52.20, *Ans.*

(9.) \$80 × .07 = \$5.60: \$5.60 × 4 = \$22.40: \$80 + \$22.40 = \$102.40, *Ans.*

(10.) $3\frac{3}{4}\% \times 2 = 7\frac{1}{2}\%$: \$237.16 × .07$\frac{1}{2}$ = \$17.79: \$237.16 + \$17.79 = \$254.95, *Ans.*

(11.) $4\% \times 5 = 20\% = \frac{1}{5}$: \$74.75 ÷ 5 = \$14.95: \$74.75 + \$14.95 = \$89.70, *Ans.*

(12.) \$85.45 × .06 = \$5.127: \$5.127 × 4 = \$20.51: \$20.51 + \$85.45 = \$105.96, *Ans.*

(13.) \$325 × .05$\frac{2}{5}$ = \$17.55: \$17.55 × 3 = \$52.65: \$52.65 + \$325 = \$377.65, *Ans.*

(14.) \$129.36 × .04$\frac{3}{5}$ = \$5.6595: \$5.6595 × 4 = \$22.638: \$22.64 + \$129.36 = \$152, *Ans.*

(15.) \$8745 × .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 ÷ 12 = \$1.50, *Ans.*

(3.) \$240 × .08 = \$19.20: 2 mo. = $\frac{1}{6}$ yr.: \$19.20 ÷ 6 = \$3.20, *Ans.*

(4.) \$50 × .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 × .06 = \$5.16: 3 mo. = $\frac{1}{4}$ yr.: $\frac{1}{4}$ of \$5.16 = \$1.29, *Ans.*

(6.) \$50 × .08 = \$4.00: 4 mo. = $\frac{1}{3}$ yr.: $\frac{1}{3}$ of \$4.00 = \$1.33+, *Ans.*

(7.) \$150.25 × .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 × .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 × .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 × .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 × .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 × .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 × .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 × .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 × .06 = \$72: $\frac{1}{12}$ of \$72 = \$6 = int. 1 mo.: 15 da. = $\frac{1}{2}$ mo.: $\frac{1}{2}$ of \$6 = \$3, *Ans.*

(5.) \$180 × .08 = \$14.40: $\frac{1}{12}$ of \$14.40 = \$1.20 (1 mo.).

15 da. = $\frac{1}{2}$ mo. = \$0.60
3 da. = $\frac{1}{5}$ 15 da. = .12
1 da. = $\frac{1}{3}$ 3 da. = .04
Int. for 19 da. = \$0.76, *Ans.*

(6.) \$240 × .07, ÷ 12 = \$1.40 = int. 1 mo.

24 da. = $\frac{4}{5}$ mo. = \$1.12
3 da. = $\frac{1}{8}$ 24 da. = .14
Int. 27 da. = \$1.26, *Ans.*

(7.) \$320 × .05, ÷ 12 = \$1.33$\frac{1}{3}$ = int. 1 mo.

20 da. = $\frac{2}{3}$ mo. = \$0.888+
1 da. = $\frac{1}{20}$ 20 da. = .044+
Int. 21 da. = \$0.93, *Ans.*

(8.) \$450 × .10, ÷ 12 = \$3.75 = int. 1 mo.: 25 da. = $\frac{5}{6}$ mo.: $\frac{5}{6}$ of \$3.75 = \$3.125. *Ans.* \$3.13.

(9.) \$100.80 × .05, ÷ 12 = \$0.42 = int. 1 mo.

25 da. = $\frac{5}{6}$ mo. = \$0.35
3 da. = $\frac{1}{10}$ mo. = .042
Int. 28 da. = \$0.39, + \$100.80 = \$101.19, *Ans.*

(10.) \$150 × .05, ÷ 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 × .06, ÷ 12 = \$1.80 = int. 1 mo.

10 da. = $\frac{1}{3}$ mo. = \$0.60
1 da. = $\frac{1}{10}$ 10 da. = .06
Int. for 11 da. = \$0.66, + \$360 = \$360.66, *Ans.*

(12.) \$264 × .06, ÷ 12 = \$1.32 = int. 1 mo.

6 da. = $\frac{1}{5}$ mo. = \$0.264
3 da. = $\frac{1}{2}$ 6 da. = .132
Int. 9 da. = \$0.40, + \$264 = \$264.40, *Ans.*

(13.) \$900 × .07 = \$63, ÷ 12 = \$5.25 = int. 1 mo.

10 da. = $\frac{1}{3}$ mo. = \$1.75
3 da. = $\frac{1}{10}$ mo. = .525
1 da. = $\frac{1}{3}$ 3 da. = .175
Int. 14 da. = \$2.45, + \$900 = \$902.45, *Ans.*

(14.) \$430 × .04$\frac{1}{2}$, ÷ 12 = \$1.61$\frac{1}{4}$ = int. 1 mo.

15 da. = $\frac{1}{2}$ mo. = \$0.806
3 da. = $\frac{1}{5}$ 15 da. = .161
1 da. = $\frac{1}{3}$ 3 da. = .053
Int. 19 da. = \$1.02, + \$430 = \$431.02, *Ans.*

5*th. When the time is years, months, and days, or any two of these periods.*

(3.) \$150 × .06 = \$9, × 4 (yr.) = \$36.00: 2 mo. = $\frac{1}{6}$ yr.: $\frac{1}{6}$ of \$9 = \$1.50: \$36 + \$1.50 = \$37.50, *Ans.*

(4.) \$375.40 × .06 = \$22.524 8 mos. = $\frac{2}{3}$ yr.
$\frac{2}{3}$ of \$22.524 = 15.016
\$37.54, *Ans.*

(5.) \$92.75 × .06 = \$5.565, × 3 (yr.) = \$16.695
4 mo. = $\frac{1}{3}$ yr. $\frac{1}{3}$ of 5.565 = 1.855
1 mo. = $\frac{1}{4}$ 4 mo. $\frac{1}{4}$ of 1.855 = .46375
\$19.01, *Ans.*

(6.) \$500 × .06 = \$30.00 = int. 1 yr.
$\frac{1}{12}$ of \$30.00 = 2.50 = int. 1 mo.
$\frac{1}{2}$ of 2.50 = 1.25 = int. 15 da.
$\frac{1}{5}$ of 1.25 = .25 = int. 3 da.
\$34.00, *Ans.*

(7) \$560 × .08 = \$44.80, × 2 = \$89.60 = int. 2 yr.
$\frac{1}{3}$ of 44.80 = 14.933+ = int. 4 mo.
$\frac{1}{8}$ of 14.933 = 1.866 = int. 15 da.
\$106.40, *Ans.*

(8.) \$750 × .06 = \$45, × 4 = \$180.00 = int. 4 yr.
3 mo. = $\frac{1}{4}$ yr. $\frac{1}{4}$ of \$45.00 = 11.25 = int. 3 mo.
Int. 1 mo. = $\frac{1}{3}$ of 11.25 = 3.75:
$\frac{1}{5}$ of 3.75 = .75 = int. 6 da.
\$192, *Ans.*

(9.) \$456 × .05 = \$22.80, × 3 = \$68.40 = int. 3 yr.
$\frac{1}{12}$ of \$22.80 = \$1.90, $\frac{5}{12}$ = 9.50 = int. 5 mo.
$\frac{1}{2}$ of 1.90 = .95 = int. 15 da.
$\frac{1}{5}$ of .95 = .19 = int. 3 da.
\$79.04, *Ans.*

(10.) \$216 × .10 = \$21.60, × 5 = \$108.00 = int. 5 yr.
$\frac{1}{12}$ of \$21.60 = 1.80 (1 mo.),
$\frac{7}{12}$ of 21.60 = 12.60 = int. 7 mo.
27 da. = 3 da., or $\frac{1}{10}$ less than 1 mo.: $\frac{1}{10}$ of 1.80 = .18: 1.80 — .18 = 1.62 = int. 27 da.
\$122.22, *Ans.*

(11.) \$380 × .15 = \$57.00, × 3 = \$171.00 = int. 3 yr.
9 mo. = $\frac{3}{4}$ yr.: $\frac{3}{4}$ of \$57 = 42.75 = int. 9 mo.
$\frac{1}{12}$ of \$57 = \$4.75 (1 mo.): 9 da.
= $\frac{3}{10}$ mo.: $\frac{3}{10}$ of \$4.75 = 1.425 = int. 9 da.
\$215.18, *Ans.*

(12.) \$300 × .06 = \$18, × 3 = \$54.00 = int. 3 yr.
½ of \$18 = 9.00 = int. 6 mo.
⅓ of 9 = 3.00 = int. 2 mo.
Int. 3 yr. 8 mo. = \$66.
300.
\$366, *Ans.*

(13.) \$250 × .06 = \$15.00 = int. 1 yr.
½ of \$15.00 = 7.50 = int. 6 mo.
⅙ of 7.50 = 1.25 = int. 1 mo.
\$23.75
250.00
\$273.75, *Ans.*

(14.) \$205.25 × .06 = \$12.315, × 2 = \$24.63 (2 yr.)
Int. 6 mo. = ½ of \$12.315 = 6.1575
Int. 2 mo. = ⅓ of 6.1575 = 2.0525
Int. 15 da. = ¼ of 2.0525 = .5131
\$33.3531
205.25
\$238.60, *Ans.*

(15.) \$150.62 × .05 = \$7.5310, × 3 = \$22.5930 (3 yr.)
Int. 4 mo. = ⅓ of \$7.5310 = 2.5103
Int. 1 mo. = ¼ of 2.5103 = .6275
Int. 12 da. = ⅖ of .6275 = .2510
\$25.9818
150.62
\$176.60, *Ans.*

(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

$\$150 \times .06 = \$9.00, \times 2 = \$18.00 =$ 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

$\$240 \times .08 = \$19.20 =$ int. 1 yr.

$\frac{1}{6}$ of $\$19.20 = 3.20 =$ int. 2 mo.

$\frac{2}{5}$ of $\frac{1}{2}$ of $3.20 = .64 =$ int. 12 da.

$\$23.04$, *Ans.*

(20.)

yr.	mo.	da.
1845	8	28
1843	5	14
2	3	14

$\$180 \times .07 = \$12.60, \times 2 = \$25.20 =$ int. 2 yr.
$\frac{1}{4}$ of $\$12.60 = 3.15 =$ int. 3 mo.
$\frac{2}{5}$ of $\frac{1}{3}$ of $3.15 = .42 =$ int. 12 da.
$\frac{1}{6}$ of $.42 = .07 =$ int. 2 da.
$\$28.84$, *Ans.*

(21.)

mo.	da.
11	27
7	3
	24

$\$137.50 \times .09 = \$12.3750 =$ int. 1 yr.
$\frac{1}{3}$ of $\$12.3750 = \$4.125 =$ int. 4 mo.
$\frac{4}{5}$ of $\frac{1}{4}$ $(= \frac{1}{5})$ of $4.125 = .825 =$ int. 24 da.
$\$4.95$, *Ans.*

(22.)

mo.	da.
8	28
3	1
5	27

$\$125.40 \times .08\frac{1}{2} = \$10.659 =$ int. 1 yr.
$\frac{5}{12}$ of $\$10.659 = \$4.44 + =$ int. 5 mo.
$\frac{9}{10}$ of $\frac{1}{5}$ of $4.44 = .799 + =$ int. 27 da.
$\$5.24$
125.40
$\$130.64$, *Ans.*

(23.)

yr.	mo.	da.
1848	3	9
1847	8	2
	7	7

$\$234.60 \times .05\frac{1}{4} = \$12.3165 =$ int. 1 yr.

$\frac{7}{12}$ of $\$12.3165 = \$7.1848 =$ int. 7 mo.
$\frac{1}{5}$ of $\frac{1}{12}$ of $12.3165 = .2052 =$ int. 6 da.
$\frac{1}{6}$ of $.2052 = .0342 =$ int. 1 da.

$\$7.4242$
234.60
$\$242.02$, *Ans.*

(24.)

yr.	mo.	da.
1847	7	24
1846	10	25
	8	29

$\$153.80 \times .05 = \$7.69 =$ int. 1 yr.

$\frac{2}{3}$ of $\$7.69 = \$5.126 =$ int. 8 mo.
Int. 1 mo. $= \frac{1}{8}$ of $\$5.126 = .64$
Int. 29 da. $= .64$ less $\frac{1}{30} = .62$

$\$5.75$
153.80
$\$159.55$, *Ans.*

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.: $\frac{1}{3}$ of 15 da. = 5 da. *Ans.* \$0.505

(10.) 2 ct. for the 2 mo., and $\frac{1}{3}$ mill for the 1 da. *Ans.* \$0.020$\frac{1}{3}$

(11.) $\frac{1}{3}$ of 17 = 5$\frac{2}{3}$ (apply rule). *Ans.* \$0.055$\frac{2}{3}$

(12.) $\frac{1}{3}$ of 13 = 4$\frac{1}{3}$ (apply rule). *Ans.* \$0.104$\frac{1}{3}$

(13.) 1 yr. 2 mo. = 14 mo.: $\frac{1}{3}$ of 4 = 1$\frac{1}{3}$. *Ans.* \$0.141$\frac{1}{3}$

(14.) 2 yr. 9 mo. = 33 mo.: $\frac{1}{3}$ of 20 = 6$\frac{2}{3}$. *Ans.* \$0.336$\frac{2}{3}$

(15.) 3 yr. 5 mo. = 41 mo.: $\frac{1}{3}$ of 29 = 9$\frac{2}{3}$. *Ans.* \$0.419$\frac{2}{3}$

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 = .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$\frac{5}{6}$ = .042$\frac{29}{36}$
\$0.299$\frac{23}{36}$, *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, × 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 × 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% = $\frac{1}{6}$ of .052 = .008$\frac{2}{3}$

\$0.060$\frac{2}{3}$ × 120 = \$7.28, *Ans.* \$0.060$\frac{2}{3}$

(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 × 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 × 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$\frac{1}{3}$ × 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$\frac{1}{2}$, × 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$\frac{1}{9}$: \$0.076$\frac{1}{9}$ × 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 ÷ 12 = 3. *Ans.* 3 yr.

(5.) Int. on \$60 for 1 yr. @ 5% = \$3.00: \$72 — \$60 = \$12: 12 ÷ 3 = 4. *Ans.* 4 yr.

(6.) If the principal is doubled, the int. will equal 100%. 100% ÷ 6% = $16\frac{2}{3}$: $\frac{2}{3}$ yr. = 8 mo. *Ans.* 16 yr 8 mo.

(7.) Int. on \$375 for 1 yr. @ 8% = \$30: 90 ÷ 30 = 3. *Ans.* 3 yr.

(8.) Int. on \$600 @ 9% for 1 yr. = \$54: \$798 — \$600 = \$198: 198 ÷ 54 = $3\frac{2}{3}$ = 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.) $\$48 \div 2 = \$24 =$ 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. $= 2\frac{2}{5}$ 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.) $\$23.40 \div 2 = \$11.70 =$ 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 = int. for $\frac{43}{12}$ 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 = 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 = int. 1 yr.: $39 \div 650 = .06 = 6\%$, *Ans.*

(12.) $\$110.40 \div 6 = \$18.40 =$ 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 ÷ .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 ÷ .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 ÷ 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 ÷ .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 ÷ .344 = \$82.50, *Ans.*

Art. 188.

(2.) 9 yr. × .05 = .45: \$435 ÷ 1.45 = \$300, *Ans.*

(3.) 4 yr. × .05 = .20: \$571.20 ÷ 1.20 = \$476 = principal: \$571.20 — \$476 = \$95.20, *Ans.*

(4.) 6 yr. × .07 = 0.42: \$532.50 ÷ 1.42 = \$375: \$532.50 — \$375 = \$157.50, *Ans.*

(5.) 2 yr. 9 mo. = 2$\frac{3}{4}$ yr.: 2$\frac{3}{4}$ × .08 = 0.22: \$285.48 ÷ 1.22 = \$234, *Ans.*

(6.) 2$\frac{1}{2}$ yr. × .06 = 0.15: \$690 ÷ 1.15 = \$600: \$690 — \$600 = \$90, *Ans.*

(7.) 3 yr. 4 mo. 24 da. = 3$\frac{2}{5}$ yr.: 3$\frac{2}{5}$ × .07 = 0.238: \$643.760 ÷ 1.238 = \$520, *Ans.*

(8.) 4 yr. 3 mo. 27 da. = $\frac{519}{120}$ yr.: $\frac{519}{120}$ × .04 = 0.173: \$914.940 ÷ 1.173 = \$780 = principal: \$914.94 — \$780 = \$134.94, *Ans.*

Compound Interest.

Art. 190.

(2)

$500	530	561.80
.06	.06	.06
30.00	31.80	33.7080
500	530	561.80
$530, 1st yr.	$561.80, 2d yr.	*Ans.* $595.51

(3)

$800	848	898.88	952.81
.06	.06	.06	.06
48.00	50.88	53.9328	57.1686
800	848	898.88	952.81
$848, 1st yr.	$898.88, 2d yr.	$952.81, 3d yr.	$1009.98, *Ans.*

(4)

$250	15.90
.06	265
$15.00 = 1st yr.	$280.90
250	.06
265	$16.8540 = 3d yr.
.06	
$15.90 = 2d yr.	$15+$15.90+$16.85=$47.75, *Ans.*

(5)

$300	330.75
.05	.05
$15.00 = 1st yr.	$16.5375 = 3d yr.
300	330.75
315	347.29
.05	.05
$15.75 = 2d yr.	$17.3645 = 4th yr.
315	
$330.75	$15+$15.75+$16.54+$17.36=$64.65, *Ans.*

(5)

\$200	212.18
.03	.03
\$6.00 = 1st hf.-yr.	\$6.3654 = 3d hf.-yr.
200	212.18
206	218.55
.03	.03
\$6.18 = 2d hf.-yr.	\$6.5565 = 4th hf.-yr.
206	
\$212.18	

\$6 + \$6.18 + \$6.36 + \$6.56 = \$25.10, *Ans.*

(7.) 20% annually = 5% quarterly.
1st qr., \$500 × .05 = \$25, + \$500 = \$525:
2d qr., \$525 × .05 = \$26.25, + \$525 = \$551.25:
3d qr., \$551.25 × .05 = \$27.56, + \$551.25 = \$578.81:
4th qr., \$578.81 × .05 = \$28.94, + \$578.81 = \$607.75:
5th qr., \$607.75 × .05 = \$30.39, + \$607.75 = \$638.14:
6th qr., \$638.14 × .05 = \$31.91, + \$638.14 = \$670.05:
7th qr., \$670.05 × .05 = \$33.50, + \$670.05 = \$703.55:
8th qr., \$703.55 × .05 = \$35.18, + \$703.55 = \$738.73, *Ans.*

(8.) Int. on \$300, 1 yr. @ 6% = \$18, + \$300 = \$318:
int. on \$318 for 1 yr. @ 6% = \$19.08, + \$318 = \$337.08:
int. on \$337.08, ½ yr. @ 6% = \$10.11, + \$337.08 = \$347.19:
\$347.19 — \$300 = \$47.19, *Ans.*

(9.) 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 8½ mo. @ 6% = \$47.75, + \$1123.60 = \$1171.35: \$1171.35 — \$1000 = \$171.35, *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 = $4\frac{16}{45}$ yr.

Int. on \$1200 for 1 yr. @ 6% = \$72.00
Int. on \$1200 for $4\frac{16}{45}$ yr. @ 6% = 313.60 . . \$313.60
Int. on annual int. 1 yr. = 4.32
Int. on an. int. $3\frac{16}{45} + 2\frac{16}{45} + 1\frac{16}{45} + \frac{16}{45}$, or $7\frac{9}{45}$, 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.

Int. on \$1500 for 1 yr. @ 5% = \$75.00
Int. on \$1500 for $4\frac{67}{120}$ yr. @ 5% = 341.88 . . \$341.88
Int. on an. int. 1 yr. = 3.75
Int. on an. int. $3\frac{67}{120} + 2\frac{67}{120} + 1\frac{67}{120} + \frac{67}{120}$, or $8\frac{7}{30}$, yr. = 30.87
Total interest, \$372.75
Add principal, 1500.00
Ans. \$1872.75

(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.*

(9.) \$500 × 6 = \$3000
Int. on \$3000 for 1 yr. @ 6% = \$180.00
Int. on \$3000 for 3 yr. @ 6% = 540.00 . . \$540.00
Int. on int. $\frac{1}{2}$ yr. = 2.70
Int. on int. 5 + 4 + 3 + 2 + 1, or 15, half-yr. = 40.50
Total interest, \$580.50
Add principal, 3000.00
Ans. \$3580.50

(10.) Int. on \$20000 for 5 yr. @ 4% = \$4000.00
Int. on \$20000 for 1 yr. = \$800.00
Int. on \$20000 for $\frac{1}{4}$ yr. = 200.00
Int. on $\frac{1}{4}$ an. int. @ $1\frac{1}{2}$% ($\frac{1}{4}$ of 6%) = 3.00
Int. on $\frac{1}{4}$ an. int. 19+18+17+16+15+14+13+12+11+10+9+8+7+6+5+4+3+2+1, or 190, qrs. = 570.00
Total interest, \$4570.00
Add to this the premium on gold, 5%, = $\frac{1}{20}$, 228.50
Ans. \$4798.50

Art. 192.

yr.	mo.	da.	
1876	3	1	. . $44
1875	7	1	
	8	mo.	
1876	10	1	. . $10
1876	3	1	
	7	mo.	
1877	1	1	. . $26
1876	10	1	$36 . .
	3	mo.	
1877	12	1	. . $15
1877	1	1	
	11	mo.	
1878	3	16	
1877	12	1	
	3	15=$3\frac{1}{2}$	mo.

(2)

$350
14=int. 8 mo.
$364
44
$320
16=int. 7+3=10 mo.
$336
36
$300
21.75=int. 11+$3\frac{1}{2}$=$14\frac{1}{2}$ mo.
$321.75
15.00
$306.75, *Ans.*

(3.) Amt. of \$200, 1 yr. @ 6% = \$212: \$212 — \$70 = \$142: amt. of \$142, 1 yr. @ 6% = \$150.52, *Ans.*

1874	1	1	. . $109
1873	7	1	
	6	mo.	
1874	7	1	
1874	1	1	
	6	mo.	
1875	1	1	
1874	7	1	
	6	mo.	

(4)

6% per yr. = 3% per $\frac{1}{2}$ yr.

$300	$6.00
.03	200
9.00	206
300	100
309	106
109	.03
200	3.18
.03	106
6.00	$109.18, *Ans.*

(5)

1871	9	10	..	$32
1870	5	10		
1 yr. 4 mo.				
1872	9	10	..	$6.80
1871	9	10		
1 yr.				
1872	11	10		
1872	9	10		
2 mo.				

$150
12 = int. for 1 yr. 4 mo.
162
32
130
9.10 = int. 1 yr. 2 mo.
139.10
6.80
$132.30, *Ans.*

(6)

1872	6	5	..	$20
1871	3	5		
1 yr. 3 mo.				
1872	12	5	..	$50.50
1872	6	5		$70.50
6 mo.				
1874	6	5		
1872	12	5		
1 yr. 6 mo.				

$200
35 = int. 1 yr. 9 mo.
235
70.50
164.60
24.68 = int. 1 yr. 6 mo.
$189.18, *Ans.*

(7)

1875	6	1	..	$6
1875	1	1		
5 mo.				
1876	1	1	..	$21.50
1875	6	1		$27.50
7 mo.				
1876	7	1		
1876	1	1		
6 mo.				

$250
17.50 = int. 12 mo.
267.50
27.50
240
8.40 = int. 6 mo.
$248.40, *Ans.*

(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	$34.30
	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	$40.
	4 mo.		
1876	7	1 . .	$11
1876	1	1	
	6 mo.		
1876	9	1 . .	$80
1876	7	1	$91.
	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
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.	

$1000
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% = 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. = 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
Days in July, 31
Days in Aug., 19
60

Int. of \$1 for 63 da. @ 6% = \$0.0105.

\$100 × .0105 = \$1.05

\$100 — \$1.05 = \$98.95

To 19th Aug. add 3 da. grace.

Ans. Aug. $^{19}/_{22}$. \$1.05, \$98.95

(3.) Remaining days in Oct., 19: 30 — 19 = Nov. $^{11}/_{14}$: int. on \$1 33, da. @ 8% = \$0.0073+: \$120 × .0073+ = \$0.88: \$120 — \$0.88 = \$119.12

Ans. Nov. $^{11}/_{14}$, \$0.88, \$119.12

(4.) Int. of \$1, 4 mo. 3 da. @ 6% = \$0.0205: \$140 × .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 × .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 × .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. $^{15}/_{18}$, 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. $^{15}/_{18}$, 1877, 120 da., \$20, \$580.

(12.) In May, 23 da., June, 30, July, 31 = 84: 90 — 84 = $^{6}/_{9}$ Aug.: June 8 to Aug. 9 = 48 da. = $1\frac{3}{5}$ mo.: int. on \$1000, $1\frac{3}{5}$ mo. @ 6% = \$8: \$1000 — \$8 = \$992.

Ans. Aug. $^{6}/_{9}$, 48 da., \$8, \$992.

(13.) 6 mo. after July 10, 1877, = Jan. $^{10}/_{13}$, 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. $^{10}/_{13}$, 1878, 81 da., \$20.25, \$1479.75

2D. *When the note bears interest.*

(2.) 6 mo. from May 20, 1875, = Nov. $^{20}/_{23}$: 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. $^{20}/_{23}$, 1875, 75 da., \$2.58, \$152.

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* See Rem. 2, page 249, Ray's New Practical Arithmetic.

(3.) 1 yr. from Aug. 5, 1876, = Aug. $^{5}/_{8}$, 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. $^{5}/_{8}$, 1877, 114 da., \$6.16, \$318.04

(4.)

1878	1	4	
1877	3	4	
	10 mo.		

\$450, 10 mo. @ 6% amounts to \$472.50: Aug. 13, 1877, to Jan. 4, 1878, = 144 da. or $4\frac{4}{5}$ mo.: discount on \$472.50, $4\frac{4}{5}$ mo. @ 10% = \$18.90: \$472.50 — \$18.90 = \$453.60

Ans. Jan. $^{1}/_{4}$, 1878, 144 da., \$18.90, \$453.60

(5.)

1878	9	4
1876	5	16
2	3	18

\$650, 2 yr. 3 mo. 18 da. @ 9% = \$784.55: Apr. 25, 1878, to Sept. 4, 1878, = 132 da. 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. $^{1}/_{4}$, 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. $^{1}/_{4}$, 1876, 75 da., \$14.71, \$867.99

(7.) 1876 5 4
1875 7 19
9 mo. 15 da.

Amt. of \$1400, $9\frac{1}{2}$ mo. @ 6% = \$1466.50: Jan. 17, 1876, to May 4, 1876, = 108 da. or $3\frac{3}{5}$ mo.: discount on \$1466.50, $3\frac{3}{5}$ 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
1876 10 16
1 yr. 2 mo. 18 da.

Amt. of \$2400, 1 yr. 2 mo. 18 da. @ 8% = \$2633.60: July 26, 1877, to Jan. 4, 1878 = 162 da. or $5\frac{2}{5}$ mo.: discount on \$2633.60, $5\frac{2}{5}$ 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 $5\frac{1}{5}$ mo.: discount on \$3711.75, $5\frac{1}{5}$ 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 ÷ .9895 = \$200, *Ans.*

(3.) Discount on \$1, 93 da. @ 6% = \$0.0155: \$1 — \$0.0155 = \$0.9845: \$393.80 ÷ .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
	10 mo. 15 da.		÷ 1.07 = \$1000, *Ans.*

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.)

1878	1	1	
1876	9	10	
1	3	21	

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 ÷ 1.045 = \$825.65 = present worth: \$862.80 — \$825.65 = \$37.15 = discount.

(8.) Amt. of \$1, 4 mo. @ 10% = \$1.03⅓: \$775 ÷ 1.03⅓ = \$750, *Ans.*

(9.) Amt. of \$1, 8 mo. @ 6% = \$1.04: \$260 ÷ 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.) ⅓ of \$956.34 = \$318.78

Amt. of \$1, 1 yr. @ 5% = \$1.05: \$318.78 ÷ 1.05 = \$303.60
Amt. of \$1, 2 yr. @ 5% = \$1.10: \$318.78 ÷ 1.10 = 289.80
Amt. of \$1, 3 yr. @ 5% = \$1.15: \$318.78 ÷ 1.15 = 277.20

Ans. \$870.60

(12.) \$535 × .07 = \$37.45 = bank discount: \$535 ÷ 1.07 = \$500: \$535 — \$500 = \$35: \$37.45 — \$35 = \$2.45, *Ans.*

(13.) Amt. of \$1, 10 mo. @ 12% = \$1.10: \$1221 ÷ 1.10 = \$1110 = present worth: \$1122 — \$1110 = \$12, *Ans.*

(14.) ⅓ 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

\$3432 ÷ 1.10 = \$3120
\$3432 ÷ 1.20 = 2860
\$3432 ÷ 1.30 = 2640 \$8620

Cash offer, 8000

Ans. \$620

(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 ÷ 1.031 = \$2223.08 = present 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 ÷ $100\frac{1}{8}$ = \$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 ÷ .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.) 8s. $= \frac{4}{10}$£: £890.4 $\times$ 4.86 ($) = $4327.34, *Ans.*

(4.) \$2130.12 $\div$ 4.88 = 436, with 244 rem.: 244 $\times$ 20s., $\div$ 4.88 = 10. *Ans.* £436 10s.

(5.) 5 fr. 15 centimes = $5\frac{3}{20}$ fr.: 1290 $\div$ $5\frac{3}{20}$ = \$250.49, *Ans.*

(6.) \$1657.60 $\times$ $5\frac{16}{100}$ = 8553 fr. 22, *Ans.*

(7.) \$12680 $\div$ 4 = 3170, $\times$ .97 = \$3074.90, *Ans.*

(8.) If 4 marks = \$0.98, 1 m. = \$0.245: \$1470 $\div$ .245 = 6000 m., *Ans.*

INSURANCE.

Art. 204.

(2.) $\frac{3}{4}$ of \$5000 = \$3750: $\frac{1}{2}\%$ of \$3750 = \$18.75, add \$1.50 = \$20.25, *Ans.*

(3.) $\frac{2}{3}$ of \$12600 = \$8400, @ $\frac{3}{4}\%$ = \$63.00
$\frac{1}{2}$ of \$14400 = \$7200, @ 2% = 144.00
2 policies @ \$1.25 = 2.50
Ans. \$209.50

(4.) $\frac{4}{7}$ of \$21000 = \$12000, @ $1\frac{1}{2}\%$ = \$180.00
\$7200 @ $\frac{3}{4}\%$ = 54.00
2 policies @ \$1.25 = 2.50
Ans. \$236.50

(5.) $\frac{3}{4}$ of \$5600 = \$4200, $\times$ $.01\frac{1}{2}$ = \$63, $\times$ 20 (yr.) = \$1260: \$4200 — \$1260 = \$2940, *Ans.*

(6.) \$3600 + \$1600 + \$800 = \$6000: $\frac{7}{8}\%$ of \$6000 = \$52.50, + \$1.25 = \$53.75, *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: $\frac{3}{3}$, or the whole value, = \$15000, *Ans.*

(8.) $\frac{4}{5}$ of \$4500 = \$3600: \$32.75 — \$1.25 = \$31.50: \$31.50 ÷ 3600 = .0087$\frac{1}{2}$ = $\frac{7}{8}\%$, *Ans.*

(9.) \$1000 + \$1500 = \$2500: \$3.50 ÷ 2500 = .0014 = $\frac{7}{50}\%$, *Ans.*

Art. 205.

(2.) \$105.53 × 10 = \$1055.30 = amount paid yearly: \$1055.30 × 10 = \$10553, *Ans.*

(3.) \$47.18 × 8 × 20 = \$7548.80: \$60.45 × 8 × 20 = \$9672.00: \$9672 — \$7548.80 = \$2123.20, *Ans.*

(4.) \$36.46 × 12 × 5 = \$2187.60: \$12000 — \$2187.60 = \$9812.40, *Ans.*

(5.) 75 yr. — 21 yr. = 54 yr.: \$19.89 × 5 × 54 = \$5370.30, *Ans.*

(6.) \$104.58 × 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 × 6 = \$174.90, × 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 ÷ 618000 = .004 *Ans.* 4 mills on \$1, or $\frac{2}{5}\%$.

(3.) 18409.44 ÷ 2876475 = .0064 = 6.4 mills = *Ans.*

(4.) 656491.61 ÷ 421285359 = .00156 = 1.56 mills = *Ans.*

Art. 209.

[I.] $\$1.25 \times 57 = \$71.25 : \$1373.64 - \$71.25 = \$1302.39 : 1302.39 \div 748500 = .00174 =$ rate 1.74 mills on \$1.

(2.) $\$2576 \times .00174 = \$4.48, + \$1.25$ (poll-tax) $= \$5.73$, *Ans.*

(3.) $\$9265 \times .00174 = \$16.12, + \$3.75$ (3 poll-taxes) $= \$19.87$, *Ans.*

(4.) $\$4759 \times .00174 = \$8.28, + \$1.25 = \$9.53$, *Ans.*

(5.) $\$8367 \times .00174 = \$14.56$, *Ans.*

[II.] $64375 \div 16869758 = .003816$. Rate 3.816 mills on \$1.

TAX TABLE.—Rate, 3.816 mills on \$1.

PROP.	TAX.	PROP.	TAX.	PROP.	TAX.	PROP.	TAX.
\$1	\$0.004	\$10	\$0.038	\$100	\$0.382	\$1000	\$3.816
2	.008	20	.076	200	.763	2000	7.632
3	.011	30	.114	300	1.145	3000	11.448
4	.015	40	.153	400	1.526	4000	15.264
5	.019	50	.191	500	1.908	5000	19.080
6	.023	60	.229	600	2.290	6000	22.896
7	.027	70	.267	700	2.671	7000	26.712
8	.030	80	.305	800	3.053	8000	30.528
9	.034	90	.343	900	3.434	9000	34.344

(1.) $\$56875 \times .003816 = \$217.04$, *Ans.*

(2.) $\$27543 \times .003816 = \$105.10$, *Ans.*

(3.) \$83612 × .003816 = \$319.06, *Ans.*

(4.) \$72968 × .003816 = \$278.45, *Ans.*

(5.) \$69547 × .003816 = \$265.39, *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 ÷ 2 = 11: 11 times 1 ct. = 11 ct., *Ans.*

(4.) 70 ct. times 40 = \$28, *Ans.*

(5.) \$5 = 500 ct.: $\frac{500}{1000}$ ct. = $\frac{1}{2}$ ct., *Ans.*

(6.)

30000 bl. @ \$1	=	\$30000
250 ret. dlrs. @ \$20 ea.	=	5000
12 wholesale dlrs. @ \$50	=	600
		\$35600, *Ans.*

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 fr. + 57.15 fr. = 422.30 fr., to which add 5% com. (21.1150 fr.) = 443.4150 fr.: 443.4150 × $19\frac{3}{10}$ (ct.) = \$85.58: 40% of \$86 = \$34.40, *Ans.*

(4.) 1317.04 mk. + 34.36 mk. = 1351.40 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. = £$8\frac{9}{40}$ or £8.225: £500 + £8.225 = £508.225: add $2\frac{1}{2}\%$ com. (£12.705+) = £520.93: £520.93 × 4.8665 (\$) = \$2535.11: 35% of \$2535 = \$887.25: \$887.25 + \$750 = \$1637.25, *Ans.*

RATIO.

Art. 214.

(20.) $\frac{7}{2} \times \frac{4}{9} = \frac{14}{9} = 1\frac{5}{9}$, *Ans.*

(21.) $\frac{35}{6} \times \frac{3}{7} = \frac{5}{2} = 2\frac{1}{2}$, *Ans.*

(22.) $\frac{69}{10} \times \frac{5}{23} = \frac{3}{2} = 1\frac{1}{2}$, *Ans.*

(28.) 5 yd. 1 ft. = 192 in.: 5 ft. 4 in. = 64 in.: $\frac{192}{64} = 3$, *Ans.*

Art. 215.

(8.) 4 lb. 8 oz. = 72 oz.: $\frac{7}{8}$ of 72 oz. = 63 oz.: 63 oz. = 3 lb. 15 oz., *Ans.*

(9.) \$4.00 × 2.6 = \$10.40, *Ans.*

Art. 216.

(3.) $42 \times \frac{10}{7} = 60$, *Ans.*

(4.) $23\frac{3}{8} = \frac{187}{8}$: $\frac{187}{8} \times \frac{4}{11} = \frac{17}{2} = 8\frac{1}{2}$, *Ans.*

(5.) $7\frac{5}{9} = \frac{68}{9}$: \$27.20 × $\frac{9}{68}$ = \$0.40 × 9 = \$3.60, *Ans.*

Art. 217.

(2.) $\left.\begin{matrix} 5 \times 6 = 30 \\ 10 \times 9 = 90 \end{matrix}\right\}$ 90 ÷ 30 = 3, *Ans.*

(3.)

	2	
$6\frac{1}{4}$	$12\frac{1}{2}$	$4 \times 2 = 8$, *Ans.*
$8\frac{1}{3}$	$33\frac{1}{3}$	
	4	

Key 13.

(4.) $\frac{1}{2} \times \frac{5}{4} = \frac{5}{8}$: $\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}$: $\frac{\frac{1}{2}}{\frac{5}{8}} = \frac{8}{10} = \frac{4}{5}$, *Ans.*

(5.) $2 \times 24 = 48$: $8 \times 12 = 96$: $96 \div 48 = 2$, *Ans.*

(6.) $\$2.25$ | $\$6.75$ 3
3 | 6 2 $3 \times 2 = 6$, *Ans.*

(7.) 2 | 5
3 | 7 $\frac{7 \times 3}{2} = \frac{21}{2} = 10\frac{1}{2}$, *Ans.*
5 | 9
3

rt. 219.

(2.) Divide by 5.

(3.) Divide by 10.

(4.) Divide by 17.

(5.) Divide by 19.

(6.) Divide by 25.

(7.) Divide by 31.

Art. 220.

(2.) $3\frac{3}{4} : 4\frac{2}{5}$
20
$75 : 88$, *Ans.*

(3.) $7\frac{1}{2} : 10\frac{2}{3}$
6
$45 : 64$, *Ans.*

(4.) $\frac{5}{6} = \frac{15}{18}$: $\frac{7}{9} = \frac{14}{18}$. $15 : 14$, *Ans.*

(5.) $\frac{63}{10} = \frac{189}{30}$: $9\frac{7}{15} = \frac{142}{15} = \frac{284}{30}$. $189 : 284$, *Ans.*

PROPORTION.

Art. 223.

(3.) 4
$\frac{8 \times 6}{2} = 24$, *Ans.*

(4.) 2
$\frac{7 \times 10}{5} = 14$, *Ans.*

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

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

(7.) $\dfrac{\overset{2}{\cancel{3}} \times \overset{}{\cancel{14}}}{\underset{}{\cancel{7}}} = 6$, *Ans.*

(8.) $\dfrac{\overset{2}{\cancel{14}} \times 9}{\underset{}{\cancel{7}}} = 18$. *Ans.*

(9.) $\dfrac{\overset{2}{\cancel{2}} \times \overset{}{\cancel{8}} \times \overset{5}{\cancel{45}}}{\underset{}{\cancel{4}} \times \underset{}{\cancel{9}}} = 20$, *Ans.*

(10.) $\dfrac{\overset{}{\cancel{2}} \times \overset{2}{\cancel{2}} \times \overset{}{\cancel{8}} \times \overset{}{\cancel{10}} \times 3 \times 7}{\underset{}{\cancel{5}} \times \underset{}{\cancel{4}} \times \underset{2}{\cancel{4}}} = 21$, *Ans.*

(11.) $\dfrac{\overset{5}{\cancel{10}} \times \overset{2}{\cancel{14}} \times \overset{3}{\cancel{33}} \times \overset{3}{\cancel{39}}}{\underset{3}{\cancel{21}} \times \underset{2}{\cancel{22}} \times \underset{2}{\cancel{26}}} = 15$, *Ans.*

(12.) $\dfrac{3}{\cancel{4}} \times \dfrac{\cancel{4}}{5} = \frac{3}{5} : \frac{3}{5} \times \frac{3}{2} = \frac{9}{10}$, *Ans.*

(13.) $\dfrac{3}{\cancel{5}} \times \dfrac{\cancel{5}}{4} = \frac{3}{4} : \dfrac{\overset{}{\cancel{3}}}{\underset{2}{\cancel{4}}} \times \dfrac{\overset{5}{\cancel{10}}}{\underset{3}{\cancel{9}}} = \frac{5}{6}$, *Ans.*

(14.) $\dfrac{\overset{7}{\cancel{14}}}{\underset{}{\cancel{3}}} \times \dfrac{\overset{5}{\cancel{15}}}{\underset{}{\cancel{2}}} = 35 : \dfrac{\overset{5}{\cancel{35}}}{1} \times \dfrac{2}{\underset{3}{\cancel{21}}} = \frac{10}{3} = 3\frac{1}{3}$, *Ans.*

(15.) $\frac{6 \times 6}{4} = 9$, *Ans.*

Art. 224.

(3.) 6 : 12 : : 3 : ? $\dfrac{\overset{2}{\cancel{12}} \times 3}{\underset{}{\cancel{6}}} = 6$, *Ans.*

(4.) 3 : 6 : : \$8 : ? $\dfrac{\overset{2}{\cancel{6}} \times 8}{\underset{}{\cancel{3}}} = \$16$, *Ans.*

(5.) 5 : 3 : : \$30 : ? $\frac{3 \times \overset{6}{\cancel{30}}}{\cancel{5}} = \$18$, *Ans.*

(6.) 3 lb. 12 oz. = 60 oz.: 11 lb. 4 oz. = 180 oz.

60 : 180 : : \$3.50 : ? $\frac{\overset{3}{\cancel{180}} \times 3.50}{\cancel{60}} = \$10.50$, *Ans.*

(7.) 2 lb. 8 oz. = 40 oz. \$2 : \$5 : : 40 oz. : ?

$\frac{\overset{20}{\cancel{5}} \times \cancel{40}}{\cancel{2}} = 100$ oz. = 6 lb. 4 oz., *Ans.*

(8.) 4 : 10 : : \$14 : ? $\frac{\overset{5}{\cancel{10}} \times \overset{7}{\cancel{14}}}{\cancel{4}\ \cancel{2}} = \$35$, *Ans.*

(9.) 3 : 11 : : 69 ct. : ? $\frac{11 \times \overset{23}{\cancel{69}}}{\cancel{3}} = \$2.53$, *Ans.*

(10.) 4 : 9 : : \$7 : ? $\frac{9 \times 7}{4} = \frac{63}{4} = \$15.75$, *Ans.*

(11.) 8 : 12 : : \$32 : ? $\frac{12 \times \overset{4}{\cancel{32}}}{\cancel{8}} = \$48$, *Ans.*

(12.) 12 : 8 : : \$48 : ? $\frac{\overset{4}{\cancel{48}} \times 8}{\cancel{12}} = \$32$, *Ans.*

(13.) \$32 : \$48 : : 8 : ? $\frac{\overset{12}{\cancel{48}} \times \cancel{8}}{\cancel{32}\ \cancel{4}} = 12$ yd., *Ans.*

(14.) \$48 : \$32 : : 12 : ?

$$\frac{\overset{8}{\cancel{32}} \times \cancel{12}}{\cancel{48}_{\cancel{4}}} = 8 \text{ yd., } \textit{Ans.}$$

(15.) 19 : 4 : : \$152 : ?

$$\frac{4 \times \overset{8}{\cancel{152}}}{\cancel{19}} = \$32, \textit{ Ans.}$$

(16.) 12 : 8 : : 24 : ?

$$\frac{8 \times \overset{2}{\cancel{24}}}{\cancel{12}} = 16 \text{ da., } \textit{Ans.}$$

(17.) 2 : 8 : : 60 : ?

$$\frac{\overset{4}{\cancel{8}} \times 60}{\cancel{2}} = 240 \text{ men, } \textit{Ans.}$$

(18.) 6 lb. = 96 oz. 15 : 96 : : 25 ct. : ?

$$\frac{\overset{32}{\cancel{96}} \times \overset{5}{\cancel{25}}}{\cancel{15}_{\cancel{3}}} = \$1.60, \textit{ Ans.}$$

(19.) 6 : 26 : : \$2.70 : ?

$$\frac{26 \times \overset{.45}{\cancel{2.70}}}{\cancel{6}} = \$11.70, \textit{ Ans.}$$

(20.) 585 lb. : 3525 lb. : : \$42.12 : ?

$$\frac{\overset{705}{\cancel{3525}} \times \overset{.36}{\cancel{42.12}}}{\cancel{585}_{\cancel{117}}} = \$253.80, \textit{ Ans.}$$

(21.) $\frac{3}{2} : \frac{9}{8} : :$ \$2.50 : ?

$$\frac{\overset{3}{\cancel{9}} \times 2.50}{\cancel{8}_{4}} \times \frac{2}{\cancel{3}} = \$1.87\tfrac{1}{2}, \textit{ Ans.}$$

(22.) 90 : 450 : : 6 : ?

$$\frac{\overset{30}{\cancel{450}} \times \cancel{6}}{\cancel{90}} = 30 \text{ da., } \textit{Ans.}$$

(23.) 5 : 15 : : 6 : ?

$$\frac{\overset{3}{\cancel{15}} \times 6}{\cancel{5}} = 18 \text{ men, } \textit{Ans.}$$

(24.) 30 : 140 : : 15 : ?

$$\frac{\overset{70}{\cancel{140}} \times \cancel{15}}{\cancel{30}} = 70 \text{ bu., } \textit{Ans.}$$

(25.) 325 lb. : 1625 lb. : : \$22.60 : ?

$$\frac{\overset{5}{\cancel{1625}} \times 22.60}{\cancel{325}} = \$113.00, \textit{Ans.}$$

(26.) $4\frac{1}{2}$ ft. : 180 ft. : : 3 ft. : ?

$180 \times 3 = 540$; $\frac{\overset{60}{\cancel{540}}}{1} \times \frac{2}{\cancel{9}} = 120$ ft., *Ans.*

(27.) 12 : 9 : : 60 : ?

$$\frac{9 \times \overset{5}{\cancel{60}}}{\cancel{12}} = 45 \text{ da., } \textit{Ans.}$$

(28.) 100 : 60 : : 2200 : ? $\frac{2200 \times 60}{100} = \$1320$, A's.
100 : 60 : : 1800 : ? $\frac{1800 \times 60}{100} = \$1080$, B's. } *Ans.*

(29.) \$800.30 + \$250 + \$375.10 + \$500 + \$115 = \$2040.40. \$2040.40 : \$612.12 : : \$1.00 : ?
\$612.12 ÷ 2040.40 = \$0.30, *Ans.*

(30.) \$6 : \$8 : : 9 oz. : ? $\frac{\overset{4}{\cancel{8}} \times \overset{3}{\cancel{9}}}{\underset{2}{\cancel{6}}} = 12$ oz., *Ans.*

(31.) \$300 : \$250 : : 6 mo. : ? $\frac{\overset{5}{\cancel{250}} \times \overset{}{\cancel{6}}}{\underset{}{\cancel{300}}} = 5$ mo., *Ans.*

(32.) $27 \times 7 = 189$; $36 - 27 = 9$.
9 mi. : 189 mi. : : 1 da. : ? $\frac{189}{9} = 21$ da., *Ans.*

(33.) 9 hr. : 12 hr. : : \$$15\frac{2}{3}$: ? = \$$20.88\frac{8}{9}$, or 1 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.) As 5 lb. : $\frac{3}{4}$ lb. : : \$$\frac{5}{8}$: \$$\frac{3}{32}$, *Ans.*

(35.) As 6 yd. : $7\frac{3}{8}$ yd. : : \$$5\frac{3}{5}$: \$$6\frac{53}{60}$, *Ans.*

(36.) As $\frac{1}{3}$ bu. : $\frac{1}{2}$ bu. : : \$$\frac{3}{8}$: \$$\frac{9}{16}$, *Ans.* ($\frac{3}{1} \times \frac{1}{2} \times \frac{3}{8} = \frac{9}{16}$.)

(37.) As $1\frac{3}{4}$ yd. : 2 yd. : : \$$\frac{7}{24}$: \$$\frac{1}{3}$, *Ans.* ($\frac{4}{7} \times \frac{2}{1} \times \frac{7}{24} = \frac{1}{3}$.)

(38.) As \$$29\frac{3}{4}$: \$$31\frac{1}{4}$: : $59\frac{1}{2}$ yd. : ? By cancellation, $\frac{4}{119} \times \frac{125}{4} \times \frac{119}{2} = \frac{125}{2} = 62\frac{1}{2}$ yd., *Ans.*

(39.) As .85 gal. : .25 gal. : : \$1.36 : \$0.40, *Ans.*

(40.) As 61.3 lb. : 1.08 lb. : : \$44.9942 : \$0.79, *Ans.*

(41.) As $\frac{5}{7}$ yd. : $\frac{9}{11}$ yd. : : \$$\frac{3}{5}$: \$$\frac{189}{275}$, *Ans.*

(42.) As $\frac{3}{7}$ yd. : $17\frac{3}{8}$ yd. : : \$$4\frac{2}{5}$: ?
$\frac{7}{3} \times \frac{139}{8} \times \frac{22}{5} =$ \$$178.38\frac{1}{3}$, *Ans.*

(43.) As 26 cogs : 35 cogs : : 1 rev. : $1\frac{9}{26}$ rev. Hence, the smaller wheel gains $\frac{9}{26}$ of a revolution in each revolution of the larger wheel. Then, $\frac{9}{26}$ rev : 10 rev. : : 1 rev. of larger : $28\frac{8}{9}$ 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 ft. × $17\frac{1}{7}$ = $19577\frac{1}{7}$ ft. = 3 mi. 226 rd. 2 yd. $2\frac{1}{7}$ ft., *Ans.*

(46.) As 25 ft. : 25 ft. 5.25 in. : : 643 ft. 8 in. : 654 ft. 11.17 in., *Ans.*

Art. 225.

(3.) 2 da. : 10 da.
4 hr. : 8 hr. } : : 24 mi. : 240 mi., *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.
8 mo. : 20 mo. The more months, the more [dollars.
: : $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 [miles.
: : 20 mi. : 60 mi., *Ans.*

(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 ÷ 735 = \$0.67 = sum paid on each dollar of indebtedness. \$234 × .67 = \$156.78, A; \$175 × .67 = \$117.25, B; \$326 × .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, $\$600 \times 10 = \$6000$; $\$600 - \$300 = \$300$;
$\$300 \times 6 = \$1800$. $\$6000 + \$1800 = \$7800$
$\$13400$
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)

$\$2 \times 4 = \$8$
$6 \times 8 = 48$
$\$8)$ $\$56$(7 mo., *Ans.*

(3)

$\$8 \times 5 = \$40$
$4 \times 8 = 32$
$\$12)$ $\$72$(6 mo., *Ans.*

(4)

\$250 × 2 = \$500
500 × 5 = 2500
750 × 8 = 6000
\$1500) \$9000(6 mo., *Ans.*

(5)

\$100 × 6 = \$600
75 × 8 = 600
125 × 12 = 1500
\$300) \$2700(9 mo., *Ans.*

$\frac{1}{5}$ of \$200 = \$40
$\frac{2}{5}$ of \$200 = \$80

(6)

\$40 × 0 = 0
80 × 5 = \$400
80 × 10 = 800
\$200) \$1200(6 mo., *Ans.*

Art. 231.

(2.) Counting from April 2d, it is 90 days to the first payment, and 150 days to the second.

\$200 × 90 = \$18000
300 × 150 = 45000
\$500) \$63000(126 da. from April 2d = Aug. 6th, *Ans.*

(3.) Counting from July 6, when first bill is due,

\$1250 × 0 = 0
4280 × 73 = 312440
675 × 168 = 113400
\$6205) \$425840(68.6+

Counting 69 days from July 6th, brings the time to Sept. 13, *Ans.*

Art. 232.

(2)

6 lb. at 3 ct. = 18 ct.
4 lb. at 8 ct. = 32 ct.
10 lb. cost 50 ct.
50 ct. ÷ 10 = 5 ct., *Ans.*

(3)

25 lb. at 12 ct. = \$3.00
25 lb. at 18 ct. = 4.50
40 lb. at 25 ct. = 10.00
90 lb. cost \$17.50
\$17.50 ÷ 90 = \$0.19$\frac{4}{9}$, *Ans.*

(4)

3 gal. cost $0.00
12 gal. at 50 ct. = 6.00
15 gal. cost $6.00
$6.00 ÷ 15 = $0.40, *Ans.*

(5)

10 at $3 = $30.00
12 at 4 = 48.00
8 at 9 = 72.00
30 worth $150.00
$150 ÷ 30 = $5, *Ans.*

(6)

6 to 10 = 4 hr. 63° × 4 = 252°
10 to 1 = 3 " 70° × 3 = 210°
1 to 3 = 2 " 75° × 2 = 150°
3 to 7 = 4 " 73° × 4 = 292°
7 to 6 = 11 " 55° × 11 = 605°
24) 1509°(62$\frac{7}{8}$°, *Ans.*

INVOLUTION.

Art. 234.

(2.) 65 × 65 = 4225, *Ans.*

(3.) 25 × 25 × 25 = 15625, *Ans.*

(4.) 12 × 12 × 12 × 12 = 20736, *Ans.*

(5.) 10 × 10 × 10 × 10 × 10 = 100000, *Ans.*

(6.) 9 × 9 × 9 × 9 × 9 × 9 = 531441, *Ans.*

(7.) 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 = 256, *Ans.*

(8.) $\frac{2}{3} \times \frac{2}{3} = \frac{4}{9}$, *Ans.* (9.) $\frac{3}{4} \times \frac{3}{4} \times \frac{3}{4} = \frac{27}{64}$, *Ans.*

(10.) $\frac{4}{5} \times \frac{4}{5} \times \frac{4}{5} \times \frac{4}{5} = \frac{256}{625}$, *Ans.*

(11.) $\frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} = \frac{32}{243}$, *Ans.*

(12.) $16\frac{1}{2} = \frac{33}{2}$. $\frac{33}{2} \times \frac{33}{2} = \frac{1089}{4} = 272\frac{1}{4}$, *Ans.*

(13.) $12\frac{1}{2} = \frac{25}{2}$. $\frac{25}{2} \times \frac{25}{2} \times \frac{25}{2} = \frac{15625}{8} = 1953\frac{1}{8}$, *Ans.*

(14.) .25 × .25 × .25 × .25 = .00390625, *Ans.*

(15.) 14 × 14 × 14 = 2744, *Ans.*

(16.) $19 \times 19 \times 19 \times 19 = 130321$, *Ans.*

(17.) $2\frac{1}{3} = \frac{7}{3}$. $\frac{7}{3} \times \frac{7}{3} \times \frac{7}{3} \times \frac{7}{3} \times \frac{7}{3} = \frac{16807}{243} = 69\frac{40}{243}$, *Ans*

Art. 238. EVOLUTION.

(5)

529(20 + 3 = 23, *Ans.*
400
20|129
2
40
3
43|129

(6)

625(25, *Ans.*
4
45)225
225

(7)

6561(81, *Ans.*
64
161)161
161

(8)

56644(238, *Ans.*
4
43)166
129
468)3744
3744

(9)

390625(625, *Ans.*
36
122)306
244
1245)6225
6225

(10)

1679616(1296, *Ans.*
1
22)67
44
249)2396
2241
2586)15516
15516

(11)

5764801(2401, *Ans.*
4
44)176
176
4801)4801
4801

(12)

43046721(6561, *Ans.*
36
125)704
625
1306)7967
7836
13121)13121
13121

(13)

987656329(31427, *Ans.*
9
61)87
61
624)2665
2496
6282)16963
12564
62847)439929
439929

(14)

```
     289442169(17013, Ans.
     1
27)189
   189
 3401)4421
      3401
34023)102069
      102069
```

(15)

```
   234.09(15.3, Ans.
   1
25)134
   125
 303)909
     909
```

(16)

```
    145.2025(12.05, Ans.
    1
  22)45.
     44
2405)12025
     12025
```

(17)

```
    915.0625(30.25, Ans.
    9
692)1506
    1204
6045)30225
     30225
```

(18)

```
  .0196(.14, Ans.
   1
24)96
   96
```

(19)

```
     1.008016(1.004, Ans.
     1
2004)008016
       8016
```

(20)

```
    .00822649(.0907, Ans.
     81
1807)12649
     12649
```

(21.) $\sqrt{25}=5$, $\sqrt{729}=27$; $\sqrt{\frac{25}{729}}=\frac{5}{27}$, *Ans.*

(22.) $\frac{847}{1183}=\frac{121}{169}$; $\sqrt{121}=11$, $\sqrt{169}=13$; *Ans.* $=\frac{11}{13}$.

(23.) $30\frac{1}{4}=\frac{121}{4}$; $\sqrt{\frac{121}{4}}=\frac{11}{2}=5\frac{1}{2}$, *Ans.*

(24)

$\dot{10}(3.162277+,$ *Ans.*

9

61)100

61

626)3900

3756

6322)14400

12644

63242)175600

126484

632447)4911600

4427129

6324547)48447100

44271829

(25)

$\dot{2}(1.41421+,$ *Ans.*

1

24)100

96

281)400

281

2824)11900

11296

28282)60400

56564

282841)383600

282841

(27)

$6\frac{2}{5} = \dot{6}.4(2.5298+,$ *Ans.*

4

45)240

225

502)1500

1004

5049)49600

45441

50588)415900

404704

(28)

$384\frac{4}{7} = \dot{3}84.\dot{5}714285\dot{7}14(19.61049+,$ *Ans.*

1

29)284

261

386)2357

2316

3921)4114

3921

392204)1932857

1568816

3922089)36404114

35298801

(26)

$\frac{2}{3} = .\dot{6}6\dot{6}666+(.81649+,$ *Ans.*

64

161)266

161

1626)10566

9756

16324)81066

65296

163289)1577066

1469601

Art. 239.

(2.) $16 = 2 \times 2 \times 2 \times 2$: $\sqrt{16} = 2 \times 2 = 4$, *Ans.*

(3.) $36 = 2 \times 2 \times 3 \times 3$: $\sqrt{36} = 2 \times 3 = 6$, *Ans.*

(4.) $100 = 2 \times 2 \times 5 \times 5$: $\sqrt{100} = 2 \times 5 = 10$, *Ans.*

(5.) $225 = 3 \times 3 \times 5 \times 5$: $\sqrt{225} = 3 \times 5 = 15$, *Ans.*

(6.) $\sqrt{(16 \times 25)} = 4 \times 5 = 20$, *Ans.*

(7.) $\sqrt{(36 \times 49)} = 6 \times 7 = 42$, *Ans.*

(8.) $\sqrt{(64 \times 81)} = 8 \times 9 = 72$, *Ans.*

(9.) $\sqrt{(121 \times 25)} = 11 \times 5 = 55$, *Ans.*

Art. 240.

(1)	(2)	(3)
$30^2 = 900$	$100^2 = 10000$	$45^2 = 2025$
$40^2 = 1600$	$60^2 = 3600$	$60^2 = 3600$
$\sqrt{2500} = 50$, *Ans.*	$\sqrt{6400} = 80$, *Ans.*	$\sqrt{5625} = 75$, *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. $47.2344 + 55.4166 = 102.65$, *Ans.*

(5.) $600^2 = 360000$, $140^2 = 19600$; $360000 - 19600 = 340400$; $\sqrt{340400} = 583.43+$; $100 \div 2 = 50$; $583.43 - 50. = 533.43+$, *Ans.*

(6)

$20^2 = 400$
$16^2 = 256$
656
Square of base $= 656$

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.

$12^2 =$ perpendicular$^2 = 144$; $656 + 144 = 800$; $\sqrt{800} = 28.28+$, *Ans.*

Art. 241.

(1)

$$\begin{array}{r|l} 6241 & 79 \text{ rd., } \textit{Ans.} \\ 49 & \\ \hline 149 & 1341 \\ & 1341 \\ \hline \end{array}$$

(2)

8 sq. ft. 4 sq. in. = 1156 sq. in.

$$\begin{array}{r|l} 1156 & 34 \text{ in.} = 2 \text{ ft. } 10 \text{ in., } \textit{Ans.} \\ 9 & \\ \hline 64 & 256 \\ & 256 \\ \hline \end{array}$$

(3.) $\sqrt{4096} = 64$ yd., *Ans.*

(4.) $4 \times 4 = 16$; $16 \times 9 = 144$; $\sqrt{144} = 12$, *Ans.*
Or, $\sqrt{(16 \times 9)} = 4 \times 3 = 12$ rd., *Ans.*

(5.) There are 43560 sq. ft. in 1 acre.
$\sqrt{43560} = 208.71+$ ft., side of acre.

Art. 244.

(3)

$$\begin{array}{r|l} 2197 & 13 \\ 1 & \\ \hline 300 & 1197 \\ 90 & \\ 9 & \\ \hline 399 & 1197 \\ \hline \end{array}$$

$$\begin{array}{r|l} 13824 & 24 \\ 8 & \\ \hline 1200 & 5824 \\ 240 & \\ 16 & \\ \hline 1456 & 5824 \\ \hline \end{array}$$

$\frac{13}{24}$, *Ans.*

(4)

$$\begin{array}{r|l} .800000000 & .928, \textit{Ans.} \\ 729 & \\ \hline 24300 & 71000 \\ 540 & \\ 4 & \\ \hline 24844 & 49688 \\ \hline 2539200 & 21312000 \\ 22080 & \\ 64 & \\ \hline 2561344 & 20490752 \\ \hline \end{array}$$

(5)

$$
\begin{array}{r|l}
\dot{9}1\dot{1}2\dot{5} & (45,\ \textit{Ans.} \\
64 & \\
\hline
 & 27125 \\
4\times4\times300=4800 & \\
4\times5\times\ 30=\ 600 & \\
5\times5\ \ \ =\ \ 25 & \\
\hline
5425 & 27125
\end{array}
$$

(6)

$$
\begin{array}{r|l}
1\dot{9}5\dot{1}1\dot{2} & (58, \\
125 & \textit{Ans.} \\
\hline
 & 70112 \\
5\times5\times300=7500 & \\
5\times8\times\ 30=1200 & \\
8\times8\ \ \ =\ \ 64 & \\
\hline
8764 & 70112
\end{array}
$$

(7)

$$
\begin{array}{r|l}
\dot{9}1\dot{2}\dot{6}\dot{7}\dot{3} & (97,\ \textit{Ans.} \\
729 & \\
\hline
 & 183673 \\
24300 & \\
1890 & \\
49 & \\
\hline
26239 & 183673
\end{array}
$$

(8)

$$
\begin{array}{r|l}
\dot{1}2\dot{2}5\dot{0}\dot{4}\dot{3} & (107, \\
1 & \textit{Ans.} \\
\hline
1\times\ 1\times300=\ \ 300 & 225 \\
10\times10\times300=30000 & 225043 \\
10\times\ 7\times\ 30=\ 2100 & \\
7\times\ 7\ \ \ =\ \ 49 & \\
\hline
32149 & 225043
\end{array}
$$

(9)

$$
\begin{array}{r|l}
\dot{1}3\dot{3}1\dot{2}0\dot{5}\dot{3} & (237,\ \textit{Ans.} \\
8 & \\
\hline
 & 5\dot{3}1\dot{2} \\
2\times2\times300=1200 & \\
2\times3\times\ 30=\ 180 & \\
3\times3\ \ \ =\ \ 9 & \\
\hline
1389 & 4167 \\
\hline
23\times23\times300=158700 & 1145053 \\
23\times\ 7\times\ 30=\ 4830 & \\
7\times\ 7\ \ \ =\ \ 49 & \\
\hline
163579 & 1145053
\end{array}
$$

(10)

102503232(468, *Ans.*

64

$4\times4\times300=$	4800	38503
$4\times6\times\ 30=$	720	
$6\times6\ \ =$	36	
	5556	33336
$46\times46\times300=$	634800	5167232
$46\times\ 8\times\ 30=$	11040	
$8\times\ 8\ \ =$	64	
	645904	5167232

(11)

529475129(809, *Ans.*

512

$8\times\ 8\times300=$	19200	17475
$80\times80\times300=$	1920000	17475129
$80\times\ 9\times\ 30=$	21600	
$9\times\ 9\ \ =$	81	
	1941681	17475129

(12)

958585256(986, *Ans.*

729

$9\times9\times300=$	24300	229585
$9\times8\times\ 30=$	2160	
$8\times8\ \ =$	64	
	26524	212192
$98\times98\times300=$	2881200	17393256
$98\times\ 6\times\ 30=$	17640	
$6\times\ 6\ \ =$	36	
	2898876	17393256

(13)

14760213677(2453, *Ans.*

8

$2\times2\times300=$	1200	6760
$2\times4\times\ 30=$	240	
$4\times4\ \ =$	16	
	1456	5824
$24\times24\times300=$	172800	936213
$24\times\ 5\times\ 30=$	3600	
$5\times\ 5\ \ =$	25	
	176425	882125
$245\times245\times300=$	18007500	54088677
$245\times\ \ 3\times\ 30=$	22050	
$3\times\ \ 3\ \ =$	9	
	18029559	54088677

(14)

128100283921(5041, *Ans.*

125

$5\times\ 5\times300=$	7500	3100
$50\times50\times300=$	750000	3100283
$50\times\ 4\times\ 30=$	6000	
$4\times\ 4\ \ =$	16	
	756016	3024064
$504\times504\times300=$	76204800	76219921
$504\times\ \ 1\times\ 30=$	15120	
$1\times\ \ 1\ \ =$	1	
	76219921	76219921

(15) $\dot{5}3.\dot{1}5\dot{7}3\dot{7}6$(3.76, *Ans.*

27

$3\times3\times300=2700$	26157
$3\times7\times\ 30=\ 630$	
$7\times7\ \ =\ \ 49$	
3379	23653
$37\times37\times300=410700$	2504376
$37\times\ 6\times\ 30=\ 6660$	
$6\times\ 6\ \ =\ \ 36$	
417396	2504376

(16) $.\dot{1}99\dot{1}7\dot{6}704$(.584, *Ans.*

125

$5\times5\times300=7500$	74176
$5\times8\times\ 30=1200$	
$8\times8\ \ =\ \ 64$	
8764	70112
$58\times58\times300=1009200$	4064704
$58\times\ 4\times\ 30=\ 6960$	
$4\times\ 4\ \ =\ \ 16$	
1016176	4064704

(17.) $\sqrt[3]{216}=6.$ $\sqrt[3]{343}=7.$ *Ans.* $\frac{6}{7}$.

(18.) $\sqrt[3]{2744}=14.$ $\sqrt[3]{6859}=19.$ *Ans.* $\frac{14}{19}$.

(19.) $\frac{48778}{118638}=\frac{24389}{59319}$ $\sqrt[3]{24389}=29.$ $\sqrt[3]{59319}=39.$ *Ans.* $\frac{29}{39}$.

(20.) $5\frac{104}{125}=\frac{729}{125}$ $\sqrt[3]{729}=9.$ $\sqrt[3]{125}=5.$ *Ans.* $\frac{9}{5}=1\frac{4}{5}$.

(21) $2(1.259+$, *Ans.*

	1	
	1000	
$300+60+4=364$	728	
$12\times12\times300=43200$	272000	
$12\times\ 5\times\ 30=\ 1800$		
$5\times\ 5\ \ =\ \ 25$		
45025	225125	
$125\times125\times300=4687500$	46875000	
$125\times\ \ 9\times\ 30=\ 33750$		
$9\times\ \ 9\ \ =\ \ 81$		
4721331	42491979	

(22) $9(2.080+$, *Ans.*

	8	
	1000	
$2\times2\times300=1200$	1000	
$20\times20\times300=120000$	1000000	
$20\times\ 8\times\ 30=\ 4800$		
$8\times\ 8\ \ =\ \ 64$		
124864	998912	
$208\times208\times300=12979200$	1088000	

(23) $200(5.848+$, *Ans.*

	125	
	75000	
$5\times5\times300=7500$	75000	
$5\times8\times\ 30=1200$		
$8\times\ \ 8=\ \ 64$		
8764	70112	
$58\times58\times300=1009200$	4888000	
$58\times\ 4\times\ 30=\ \ 6960$		
$4\times\ \ 4=\ \ \ \ 16$		
1016176	4064704	
$584\times584\times300=102316800$	823296000	
$584\times\ \ 8\times\ 30=\ \ 140160$		
$8\times\ \ 8=\ \ \ \ \ \ 64$	819656192	

(24) . . .

$9\frac{1}{6} = 9.166666 + (2.092+$, *Ans.*

8

$2\times2\times300=$	1200	1166
$20\times20\times300=$	120000	1166666
$20\times\ 9\times\ 30=$	5400	
$9\times\ 9=$	81	
	125481	1129329
$209\times209\times300=$	13104300	37337666
$209\times\ 2\times\ 30=$	12540	
$2\times\ 2=$	4	
	13116844	26233688

Art. 245.

(1.) $\sqrt[3]{1953.125} = 12.5$ ft., *Ans.*

(2.) $64 \times 3 \times 3 \times 3 = 1728$ cu. in. $= 1$ cu. ft., one side of which $= 1$ ft., *Ans.*

(3.) $\sqrt[3]{512} = 8$ half in. $= 4$ in., *Ans.*

(4.) 450 cu. yd. 17 cu. ft. $= 12167$ cu. ft.; $\sqrt[3]{12167} = 23$ ft., *Ans.*

(5.) $288 \times 216 \times 48 = 2985984$, $\sqrt[3]{2985984} = 144$ ft., *Ans.*

(6.) $1728 \times 3 = 5184$, $\sqrt[3]{5184} = 17.306+$ in., *Ans.*

MENSURATION.

Art. 247.

(1.) 17 ft. $\times$ 15 ft. $= 255$ sq. ft., *Ans.*

(2.) 120 rd. $\times$ 84 rd. $= 10080$ sq. rd. $= 63$ A., *Ans.*

(3.) 65 rd. $\times$ 65 rd. $= 4225$ sq. rd. $= 26$ A. 65 sq. rd.

(4.) 35 rd. $\times$ 16 rd. $= 560$ sq. rd. $= 3$ A. 80 sq. rd., *Ans.*

(5.) 30 ft. × 30 ft. = 900 sq. ft. = 100 sq. yd.
15 ft. × 15 ft. = 225 sq. ft., × 2 = 450 sq. ft. = 50 sq. yd.
Diff. = 50 sq. yd.

(7.) 5 ft. 6 in. = $5\frac{1}{2}$ ft.; 1 ft. 8 in. = $1\frac{2}{3}$ ft.; $\frac{11}{2}$ ft. × $\frac{5}{3}$ ft. = $\frac{55}{6}$ sq. ft. = $9\frac{1}{6}$ sq. ft., *Ans.*

(8.) 25 ft. 9 in. = $25\frac{3}{4}$ ft. = $\frac{103}{4}$ ft.; 21 ft. 3 in. = $21\frac{1}{4}$ ft. = $\frac{85}{4}$ ft.; $\frac{103}{4} \times \frac{85}{4} = \frac{8755}{16}$ sq. ft. = $547\frac{3}{16}$ sq. ft. = 60 sq. yd. 7 sq. ft. 27 sq. in., *Ans.*

(9.) 80 sq. ft. ÷ 10 ft. = 8 ft., *Ans.*

(10.) 18 ft. × 15 ft. = 270 sq. ft. = 30 sq. yd.; 30 sq. yd. ÷ $1\frac{1}{2}$ yd. = 20 yd., *Ans.*

(11.) 3 yd. × $1\frac{1}{2}$ yd. = $4\frac{1}{2}$ sq. yd.; $4\frac{1}{2} \div \frac{3}{4} = \frac{9}{2} \times \frac{4}{3} = 6$ yd., *Ans.*

(12.) 21 ft. 3 in. = 21.25 ft.; 13 ft. 6 in. = 13.5 ft.; 21.25 ft. × 13.5 ft. = 286.875 sq. ft.; $1\frac{1}{4}$ yd. = $3\frac{3}{4}$ = 3.75 ft.; 286.875 sq. ft. ÷ 3.75 ft. = 76.5 ft. = 25.5 yd. = $25\frac{1}{2}$ yd.

(13.) 160 sq. rd. in 1 A. 160 ÷ 15 = $10\frac{2}{3}$ rd., *Ans.*

Art. 248.

(1.)

ft.	in.
2	2
2	11
5	1 = 61 in.

61 in. ÷ 2 = $30\frac{1}{2}$ in., × 11 in. = $335\frac{1}{2}$ sq. in.: $335\frac{1}{2}$ sq. in. ÷ 144 = 2 sq. ft. $47\frac{1}{2}$ sq. in., *Ans.*

(2.) 25 rd. + 19 rd. = 44 rd.; 44 rd. ÷ 2 = 22 rd., × 32 rd. = 704 sq. rd., ÷ 160 = 4 A. 64 sq. rd., *Ans.*

(3.) 10 ft. 8 in. = 128 in.; 6 ft. 2 in. = 74 in.; 128 + 74 = 202 in., ÷ 2 = 101 in.; 12 ft. = 144 in.; 101 × 144 = 14544 sq. in. = 101 sq. ft. = 11 sq. yd. 2 sq. ft., *Ans.*

Art. 249.

(1.) 15 ft. × 12 ft. = 180 sq. ft., ÷ 2 = 90 sq. ft., *Ans.*

(2.) 44 rd. × 18 rd. = 792 sq. rd., ÷ 2 = 396 sq. rd.: 396 sq. rd. ÷ 160 = 2 A. 76 sq. rd., *Ans.*

(3.) $12\frac{1}{2}$ ft. × $16\frac{3}{4}$ ft. = $\frac{1675}{8}$ sq. ft. = $209\frac{3}{8}$ sq. ft.; $209\frac{3}{8}$ ÷ 2 = $104\frac{11}{16}$ sq. ft. = 11 sq. yd. 5 sq. ft. 99 sq. in., *Ans.*

(4.) 13 + 14 + 15 = 42, ÷ 2 = 21. 21 − 13 = 8, 21 − 14 = 7, 21 − 15 = 6. 21 × 8 × 7 × 6 = 7056: its square root = 84 sq. ft., *Ans.*

(5.) 30 + 40 + 50 = 120, ÷ 2 = 60. 60 − 30 = 30, 60 − 40 = 20, 60 − 50 = 10. 60 × 30 × 20 × 10 = 360000: $\sqrt{360000}$ = 600 sq. ft.: 600 sq. ft. = 66 sq. yd. 6 sq. ft., *Ans.*

Art. 250.

(1.) 50 rd. × 30 rd. = 1500 sq. rd., ÷ 2 = 750 sq. rd.: 50 rd. × 20 rd. = 1000 sq. rd., ÷ 2 = 500 sq. rd.; 750 sq. rd. + 500 sq. rd. = 1250 sq. rd. = 7 A. 130 sq. rd., *Ans.*

Art. 251.

(1.) 48 ft. × 3.1416 = 150.7968 ft. = 150 ft. 9.56 in.

(2.) 15 ft. ÷ 3.1416 = 4.7746 ft. = 4 ft. 9.3 in. nearly.

(3.) 4 × 3.1416 = 12.5664 ft. = 12 ft. 6.8 in. nearly.

(4.) 12 ft. 5 in. = 12.4166+ ft.; 12.4166 ft. ÷ 3.1416 = 3.952338 ft. = 3 ft. 11.43 in. nearly, *Ans.*

(5.) 7912 mi. × 3.1416 = 24856+ mi., *Ans.*

Art. 252.

(1.) 21 × 21 = 441: 3.1416 × 441 = 1385.4456 sq. ft. = 153 sq. yd. 8 sq. ft. 64 sq. in., *Ans.*

NOTE.—To find the diameter when the area is given, divide the area by .7854; the square root of the quotient will be the diameter.

(2.) 6 sq. ft. 98.115 sq. in. = 962.115 sq. in.; 962.115 ÷ .7854 = 1225: $\sqrt{1225}$ = 35 in., = 2 ft. 11 in. = diameter. 35 in. × 3.1416 = 109.956 in. = 9 ft. 1.9+ in. = circum.

(3.) 160 rd. $\div$ .7854 = 203.71785077+; $\sqrt{203.71785077}$ = 14.2729; 14.2729 $\div$ 2 = 7.1364 rd. = 7 rd. 2 ft. 3 in., *Ans.*

(4.) 10 $\div$ 2 = 5 = one radius; $5^2 = 25$: 16 $\div$ 2 = 8 = one radius; $8^2 = 64$. 25 $\times$ 3.1416 = 78.5400; 64 $\times$ 3.1416 = 201.0624: 201.0624 — 78.5400 = 122.5224 sq. ft.; .5224 $\times$ 144 = 75 sq. in. *Ans.* 122 sq. ft. 75 sq. in.

(5.) 1 sq. ft. = 144 sq. in. 144 $\div$ .7854 = 183.3460 sq. in.: $\sqrt{183.3460}$ = 13.54 in., *Ans.*

Art. 254.

(1.) 37 $\times$ 37 $\times$ 6 = 8214 sq. in. = 6 sq. yd. 3 sq. ft. 6 sq. in., *Ans.*

(2.) 4 + 4 + 4 = 12 ft., $\times$ 5 ft. = 60 sq. ft. = convex surface.

$\frac{4+4+4}{2} = 6$. $\left.\begin{matrix} 6-4=2 \\ 6-4=2 \\ 6-4=2 \end{matrix}\right\}$ $6 \times 2 \times 2 \times 2 = 48$.

$\sqrt{48} = 6.92+$; $6.92+ \times 2 = 13.85$ sq. ft. = area of 2 bases. 60 sq. ft. + 13.85 sq. ft. = 73.85+ sq. ft., *Ans.*

(3.) $\left.\begin{matrix} \text{3 ft. 6 in.} = 3\frac{1}{2} \text{ ft.} = \frac{7}{2}; \ \frac{7}{2} \times 2 = 7 \\ \text{2 ft. 9 in.} = 2\frac{3}{4} \text{ ft.} = \frac{11}{4}; \ \frac{11}{4} \times 2 = 5\frac{1}{2} \\ \text{1 ft. 10 in.} = 1\frac{5}{6} \text{ ft.} = \frac{11}{6}. \end{matrix}\right\} = 12\frac{1}{2}$ or $\frac{25}{2}$.

$\frac{25}{2} \times \frac{11}{6} = \frac{275}{12}$ = convex surface; $\frac{7}{2} \times \frac{11}{4} \times 2 = \frac{77}{4}$ or $\frac{231}{12}$ = areas of 2 bases: $\frac{275}{12} + \frac{231}{12} = \frac{506}{12} = 42\frac{1}{6}$ sq. ft., *Ans.*

(4.) 3.1416 $\times$ 4 ft. (diameter) = 12.5664 = circumference.

12.5664 $\times$ 5 = 62.8320 = convex surface.

2 $\times$ 2 $\times$ 3.1416 $\times$ 2 = 25.1328 = areas of 2 bases.

87.96+ sq. ft., *Ans.*

Art. 255.

(2.) 24 ft. $\times$ $18\frac{1}{2}$ ft. $\times$ $10\frac{7}{12}$ ft. = 4699 cu. ft. = 174 cu. yd. 1 cu. ft., *Ans.*

(3.) Area of base $= 1.73+$ sq. ft.; 1.73 sq. ft. $\times$ 14 ft. $= 24\frac{1}{4}$ cu. ft. nearly, *Ans.*

(4.) $2 \times 2 \times 3.1416 \times 12 = 150.8$ cu. ft., *Ans.*

(5.) $9\frac{1}{4}$ in. $= \frac{37}{4}$; $\frac{1}{2}$ of $\frac{37}{4} = \frac{37}{8}$; $(\frac{37}{8})^2 \times 3.1416 \times 8 = 537.6$ cu. in., *Ans.*

Art. 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.) $2\frac{11}{12}$ ft. $\times 3.1416 \times 4\frac{7}{12}$ ft. $\div 2 = 21.008$ sq. ft. $=$ convex surface. $2\frac{11}{12}$ ft. $= \frac{35}{12}$, $\div 2 = \frac{35}{24}$; $(\frac{35}{24})^2 \times 3.1416 = 6.68$ 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.; $(240 \text{ yd})^2 \times 159$ yd. $\div 3 = 3052800$ cu. yd., *Ans.*

(4.) $37\frac{2}{3}$ ft. $= 11\frac{3}{3}$, $\div 2 = 11\frac{3}{6}$; $(11\frac{3}{6})^2 \times 3.1416 = 1114.3+$ sq. ft. $=$ area of base. $1114.3+$ sq. ft. $\times 79\frac{3}{4}$ ft., $\div 3 = 29622+$ cu. ft., *Ans.*

Art. 258.

(2.) $(4\frac{1}{2}$ ft.$)^2 \times 3.1416 = 63.6+$ sq. ft., *Ans.*

(3.) $(7912)^2 \times 3.1416 = 196663355.75$ sq. mi., *Ans.*

Art. 259.

(1.) $13 \times 13 \times 13 \times .5236 = 1150.3+$ cu. ft., *Ans.*

(2.) $2\frac{1}{2}$ ft. $= \frac{5}{2}$: $\frac{5}{2} \times \frac{5}{2} \times \frac{5}{2} \times .5236 = 8.18+$ cu. ft., *Ans.*

(3.) 1 cu. ft. = 1728 cu. in.; $1728 \div .5236 = 3300.229$; $\sqrt[3]{3300.229} = 14.9$ in. nearly, *Ans.*

Art. 260.

(1.) $20\frac{1}{2} \times 16\frac{1}{4}$ = area of ceiling; $20\frac{1}{2} \times 10\frac{1}{12} \times 2$ = area of 2 sides; $16\frac{1}{4} \times 10\frac{1}{12} \times 2$ = 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.)

	21 yd. × 15 yd. = 315 sq. yd.
5 ft. = $1\frac{2}{3}$ yd.	21 yd. × $1\frac{2}{3}$ yd. = 35 sq. yd.
	280 sq. yd.

$35 \times .36 = \$12.60$; $280 \times .24 = \$67.20$; $\$12.60 + \$67.20 = \$79.80$, *Ans.*

(4.) $15\frac{1}{2}$ ft. $\times$ $12\frac{1}{2}$ ft. $\times 2 = 387.5$ sq. ft. $= 43.06$ sq. yd.; 43.06 sq. yd. @ 10 ct. = \$4.31, *Ans.*

(5.) 6 ft. 11 in. + 5 ft. 4 in. + 4 ft. 3 in., $\times 7 = 115\frac{1}{2}$ ft., $\times 3\frac{1}{2}$ ft. $= 404\frac{1}{4}$ sq. ft., $\times$ 16 ct. = \$64.68, *Ans.*

(6.) $36\frac{1}{4}$ ft. $\times$ $16\frac{1}{2}$ ft. = 598 sq. ft. = 5.98 squares; $5.98 \times \$3.00 = \$17.94$, *Ans.*

(7.) 40 ft. $\times$ $18\frac{1}{2}$ ft. $\times 2 = 1480$ sq. ft. = 14.80 squares; $14.80 \times \$3.50 = \$51.80$, *Ans.*

Art. 261.

(1.) $16 \times 1\frac{1}{4} = 20$ ft., *Ans.*

(2.) $12\frac{1}{2} \times 2\frac{1}{4} \times 2 = 56\frac{1}{4}$ ft., *Ans.*

(3.) $15 \times \frac{1}{3} \times 3 = 15$ ft., *Ans.*

(4.) $12 \times 2 \times 24 = 576$ ft., *Ans.*

(5.) 1 ft. 3 in. + 11 in. $= 2\frac{1}{6}$ ft., $\div 2 = 1\frac{1}{12}$ ft. = average width. $12\frac{1}{2} \times 1\frac{1}{12} = 13\frac{13}{24}$ ft., *Ans.*

Art. 262.

(1.) 97 ft. 5 in. = 97.416+ ft.; 18 ft. 3 in. = 18.25 ft.; 2 ft. 3 in. = 2.25 ft.: 97.416 ft. $\times$ 18.25 ft. $\times$ 2.25 ft. = 4000.1445 cu. ft. 4000.1445 $\div$ 24.75 = 161.6+ P., *Ans.*

(2.) 53 ft. 6 in. = 53.5 ft.; 12 ft. 6 in. = 12.5 ft.; 53.5 $\times$ 12.5 $\times$ 2 = 1337.5 cu. ft. = 54.0404+ P. 54.0404 $\times$ \$2.25 = \$121.59+, *Ans.*

(3.) $48\frac{1}{3} \times 16\frac{1}{2} \times 1\frac{1}{2} = \frac{145}{3} \times \frac{33}{2} \times \frac{3}{2} = \frac{14355}{12} = 1196\frac{1}{4}$ cu. ft.; $1196\frac{1}{4} \times 20 = 23925$ bricks, *Ans.*

(4.) $120 \times 8 \times 1\frac{1}{2} = 1440$ cu. ft. = 2488320 cu. in. in wall; $8 \times 4 \times 2.25 = 72$ cu. in. in each brick; 2488320 $\div 72 = 34560$ bricks, *Ans.*

(5.) $240 \times 6 \times 3 = 4320$ cu. ft. = 7464960 cu. in. in wall; $9 \times 4 \times 2 = 72$ cu. in. in brick; 7464960 $\div 72 =$ 103680 bricks; 103680 $\div 1000 = 103.68$; \$3.25 $\times$ 103.68 = \$336.96, *Ans.*

Art. 263.

(1.) 15 ft. $\times$ 5 ft. $\times$ 4 ft. = 300 cu. ft. = 518400 cu. in.; 518400 $\div$ 2150.4 = 241+ bu., *Ans.*

(2.) 10 ft. = 120 in.; 5 ft. = 60 in.; 4 ft. = 48 in.; $120 \times 60 \times 48 = 345600$ cu. in.; 345600 $\div 231 = 1496+$ gal., *Ans.*

(3.) $(6)^2 \times .7854 = 28.2744$ = area of end; 28.2744 $\times$ 8 = 226.1952 cu. ft. = 390865.3056 cu. in. This divided by 2150.4 = 181.76+ bu., *Ans.*

(4.) 4 [illegible] = 48 in.; 6 ft. = 72 in.; $(48)^2 = 2304$; $2304 \times .7854 \times 72 = 130288.4352$ cu. in.; $130288.4352 \div 231 = 564.019+$ gal.; $564.019+ \div 31\frac{1}{2} = 17.9+$ bl., *Ans.*

PROGRESSIONS.

Arithmetical Progression.

Case I.

Art. 265.

(3.) $50 - 1 = 49$; $49 \times 3 + 2 = 149$, *Ans.*

(4.) $54 - 1 = 53$; $53 \times 2 = 106$; $140 - 106 = 34$, *Ans.*

(5.) $99 - 1 = 98$; $98 \times \frac{7}{8} = 85\frac{3}{4}$; $329 - 85\frac{3}{4} = 243\frac{1}{4}$, *Ans.*

Case II.

Art. 266.

(2.) $300 - 3 = 297$; $10 - 1 = 9$; $297 \div 9 = 33$, *Ans.*

(3.) $50 - 5 = 45$; $10 - 1 = 9$; $45 \div 9 = 5$ 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.*

(4.) 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. $100 - 1 = 99$; $99 \times 6 + 6 = 600$, last term. $6 + 600 = 606$; $606 \times 100 = 60600$; $60600 \div 2 = 30300$ yd.; 30300 yd. = 17 mi. 69 rd. $\frac{1}{2}$ yd., *Ans.*

(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.*