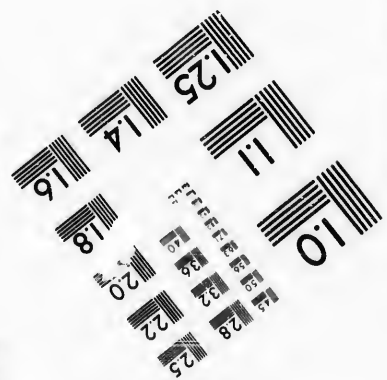
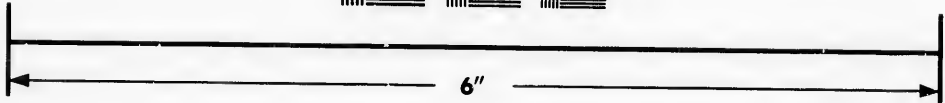
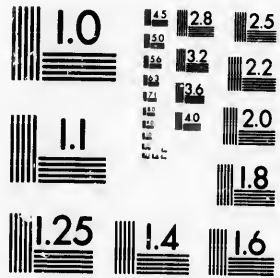


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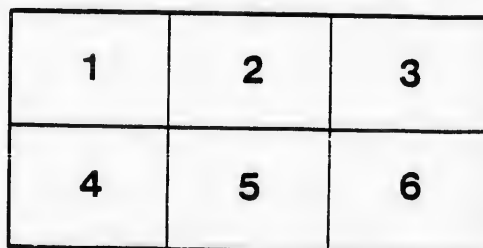
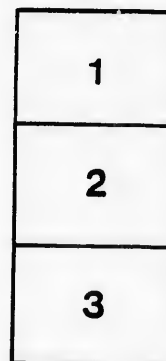
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932040674  
236040769  
695999906

7843692865  
3456738625  
4386954240

8736000432  
1226000433  
7499999999

900000000000  
100000000000  
799999999999

7328694325843  
6378952387659

6734870685  
1349670627  
5385200058

94973333333333

5385200058

86984882  
68764395  
34538789  
87692875  
48234569  
87629587  
12345678  
23456789

57895632  
48769407  
32687489  
67825418  
78902624  
53284768  
73628964  
27965487

9638745  
2387698  
0736787  
9287396  
3456789  
5287695  
2743869  
8729304

449597514

470989789

46268333

576328  
362496  
638724  
567483  
295834  
3619817

3,18.41  
2,86.4  
3,68.6

KEY

TO

ELEMENTARY ARITHMETIC,

FOR

CANADIAN SCHOOLS,

BY

REV. BARNARD SMITH, M.A.,

ST. PETER'S COLLEGE, CAMBRIDGE,

AND

ARCHIBALD McMURCHY, M.A.,

UNIVERSITY COLLEGE, TORONTO.

---

TORONTO:

COPP, CLARK & CO., KING STREET EAST.

1871.

68358743  
 47839652  
 23456789  
 87654321  
 91234567  
 65432198  
 78912345  
 43219876  
506118491

123456789  
 876543210  
 901234567  
 654321098  
 789012345  
 432109876  
 567890123  
 210987654  
 345678901  
4901234563

ELEM

(6)  
 6  
 7  
 6 + 1 = 7  
 7 + 2 = 9  
 —  
 29 b

Entered according to Act of the Parliament of Canada, in the year One Thousand Eight Hundred and Seventy-one, by COPP, CLARK & Co., Toronto, in the Office of the Minister of Agriculture.

98765432  
 45678901  
 32109876  
 89012345  
 76543210  
 23456789  
 10987654  
 67890123  
 54321098  
498765428

Acad	25
Printing	27
Draw	11
Spelling	28
Comps	40
Hist	45
Geog	34 216
Phys	40
Latin	50
Grammar	150
Arith	150
	<u>556</u>

17 + 19 =  
 36 + 9 =

# KEY TO ELEMENTARY ARITHMETIC.

---

## Ex. VI. (p. 17.)

(6) $\begin{array}{r} 6 \\ 7 \\ \hline 6 + 1 = 7 \\ 7 + 2 = 9 \\ \hline \end{array}$	(7) $\begin{array}{r} 2 \\ 4 \\ 6 \\ \hline 2 + 2 = 4 \\ 4 + 2 = 6 \\ \hline \end{array}$	(8) $\begin{array}{r} 2 \\ 5 \\ 7 \\ 9 \\ \hline A's \ 2 \\ B's \ 5 \\ C's \ 7 \\ D's \ 9 \\ \hline \end{array}$
29 boys.	12 years.	23
	If C had bought	7 more.
		30 total.

## Ex. VII. (p. 19.)

(36) $\begin{array}{r} 19 \\ 36 \\ 45 \\ \hline 17 + 19 = 36 \\ 36 + 9 = 45 \\ \hline \end{array}$	(37) $\begin{array}{r} 32 \\ 97 \\ 129 \\ 29 \\ \hline 32 \text{ men.} \\ 97 \text{ women.} \\ 129 \text{ youths.} \\ 29 \text{ infants.} \\ \hline \end{array}$
100 marbles.	287

(38) $\begin{array}{r} 659 \\ 888 \\ 892 \\ 2448 \\ 4885 \\ \hline 657 + 231 = 888 \\ 2437 + 11 = 2448 \\ \hline \end{array}$	$\begin{array}{r} 1st \\ 2d \\ 3d \\ 4th \\ 5th \\ \hline \end{array}$
	9770 total.



	(39)	(40)
\$9080	wife's share.	589 1st
\$11788	two younger sons' share.	$215 + 589 = 804$ 2d
\$10600	eldest son's share.	$197 + 589 = 786$ 3d
\$10600	three daughters' share.	$589 + 786 = 1375$ 4th
<u>\$42068</u>		<u>3554</u>

## Ex. VIII. (p. 21.)

(21)	(22)	(23)
24916	15499	44821
51954	6824	90323
27499	29620	19096
37750	20325	14669
44720	<u>72268</u>	13743
<u>186839</u>		11555
		<u>194207</u>

## Ex. IX. (p. 22.)

(14)	(15)	(16)
44 sheep.	523 bu. wheat.	\$1650
35 cattle.	120 " oats.	160
15 pigs.	64 " peas.	575
6 horses.	237 " potatoes.	200
<u>100 animals.</u>	38 " turnips.	600
	<u>982 total.</u>	<u>\$3185</u>

(17)
25211
32050
31183
28590
23780
24988
<u>165802</u>

589 1st  
 804 2d  
 786 3d  
 775 4th  
 ---  
 354

Ex. X. (p. 25.)

(30)	\$560	\$300	75	(31)	47
	300	260	28		28
	-----	-----	-----		-----
	\$260 w'th of carriage.	\$ 40	47 No. of boys.	19	

(32)	49 + 65 + 19 = 133	(33)	6 + 4 = 10
	167 - 133 = 34		6 - 4 = 2
	35 - 34 = 31		10 - 2 = 8

(34)  
 10 + 3 + 8 + 5 + 3 + 4 = 33.  
 40 - 33 = 7.

Ex. XI. (p. 26.)

(22)	9277 - 1288 = 7994	2d In.	23047	(23)	10000
	9277 + 7994 = 17271		175		8406
	23257 - 17271 = 5986		-----	-----	-----
			23222		1594
			368		704
(24)	1869		-----	-----	-----
	1819		22854		890
	-----		495		7305
	50 the age of the queen <i>now</i> .		-----	-----	-----
	1841		23349		8195
	50		132		
	-----		-----		
	1891 when the prince's		23217		
	age = the queen's.		∴ the difference is		
	1891 - 1819 = 72 years, the queen's age <i>then</i> .		23217 - 8165 = 15022.		

(25)

97 - 29 = 68 Henry's marbles.  
 97 + 68 - 25 = 140 Charles' marbles.

(26)	(27)
84	45 - 16 = 29
135	29 + 7 = 36
39	36 - 10 = 26
58	26 + 2 = 28
39 + 58 = 97	28 + 4 = 32
804	32 - 11 = 21
<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	21 + 9 = 30
\$1217	30 - 7 = 23
\$1217 - \$1000 = \$217 in debt.	23 - 5 = 18
	18 + 8 = 26th from top.
	45 - 26 = 19th from bottom.

(28)	(29)
63 - 5 = 58 children.	1769 - 1696 = 73 eggs.
105 - 58 = 47 able-bodied.	1262 - 73 = 1189 nuts.
70 - 47 = 23 infirm.	73 + 1189 = 1262
5 officers.	1769 - 1262 = 507 oranges
	1189 - 507 = 682

(30)	(31)
117986	45008008
72268	37906703
<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>
45718	7096305

(32)

Since minuend = sum of subtrahend and remainder,  
 $\therefore \text{min.} = 56212300 + 77313 = 56289613.$

(33)

Since subtrahend = difference bet. min. and remainder,  
 $\therefore \text{sub.} 66304000 - 12586 = 66291414.$

(34)	(35)
Gained \$1 per head.	\$43054836
Total gain \$305.	34717248
$\therefore \text{Actual gain} = \$305 - \$45 = \$260.$	<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>
	\$8337588

## Ex. XII. (p. 28.)

3 = III;	18 = XVIII;	59 = LIX;
7 = VII;	25 = XXV;	62 = LXII;
11 = XI;	28 = XXVIII;	77 = LXXVII;
9 = IX;	37 = XXXVII;	84 = LXXXIV;
12 = XII;	40 = LX;	103 = CIII;
16 = XVI;	53 = LIII;	157 = CLVII;
190 = CXC;	200 = CC;	
651 = DCLI;	783 = DCLXXXIII;	
1204 = MCCIV;	1527 = MDXXVII;	
1865 = MDCCCLXV.		

(2)

III = three, or 3;	VI = six, 6;
VIII = eight, or 8;	XIII = thirteen, or 13;
XV = fifteen, or 15;	XVII = seventeen, or 17;
XX = twenty, or 20;	LIV = fifty-four, or 54;
LXXXI = eighty-one, or 81;	
CXI = one hundred and eleven, or 111;	
DCV = six hundred and five, or 605;	
VII = five thousand and two, or 5002;	
MC = one million one hundred thousand, or 1100000;	
MM = two thousand, or 2000;	
DCCXLIX = seven hundred and forty-nine, or 749;	
MDCCCLXV = one thousand eight hundred and sixty-five, or 1865.	

## Ex. XIII. (p. 31.)

(45)

$$39 \times 11 = 429 \text{ bu.}$$

$$429 \times 6 = 2574 \text{ s.}$$

(46)

$$21 \times 12 = 252 \text{ pence.}$$

$$252 \times 3 = 756 \text{ pence.}$$

$$252 \times 7 = 1764 \text{ pence.}$$

$$252 \times 12 = 3024 \text{ pence.}$$

(47)

$$11 \times 23 = 253 \text{ cents.}$$

$$33 \times 9 = 297 \text{ cents.}$$

$$297 - 253 = 44 \text{ cents.}$$

(48)

$$12 \times 12 + 8 = 152.$$

$$8 \times 12 + 12 = 108.$$

$$152 - 108 = 44.$$

(40)

$$\begin{aligned}
 57 \times 12 + 5 &= 689 \text{ B's share.} \\
 112 \times 12 + 11 &= 1355 \text{ C's share.} \\
 259 \times 12 + 9 &= 3117 \text{ D's share.} \\
 689 + 1355 + 3117 &= 5161. \\
 7401 - 5161 &= 2240 \text{ E's share.} \\
 2240 - 1355 &= 885.
 \end{aligned}$$

Ex. XIV. (p. 32.)

(18) 1st travels 93 miles per day, and 2d 79; therefore, in one day he gains  $93 - 79$ , or 14 miles, and in a week, or seven days, he would gain  $14 \times 7$ , or 98 miles.

(19) At the end of two days, the first will have gained  $14 \times 2$ , or 28 miles; then second travels in an opposite direction 5 days, or  $5 \times 79$  miles = 395, while first is travelling from him  $5 \times 93$  miles, or 465 miles. Therefore, whole distance apart at the end of 7 days =  $28 + 395 + 465$  miles = 888 miles.

Ex. XV. (p. 34.)

(19)	(20)	(21)	(22)
495	690	417	273
<u>370</u>	<u>480</u>	<u>730</u>	<u>900</u>
34650	55200	3753	250200
<u>1485</u>	<u>2760</u>	<u>1251</u>	
183150	331200	2919	
		<u>308163</u>	

(23)	(24)	(25)
904	3259	15900
<u>803</u>	<u>497</u>	<u>3300</u>
2712	22813	477
<u>7252</u>	<u>29331</u>	<u>477</u>
725912	13036	52470000
	<u>1619723</u>	

there-  
nd in a  
3 miles.  
I have  
in an  
, while  
miles.  
lays =

2)  
73  
900  
200

(26)  
50738  
9706  

---

304428  
355166  
456642  

---

492463023

(27)  
86370  
93900  

---

77733  
77733  

---

7851038000

(28)  
47672  
5126  

---

285032  
95344  
47672  

---

238360  

---

244366672

(29)  
68196  
2065  

---

340545  
408554  
~~136718~~  

---

140645085

(30)  
45001  
7823  

---

300752  
185222  
560752  
815658  

---

853446772

(31)  
56888  
2040  

---

511992  
227552  
941328  

---

844115512

(32)  
92035  
8007  

---

644215  
736280  

---

73624245

(33)  
84009  
7898  

---

672072  
756081  
672072  
588063  

---

663503082

(34)  
678000  
876000  

---

4028  
4746  
5424  

---

593928000000

(35)  
90058  
90003  

---

810522  
810522  

---

8106030522

(36)  
86108  
7770  

---

560756  
560756  
560756  

---

622429160

KEY. [ELEM. ARITH.]

7039  
 4709  
 -----  
 63351  
 49273  
 28156  
 -----  
 33146651  
 -----  
 87900  
 9006  
 -----  
 5274  
 7011  
 -----  
 791627400

(37) 3910  
 350000  
 -----  
 1955  
 1173  
 -----  
 1368500000  
 -----  
 7008005  
 400703  
 -----  
 21024015  
 49056035  
 28032020  
 -----  
 2208128627515

(38)  
 Sum of 493 and 312 = 808  
 Diff. of 493 and 312 = 184

3232  
 6464  
 808  
 -----

148672 product.

(\*) 973    973  
       63    3  
 -----  
       2919  
 (5838) 3  
 -----  
       61299    8757  
                   7  
 -----  
       61299

(39) (\*) 33000    33000  
           1560        13  
 -----  
           198        99  
           165        33  
           33  
 -----  
       51480000    429000  
                           5  
 -----  
                   2145000  
                           4  
 -----  
                   8580000  
                           6  
 -----  
                   51480000

Ex. XVI.]

KEY.

(40)

<u>1263</u> 3	<u>5613</u> 2	<u>96732</u> 3	<u>67628</u> 2
<u>3789</u> 2	<u>11226</u> 3	<u>290196</u> 4	<u>135256</u> 4
<u>7578</u> 6	<u>33678</u> 9	<u>1160784</u> 6	<u>541024</u> 8
<u>45468</u>	<u>303102</u>	<u>6964704</u>	<u>4328192</u>

Ex. XVI. (p. 34.)

(1)	(2)	(3)
<u>78689</u> 547	<u>275832</u> 476	<u>729817</u> 6736
<u>550823</u> 314756	<u>1034992</u> 1930324	<u>4378902</u> 2189451
<u>393445</u>	<u>1103528</u>	<u>510879</u> 4378902
<u>43042883</u>	<u>131296032</u>	<u>4916017312</u>
(4)	(5)	(6)
<u>46481</u> 936	<u>40980</u> 779	<u>9264397</u> 9584
<u>278886</u> 139443	<u>36837</u> 28651	<u>37057588</u> 74115176
<u>418329</u>	<u>28651</u>	<u>46321985</u> 88379573
<u>43506216</u>	<u>31884470</u>	<u>88789990343</u>



## KEY.

## [ELEM. ARITH.]

(7) 6707936 9878	(8) 6078908 6725	(9) 708670567 97806
53663488 46955552 53663488 60371434	30394540 12157816 42552356 36478448	4252023402 5669364536 4960693969 6378035103
66260991808	40880656300	69312233476002
(10) 6835675 2689	(11) 27083679 3709	(12) 25058612 6289
61521075 54685400 41014050 13671350	243763111 189595753 81251037	225527508 200468896 50117224 150351672
18381180075	1054235411	157593610868
(13) 3523725 2533	(14) 2778588 9867	(15) 79068025 1386
28189800 10371175 17618625 7047450	19450116 16671528 22228704 25007392	494408150 632544200 237204075 79068025
8943314050	27416327796	109588282650
(16) 79094451 764095		(17) 5076812 97613
395472255 711850059 316377804 474566706 553661157		15230436 5076812 30460872 35537684 45691308
60435674536845		495562849756

9) 70567  
 97806  
 -----  
 23402  
 536  
 89  
 3  
 -----  
 76002  
 2) 8612  
 6289  
 -----  
 7508  
 896  
 24  
 2  
 -----  
 868  
 ) 025  
 886  
 -----  
 150  
 00  
 5  
 -----  
 350

Ex. xvii.]

KEY.

(18)  
 9507340  
 7071  
 -----  
 950734  
 6655138  
 6655138  
 -----  
 67226401140

(19)  
 12481630  
 1509  
 -----  
 11233467  
 6240815  
 1248163  
 -----  
 18834779670

Ex. XVII. (p. 38.)

(13)  
 12) 800709  
 -----  
 66725  $\frac{2}{3}$   
 -----  
 11) 218581  
 -----  
 19871

(14)  
 Divisor = dividend + rem'r + quotient.  
 $\therefore$  divisor =  $84 - 3 + 9 = 9$ .  
 Dividend = divisor  $\times$  quotient + rem'r.  
 $\therefore$  dividend =  $11 \times 146 + 7 = 1613$ .

(15)  
 Cost of fowls  $11 \times 36 = 396$  cts.  
 Selling price  $396$  cts. +  $198$  cts. =  $594$  cts.  
 Selling price per fowl  $594 \div 11 = 54$  cts.

(16)  
 9) 214  
 -----  
 23-7 rem'r.

(17)  
 Greater No. =  $4568 - 9 = 4554$ .  
 $\therefore$  quotient =  $4554 \div 9 = 506$ .

(18)  
 40687  
 503  
 -----  
 122061  
 203455  
 -----

(19) 93710563  
 -----  
 8519143

20465561  $\therefore$  diff. =  $20465561 - 8519142 = 11946419$ .

(19)

$\$5427 - \$1500 = \$3927.$   
 Suppose cook's share = 1.  
 Then man-servant's sh. = 2.  
 Housekeeper's share = 4.  
 $\therefore$  total shares, 7.  
 $\$3927 \div 7 = \$561.$   
 $\$561 \times 1 =$  cook's share.  
 $\$561 \times 2 = \$1122,$  man-servant's share.  
 $\$561 \times 4 = \$2244,$  housekeeper's share.

(20)

Sum of 18 and 30 = 48.  
 Diff. bet. 18 and 20 = 12.  
 $48 \div 12 = 4.$   
 Product of 16 and 27 =  
 $432. 432 \times 4 = 1728.$

(21)

$\begin{array}{r} 907057 \\ 6000000 \\ \hline 5442342 \\ 5442342 \\ \hline 5442347442342 \end{array}$	$\begin{array}{r} 9) 5442347442342 \\ \hline 604705271371-3 \\ \hline 9-3=6. \end{array}$
-------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------

(22)

$282 - 230 = 52.$   
 $\therefore$  No. of oranges =  $52 \div 2 = 26.$

(23)

Cost of penholders  $4 \times 12 \times 10 = 480$  cts.  
 No. of envelopes  $25 \times 20 = 500.$   
 $500 @ 16$  cts. per hundred =  $16 \times 5 = 80$  cts.  
 $480 + 80 = 560$  cts.  
 No. of penknives =  $560 \div 16 = 35.$

Ex. XVIII. (p. 41.)

(7)

$\begin{array}{r} 256) 88832 (347 \\ 768 \\ \hline 1203 \\ 1024 \\ \hline 1792 \\ 1792 \\ \hline \end{array}$	$\begin{array}{r} 308) 175252 (569 \\ 1540 \\ \hline 2125 \\ 1848 \\ \hline 2772 \\ 2772 \\ \hline \end{array}$	$\begin{array}{r} 104) 321776 (3094 \\ 312 \\ \hline 977 \\ 936 \\ \hline 416 \\ 416 \\ \hline \end{array}$
---------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------

ITH.

8.  
12.  
7 =

EX. XVIII.]

KEY.

(8)		
329) 653723 (1987	506) 3577926 (7071	884) 542100 (650
829	8542	5004
-----	-----	-----
3247	3592	4170
2961	3542	4170
-----	-----	-----
2862	506	
2622	506	
-----		
2303		
2303		

(9)		
909) 8180181 (9009	745) 4040820 (5436	883) 342604 (388
8181	8725	2049
-----	-----	-----
8181	3248	7770
8181	2980	7064
	-----	-----
	2682	7064
	2235	7064
	-----	
	4470	
	4470	

(10)		
365) 7848600 (21503	678) 2839100 (3450	727) 90625 (124
730	2034	727
-----	-----	-----
548	3051	1792
365	2712	1454
-----	-----	-----
1836	3390	3385
1825	3390	2908
-----		-----
1109		477
1025		

## KEY.

[ELEM. ARITH.]

(11)

478) 27291888 (57096

2390

3391

3846

4588

4302

2368

2368

397) 30387310 (76542

2779

2597

2382

2153

1985

1681

1588

930

794130

703) 3273068 (4655

2812

4610

4218

3926

3515

4118

3515603

(12)

843) 87624792 (103944

843

3324

2529

7957

7587

3709

3372

3372

3372

609) 53006751 (87039

4872

4286

4268

2375

1927

5481

5481

513) 90273189 (175971

513

3897

3591

3063

2565

4981

4617

3648

3591

579

51366

(Continued on next page.)

(4655

609) 53006751 (87039  
4872

(12 continued.)

4286  
4263

2375  
1827

5481  
5481

358) 30073074 (84003  
2864

1433  
1432

1074  
1074

652) 630762540981 (367427210  
5868

4396  
3912

4842  
4564

2785  
2608

1774  
1304

4700  
4564

1369  
1304

658  
652

71

(13)

2731) 519387042 (190182)

2731

24028

24579

4970

2731

22394

21848

5462

5462

2185) 10101255 (4623)

8740

13612

13110

5025

4870

6555

6555

3076) 154725876 (50301)

15380

9258

9228

3076

3076

7243) 632798014 (87366)

57944

53358

50701

26570

21729

48411

43458

49534

434586076

1004) 2015029 (2007)

2098

7029

70231

(14)

6487) 131686100 (20300)

12974

19461

19461

(Continued on next page.)

(14 continued.)

6007) 395494875 (65889	1617) 50696184 (31852
36042	4851
<hr/>	<hr/>
35074	2186
30035	1617
<hr/>	<hr/>
50398	5691
48056	4851
<hr/>	<hr/>
28427	6408
18021	8085
<hr/>	<hr/>
54065	3284
54063	3284
<hr/>	<hr/>
2	

1255 (4623  
 0  
 12.  
 10  
 025  
 370  
 5555  
 5555  
 (87366

(15)

5008) 4519559744 (902468	9306) 16322858 (1754
45072	9306
<hr/>	<hr/>
12359	70168
10016	65142
<hr/>	<hr/>
23437	50265
20032	46530
<hr/>	<hr/>
34054	87358
30048	87224
<hr/>	<hr/>
40064	
40064	
<hr/>	<hr/>
	129

(20300

(Continued on next page.)



(15 continued.)

1579) 23617103000 (14957000

1579

7827

0313

15111

14311

9090

7895

11053

11053

2735) 2106144185 (770071

19145

19164

19145

19418

19145

2735

2735

(16)

3782) 142997420 (37810

1134626537

26471

30834

30256

3782

3782

0016) 19554707200 (3250450

18048

15067

12032

30350

30080

27072

24064

30080

30080

(Continued on next page.)

(16 continued.)

38706) 2828882701578 (73086413  
270942

119462  
116118

334470  
309648

248221  
232236

159855  
154824

50317  
38766

116118  
116118

(17)

$257 \times 553 = 142121.$   
 $142121 \div 79 = 1799.$

(18)

Cost of gloves,  $9 \times 12 \times 110 =$   
 $11880$  cts.

$\therefore$  No. of pairs stockings =  $11880$   
 $\div 66 = 180.$

(19)

$30984051 \div 288 = 107583$ ; rem'r 147.  
 $\therefore$  No. to be added =  $288 - 147 = 141.$

(20)

$274 + 108 = 382.$   
 $274 - 108 = 166.$   
 $382 \times 166 = 63412.$   
 $63412 \div 176 = 360$ ; rem'r 52.

(21)

$75 \times \$4 = \$300$   
 $94 \times \$3 = \$282$   
 $106 \times \$2 = \$212$  } = \$794.

He wishes to realize  $\$794 + \$147$ , or  $\$941.$   
 $\$941 \div 275$  (whole No. of sheep) =  $\$341\frac{1}{5}.$

5 (770071

250450

(22) Gain, \$267

$$\begin{aligned} \text{Buying price, } \$1068 - \$267 &= \$801 \\ \$801 + 267 &= \$3. \end{aligned}$$

$$\begin{aligned} (23) \quad 102 + 29 + 267 &= 399. \\ 899 + 19 &= 21. \\ 21 \times 57 &= 1197. \\ 1197 - 197 &= 1000. \end{aligned}$$

(24)

$$\begin{aligned} 1 \text{ lamb is worth } 16 + 8 &= \$2. \\ 1 \text{ sheep is worth } 60 + 15 &= \$4. \\ 840 \text{ lambs cost } 840 \times \$2 &= \$1680. \\ \therefore \text{No. of sheep} &= \$1680 \div 4 = 420. \end{aligned}$$

(25)

$$\begin{aligned} 87403 - 355 &= 87048. \\ 87048 + 216 &= 403. \end{aligned}$$

(26)

$$154979552 + 416 = 372547.$$

(27)

$$\begin{aligned} 479632 - 20 &= 479612. \\ 479612 + 28 &= 17129. \end{aligned}$$

(28)

$$\begin{aligned} \text{Cost of keeping 29 bullocks 3 months @ } \$5 &= \$435. \\ \therefore \$1885 + \$435 &= \$2320 = \text{whole cost.} \\ \therefore \$2610 - \$2320 &= \$290 = \text{whole gain.} \\ \therefore \$290 \div 29 &= \$10 = \text{gain per bullock.} \end{aligned}$$

Ex. XIX. (p. 43.)

(4)

$$9067) 806753245 (88976 \overset{1353}{\underset{5067}{}}$$

72536

81393

72536

88572

81603

69694

63469

62255

54402

7852

(5)

$$70602) 612709066 (8678 \overset{1111}{\underset{1111}{}}$$

564816

476930

498012

553180

494214

589726

564816

24910

M. ARITH.

EX. XIX.]

KEY.

30

= 87048.  
= 403.

479612.  
17129.

8435.

876802

(6)

896) 60005836 (66970 114

5376

6245

5376

8698

8064

6343

6272

716

(7)

9286) 70867509 (7096 1144

69902

96550

89874

66769

59916

6853

(8)

868) 8673456954 (9992461 114

7812

8614

7812

8025

7812

2136

1736

4009

3472

5375

5208

1674

868

806

(9)

93256) 200006783 (2144 1144

186512

124947

93256

416918

373024

438943

373024

65919

## KEY.

[ELEM. ARITH.

(10)

$$\begin{array}{r} 14609 \\ 719 \\ \hline 131481 \\ 14609 \\ 102263 \\ \hline 10503871 \end{array}$$

$$\begin{array}{r} 8067) 10503871 (1302 \overset{637}{8067} \\ \underline{8067} \\ 24368 \\ \underline{24201} \\ 16771 \\ \underline{16134} \\ 637 \end{array}$$

Ex. XX. (p. 51.)

(1)

$$\begin{array}{r} \text{£} \quad \text{s.} \quad \text{d.} \\ 700 \quad 16 \quad 8 \\ \underline{20} \\ 14196 \text{ s.} \\ \underline{12} \\ 170360 \text{ d.} \\ \underline{4} \\ 681440 \text{ q.} \end{array}$$

(2)

mls.	fur.	ft.	in.
17	1	2	6
8			

$$\begin{array}{r} 137 \text{ fur.} \\ \underline{40} \end{array}$$

$$\begin{array}{r} 5480 \text{ poles.} \\ \underline{5\frac{1}{2}} \end{array}$$

$$\begin{array}{r} 27400 \\ \underline{2740} \end{array}$$

$$\begin{array}{r} 30140 \text{ yds.} \\ \underline{3} \end{array}$$

$$\begin{array}{r} 90422 \text{ ft.} \\ \underline{12} \end{array}$$

$$\begin{array}{r} 1085070 \text{ in.} \end{array}$$

2 537  
8067

(3)  
 tons. cwt. qrs. lbs.  
 8 2 3 5  
 20

162 cwt.  
 4

651 qrs.  
 25

3260  
 1302

16280 lbs.  
 16

97680  
 16280

260480 oz.  
 16

1562880  
 260480

4167680 dra.

(4)

ac. r. sq. p. s. yd.  
 612 2 0 27 1/2

4

2450 r.  
 40

98000 p.  
 80 1/2

2946027 1/2  
 24500

2964527 1/2 yds.  
 9

26680747 1/2 ft.  
 144

106722988  
 106722988  
 26680747

3842027568  
 72

3842027640 in.

in.  
6

## KEY.

[ELEM. ARITH.]

(5)

mls.	fur.	po.	yds.	ft.	in.	ls.
10	5	5	5	0	5	5
<hr/>						
8						
<hr/>						
85 fur.						
40						
<hr/>						
8405 p.						
5½						
<hr/>						
17080						
1702½						
<hr/>						
18782½ yds.						
8						
<hr/>						
56197½						
12						
<hr/>						
674375 ft.						
12						
<hr/>						
8092595 in.						

(6)

ac.	r.	per.	yds.
5	0	8	29
<hr/>			
4			
<hr/>			
20 r.			
40			
<hr/>			
803 p.			
30½			
<hr/>			
24119			
200½			
<hr/>			
24319½ yds.			
9			
<hr/>			
218877½ ft.			
144			
<hr/>			
875508			
875508			
218877			
<hr/>			
31518288			
108			
<hr/>			
31518396			

(7)

17 days.	
24	
<hr/>	
63	
34	
<hr/>	
408 hrs.	
60	
<hr/>	
24480 min.	

er. yds.  
20

(8)  
lbs. oz. drs. scr. grs.  
2 11 0 0 20

(9)  
lea. mls. fur.  
2 2 7

12

3

35 oz.

8 mls.

8

8

280 drs.

71 fur.

3

40

840 scr.

2840 per.

20

5½

16820 grs.

14200

1420

(10)  
cub. yds. ft. in.  
23 0 1000

15620 yds.

27

(11)  
galls. qts.

161

13

3

46

4

621 ft.

55 qts.

1728

2

5968

110 pts.

1242

4

4347

440 gills.

621

(12)

1074088 in.

220 bush.

4

880 pks.

2

1760 galls.

4

7040 qts.



(13)

yrs.	dys.
3	315

---

 365
 

---

15

18

---

 9
 

---

1095

---

 315
 

---

1410 dys.

---

 24
 

---

5640

---

 2820
 

---

33840 hrs.

---

 60
 

---

2030400 min.

(14)

lbs.	oz.	dwt.
27	5	16

---

 12
 

---

329 oz.

---

 20
 

---

6596 dwt.

---

 24
 

---

26384

---

 13192
 

---

158304 grs.

(15)

lbs.	oz.	drs.	sc.
47	11	6	2

---

 12
 

---

575 oz.

---

 8
 

---

4606 drs.

---

 3
 

---

13820 sc.

---

 20
 

---

276400 gr.

(16)

£	s.	d.
200	17	8½

---

 20
 

---

4017 s.

---

 12
 

---

48212 d.

---

 2
 

---

96425 ½ d.

(17)  
 ac.            r.        per.  
 219            2            16  
 4

878 ro.  
 40

35136 per.  
 30½

1054080  
 8784

1062864 yds.

(19)  
 £            s.        d.  
 2376        19        8½  
 20

47539 s.  
 12

570476 d.  
 4

2281906 q.

(18)  
 yds.    qrs.    nls.  
 218     2     3  
 4

874 qrs.  
 4

3499 nls.

(20)  
 cwt.    qrs.    lbs.  
 216     2     17  
 4

866 qrs.  
 25

4347  
 1732

21667 lbs.

(21)  
 25°    36'  
 60  
 1536'  
 60  
 92160''

KEY.

[ELEM. ARITH.]

(22)  
mils. fur. per. yds.  
8 3 0 4

£  
312  
20

(23)  
s. d.  
17 6½

67 fur.  
40

6257 s.  
12

(24)  
lbs.  
105  
12

2680 per.  
5½

75090 d.  
4

1260 oz.  
20

13404  
1340

300362 q.

14744 yds.  
3

(25)  
E. ells.  
26  
5

25200 dwt.  
24

44232 ft.  
12

130 qrs.  
4

100800  
50400

580784 in.

520 nls.

604800 grs.

(26)  
Fr. ells.  
37  
6

(27)  
£ s. d.  
576 0 6½

(28)  
lbs. oz.  
287 6  
12

222 qrs.  
4

11840 s.  
12

3450 oz.  
8

888 nls.

136086 d.  
4

(30)  
£ s. d.  
200 19 6½

27600 drs.  
3

(29)  
pipes.  
3  
2

4019 s.  
12

82800 sc.

6 hhds.  
63

48234 d.  
4

378 galls.

192938 q.

## Ex. XXI. (p. 53.)

(1) 4) 123290 *farthings* (2) 24) 13172 *grains*

12) 30822 -  $\frac{1}{2}$  d. 20) 548 - 20 grs.

20) 2568 - s. 6 d. 12) 27 - 8 dwt.

£128 8 s. 6  $\frac{1}{2}$  d. 2 lbs. 3 oz. 8 dwt. 20 grs.

(3) 2) 18191 *pints*

(4) *mals* 4) 9095 - 1 pt.  
12) 76787568 2273 galls. 3 qts. 1 pt.

3) 6398964

5  $\frac{1}{2}$ ) 2132988 - yds.  
2 2

11) 4265976

40) 387816

8) 9695 - 16 poles.

3) 1211 - 7 fur.

403 lea. 2 mls. 7 fur. 16 poles.

(5) *ms*  
16) 2007008 *q*

(6) 40) 93827 *per*

16) 125438

4) 2345 r. - 27 per.

25) 7839 - 14 oz.

586 a. 1 r. 27 per.

4) 313 - 14 lbs.

20) 78 - 1 qr.

3 tons. 18 cwt. 1 qr. 14 lbs. 14 oz.



(10)  
12) 121605 *mches*

8) 10133 ft. - 9 in.

5½) 3377 - 2 ft.  
2        2

11) 6754

40) 614

8) 15 - 14 po.

1 ml. 7 fur. 14 p. 0 yds. 2 ft. 9 in.

(11)  
24) 98006 *grs*

20) 4088 - 14 grs.

12) 204 - 3 dwt.

17 lbs. 0 oz. 3 dwt. 14 grs.

(12)  
16) 2022752 *drs*

16) 126422

25) 7901 - 6 oz.

4) 316 - 1 lb.

20) 79 - 0 qrs.

3 tons. 19 cwt. 0 qrs. 1 lb. 6 oz.

(13)  
20) 702917 *grs*

3) 85145 - 17 grs.

8) 11715 - 0 sc.

12) 1464 - 3 dr.

122 lb. 0 oz. 3 dr. 0 sc. 17 gr.

(14)  
60) 1727893 *sec*

60) 28798 - 13 sec.

24) 479 - 58 min.

7) 19 - 23 hrs.

2 wk. 5 dy. 23 hr. 58' 13''

(15)  
30½) 172425 *yds sq*  
4            4

121) 689700

40) 5700 sq. poles.

4) 142 r. - 20 sq. poles.

35 a. 2 r. 20 sq. po.

$$\begin{array}{r} (16) \text{ cut in} \\ 1728) 13856832 \\ \hline \end{array} \quad \begin{array}{r} (17) \\ 144) 1244180000 \\ \hline \end{array} \quad \text{sq. ft.}$$

$$\begin{array}{r} 27) 8019 \text{ cub. ft.} \\ \hline \end{array} \quad \begin{array}{r} 9) 8640000 \text{ sq. ft.} \\ \hline \end{array}$$

$$\begin{array}{r} 297 \text{ cub. yds.} \\ \hline \end{array} \quad \begin{array}{r} 30\frac{1}{2}) 960000 \\ \hline 4 \quad 4 \end{array}$$

$$\begin{array}{r} (18) \\ 4) 500 \text{ rls} \\ \hline \end{array} \quad \begin{array}{r} 121) 3840000 \\ \hline \end{array}$$

$$\begin{array}{r} 4) 125 \\ \hline \end{array}$$

$$\begin{array}{r} 40) 31735 - 16\frac{1}{2} \text{ sq. yds.} \\ \hline \end{array}$$

$$\begin{array}{r} 31 \text{ yds. 1 qr.} \\ \hline \end{array}$$

$$\begin{array}{r} 4) 798 \text{ r.} - 15 \text{ sq. per.} \\ \hline \end{array}$$

$$\begin{array}{r} 198 \text{ a. 1 r. 15 s. p. } 16\frac{1}{2} \text{ s. yds.} \\ \hline \end{array}$$

$$\begin{array}{r} (19) \\ 60) 131073 \text{ sec} \\ \hline \end{array}$$

$$\begin{array}{r} (20) \\ 60) 31557600 \text{ sec} \\ \hline \end{array}$$

$$\begin{array}{r} 60) 2184 \text{ min.} - 35 \text{ sec.} \\ \hline \end{array} \quad \begin{array}{r} 60) 525960 \text{ min.} \\ \hline \end{array}$$

$$\begin{array}{r} 36 \text{ hrs. 24 min. 35 sec.} \\ \hline \end{array} \quad \begin{array}{r} 24) 9766 \text{ hrs.} \\ \hline \end{array}$$

$$\begin{array}{r} 365 \text{ dys. 6 hrs.} \\ \hline \end{array}$$

$$\begin{array}{r} (21) \\ 2) 219612 \text{ pts} \\ \hline \end{array}$$

$$\begin{array}{r} (22) \\ 2) 300738 \text{ pts} \\ \hline \end{array}$$

$$\begin{array}{r} 4) 109806 \text{ qts.} \\ \hline \end{array}$$

$$\begin{array}{r} 4) 150369 \text{ qts.} \\ \hline \end{array}$$

$$\begin{array}{r} 54) 27451 \text{ galls. 2 qts.} \\ \hline \end{array}$$

$$\begin{array}{r} 63) 37592 \text{ galls. 1 qt.} \\ \hline \end{array}$$

$$\begin{array}{r} 508 \text{ hhds. 19 gals. 2 qts.} \\ \hline \end{array} \quad \begin{array}{r} 596 \text{ hhds. 44 gals. 1 qt.} \\ \hline \end{array}$$

$$\begin{array}{r} (23) \\ 60) 912715 \text{ lbs} \\ \hline \end{array}$$

$$\begin{array}{r} (24) \\ 34) 1000000 \text{ lbs} \\ \hline \end{array}$$

$$\begin{array}{r} (25) \\ 60) 7263 \text{ lbs} \\ \hline \end{array}$$

$$\begin{array}{r} 15211 \text{ bu. 55 lbs.} \\ \hline \end{array}$$

$$\begin{array}{r} 29411 \text{ bu. 26 lbs.} \\ \hline \end{array} \quad \begin{array}{r} 121 \text{ bu. 3 lbs.} \\ \hline \end{array}$$

(26)  
\$307.47

(27)  
4) 973647 *fourthways*  
12) 243411 d. - 3 q.  
20) 20284 s. - 3 1/2 d.  
£1014 : 4 s. 3 1/2 d.

Ex. XXV. (p. 59.)

(15)				(16)			
lbs.	oz.	dwt.	grs.	£	s.	d.	
6	2	3	17 × 2 10	13	7	4 1/2	11
61	9	17	2 × 8 10	147	1	4 1/2	5
618	2	10	20 × 3 10	735	6	9 1/2	5
6182	1	8	8 5	3676	13	10 1/2	
30910	7	1	16				
1854	7	12	12				
494	6	16	16				
12	4	7	10				
33272	1	18	6				

(17)						
ac.	r.	per.	yds.	ft.	in.	
20	2	17	15	3	3	8
164	3	20	1	6	2 1/2	8
1319	0	0	13	4	48	

ls.  
er.  
16 1/2 s.yds.

rs.

s. 1 qt.

3 lbs.



(18)

mls.	fur.	per.	yds.	ft.	in.
2	6	2	3	0	5
<hr/>					
13	6	12	4	2	1
<hr/>					
68	7	24	1	1	1
<hr/>					
344	6	1	1 $\frac{1}{2}$	1	1
<hr/>					
1034	2	4	0	0	3

(19)

£	s.	d.
2	6	8 $\frac{1}{2}$
<hr/>		
23	6	10 $\frac{1}{2}$
<hr/>		
233	8	9
<hr/>		
2100	18	9

(20)	bu.	(21)	pk.	galls.
\$237.15	.10	2	1	10
100	<hr/>			
\$23715.00	106	1	0	10
5	<hr/>			
\$118575.00	1062	2	0	8
<hr/>				
	8500	0	0	0

Ex. XXVI. (p. 61.)

(1)

cwt.	qrs.	lbs.	oz.
3	3	21	5
			10
<hr/>			
39	2	13	2
			8
<hr/>			
317	0	5	0
35	2	16	13
<hr/>			
352	2	21	13

(2)

lbs.	oz.	dwt.	grs.
6	2	3	17
			10
<hr/>			
61	9	17	2
			10
<hr/>			
618	2	10	20
			10
<hr/>			
6182	1	8	8
			5
<hr/>			
30910	7	1	16
2472	10	3	8
370	11	2	12
18	6	11	3
<hr/>			
33772	10	18	15

(3)

£	s.	d.
2	6	9½
		10
<hr/>		
23	7	11
		10
<hr/>		
233	19	2
		9
<hr/>		
2105	12	6
70	3	9
18	14	4
<hr/>		
2194	10	7

(4)

cwt.	qrs.	lbs.	oz.	drs.
2	3	23	6	7
				10
<hr/>				
29	3	9	0	6
				10
<hr/>				
298	1	15	3	12
				6
<hr/>				
1790	1	16	6	8
59	2	18	0	12
20	3	13	13	1
<hr/>				
1870	3	23	4	5

lls.  
1  
0  

---

0  
0  

---

0  
0  

---

0  
3  

---

0

KEY. [ELEM. ARITH.]

(5)

£	s.	d.
4	18	9½
		10
<hr/>		
49	7	11
		10
<hr/>		
493	19	2
		5
<hr/>		
2469	15	10
296	7	6
4	18	9½
<hr/>		
2771	2	1½

(6)

lbs.	oz.	drs.	sc.	grs.
15	2	3	2	7
<hr/>				
152	0	5	2	10
<hr/>				
1520	7	2	1	0
<hr/>				
10644	3	0	1	0
152	0	5	2	10
30	4	7	1	14
<hr/>				
10826	8	5	2	4

(7)

\$2.25
209
<hr/>
2025
450
<hr/>
\$470.25

(8)

\$1.27
52
<hr/>
254
635
<hr/>
\$66.04

(9)

1625 cts.
6
<hr/>
\$97.50

(10)

qrs.	lbs.	oz.
1	17	8
		10
<hr/>		
17	0	0
		2
<hr/>		
34	0	0
15	7	8
<hr/>		
cwt. 12	1	7
		8

(11)

100000
40
<hr/>
\$40000.00

Ex. XXVII. (p. 63.)

grs.  
7  
10  
10  
0  
7  
0  
10  
14  
4

(1)			(2)			
£	s.	d.	lbs.	oz.	dwt.	grs.
5)278	15	8	8)237	5	6	0
<hr/>			<hr/>			
55	15	1½	29	8	3	6

(3)						
mils.	fur.	per	yds.	ft.	in.	
9)217	5	16	2	0	0	
<hr/>						
24	1	19	3	10	10	

(4)			(5)				
yds.	qrs.	nls.	lbs.	oz.	drs.	sc.	grs.
5)115	2	2	6)865	9	0	2	10
<hr/>			<hr/>				
23	0	2	144	3	4	0	8½ = ½

(6)			(7)					
£	s.	d.	tons.	cwt.	qrs.	lbs.	oz.	drs.
11)2078	17	11½	9)67	13	1	17	0	0
<hr/>			<hr/>					
188	19	9½	3)7	10	1	13	0	0
			<hr/>					
			2	10	0	12	10	10½

(8)						
ac.	rds.	per.	yds.	ft.	in.	
7)976	2	19	25	0	0	
<hr/>						
8)139	2	2	25	1	87-3 rem.	
<hr/>						
17	1	30	10	6	55-7 rem.	
7 × 7 + 3 = 52, true rem.						
½ = ½.						

cwt.	qrs.	(9) lbs.	oz.	drs.	
705) 612	0	17	0	2	(3 qrs.
4					

2448  
2115

333  
25

1682  
668

8342 (11 lbs.  
705

1292  
705

587  
16

3522  
587

9392 (13 oz.  
705

2342  
2115

227  
16

1364  
227

3634 (5  $\frac{1}{2}$  drs.  
3525

109

ANS.—3 qrs. 11 lbs. 13 oz. 5  $\frac{1}{2}$  drs.

	mls.	(10) fur.	yds.	
1247) 8627		6	2	(7 fur.
	7482			

1145  
8

9166  
8729

437  
40

17480 (14 per.  
1247

5010  
4988

22  
5  $\frac{1}{2}$

112  
11

123 (0 yds.  
3

369 (0 ft.  
12

4428 (3  $\frac{1}{2}$   $\frac{1}{4}$  in.  
3741

687

ANS.—7 fur. 14 per. 3  $\frac{1}{2}$   $\frac{1}{4}$  in.

RTII.

Ex. xxvii.]

KEY.

47

(11)						(12)		
bu.	pks.	gall.	qts.	pts.		£	s.	d.
12) 612	2	1	2	0		9) 2851	16	4½
<hr/>						<hr/>		
8) 51	0	0	1	1 rem.	-8	6) 316	17	4½
<hr/>						<hr/>		
6	1	1	0	0 rem.	-3	52	16	2½
3 × 12 + 8 = 44, true rem.								

fur.

(13)				
lbs.	oz.	drs.	sc.	grs.
57) 247	10	7	1	0 (4 lbs.)
228				
<hr/>				
19				
12				
<hr/>				
238 (4 oz.				
228				
<hr/>				
10				
8				
<hr/>				
87 (1 dr.				
57				
<hr/>				
30				
3				
<hr/>				
91 (1 sc.				
57				
<hr/>				
34				
20				
<hr/>				
680 (11½ grs.				
627				
<hr/>				
53				

Ans.—4lbs. 4oz. 1 dr. 1 sc. 11½ grs.

## KEY.

[ELEM. ARITH.]

$$\begin{array}{r} (14) \\ \text{mfs.} \quad \text{fur.} \quad \text{per.} \\ 211) 200 \quad . \quad 3 \quad . \quad 6 \quad (7 \text{ fur.} \\ \quad \quad \quad 8 \end{array}$$

---

1603

1477

---

126

40

---

5046 (23 per.

422

---

826

633

---

193

5½

---

965

96½

---

1061½ (5 yds.

1055

---

6½

3

---

19½

12

---

234 (1 in.

211

---

23

12

---

276 (1½½ ls

211

---

65

Ans.—7 fur. 23 per. 5 yds. 1 in. 1½½ ls.

	ac.	r.	(15) per.	yds.	
318)	416	3	19	7	(1 ac.
	318				
	<hr style="width: 50px; margin-left: 0;"/>				
	98				
	4				
	<hr style="width: 50px; margin-left: 0;"/>				
	395	(1 ro.			
	318				
	<hr style="width: 50px; margin-left: 0;"/>				
	77				
	40				
	<hr style="width: 50px; margin-left: 0;"/>				
	3099	(9 per.			
	2862				
	<hr style="width: 50px; margin-left: 0;"/>				
	237				
	30 $\frac{1}{4}$				
	<hr style="width: 50px; margin-left: 0;"/>				
	7117				
	59 $\frac{1}{4}$				
	<hr style="width: 50px; margin-left: 0;"/>				
	7176 $\frac{1}{4}$	(22 yds.			
	636				
	<hr style="width: 50px; margin-left: 0;"/>				
	816 $\frac{1}{4}$				
	636				
	<hr style="width: 50px; margin-left: 0;"/>				
	180 $\frac{1}{4}$				<hr style="width: 50px; margin-left: 0;"/>
	9				4608
	<hr style="width: 50px; margin-left: 0;"/>				<hr style="width: 50px; margin-left: 0;"/>
	1622 $\frac{1}{4}$	(5 ft.			36
	1590				<hr style="width: 50px; margin-left: 0;"/>
	<hr style="width: 50px; margin-left: 0;"/>				4644
	32 $\frac{1}{4}$				(14 $\frac{1}{3}$ $\frac{9}{8}$ in.
	144				<hr style="width: 50px; margin-left: 0;"/>
	<hr style="width: 50px; margin-left: 0;"/>				318
	128				<hr style="width: 50px; margin-left: 0;"/>
	128				1464
	<hr style="width: 50px; margin-left: 0;"/>				<hr style="width: 50px; margin-left: 0;"/>
	32				1272
	<hr style="width: 50px; margin-left: 0;"/>				<hr style="width: 50px; margin-left: 0;"/>
					192
					<hr style="width: 50px; margin-left: 0;"/>
					318
					<hr style="width: 50px; margin-left: 0;"/>

ANS.—1 ac. 1 ro. 9 per. 22 yds. 5 ft. 14 $\frac{1}{3}$  $\frac{9}{8}$  in.



(16)  
 tons. cwt. qrs.  
 564) 614      2      3 (1 ton.  
      564

—  
 50  
 20

—  
 1002 (1 cwt.  
      564

—  
 438  
    4

—  
 1755 (3 qrs.  
      1692

—  
 63  
 25

—  
 315  
 126

—  
 1575 (2 lbs.  
      1128

—  
 447  
 16

—  
 2682  
 447

—  
 7152 (12 oz.  
      564

—  
 1512  
 1128

—  
 384  
 16

—  
 2304

—  
 2304  
 384

—  
 6144 (10 $\frac{5}{6}$  drs.  
      5640

—  
 504

(17)  
 c. yds.    c. ft.    c. in.  
 169) 917    9    100 (5 c. yds.  
      845

—  
 72  
 27

—  
 513  
 144

—  
 1953 (11 c. ft.  
 169

—  
 263  
 169

—  
 94  
 1728

—  
 852  
 188  
 658  
 94

—  
 162532 (961 $\frac{2}{3}$  c. in.  
 1521

—  
 1043  
 1014

—  
 292  
 169  
 —  
 123

(18)  
 lbs.    oz.    drs.    sc.  
 212) 926    5    3    2 (4 lbs.  
      848

—  
 78  
 12

—  
 941 (4 oz.  
 848

—  
 93  
 8

—  
 747 (3 drs.  
 636

—  
 111  
 3

—  
 335 (1 sc.  
 212

—  
 123  
 20

—  
 2460 (11 $\frac{2}{3}$  grs.  
 212

—  
 340  
 212

—  
 128



d.  
5 (£3

(22)  
yrs. dys. hrs. min.  
397) 125 127 16 47 (115 days.

365

752

750

375

45752

397

605

397

2082

1985

97

24

404

194

2344 (5 hrs.)

1985

359

60

21587 (54 min.)

1985

1737

1588

149

60

8940 (22 $\frac{3}{4}$  sc.)

794

1000

794

206

Ans.—115 dys. 5 hrs. 54'. 22 $\frac{3}{4}$ ''.

(23)

267) \$2267.84 (\$8.49 $\frac{1}{10}$ ).

2136

1318

1068

2504

2403

101

(24)

425) \$5693.75 (\$13.39 $\frac{1}{10}$ ).

425

1443

1275

1687

1275

4125

3825

300

$$\begin{array}{r} (25) \\ 365) \$600.00 (\$1.64\frac{1}{2}) \\ \underline{365} \end{array}$$

2350  
2190

1600  
1460

$$140 \quad 365 - 52 = 313.$$

$$313) \$600.00 (\$1.91\frac{1}{2})$$

313

2870  
2817

530  
313

217

$$\begin{array}{r} (27) \\ 57) \$65.55 (\$1.15) \\ \underline{57} \end{array}$$

85

57

285

285

$$\begin{array}{r} (26) \\ 57) \$265.05 (\$4.65) \\ \underline{228} \end{array}$$

370

342

285

285

$$\begin{array}{r} (28) \\ 52) \$132.00 (\$2.53\frac{1}{2}) \\ \underline{104} \end{array}$$

280

260

200

156

44

Ex. XXVIII. (p. 64.)

$$\begin{array}{ll} (1) & (2) \\ \text{£}684 \text{ 7s. 6d.} = 164250\text{d.} & \text{£}171 \text{ 1s. 10}\frac{1}{2}\text{d.} = 82125\frac{1}{2}\text{d.} \\ \text{£}76 \text{ 0s. 10d.} = 18250\text{d.} & \text{£}57 \text{ 0s. 7}\frac{1}{2}\text{d.} = 27375\frac{1}{2}\text{d.} \\ 164550 \div 18250 = 9 \text{ times.} & 82125 \div 27375 = 3 \text{ times.} \end{array}$$

$$\begin{array}{l} (3) \\ 9 \text{ lbs. 9 oz. 3 dwt. 12 grs.} = 56244 \text{ grs.} \\ 5 \text{ dwt. 9 grs.} = 129 \text{ grs.} \\ 56244 \div 129 = 436 \text{ times.} \end{array}$$

4.65

$$\begin{aligned} & (4) \\ 4 \text{ mls. } 1 \text{ fur. } 2 \text{ yds.} &= 21786 \text{ ft.} \\ 1 \text{ ml. } 3 \text{ fur. } 2 \text{ ft.} &= 9262 \text{ ft.} \\ 21786 + 9262 &= 3 \text{ times.} \end{aligned}$$

$$\begin{aligned} & (5) \qquad \qquad \qquad (6) \\ 6 \text{ cwt. } 2 \text{ qrs.} &= 10400 \text{ oz.} & 12 \text{ lbs. } 6 \text{ oz. } 2 \text{ sc.} &= 72040 \text{ gr.} \\ 1 \text{ qr. } 3 \text{ oz.} &= 403 \text{ oz.} & 1 \text{ lb. } 6 \text{ oz. } 2 \text{ sc. } 10 \text{ grs.} &= 8690 \text{ grs.} \\ 10400 + 403 &= 25\frac{1}{2}\frac{1}{4} \text{ times.} & 72040 + 8690 &= 8\frac{1}{4}\frac{1}{8} \text{ times.} \end{aligned}$$

$$\begin{aligned} & (7) \qquad \qquad \qquad (8) \\ 3 \text{ yds. } 1 \text{ qr. } 2 \text{ nls.} &= 54 \text{ nls.} & 1 \text{ dy. } 1 \text{ hr. } 12 \text{ min.} &= 1512 \text{ min.} \\ 1 \text{ qr. } 2 \text{ nls.} &= 6 \text{ nls.} & 1 \text{ hr. } 3 \text{ min.} &= 63 \text{ min.} \\ 54 + 6 &= 9 \text{ times.} & 1512 + 63 &= 24 \text{ times.} \end{aligned}$$

$$\begin{aligned} & (9) \\ 5\text{s. per. } 7 \text{ yds. } 108 \text{ in.} &= 205200 \text{ in.} \\ 2 \text{ yds. } 1 \text{ ft.} &= 2736 \text{ in.} \\ 205200 + 2736 &= 75 \text{ times.} \end{aligned}$$

$$\begin{aligned} & (10) \qquad \qquad \qquad (11) \\ \$141.05 &= 14105 \text{ cts.} & \$221.00 &= 22100 \text{ cts.} \\ \$ 2.17 &= 217 \text{ cts.} & \$ 2.21 &= 221 \text{ cts.} \\ 14105 + 217 &= 65 \text{ times.} & 22100 + 221 &= 100 \text{ times.} \end{aligned}$$

3\frac{1}{2}

Ex. XXIX. (p. 65.)

$$\begin{aligned} & (1) \\ £25 \times 4 &= \$100.00 \\ 6\text{s.} \times 20 &= 1.20 \\ 3\text{d.} = 12 \text{ q.} \times 5 + 12 &= .05 \\ \hline & \$101.25 \end{aligned}$$

$$\begin{aligned} & (2) \\ £57 \times 4 &= \$228.00 \\ 19\text{s.} \times 20 &= 3.80 \\ 3\text{d.} = 12 \text{ q.} \times 5 + 12 &= .05 \\ \hline & \$231.85 \end{aligned}$$

5\frac{1}{2}\text{d.}

5\frac{1}{2}\text{d.}

mes.

$$\begin{aligned} & (3) \\ £207 \times 4 &= \$828.00 \\ 17\text{s.} \times 20 &= 3.40 \\ 8\text{d.} = 32 \text{ q.} \times 5 + 12 &= .13\frac{1}{4} \\ \hline & \$831.53\frac{1}{4} \end{aligned}$$

$$\begin{array}{r}
 \text{(4)} \\
 \text{£153} \times 4 = \$612.00 \\
 18\text{s.} \times 20 = 3.60 \\
 5\text{d.} = 20 \text{ q.} \times 5 \div 12 = .08\frac{1}{2}
 \end{array}$$

---

\$615.68½

$$\begin{array}{r}
 \text{(5)} \\
 \text{£217} \times 4 = \$868.00 \\
 17\text{s.} \times 20 = 3.40 \\
 \hline
 \$871.40
 \end{array}$$

$$\begin{array}{r}
 \text{(6)} \\
 \text{£319} \times 4 = \$1276.00 \\
 15\text{s.} \times 20 = 3.00 \\
 7\frac{1}{2}\text{d.} = 30 \text{ q.} \times 5 \div 12 = .12\frac{1}{2} \\
 \hline
 \$1279.12\frac{1}{2}
 \end{array}$$

$$\begin{array}{r}
 \text{(7)} \\
 \text{£612} \times 4 = \$2448.00 \\
 19\text{s.} \times 20 = 3.80 \\
 11\frac{1}{2}\text{d.} = 45 \text{ q.} \times 5 \div 12 = .18\frac{3}{4} \\
 \hline
 \$2451.98\frac{3}{4}
 \end{array}$$

$$\begin{array}{r}
 \text{(8)} \\
 \text{£63} \times 4 = \$252.00 \\
 9\text{s.} \times 20 = 1.80 \\
 9\frac{1}{4}\text{d.} = 30 \text{ q.} \times 5 \div 12 = .16\frac{1}{4} \\
 \hline
 \$253.96\frac{1}{4}
 \end{array}$$

$$\begin{array}{r}
 \text{(9)} \\
 \text{£912} \times 4 = \$3648.00 \\
 12\text{s.} \times 20 = 2.40 \\
 6\text{d.} = 24 \text{ q.} \times 5 \div 12 = .10 \\
 \hline
 \$3650.50
 \end{array}$$

$$\begin{array}{r}
 \text{(10)} \\
 \text{£711} \times 4 = \$2844.00 \\
 5\text{s.} \times 20 = 1.00 \\
 5\frac{1}{2}\text{d.} = 22 \text{ q.} \times 5 \div 12 = .09\frac{1}{6} \\
 \hline
 \$2845.09\frac{1}{6}
 \end{array}$$

$$\begin{array}{r}
 \text{(11)} \\
 \text{£1117} \times 4 = \$4468.00 \\
 7\frac{1}{2}\text{d.} = 30 \text{ q.} \times 5 \div 12 = .12\frac{1}{2} \\
 \hline
 \$4468.12\frac{1}{2}
 \end{array}$$

$$\begin{array}{r}
 (12) \\
 £47 \times 4 = \$188.00 \\
 7 \text{ s.} \times 20 = 1.40 \\
 9 \text{ d.} = 36 \text{ q.} \times 5 + 12 = .15 \\
 \hline
 \$189.55
 \end{array}$$

$$\begin{array}{r}
 (13) \\
 £2017 \times 4 = \$8068.00 \\
 6 \text{ s.} \times 20 = 1.20 \\
 8 \text{ d.} = 32 \text{ q.} \times 5 + 12 = .13\frac{1}{2} \\
 \hline
 \$8069.33\frac{1}{2}
 \end{array}$$

$$\begin{array}{r}
 (14) \\
 £75 \times 4 = \$300.00 \\
 9 \text{ s.} \times 20 = 1.80 \\
 8\frac{1}{2} \text{ d.} = 34 \text{ q.} \times 5 + 12 = .14\frac{1}{2} \\
 \hline
 \$301.94\frac{1}{2}
 \end{array}$$

$$\begin{array}{r}
 (15) \\
 £37 \times 4 = \$148.00 \\
 18 \text{ s.} \times 20 = 3.60 \\
 7\frac{1}{2} \text{ d.} = 30 \text{ q.} \times 5 + 12 = .12\frac{1}{2} \\
 \hline
 \$151.72\frac{1}{2}
 \end{array}$$

$$\begin{array}{r}
 (16) \\
 £87 \times 4 = \$348.00 \\
 13 \text{ s.} \times 20 = 2.60 \\
 9 \text{ d.} = 36 \text{ q.} \times 5 + 12 = .15 \\
 \hline
 \$350.75
 \end{array}$$

Ex. XXX. (p. 66.)

$$\begin{array}{r}
 (1) \\
 \$217 \div 4 = £54 + \$1 \\
 125 \text{ cts.} \div 20 = 6 \text{ s.} + 5 \text{ cts.} \\
 5 \text{ cts.} \times 3 \div 5 = 3 \text{ d.} \\
 £54 \text{ 6s. 3d.}
 \end{array}$$

$$\begin{array}{r}
 (2) \\
 \$327 \div 4 = £81 + \$3 \\
 355 \text{ cts.} \div 20 = 17 \text{ s.} + 15 \text{ c.} \\
 15 \text{ cts.} \times 3 \div 5 = 9 \text{ d.} \\
 £81 \text{ 17s. 9d.}
 \end{array}$$

$$\begin{array}{r}
 (3) \\
 \$17 \div 4 = £4 + \$1 \\
 135 \text{ cts.} \div 20 = 6 \text{ s.} + 15 \text{ c.} \\
 15 \text{ cts.} \times 3 \div 5 = 9 \text{ d.} \\
 £4 \text{ 6s. 9d.}
 \end{array}$$

$$\begin{array}{r}
 (4) \\
 \$84 \div 4 = £21. \\
 50 \text{ cts.} \div 20 = 2 \text{ s.} + 10 \text{ cts.} \\
 10 \text{ cts.} \times 3 \div 5 = 6 \text{ d.} \\
 £21 \text{ 2s. 6d.}
 \end{array}$$



(5)

$$\begin{aligned} \$75 \div 4 &= \text{£}18 + \$3 \\ 395\text{c.} \div 20 &= 19\text{s.} + 15\text{c.} \\ 15\text{c.} \times 3 \div 5 &= 9\text{d.} \\ &\text{£}18 \text{ 19s. } 9\text{d.} \end{aligned}$$

(6)

$$\begin{aligned} \$125 \div 4 &= \text{£}31 + \$1 \\ 137\frac{1}{2}\text{c.} \div 20 &= 6\text{s.} + 17\frac{1}{2}\text{c.} \\ 17\frac{1}{2}\text{c.} \times 3 \div 5 &= 10\frac{1}{2}\text{d.} \\ &\text{£}31 \text{ 6s. } 10\frac{1}{2}\text{d.} \end{aligned}$$

(7)

$$\begin{aligned} \$867 \div 4 &= \text{£}216 + \$3 \\ 387\frac{1}{2}\text{c.} \div 20 &= 19\text{s.} + 7\frac{1}{2}\text{c.} \\ 7\frac{1}{2}\text{c.} \times 3 \div 5 &= 4\frac{1}{2}\text{d.} \\ &\text{£}216 \text{ 19s. } 4\frac{1}{2}\text{d.} \end{aligned}$$

(8)

$$\begin{aligned} \$1162 \div 4 &= \text{£}290 + \$2 \\ 240\text{c.} \div 20 &= 12\text{s.} \\ &\text{£}290 \text{ 12s.} \end{aligned}$$

(9)

$$\begin{aligned} \$1393 \div 4 &= \text{£}348 + \$1 \\ 162\frac{1}{2}\text{c.} \div 20 &= 8\text{s.} + 2\frac{1}{2}\text{c.} \\ 2\frac{1}{2}\text{c.} \times 3 \div 5 &= 1\frac{1}{2}\text{d.} \\ &\text{£}348 \text{ 8s. } 1\frac{1}{2}\text{d.} \end{aligned}$$

(10)

$$\begin{aligned} \$1937 \div 4 &= \text{£}484 + \$1 \\ 120\text{c.} \div 20 &= 6\text{s.} \\ &\text{£}484 \text{ 6s.} \end{aligned}$$

(11)

$$\begin{aligned} \$2220 \div 4 &= \text{£}555 \\ 29\text{c.} \div 20 &= 1\text{s.} + 9\text{c.} \\ 9\text{c.} \times 3 \div 5 &= 5\frac{1}{2}\text{d.} \\ &\text{£}555 \text{ 1s. } 5\frac{1}{2}\text{d.} \end{aligned}$$

(12)

$$\begin{aligned} \$3785 \div 4 &= \text{£}946 + \$1 \\ 148\text{c.} \div 20 &= 7\text{s.} + 8\text{c.} \\ 8\text{c.} \times 3 \div 5 &= 5\frac{1}{2}\text{d.} \\ &\text{£}946 \text{ 7s. } 5\frac{1}{2}\text{d.} \end{aligned}$$

Ex. XXXI. (p. 66.)

## PAPER I.

(1)	(2)	(3)
35700	55146	100000
24191	23503	229713
18777	9889	58705
18129	6275	612517
21187	8369	999999
<hr/>	4584	833719
117984	<hr/>	768309
	107766	50050
		<hr/>
		3653013

(4)  
 5005  
 7018  
 17915  
 28719  
 9012  
 807512  
 717017  
 93502  
 212607  


---

 1898307

(5)  
 12) 178006  


---

 3) 14833 - 10 in.  


---

 5½ { 4944 - 1 ft.  
       2  
       

---

 11) 9888  


---

 40) 898 - 10 hf. yds. = 5 yds.  


---

 8) 22 - 18 per.  


---

 2 - 6 fur.

ANS.—2 mls., 6 fur., 18 per., 5 yds., 1 ft., 10 in.

(6)  
 $\$ 8375180.20 \div 1493332 = \$ 5.60$  and a fraction.  
 $\$ 43054836.00 \div 2506755 = \$ 17.17$  " " "  
 $\$ 17.17 - \$ 5.60 = \$ 11.57$

PAPER II.

(1)  
 8s. 10½d. × 818  
       10  


---

 £4 8s. 9d.  
       10  


---

 £44 7s. 6d.  
       8  


---

 £355 0s. 0d.  
   4 8s. 9d.  
   3 11s. 0d.  


---

 £362 19s. 9d.

(2)  
 67 × \$1.62 = \$108.54  
 82c. × 13½ = \$ 11.07  
 $\$ 11.07 + \$ 18 + \$ 16 = \$ 45.07 =$   
 Total amount expended,  
 $\$ 108.54 - \$ 45.07 = \$ 63.47$

	ac.	ac.	r.	per.	yds.	ft.
397)	72812	(183	1	24	26	7 $\frac{1}{2}$
	897					

(3)

---

 3311  
 3176
 

---

$$160 \times \$1.60 = \$256.00$$

$$\$256 \div 27 = \$ 9.48\frac{1}{2}$$

---

 1352  
 1191
 

---



---

 161  
 4
 

---

$$42\frac{1}{2} \text{ yds.} + 8\frac{1}{2} = 5$$

$$8\frac{1}{2} \times 6\text{s. } 6\frac{1}{2}\text{d.} = \text{£}2 \text{ 15s. } 7\frac{1}{2}\text{d.}$$

---

 644 (1 ro.  
 397
 

---



---

 247  
 40
 

---

$$\text{Amt. rec'd} = \text{£}1 \text{ 18s. } 9\text{d.} \times 618$$

$$= \text{£}1042 \text{ 17s. } 6\text{d.} = \$4171.50$$

$$84 \times 17\text{c.} = \$ 14.28$$

$$3\text{s. } 9\text{d.} \times 5 = 18\text{s. } 9\text{d.} = 3.75$$

$$\text{£}1 \text{ 15s.} \times 2 = \text{£}3 \text{ 10s.} = 14.00$$

$$\text{£}2 \text{ 11s. } 9\text{d.} \times 8 = \text{£}20 \text{ 14s.} = 82.80$$

$$\text{£}12 \text{ 19s. } 9\text{d.} \times 15 = \text{£}194 \text{ 18s. } 9\text{d.} = 779.25$$

---

 1940
 

---

$$\therefore \text{Total amount expended} = \$944.08$$

$$1588 \therefore \text{Deposit in bank} = \$4171.50 - \$944.08 =$$

$$\$3227.42.$$

---

 352
 

---



---

 30 $\frac{1}{2}$ 


---



---

 10648 (26 yds.
 

---



---

 794 $\frac{1}{2}$ 


---



---

 2708
 

---



---

 2382
 

---



---

 326
 

---



---

 9
 

---



---

 2934 (7 $\frac{1}{2}$  ft.
 

---



---

 2779
 

---



---

 155
 

---

ITH.

PAPER III.

(1)

£	s.	d.	
203761) 9520732	14	6	(£46
815044			

1370292

1222566

147726

20

2954534 (14s.

203761

916924

815044

101880

12

1222566 (6d.

1222566

(2)

Suppose 1 to represent the 1st man's share,

∴ 1 + 3 + 5 = 9 = No. of shares.

\$63000 ÷ 9 = \$7000 = value of a share.

\$7000 × 1 = \$ 7000

\$7000 × 3 = \$21000

\$7000 × 5 = \$35000

(3)

£	s.	d.	
26) 354	11	6	(£13

26

94

78

16

20

331 (12s.

812

19

12

234 (9d.

234



ARIPH.

PAPER IV.

(1)	(2)	(4)
£6 17s. 6d. = \$27.50	8+3=11	4 x 38 = 152 doz.
£3 12s. 9d. = \$14.55	8+11-1=18	Owner net, 1 sh.
∴ sum = \$27.50 +		Owner boat, 2 shs.
\$30.27 + \$14.55 + \$75.83	(3)	Each man, 4 shs.
= \$148.15.	54 + 6 = 9	Four men, 16 shs.
	9 x 1 = 9	∴ total no. of shs.
(6)	9 x 2 = 18	= 1 + 2 + 16 = 19
84889 - 889 = 84000	9 x 3 = 27	152 + 19 = 8 doz. =
84000 + 2 = 42000		value of 1 share.
42000 + 889 = 42889		8 x 1 = 8 doz.
		8 x 2 = 16 "
		8 x 4 = 32 "

200 in.  
n.  
ken =  
2240  
ied in

4  
rcst.  
n. =

PAPER V.

(1)	(2)
72678397	73697 x 11689 = 861444233
86073	861444233 + 3687 = 861447920
-----	
218035191	(3)
508748779	27812 - 15908 = 11904
436070382	
581427176	(5)
-----	22983
6255647664981	96801
	64183
(4)	91308
89264 ÷ 7 = 12752	190060
	-----
	465335
	(6)
	10240
	704
	8084
	4312
	72247
	-----
	95587

PAPER VI.

(1)	(2)
160302 + 168795 = 329097	\$6000000
71973 + 24527 = 96500	4866666
160302	1467750
329097	800000
71973	1909640
96500	590882
-----	862033
657872	-----
	\$16496471

(3)  
 \$7328146.68  
 1888576.76  
 621936.42  
 417474.00  
 66554.00  
 122142.77  
 -----  
 \$10444830.63

(5)  
 ac.  
 635) 86895 (136 ac.  
 635  
 -----  
 2339  
 1905

4345  
 3810  
 -----  
 535  
 4

2140 (3 ro.  
 1905

235  
 40

9400 (14 per.  
 635

3050 15427½ (24½ yds.  
 2540 1270

510 2727½  
 30½ 2540

15300 187½ = 375  
 127½ -----  
 635 1270

(4)  
 \$375, team,  
 \$ 82, wagon,  
 \$ 16, plough,  
 \$ 16, stove,  
 \$153, reaping machine,  
 \$ 96, sheep,  
 \$ 50, cows,  
 \$ 18, pigs,  
 \$ 60, wages.

Total expenditure = \$866,  
 \$975 - \$866 = \$109  
 \$109 ÷ \$1.75 = 62.28½  
 no. of hundred lbs.  
 62.28½ × 100 = 6228½ lbs.

(6)  
 mls. per. yds.  
 10 3 4  
 8

80  
 40

3203  
 5½

16019  
 1601½

17620½  
 3

52861½  
 12

634338

EX. XXXII. (p. 71.)

(1) 8) 18 (2 16 — 2) 8 (4 8 — ∴ G. C. M. is 2	(2) 6) 15 (2 12 — 3) 6 (2 6 — ∴ G. C. M. is 3	(3) 4) 22 (5 20 — 2) 4 (2 4 — ∴ G. C. M. is 2	(4) 16) 28 (1 16 — 12) 16 (1 12 — 4) 12 (3 12 — ∴ G. C. M. is 4
--------------------------------------------------------------------	--------------------------------------------------------------------	--------------------------------------------------------------------	-----------------------------------------------------------------------------------------------

(5) 20) 32 (1 20 — 12) 20 (1 12 — 8) 12 (1 8 — 4) 8 (2 8 — ∴ G. C. M. is 4	(6) 24) 39 (1 24 — 15) 24 (1 15 — 9) 24 (2 18 — 6) 9 (1 6 — 3) 6 (2 6 — ∴ G. C. M. is 3	(7) 26) 44 (1 26 — 18) 26 (1 18 — 8) 18 (2 16 — 2) 8 (4 8 — ∴ G. C. M. is 2
-------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------

(8) 30) 42 (1 30 — 12) 30 (2 24 — 6) 12 (2 12 — ∴ G. C. M. is 6	(9) 36) 56 (1 36 — 20) 36 (1 20 — 16) 20 (1 16 — ∴ G. C. M. is 4	(10) 46) 116 (2 92 — 24) 46 (1 24 — 22) 24 (1 22 — ∴ G. C. M. is 2
-----------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------

(11) 58) 174 (3 174 — ∴ G. C. M. is 3	(12) 4) 16 (4 16 — ∴ G. C. M. is 4	(13) 2) 22 (11 22 — ∴ G. C. M. is 2
---------------------------------------------------	------------------------------------------------	-------------------------------------------------



$$\begin{array}{r} (12) \\ 315) 378 (1 \\ \underline{315} \end{array}$$

$$\begin{array}{r} 63) 315 (5 \\ \underline{315} \end{array}$$

∴ G. C. M. is 63

$$\begin{array}{r} (15) \\ 310) 630 (2 \\ \underline{620} \end{array}$$

$$\begin{array}{r} 10) 310 (31 \\ \underline{310} \end{array}$$

∴ G. C. M. is 10

$$\begin{array}{r} (17) \\ 127) 445 (4 \\ \underline{381} \end{array}$$

$$\begin{array}{r} 64) 127 (1 \\ \underline{64} \end{array}$$

$$\begin{array}{r} 63) 64 (1 \\ \underline{63} \end{array}$$

$$\begin{array}{r} 1) 63 (63 \\ \underline{63} \end{array}$$

∴ No G. C. M.

$$\begin{array}{r} (18) \\ 6408) 7264 (1 \\ \underline{6408} \end{array}$$

$$\begin{array}{r} 856) 6408 (7 \\ \underline{5992} \end{array}$$

$$\begin{array}{r} 416) 856 (2 \\ \underline{832} \end{array}$$

$$\begin{array}{r} (13) \\ 138) 366 (2 \\ \underline{256} \end{array}$$

$$\begin{array}{r} 110) 128 (1 \\ \underline{110} \end{array}$$

$$\begin{array}{r} 18) 110 (6 \\ \underline{108} \end{array}$$

$$\begin{array}{r} 2) 18 (9 \\ \underline{18} \end{array}$$

∴ G. C. M. is 2

$$\begin{array}{r} (16) \\ 424) 1216 (2 \\ \underline{848} \end{array}$$

$$\begin{array}{r} 368) 424 (1 \\ \underline{368} \end{array}$$

$$\begin{array}{r} 56) 368 (6 \\ \underline{336} \end{array}$$

$$\begin{array}{r} 32) 56 (1 \\ \underline{32} \end{array}$$

$$\begin{array}{r} 24) 32 (1 \\ \underline{24} \end{array}$$

$$\begin{array}{r} 8) 24 (3 \\ \underline{24} \end{array}$$

∴ G. C. M. is 8

$$\begin{array}{r} (19) \\ 3042) 3094 (1 \\ \underline{3042} \end{array}$$

$$\begin{array}{r} 52) 3042 (58 \\ \underline{260} \end{array}$$

(Continued on next page.)

(18 and 19 continued.)

$$\begin{array}{r} 24) 416 (17 \\ \underline{24} \end{array}$$

$$\begin{array}{r} 442 \\ \underline{416} \end{array}$$

$$\begin{array}{r} 176 \\ \underline{168} \end{array}$$

$$\begin{array}{r} 26) 52 (2 \\ \underline{52} \end{array}$$

$$\begin{array}{r} 8) 24 (3 \\ \underline{24} \end{array}$$

∴ G. C. M. is 26

∴ G. C. M. is 8

$$\begin{array}{r} (21) \\ 1441) 1572 (1 \\ \underline{1441} \end{array}$$

$$\begin{array}{r} (20) \\ 7040) 7392 (1 \\ \underline{7040} \end{array}$$

$$\begin{array}{r} 131) 1441 (11 \\ \underline{131} \end{array}$$

$$\begin{array}{r} 352) 7040 (20 \\ \underline{7040} \end{array}$$

$$\begin{array}{r} 131 \\ \underline{131} \end{array}$$

∴ G. C. M. is 352

∴ G. C. M. is 131

$$\begin{array}{r} (22) \\ 23025) 46436 (2 \\ \underline{46050} \end{array}$$

$$\begin{array}{r} (23) \\ 21168) 204624 (9 \\ \underline{190512} \end{array}$$

$$\begin{array}{r} 386) 23025 (59 \\ \underline{1930} \end{array}$$

$$\begin{array}{r} 14112) 21168 (1 \\ \underline{14112} \end{array}$$

$$\begin{array}{r} 3725 \\ \underline{3474} \end{array}$$

$$\begin{array}{r} 7056) 14112 (2 \\ \underline{14112} \end{array}$$

$$\begin{array}{r} 251) 386 (1 \\ \underline{251} \end{array}$$

∴ G. C. M. is 7056

$$\begin{array}{r} 2) 18 (9 \\ \underline{18} \end{array}$$

$$\begin{array}{r} 135) 251 (1 \\ \underline{135} \end{array}$$

$$\begin{array}{r} 1) 2 (2 \\ \underline{2} \end{array}$$

$$\begin{array}{r} 116) 135 (1 \\ \underline{116} \end{array}$$

∴ No G. C. M.

$$\begin{array}{r} 19) 116 (6 \\ \underline{114} \end{array}$$

(24)  
20579) 97482 (3  
88737

8745) 29579 (3  
26235

3344) 8745 (2  
6688

2057) 3344 (1  
2057

1287) 2057 (1  
1287

770) 1287 (1  
770

(25)  
738140) 828597 (1  
738140

90457) 738140 (3  
723656

14484) 90457 (6  
86904

3553) 14484 (4

14212 ∴ G. C. M. is 11

272) 3553 (13  
272

833

81

1) 272 (16  
17

102  
102

∴ G. C. M. is 17

$$\begin{array}{r} (26) \\ 326337) 737800 (2 \\ \underline{652674} \end{array}$$

$$\begin{array}{r} 85120) 326337 (3 \\ \underline{255378} \end{array}$$

$$\begin{array}{r} 70959) 85126 (1 \\ \underline{70959} \end{array}$$

$$\begin{array}{r} 14167) 70950 (5 \\ \underline{70835} \end{array}$$

$$\begin{array}{r} 124) 14167 (114 \\ \underline{124} \end{array}$$

$$\begin{array}{r} 176 \\ \underline{124} \end{array}$$

$$\begin{array}{r} 527 \\ \underline{496} \end{array}$$

$$\begin{array}{r} 31) 124 (4 \\ \underline{124} \end{array}$$

∴ G. C. M. is 31

Ex. XXXIII. (p. 72.)

$$2 \begin{array}{l} (1) \\ \hline 2, 4, 10 \end{array}$$

$$\begin{array}{l} 2, 5 \\ \hline \therefore \text{L. C. M.} = 2 \times 2 \times 5 = 20 \end{array}$$

$$2 \begin{array}{l} (3) \\ \hline 12, 16, 18 \end{array}$$

$$2 \begin{array}{l} \hline 6, 8, 9 \end{array}$$

$$3 \begin{array}{l} \hline 3, 4, 9 \end{array}$$

$$\begin{array}{l} 1, 4, 3 \\ \hline \therefore \text{L. C. M.} = 2 \times 2 \times 5 \times 7 \times 9 = 1260 \\ \therefore \text{L. C. M.} = 2 \times 2 \times 3 \times 4 \times 3 = 144 \end{array}$$

$$4 \begin{array}{l} (2) \\ \hline 8, 9, 12 \end{array}$$

$$3 \begin{array}{l} \hline 2, 9, 3 \end{array}$$

$$\begin{array}{l} 2, 3, 1 \\ \hline \therefore \text{L. C. M.} = 4 \times 3 \times 2 \times 3 = 72 \end{array}$$

$$2 \begin{array}{l} (4) \\ \hline 20, 28, 36 \end{array}$$

$$2 \begin{array}{l} \hline 10, 14, 18 \end{array}$$

$$\begin{array}{l} 5, 7, 9 \end{array}$$

$$\begin{array}{r|l}
 & (5) \\
 2 & 16, 24, 30 \\
 \hline
 2 & 8, 12, 15 \\
 \hline
 2 & 4, 6, 15 \\
 \hline
 3 & 2, 3, 15 \\
 \hline
 & 2, 1, 5
 \end{array}$$

$$\therefore \text{L. C. M.} = 2 \times 2 \times 2 \times 3 \times 2 \times 5 = 240$$

$$\text{L. C. M.} = 2 \times 2 \times 2 \times 3 \times 7 = 168$$

$$\begin{array}{r|l}
 & (7) \\
 5 & 15, 25, 105 \\
 \hline
 & 5, 21
 \end{array}$$

$$\therefore \text{L. C. M.} = 5 \times 5 \times 21 = 525$$

$$\begin{array}{r|l}
 & (9) \\
 2 & 7, 21, 6, 14, 25 \\
 \hline
 3 & 21, 3, 7, 25
 \end{array}$$

$$\therefore \text{L. C. M.} = 2 \times 3 \times 7 \times 25 = 1050$$

$$\begin{array}{r|l}
 & (10) \\
 2 & 7, 8, 9, 10, 12 \\
 \hline
 2 & 7, 4, 9, 5, 6 \\
 \hline
 3 & 7, 2, 9, 5, 3
 \end{array}$$

$$\therefore \text{L. C. M.} = 2 \times 2 \times 7 \times 2 \times 3 \times 5 \times 3 = 2520$$

$$\therefore \text{L. C. M.} = 2 \times 2 \times 2 \times 3 \times 7 \times 3 \times 11 \times 2 = 11088$$

$$\begin{array}{r|l}
 & (12) \\
 5 & 2, 5, 45, 15, 25
 \end{array}$$

$$\therefore \text{L. M.} = 5 \times 2 \times 9 \times 5 = 450$$

$$\therefore \text{L. C. M.} = 3 \times 8 \times 5 \times 9 = 1080$$

$$\begin{array}{r|l}
 & (6) \\
 2 & 24, 56, 84 \\
 \hline
 2 & 12, 28, 42 \\
 \hline
 2 & 6, 14, 21 \\
 \hline
 3 & 3, 7, 21
 \end{array}$$

$$\begin{array}{r|l}
 & (8) \\
 2 & 6, 33, 24, 32 \\
 \hline
 2 & 33, 12, 16 \\
 \hline
 2 & 33, 6, 8 \\
 \hline
 3 & 33, 3, 4
 \end{array}$$

$$\therefore \text{L. C. M.} = 2 \times 2 \times 2 \times 3 \times 11 \times 4 = 1056$$

$$\begin{array}{r|l}
 & (11) \\
 2 & 24, 28, 36, 22, 16 \\
 \hline
 2 & 12, 14, 18, 11, 8 \\
 \hline
 2 & 6, 7, 9, 11, 4 \\
 \hline
 3 & 3, 7, 9, 11, 2
 \end{array}$$

$$\therefore \text{L. C. M.} = 2 \times 2 \times 2 \times 3 \times 7 \times 3 \times 11 \times 2 = 11088$$

$$\begin{array}{r|l}
 & (13) \\
 3 & 9, 4, 8, 15, 27
 \end{array}$$

$$\therefore \text{L. C. M.} = 3 \times 8 \times 5 \times 9 = 1080$$

2	(14)	15, 20, 24, 21, 35	2	4, 5, 7, 8, 15, 21, 30	(15)
2		15, 10, 12, 21, 35	3		4, 21, 15
3		15, 5, 6, 21, 35			4, 7, 5
				$\therefore$ L. C. M. =	
				$2 \times 3 \times 4 \times 7 \times 5 = 840$	
				$\therefore$ L. C. M. = $2 \times 2 \times 3 \times 2 \times 35 = 840$	

3	(16)	2, 7, 9, 13, 15, 52, 63	3	3, 7, 21, 11, 77, 198	(17)
		5, 52, 21	11		7, 77, 66
				$\therefore$ L. C. M. = $3 \times 5 \times 52 \times 21 = 16380$	
				$\therefore$ L. C. M. = $3 \times 11 \times 7 \times 6 = 1386$	

2	(18)	100, 56, 35, 125, 150	5	22, 55, 19, 15, 95, 133	(19)
2		50, 28, 125, 75		22, 11, 3, 19, 133	$\therefore$ L. C. M. =
5		25, 14, 125, 75			$5 \times 22 \times 3 \times 133 = 43890$
5		14, 25, 15			

$\therefore$  L. C. M. =  $2 \times 2 \times 5 \times 5 \times 14 \times 5 \times 3 = 21000$ .

2	(20)	48, 64, 27, 33, 110, 165	
2		24, 32, 27, 33, 165	
2		12, 16, 27, 165	
2		6, 8, 27, 165	
3		3, 4, 27, 165	

$\therefore$  L. C. M. =  $2 \times 2 \times 2 \times 2 \times 3 \times 4 \times 9 \times 55 = 95040$ .

## Ex. XXXVII. (p. 76.)

- (1)  $\frac{2}{3} = 3$ . (2)  $\frac{3}{2} = 2\frac{1}{2}$ . (3)  $\frac{1}{3} = 4\frac{1}{3}$ . (4)  $\frac{1}{4} = 4$ .  
 (5)  $\frac{1}{6} = 3\frac{1}{6}$  (6)  $\frac{4}{7} = 6\frac{4}{7}$  (7)  $\frac{5}{9} = 5\frac{5}{9}$  (8)  $\frac{7}{11} = 6\frac{7}{11}$   
 (9)  $\frac{2}{13} = 7$  (10)  $\frac{1}{14} = 8$  (11)  $\frac{2}{17} = 8\frac{2}{17}$  (12)  $\frac{20}{19} = 18\frac{20}{19}$   
 (13)  $\frac{1000}{107} = 9\frac{27}{107}$  (14)  $\frac{24540}{260} = 102\frac{20}{260}$  (15)  $\frac{1718}{133} = 12\frac{22}{133}$

## Ex. XXXVIII. (p. 76.)

- (1)  $1\frac{1}{3} = \frac{1 \times 3 + 1}{3} = \frac{4}{3}$  (2)  $2\frac{1}{2} = \frac{2 \times 2 + 1}{2} = \frac{5}{2}$   
 (3)  $1\frac{1}{5} = \frac{1 \times 5 + 1}{5} = \frac{6}{5}$  (4)  $17\frac{3}{5} = \frac{17 \times 5 + 3}{5} = \frac{88}{5}$   
 (5)  $12\frac{5}{7} = \frac{12 \times 7 + 5}{7} = \frac{89}{7}$  (6)  $203\frac{1}{19} = \frac{203 \times 19 + 17}{19} = \frac{3874}{19}$   
 (7)  $2\frac{1}{65} = \frac{2 \times 65 + 11}{65} = \frac{141}{65}$  (8)  $29\frac{7}{8} = \frac{29 \times 8 + 7}{8} = \frac{239}{8}$   
 (9)  $704\frac{1}{126} = \frac{704 \times 126 + 12}{126} = \frac{88716}{126}$   
 (10)  $900\frac{31}{401} = \frac{900 \times 401 + 31}{401} = \frac{360931}{401}$   
 (11)  $5\frac{7}{680} = \frac{5 \times 680 + 7}{680} = \frac{3407}{680}$   
 (12)  $53\frac{27}{63} = \frac{53 \times 63 + 37}{63} = \frac{3376}{63}$   
 (13)  $21\frac{3}{1250} = \frac{21 \times 1250 + 3}{1250} = \frac{26253}{1250}$   
 (14)  $148\frac{237}{465} = \frac{148 \times 465 + 237}{465} = \frac{69057}{465}$   
 (15)  $13\frac{1080}{2160} = \frac{13 \times 2160 + 1080}{2160} = \frac{29160}{2160}$   
 (16)  $25\frac{385}{2400} = \frac{25 \times 2400 + 389}{2400} = \frac{60389}{2400}$   
 (17)  $197\frac{905}{3084} = \frac{197 \times 3084 + 905}{3084} = \frac{608545}{3084}$

## Ex. XXXIX. (p. 77.)

$$(1) \frac{1}{2} \text{ of } \frac{1}{2} = \frac{3 \times 4}{4 \times 5} = \frac{3}{5} \quad (2) \frac{1}{2} \text{ of } 1\frac{2}{3} = \frac{4 \times 10}{5 \times 12} = \frac{2}{3}$$

$$(3) \frac{1}{2} \text{ of } 1\frac{1}{2} = \frac{9}{19} \quad (4) \frac{1}{2} \text{ of } 1\frac{1}{2} = \frac{12}{55}$$

$$(5) \frac{1}{2} \text{ of } 2\frac{1}{2} = \frac{5}{6} \times \frac{21}{8} = \frac{35}{16} \quad (6) \frac{1}{2} \text{ of } 1\frac{1}{2} = \frac{2}{3} \times \frac{5}{4} = \frac{5}{6}$$

$$(7) 18\frac{1}{2} \text{ of } 5\frac{1}{2} \text{ of } 10 = \frac{164}{9} \times \frac{87}{16} \times \frac{10}{1} = \frac{5945}{6}$$

$$(8) 11\frac{1}{2} \text{ of } 8\frac{1}{2} = \frac{57}{5} \times \frac{59}{7} = \frac{3363}{35}$$

$$(9) \frac{1}{2} \text{ of } 2\frac{1}{2} \text{ of } 9 = \frac{5}{6} \times \frac{7}{3} \times \frac{9}{1} = \frac{35}{2}$$

$$(10) \frac{1}{2} \text{ of } 3\frac{1}{2} \text{ of } 3\frac{1}{2} = \frac{4}{7} \times \frac{15}{4} \times \frac{7}{2} = \frac{15}{2}$$

$$(11) \frac{1}{2} \text{ of } \frac{1}{2} \text{ of } 2\frac{1}{2} \text{ of } 1\frac{1}{2} = \frac{1}{36}$$

$$(12) \frac{1}{4} \text{ of } 4\frac{1}{2} \text{ of } \frac{5}{7} \text{ of } 6\frac{1}{2} \text{ of } \frac{1}{2} = \frac{3}{14} \times \frac{41}{9} \times \frac{6}{37} \times \frac{74}{11} \times \frac{7}{82}$$

$$= \frac{1}{11} \quad (13) \frac{1}{2} \text{ of } 2\frac{1}{2} \text{ of } \frac{1}{2} \text{ of } 10\frac{1}{2} = \frac{5}{11} \times \frac{5}{2} \times \frac{5}{7} \times \frac{21}{3} = \frac{375}{44}$$

$$(14) \frac{1}{2} \text{ of } 12\frac{1}{2} \text{ of } \frac{1}{2} \text{ of } \frac{5}{6} \text{ of } \frac{1}{2} \text{ of } 9 = \frac{7}{9} \times \frac{25}{2} \times \frac{4}{5} \times \frac{5}{6} \times \frac{3}{8} \times \frac{9}{1}$$

$$= \frac{175}{8} \quad (15) \frac{1}{2} \text{ of } \frac{1}{2} \text{ of } 2\frac{1}{2} \text{ of } \frac{1}{2} \text{ of } \frac{1}{2} \text{ of } 2 \text{ of } \frac{1}{2} = \frac{1}{27}$$

$$\frac{5}{18} \times \frac{7}{8} \times \frac{36}{10} \times \frac{9}{4} \times \frac{3}{10} \times \frac{2}{1} \times \frac{8}{27} = \frac{14}{15}$$



(16)  $\frac{5}{7}$  of  $\frac{3}{8}$  of  $\frac{6}{7}$  of  $70\frac{2}{3}$  of  $\frac{3}{10}$  of  $1\frac{7}{11}$  of  $147 =$

$$\frac{5}{7} \times \frac{3}{8} \times \frac{6}{7} \times \frac{632}{9} \times \frac{3}{40} \times \frac{18}{11} \times \frac{147}{1} = \frac{6399}{22}.$$

Ex XL. (p. 78.)

In each of the following examples we divide numerator and denominator by their G. C. M., or as we shall write it:

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

$$(2) \frac{10}{15} = \frac{10+5}{15+5} = \frac{2}{3}.$$

$$(3) \frac{14}{21} = \frac{14+7}{21+7} = \frac{2}{3}.$$

$$(4) \frac{30}{48} = \frac{30+6}{48+6} = \frac{5}{8}.$$

$$(5) \frac{28}{63} = \frac{28+7}{63+7} = \frac{4}{9}.$$

$$(6) \frac{64}{84} = \frac{64+4}{84+4} = \frac{16}{21}.$$

$$(7) \frac{77}{121} = \frac{77+11}{121+11} = \frac{7}{11}.$$

$$(8) \frac{48}{272} = \frac{48+16}{272+16} = \frac{3}{17}.$$

$$(9) \frac{1428}{2652} = \frac{1428+204}{2652+204} = \frac{7}{13}.$$

$$(10) \frac{1408}{1664} = \frac{1408+128}{1664+128} = \frac{11}{13}.$$

$$(11) \frac{875}{1000} = \frac{875+125}{1000+125} = \frac{7}{8}.$$

$$(12) \frac{1690}{2600} = \frac{1690+130}{2600+130} = \frac{13}{20}.$$

$$(13) \frac{837}{2268} = \frac{837+27}{2268+27} = \frac{31}{84}.$$

$$(14) \frac{6006}{8008} = \frac{6006+2002}{8008+2002} = \frac{3}{4}.$$

$$(15) \frac{805}{2622} = \frac{805+23}{2622+23} = \frac{35}{114}.$$

$$(16) \frac{9504}{10692} = \frac{9504+1188}{10692+1188} = \frac{8}{9}.$$

$$(17) \frac{33111}{33759} = \frac{28111+121}{33759+121} = \frac{191}{279}.$$

$$(18) \frac{30599}{271469} = \frac{30599+37}{271469+37} = \frac{827}{7337}$$

$$(19) \frac{5170}{8734} = \frac{5170+22}{8734+22} = \frac{235}{397}$$

$$(20) \frac{1236}{1632} = \frac{1236+12}{1632+12} = \frac{103}{136}$$

$$(21) \frac{285714}{999999} = \frac{285714+142857}{999999+142857} = \frac{2}{7}$$

$$(22) \frac{10395}{16819} = \frac{10395+11}{16819+11} = \frac{945}{1529}$$

$$(23) \frac{7040}{7392} = \frac{7040+352}{7392+352} = \frac{20}{21}$$

$$(24) \frac{11385}{16335} = \frac{11385+495}{16335+495} = \frac{23}{33}$$

Ex. XLI. (p. 79.)

(1)  $\frac{2}{3}, \frac{5}{8}$ . 12 is L. C. M. of denominators;

$\therefore$  fractions become  $\frac{3 \times 2}{4 \times 3}, \frac{5 \times 2}{6 \times 2}$  or  $\frac{9}{12}, \frac{10}{12}$

(2)  $\frac{2}{3}, \frac{3}{4}$ . 12 is L. C. M. of denominators;

$\therefore$  fractions become  $\frac{3 \times 3}{4 \times 3}, \frac{2 \times 4}{3 \times 4}$  or  $\frac{9}{12}, \frac{8}{12}$

(3)  $\frac{2}{4}, \frac{7}{8}$ . 8 is L. C. M. of denominators;

$\therefore$  fractions become  $\frac{3 \times 2}{4 \times 2}, \frac{7 \times 1}{8 \times 1}$  or  $\frac{6}{8}, \frac{7}{8}$

(4)  $\frac{3}{7}, \frac{5}{9}$ . 63 is L. C. M. of denominators;

$\therefore$  fractions become  $\frac{3 \times 9}{7 \times 9}, \frac{5 \times 7}{9 \times 7}$  or  $\frac{27}{63}, \frac{35}{63}$

(5)  $\frac{1}{16}, \frac{21}{24}$ . 48 is L. C. M. of denominators;

$\therefore$  fractions become  $\frac{11 \times 3}{16 \times 3}, \frac{21 \times 2}{24 \times 2}$  or  $\frac{33}{48}, \frac{42}{48}$

(6)  $\frac{1}{12}, \frac{17}{40}$ . 120 is L. C. M. of denominators;

$\therefore$  fractions become  $\frac{11 \times 10}{12 \times 10}, \frac{27 \times 3}{40 \times 3}$  or  $\frac{110}{120}, \frac{81}{120}$

(7)  $\frac{7}{10}, \frac{183}{200}$ . 200 is L. C. M. of denominators;

$\therefore$  fractions become  $\frac{7 \times 20}{10 \times 20}, \frac{183 \times 1}{200 \times 1}$  or  $\frac{140}{200}, \frac{183}{200}$

(8)  $\frac{113}{280}, \frac{527}{960}$ . 6720 is L. C. M. of denominators;

$\therefore$  fractions become  $\frac{113 \times 24}{280 \times 24}, \frac{527 \times 7}{960 \times 7}$  or  $\frac{2712}{6720}, \frac{3689}{6720}$

(9)  $\frac{4}{5}, \frac{11}{12}$ . 60 is L. C. M. of denominators;

$\therefore$  fractions become  $\frac{4 \times 12}{5 \times 12}, \frac{11 \times 5}{12 \times 5}$  or  $\frac{48}{60}, \frac{55}{60}$

(10)  $\frac{3}{16}, \frac{8}{21}, \frac{5}{9}$ . 1008 is L. C. M. of den<sup>rs.</sup>;  $\therefore$  fractions

become  $\frac{3 \times 63}{16 \times 63}, \frac{8 \times 48}{21 \times 48}, \frac{5 \times 112}{9 \times 112}$  or  $\frac{189}{1008}, \frac{384}{1008}, \frac{560}{1008}$

(11)  $\frac{7}{15}, \frac{11}{21}, \frac{23}{30}$ . 210 is L. C. M. of den<sup>rs.</sup>;  $\therefore$  fractions

become  $\frac{7 \times 14}{15 \times 14}, \frac{11 \times 10}{21 \times 10}, \frac{23 \times 7}{30 \times 7}$  or  $\frac{98}{210}, \frac{110}{210}, \frac{161}{210}$

(12)  $\frac{7}{9}, \frac{8}{11}, \frac{13}{15}, \frac{9}{17}$ . 8415 is L. C. M. of den<sup>rs.</sup>;  $\therefore$  fract<sup>ns.</sup>

become  $\frac{7 \times 935}{9 \times 935}, \frac{8 \times 765}{11 \times 765}, \frac{13 \times 561}{15 \times 561}, \frac{9 \times 495}{17 \times 495}$  or  $\frac{6545}{8415}$

$\frac{6120}{8415}, \frac{7293}{8415}, \frac{4455}{8415}$

(13)  $\frac{13}{14}, \frac{35}{36}, \frac{14}{15}, \frac{49}{63}$ . 1260 is L. C. M. of den<sup>rs.</sup>;  $\therefore$  fract<sup>ns.</sup>

become  $\frac{13 \times 90}{14 \times 90}, \frac{35 \times 35}{36 \times 35}, \frac{14 \times 84}{15 \times 84}, \frac{40 \times 20}{63 \times 20}$  or  $\frac{1170}{1260}$

$\frac{1225}{1260}, \frac{1176}{1260}, \frac{800}{1260}$

(14)  $\frac{7}{12}, \frac{17}{30}, \frac{13}{18}, \frac{15}{20}, \frac{7}{16}$ . 180 is L. C. M. of denominators;

$\therefore$  fractions become  $\frac{7 \times 15}{12 \times 15}, \frac{17 \times 6}{30 \times 6}, \frac{13 \times 10}{18 \times 10}, \frac{15 \times 9}{20 \times 9}$

$$\frac{7 \times 13}{15 \times 12} \text{ or } \frac{105}{180'} \quad \frac{103}{180'} \quad \frac{120}{180'} \quad \frac{135}{180'} \quad \frac{84}{180'}$$

(15)  $\frac{1}{3}, \frac{2}{5}, \frac{1}{2}, \frac{1}{4}$ . 7200 is L. C. M. of den<sup>rs.</sup>;  $\therefore$  fract<sup>ns.</sup>

$$\text{become } \frac{13 \times 288}{25 \times 288'} \quad \frac{27 \times 225}{32 \times 225'} \quad \frac{7 \times 600}{12 \times 600'} \quad \frac{15 \times 400}{18 \times 400'}$$

$$\text{or } \frac{3744}{7200'} \quad \frac{6075}{7200'} \quad \frac{4200}{7200'} \quad \frac{6000}{7200'}$$

(16)  $\frac{9}{14}, \frac{13}{18}, \frac{7}{29}, \frac{13}{32}, \frac{23}{42}, \frac{53}{54}$ . 621180 is L. C. M. of den<sup>rs.</sup>;

$\therefore$  fractions become  $\frac{9 \times 44370}{14 \times 44370'}$   $\frac{13 \times 34510}{18 \times 34510'}$   $\frac{7 \times 21420}{29 \times 21420'}$

$$\frac{18 \times 17748}{35 \times 17748'} \quad \frac{23 \times 14790}{42 \times 14790'} \quad \frac{53 \times 9135}{68 \times 9135'} \quad \text{or } \frac{399330}{621180'}$$

$$\frac{448630}{621180'}$$

$$\frac{149940}{621180'} \quad \frac{319464}{621180'} \quad \frac{340170}{621180'} \quad \frac{484155}{621180'}$$

(17)  $\frac{2}{3}, \frac{4}{5}, \frac{3}{8}, \frac{1}{4}$ . 120 is L. C. M. of den<sup>rs.</sup>;  $\therefore$  fractions

$$\text{become } \frac{2 \times 40}{3 \times 40'}$$

$$\frac{4 \times 24}{5 \times 24'}$$

$$\frac{3 \times 15}{8 \times 15'}$$

$$\frac{14 \times 8}{15 \times 8'}$$

$$\text{or } \frac{80}{120'}$$

$$\frac{96}{120'}$$

$$\frac{45}{120'}$$

$$\frac{112}{120'}$$

(18)  $\frac{4}{5}, \frac{5}{6}, \frac{7}{8}, \frac{9}{10}$ . 120 is L. C. M. of den<sup>rs.</sup>;  $\therefore$  fractions

$$\text{become } \frac{3 \times 30}{4 \times 30'}$$

$$\frac{5 \times 20}{6 \times 20'}$$

$$\frac{7 \times 15}{8 \times 15'}$$

$$\frac{9 \times 12}{10 \times 12'}$$

$$\text{or } \frac{90}{120'}$$

$$\frac{100}{120'}$$

$$\frac{105}{120'}$$

$$\frac{108}{120'}$$

(19)  $\frac{3}{8}, \frac{5}{6}, \frac{7}{8}, \frac{5}{9}, \frac{8}{12}$ . 72 is L. C. M. of den<sup>rs.</sup>;  $\therefore$  fractions

$$\text{become } \frac{2 \times 24}{3 \times 24'}$$

$$\frac{5 \times 12}{6 \times 12'}$$

$$\frac{7 \times 9}{8 \times 9'}$$

$$\frac{5 \times 8}{9 \times 8'}$$

$$\frac{8 \times 6}{12 \times 6'}$$

$$\text{or } \frac{48}{72'}$$

$$\frac{60}{72'}$$

$$\frac{63}{72'}$$

$$\frac{40}{72'}$$

$$\frac{48}{72'}$$

(20)  $\frac{2}{3}, \frac{4}{5}, \frac{1}{2}, \frac{3}{11}$ ; 330 is L. C. M. of den<sup>rs</sup>.;  $\therefore$  fractions

$$\text{become } \frac{2 \times 110}{3 \times 100'} \quad \frac{4 \times 66}{5 \times 66'} \quad \frac{1 \times 165}{2 \times 165'} \quad \frac{3 \times 30}{11 \times 30'} \quad \text{or}$$

$$\frac{220}{330'} \quad \frac{264}{330'} \quad \frac{165}{330'} \quad \frac{90}{330'}$$

Ex. XLII. (p. 80.)

(1)  $\frac{2}{3}, \frac{4}{5}$ ; 15 is L. C. M. of den<sup>rs</sup>.;  $\therefore$  fractions become

$$\frac{2 \times 5}{3 \times 5'} \quad \frac{4 \times 3}{5 \times 3'} \quad \text{or} \quad \frac{10}{15'} \quad \frac{12}{15'}$$

$\therefore$  in order of magnitude the fractions stand thus,  $\frac{4}{5}, \frac{2}{3}$ .

(2)  $\frac{7}{9}, \frac{9}{12}$ ; 36 is L. C. M. of den<sup>rs</sup>.;  $\therefore$  fractions become

$$\frac{7 \times 4}{9 \times 4'} \quad \frac{9 \times 3}{12 \times 3'} \quad \text{or} \quad \frac{28}{36'} \quad \frac{27}{36'}$$

$\therefore$  in order of magnitude the fractions stand thus,  $\frac{7}{9}, \frac{9}{12}$ .

(3)  $\frac{17}{24}, \frac{19}{26}$ ; 312 is L. C. M. of den<sup>rs</sup>.;  $\therefore$  fract<sup>ns</sup>. become

$$\frac{17 \times 13}{24 \times 13'} \quad \frac{19 \times 12}{26 \times 12'} \quad \text{or} \quad \frac{221}{312'} \quad \frac{228}{312'}$$

$\therefore$  in order of magnitude the fractions stand thus,  $\frac{19}{26}, \frac{17}{24}$ .

(4)  $\frac{7}{9}, \frac{5}{8}, \frac{11}{14}$ ; 504 is L. C. M. of den<sup>rs</sup>.;  $\therefore$  fract<sup>ns</sup>. become

$$\frac{7 \times 56}{9 \times 56'} \quad \frac{5 \times 63}{8 \times 63'} \quad \frac{11 \times 36}{14 \times 36'} \quad \text{or} \quad \frac{392}{504'} \quad \frac{315}{504'} \quad \frac{396}{504'}$$

$\therefore$  in order of magnitude the fractions stand thus,  $\frac{11}{14}, \frac{7}{9}, \frac{5}{8}$ .

(5)  $\frac{15}{42}, \frac{22}{49}, \frac{48}{63}$ ; 882 is L. C. M. of den<sup>rs</sup>.;  $\therefore$  fract<sup>ns</sup>. become

$$\frac{15 \times 21}{42 \times 21'} \quad \frac{22 \times 18}{49 \times 18'} \quad \frac{48 \times 14}{63 \times 14'} \quad \text{or} \quad \frac{315}{882'} \quad \frac{396}{882'} \quad \frac{672}{882'}$$

$\therefore$  in order of magnitude the fract<sup>ns</sup>. stand thus,  $\frac{48}{63}, \frac{22}{49}, \frac{15}{42}$ .

(6)  $\frac{53}{80}, \frac{63}{90}, \frac{57}{84}$ ; 5040 is L. C. M. of den<sup>rs</sup>.;  $\therefore$  fract<sup>ns</sup>. become

$$\frac{53 \times 63}{80 \times 63'} \quad \frac{63 \times 56}{90 \times 56'} \quad \frac{57 \times 60}{84 \times 60'} \quad \text{or} \quad \frac{3339}{5040'} \quad \frac{3528}{5040'} \quad \frac{3420}{5040'}$$

$\therefore$  in order of magnitude the fract<sup>ns</sup>. stand thus,  $\frac{53}{80}, \frac{57}{84}, \frac{63}{90}$ .

(7)  $\frac{2}{3}$  of  $\frac{5}{8} = \frac{10}{24}$ ;  $\frac{1}{4}$  of  $\frac{7}{8} = \frac{7}{32}$ ;  $7\frac{1}{8} = \frac{57}{8}$ ; 168 is L. C. M. of denominators;  $\therefore$  fractions become

$\frac{5 \times 8}{21 \times 8}$   $\frac{3 \times 12}{14 \times 12}$   $\frac{59 \times 21}{8 \times 21}$  or  $\frac{40}{168}$   $\frac{36}{168}$   $\frac{1239}{168}$   $\therefore$  in order of magnitude the fractions stand thus,  $7\frac{1}{8}$ ,  $\frac{2}{3}$  of  $\frac{5}{8}$ ,  $\frac{1}{4}$  of  $\frac{7}{8}$ .

(8)  $1\frac{1}{2}$ ,  $1\frac{7}{10}$ ,  $2\frac{1}{5}$ ,  $3\frac{3}{10}$ ; 300 is L. C. M. of den<sup>rs</sup>;  $\therefore$  fract<sup>ns</sup>.

become  $\frac{11 \times 20}{15 \times 20}$   $\frac{17 \times 15}{20 \times 15}$   $\frac{21 \times 12}{25 \times 12}$   $\frac{29 \times 10}{30 \times 10}$  or  $\frac{220}{300}$

$\frac{255}{300}$   $\frac{252}{300}$   $\frac{290}{300}$   $\therefore$  in order of magnitude the fractions stand thus,  $3\frac{3}{10}$ ,  $1\frac{7}{10}$ ,  $2\frac{1}{5}$ ,  $1\frac{1}{2}$ .

(9)  $\frac{9}{11}$  of  $1\frac{1}{8}$  of  $7\frac{1}{2} = \frac{9}{11}$ ;  $4\frac{1}{2}$  of  $\frac{2}{3} = \frac{4}{3}$ ;  $\frac{1}{5}$  of  $7\frac{1}{2}$  of 11 =  $\frac{11}{10}$ ;  $\frac{2}{3}$  of  $4\frac{1}{2}$  of  $14\frac{7}{11} = \frac{196}{11}$ ; 6336 is L. C. M. of denominators;  $\therefore$  fractions become

$\frac{29 \times 576}{11 \times 576}$   $\frac{3 \times 576}{11 \times 576}$   $\frac{55 \times 99}{64 \times 99}$   $\frac{1610 \times 64}{99 \times 74}$  or  $\frac{16704}{6336}$   $\frac{1728}{6336}$   $\frac{5445}{6336}$

$\frac{103040}{6336}$   $\therefore$  in order of magnitude the fract<sup>ns</sup> stand thus,  $\frac{2}{3}$  of  $4\frac{1}{2}$ , of  $\frac{2}{3}$  of  $14\frac{7}{11}$ ,  $\frac{9}{11}$  of  $1\frac{1}{8}$   $7\frac{1}{2}$ ,  $\frac{1}{5}$  of  $7\frac{1}{2}$  of 11,  $4\frac{1}{2}$  of  $\frac{2}{3}$ .

(10)  $4\frac{1}{2}$  of  $1\frac{1}{2}$  of  $1\frac{1}{2} = \frac{15}{4}$ ;  $1\frac{1}{2}$  of  $6\frac{1}{2}$  of  $\frac{1}{6}$  of  $1\frac{1}{2} = \frac{1}{4}$ ;  $1\frac{1}{2}$  of  $1\frac{1}{2}$  of  $5\frac{1}{3}$  of  $\frac{1}{2}$  of  $1\frac{1}{2} = \frac{25}{8}$ ; 63 is L. C. M. of denominators;

$\therefore$  fractions become  $\frac{4 \times 7}{9 \times 7}$   $\frac{11 \times 9}{7 \times 9}$   $\frac{20 \times 21}{3 \times 21}$  or  $\frac{28}{63}$   $\frac{99}{63}$

$\frac{420}{63}$   $\therefore$  in order of magnitude the fractions  $1\frac{1}{2}$  of  $1\frac{1}{2}$  of  $5\frac{1}{3}$  of  $\frac{1}{2}$  of  $1\frac{1}{2}$ ,  $1\frac{1}{2}$  of  $6\frac{1}{2}$  of  $\frac{1}{6}$  of  $1\frac{1}{2}$ ,  $4\frac{1}{2}$  of  $1\frac{1}{2}$ .

(11)  $\frac{4}{5}$ ,  $\frac{3}{7}$ ; 35 is L. C. M. of den<sup>rs</sup>;  $\therefore$  fractions become

$\frac{5 \times 5}{7 \times 5}$   $\frac{3 \times 7}{5 \times 7}$  or  $\frac{25}{35}$   $\frac{21}{35}$   $\frac{25}{35}$   $\frac{21}{35} = \frac{4}{35}$

$\therefore$   $\frac{4}{5}$  of a yard is greater by  $\frac{1}{35}$  of a yard.

(12)  $\frac{1}{2}$ ,  $\frac{2}{3}$ ; 6 is L. C. M. of den<sup>rs</sup>.;  $\therefore$  fractions become

$$\frac{1 \times 3}{2 \times 3} \frac{2 \times 2}{3 \times 2} \text{ or } \frac{3}{6} \frac{4}{6} \frac{4}{6} \frac{3}{6} = \frac{1}{6}$$

$\therefore \frac{2}{3}$  of a yard is the greater by  $\frac{1}{6}$  of a yard.

(13)  $1\frac{1}{2}$  of  $\frac{3}{4}$  of  $1\frac{1}{2}$  of  $\frac{2}{3}$  =  $\frac{5}{2}$ ;  $\frac{5}{8}$  of  $1\frac{1}{10}$  of  $5\frac{1}{2}$  =  $\frac{7}{4}$ ; 24 is

L. C. M. of denominators;  $\therefore$  fractions become

$$\frac{5 \times 2}{12 \times 2} \frac{7 \times 1}{24 \times 1} \text{ or } \frac{10}{24} \frac{7}{24} \frac{10}{24} \frac{7}{24} = \frac{3}{24}$$

$\therefore 1\frac{1}{2}$  of  $\frac{3}{4}$  of  $1\frac{1}{2}$  of  $\frac{2}{3}$  is the greater by  $\frac{3}{24}$  of a loaf.

Ex. XLIII. (p. 82.)

$$(1) \frac{1}{2} + \frac{7}{21} = \frac{7+6}{21} = \frac{13}{21} \quad (2) \frac{4}{4} + \frac{8}{12} = \frac{9+8}{12} = \frac{17}{12} = 1 \frac{5}{12}$$

$$(3) 3 + \frac{1}{3} = 3\frac{1}{3} \quad (4) \frac{4}{4} + \frac{5}{6} = \frac{9+10}{12} = \frac{19}{12} = 1 \frac{7}{12}$$

$$(5) \frac{5}{12} + \frac{7}{6} = \frac{25+28}{60} = \frac{53}{60}$$

$$(6) \frac{4}{4} + \frac{7}{12} = \frac{9+7}{12} = \frac{16}{12} = 1 \frac{4}{12} = 1 \frac{1}{3}$$

$$(7) \frac{3}{3} + \frac{5}{11} = \frac{33+25}{55} = \frac{58}{55} = 1 \frac{3}{55}$$

$$(8) \frac{6}{6} + \frac{5}{14} = \frac{21+20}{56} = \frac{41}{56} \quad (9) \frac{1}{2} + \frac{2}{3} = \frac{33+4}{90} = \frac{37}{90}$$

$$(10) 1\frac{1}{3} + 1\frac{1}{6} = \frac{4}{3} + \frac{7}{6} = \frac{8+7}{6} = \frac{15}{6} = 2\frac{3}{6} = 2\frac{1}{2}$$

$$(11) 7\frac{3}{6} + 8 = 7 + 8 + \frac{3}{6} = 15\frac{3}{6} = 15\frac{1}{2}$$

$$(12) 1\frac{1}{3} \text{ of } 2\frac{1}{2} = \frac{4}{3} \text{ of } \frac{5}{2} = \frac{10}{3} = 3\frac{1}{3}; \quad 3\frac{1}{3} + 6\frac{1}{4} = 8 + 6 +$$

$$\frac{1}{3} + \frac{1}{4} = 9 + \frac{4+3}{12} = 9\frac{7}{12}.$$

$$(13) \frac{4}{4} + \frac{4}{3} + \frac{7}{2} = \frac{45+48+35}{60} = \frac{128}{60} = 2\frac{8}{60} = 2\frac{2}{15}.$$

$$(14) 2\frac{3}{8} + \frac{5}{3} + 3\frac{1}{2} = 2+3 + \frac{3}{8} + \frac{5}{18} + \frac{1}{2} = 5 + \frac{27+20+6}{72} =$$

$$5 + \frac{53}{72} = 5\frac{53}{72}.$$

$$(15) \frac{1}{3} \text{ of } 1\frac{3}{4} = \frac{1}{3} \text{ of } \frac{10}{7} = \frac{10}{21}; \quad 6\frac{3}{14} + \frac{10}{21} + 2\frac{7}{9} = 6+2 + \frac{3}{14}$$

$$+ \frac{10}{21} + \frac{7}{9} = 8 + \frac{27+60+98}{126} = 8 + \frac{185}{126} = 9\frac{59}{126}.$$

$$(16) 9\frac{1}{2} \text{ of } 2\frac{1}{3} = \frac{19}{2} \times \frac{7}{3} = \frac{133}{6} = 22\frac{1}{6}; \quad 22\frac{1}{6} + \frac{13}{18} + \frac{1}{27} = 22$$

$$+ \frac{1}{6} + \frac{13}{18} + \frac{1}{27} = 22 + \frac{9+39+2}{54} = 22 + \frac{50}{54} = 22\frac{25}{27}.$$

$$(17) \frac{1}{3} \text{ of } (1+1\frac{1}{3}) = \frac{1}{3} \text{ of } 2\frac{1}{3} = \frac{1}{3} \text{ of } \frac{7}{3} = \frac{7}{9}; \quad \frac{7}{9} + \frac{2}{3} + \frac{5}{6} + \frac{7}{9} =$$

$$\frac{12+15+14}{18} = \frac{41}{18} = 2\frac{5}{18}.$$

$$(18) \frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \frac{4}{5} = \frac{30+40+45+48}{60} = \frac{163}{60} = 2\frac{43}{60}.$$

$$(19) 2\frac{1}{2} + 3\frac{1}{3} + 4\frac{1}{4} + 5\frac{1}{5} = 2+3+4+5 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} = 14 +$$

$$\frac{30+20+15+12}{60} = 14 + \frac{77}{60} = 14 + 1\frac{17}{60} = 15\frac{17}{60}.$$



$$\begin{aligned}
 (20) \quad 5\frac{7}{4} + 13\frac{5}{2} + 4\frac{9}{2} + 2\frac{23}{2} &= 5 + 13 + 2 + \frac{7}{24} + \frac{5}{32} + \frac{49}{72} + \frac{23}{60} \\
 &= 20 + \frac{1850 + 900 + 3920 + 2208}{5760} = 20 + \frac{8708}{5760} = 20 + 1 + \frac{2948}{5760} \\
 &= 20 + 1\frac{737}{1440} = 21\frac{737}{1440}
 \end{aligned}$$

$$\begin{aligned}
 (21) \quad 4\frac{5}{9} + 7\frac{7}{3} + 16\frac{9}{6} + 25\frac{13}{3} &= 4 + 16 + 25 + \frac{5}{9} + \frac{7}{15} + \frac{9}{20} + \frac{13}{25} \\
 &= 45 + \frac{500 + 420 + 405 + 468}{900} = 45 + \frac{1793}{900} = 45 + 1\frac{893}{900} \\
 &= 46\frac{893}{900}
 \end{aligned}$$

$$\begin{aligned}
 (22) \quad \frac{2}{3} \text{ of } 3\frac{1}{2} = \frac{2}{3} \text{ of } 1\frac{1}{2} = \frac{2}{3} = 1\frac{1}{3}; \quad 3\frac{8}{9} + 16\frac{7}{3} + 7\frac{5}{2} + 1\frac{1}{2} &= 3 \\
 + 16 + 7 + 1 + \frac{64 + 63 + 30 + 36}{72} &= 27 + \frac{193}{72} = 27 + 2\frac{49}{72} \\
 &= 29\frac{49}{72}
 \end{aligned}$$

$$\begin{aligned}
 (23) \quad (2\frac{1}{2} + 3\frac{2}{3}) \text{ of } 2\frac{5}{4} + 3\frac{1}{2} \text{ of } (16\frac{8}{3} + 3\frac{1}{2}) + 1\frac{2}{3} \text{ of } 11 \text{ of } 2\frac{1}{2} &= \\
 (2 + 3 + \frac{3}{4} + \frac{2}{3}) \text{ of } \frac{27}{11} + \frac{16}{5} \text{ of } (16 + 3 + \frac{5}{8} + \frac{1}{4}) + \frac{5}{3} \text{ of } (11 & \\
 \text{of } \frac{45}{22}) = (5 + \frac{9+8}{12}) \text{ of } \frac{27}{11} + \frac{16}{5} \text{ of } (19 + \frac{5+2}{8}) + \frac{75}{2} = & \\
 6\frac{5}{12} \text{ of } \frac{27}{11} + \frac{16}{5} \text{ of } 19\frac{7}{8} + \frac{75}{2} = \frac{77}{12} \text{ of } \frac{27}{11} + \frac{16}{5} \text{ of } \frac{159}{8} + \frac{75}{2} & \\
 = \frac{63}{4} + \frac{318}{5} + \frac{75}{2} = 15\frac{3}{4} + 63\frac{3}{5} + 37\frac{1}{2} = 15 + 63 + 37 + \frac{3}{4} + & \\
 \frac{3}{5} + \frac{1}{2} = 115 + \frac{15+12+10}{20} = 115 + \frac{37}{20} = 115 + 1\frac{17}{20} = & \\
 116\frac{17}{20} &
 \end{aligned}$$

$$(24) \text{ £}2\frac{13}{18} + \text{ £}2\frac{19}{24} + \text{ £}3\frac{1}{12} + \text{ £}4\frac{13}{16} + \text{ £}2\frac{20}{48} = \text{ £}2 + \text{ £}3 + \text{ £}4 +$$

$$\text{ £}\frac{13}{18} + \text{ £}\frac{19}{24} + \frac{1}{12} + \text{ £}\frac{13}{16} + \text{ £}\frac{20}{48} = \text{ £}9 +$$

$$\frac{\text{ £}104 + 114 + 12 + 117 + 60}{144} = \text{ £}2\frac{119}{144} + \text{ £}9 = \text{ £}11\frac{119}{144}$$

$$(25) \frac{8}{10} \text{ of 4 lbs.} + \frac{5}{12} \text{ of 4 lbs.} + \frac{7}{15} \text{ of 4 lbs.} + \frac{9}{20} \text{ of 4 lbs.} +$$

$$\frac{14}{27} \text{ of 4 lbs.} + 4\frac{11}{15} = 1\frac{1}{5} \text{ lbs.} + 1\frac{2}{3} \text{ lbs.} + 1\frac{13}{15} \text{ lbs.} + 1\frac{4}{5} \text{ lbs.}$$

$$+ 2\frac{2}{27} \text{ lbs.} + 4\frac{11}{15} \text{ lbs.} = \left(1+1+1+1+2+4+\frac{1}{5}+\frac{2}{3}+\frac{13}{15}+\frac{4}{5}\right.$$

$$\left. + \frac{2}{27} + \frac{11}{15}\right) \text{ lbs.} = 10 \text{ lbs.} + \frac{27+90+117+108+10+99}{135} \text{ lbs.}$$

$$= 10 \text{ lbs.} + \frac{451}{135} \text{ lbs.} = 10 \text{ lbs.} + 3\frac{46}{135} \text{ lbs.} = 13\frac{46}{135} \text{ lbs.}$$

## Ex. XLIV. (p. 83.)

$$(1) \frac{1}{2} - \frac{1}{3} = \frac{5-4}{20} = \frac{1}{20} \quad (2) \frac{1}{2} - \frac{1}{3} = \frac{4-1}{8} = \frac{3}{8}$$

$$(3) \frac{1}{2} - \frac{1}{3} = \frac{9-5}{12} = \frac{4}{12} = \frac{1}{3} \quad (4) \frac{1}{2} - \frac{1}{3} = \frac{57-52}{72} = \frac{5}{72}$$

$$(5) 3\frac{1}{2} - 2\frac{1}{3} = 3 - 2 + \frac{4-1}{6} = 1 + \frac{3}{6} = 1\frac{1}{2}$$

$$(6) 7 - 2\frac{9}{10} = 7 - 2 + \frac{10-9}{10} = 4 + \frac{1}{10} = 4\frac{1}{10}$$

$$(7) 10\frac{1}{4} - 8\frac{1}{2} = 10\frac{13}{12} - 9\frac{1}{9} = 1 + \left(\frac{13}{12} - \frac{1}{9}\right) = 1 + \frac{39-4}{36} = 1\frac{35}{36}$$

$$(8) 17\frac{1}{4} - 13\frac{1}{6} = 17\frac{7}{4} - 14\frac{5}{6} = 3 + \left(\frac{7}{4} - \frac{5}{6}\right) = 3 + \frac{21-10}{12} = 3\frac{11}{12}$$

$$(9) 1\frac{1}{5} - \frac{1}{4} = 1\frac{29}{25} - 1\frac{3}{4} = \frac{116-75}{100} = \frac{41}{100}$$

$$(10) 4\frac{1}{7} - 2\frac{1}{5} = 4\frac{10}{7} - 3\frac{17}{20} = 1 + \frac{200-119}{140} = 1 + \frac{81}{140} = 1\frac{81}{140}$$

$$(11) 15\frac{1}{7} - 7\frac{2}{3} = 15\frac{10}{7} - 8\frac{2}{3} = 7 + \frac{30-14}{21} = 7 + \frac{16}{21} = 7\frac{16}{21}$$

$$(12) 20\frac{1}{8} - 8\frac{3}{5} = 20\frac{23}{18} - 9\frac{3}{56} = 11 + \frac{644-27}{504} = 11 + \frac{617}{504} = 11 + 1\frac{113}{504} = 12\frac{113}{504}$$

$$(13) 1 - \frac{3}{5} = \frac{5-3}{5} = \frac{2}{5}; \quad \frac{3}{5} - \frac{2}{5} = \frac{1}{5}$$

$$(14) (1) \frac{13}{12} - \frac{7}{36} = \frac{39-7}{36} = \frac{32}{36} = \frac{8}{9}$$

$$(2) 8\frac{1}{2} - 2\frac{4}{5} = 8\frac{3}{2} - 3\frac{4}{5} = 5 + \frac{3}{2} - \frac{4}{5} = 5 + \frac{15-8}{10} = 5\frac{7}{10}$$

$$(15) \frac{5}{8} \text{ d.} - \frac{5}{9} \text{ d.} = \frac{45-40}{72} \text{ d.} = \frac{5}{72} \text{ d.}$$

## Ex. XLV. (p. 84.)

$$(1) \frac{1}{6} + 2\frac{1}{2} + 13\frac{3}{10} - 3\frac{2}{5} = 2 + 13 - 3 + \frac{1}{6} + \frac{1}{7} + \frac{3}{10} - \frac{3}{70} = 12$$

$$+ \frac{35 + 30 + 63 - 9}{210} = 12 + \frac{119}{210} = 12\frac{119}{210}$$

$$(2) \frac{1}{2} - \frac{1}{3} + \frac{5}{6} - \frac{1}{4} = \frac{6 - 9 + 20 - 13}{24} = \frac{6 + 20 - 9 - 13}{24}$$

$$= \frac{4}{24} = \frac{1}{6}$$

$$(3) 12\frac{1}{7} - 3\frac{1}{4} + 7\frac{1}{5} - \frac{1}{2} \text{ of } \frac{1}{7} + \frac{2}{3} \text{ of } 3\frac{1}{4} = 12\frac{11}{17} - \frac{21}{34} + 7\frac{16}{51}$$

$$- \frac{16}{51} + \frac{3}{2} = 12 + 7 + 1 + \frac{11}{17} - \frac{21}{34} + \frac{16}{51} - \frac{16}{51} + \frac{1}{2} = 20 +$$

$$\frac{66 - 63 + 32 - 32 + 51}{102} = 20 + \frac{54}{102} = 20\frac{9}{17}$$

$$(4) (16\frac{3}{5} - 3\frac{1}{4}) \text{ of } 3\frac{1}{2} - 16\frac{5}{8} + (3\frac{1}{4} \text{ of } 3\frac{1}{5}) = (16 - 3 + \frac{5-2}{8})$$

$$\text{of } \frac{16}{5} - 16\frac{5}{8} + (\frac{13}{4} \text{ of } \frac{16}{5}) = 13\frac{3}{8} \times \frac{16}{5} - 16\frac{5}{8} + 10\frac{2}{5} = \frac{107}{8}$$

$$\times \frac{16}{5} - 16\frac{5}{8} + 10\frac{2}{5} = 42\frac{4}{5} - 16\frac{5}{8} + 10\frac{2}{5} = 42 - 16 + 10 +$$

$$\frac{32 - 25 + 16}{40} = 36 + \frac{23}{40} = 36\frac{23}{40}$$

$$(5) 6\frac{1}{4} + \frac{1}{2} \text{ of } \frac{3}{4} \text{ of } 3\frac{1}{2} - \frac{15}{60} - 5\frac{1}{4} = 6\frac{1}{4} + (\frac{7}{12} \times \frac{9}{14} \times \frac{10}{3}) -$$

$$\frac{45}{60} - 5\frac{3}{4} = 6 + 1 - 5 + \frac{15 + 15 - 45 - 45}{60} = 1 + \frac{60 - 60}{60} = 1.$$

$$\begin{aligned}
 (6) \quad & 6\frac{1}{4} + \frac{7}{12} \text{ of } \frac{3}{4} \text{ of } (3\frac{1}{2} - \frac{45}{60}) - 5\frac{3}{4} = 6\frac{1}{4} + \frac{7}{12} \text{ of } \frac{9}{14} \text{ of} \\
 & (3\frac{4}{3} - 1\frac{47}{4}) - \frac{3}{4} = 6\frac{1}{4} + \frac{7}{12} \text{ of } \frac{9}{14} \text{ of } (2 + \frac{80-45}{60}) - 5\frac{3}{4} \\
 & = 6\frac{1}{4} + \frac{7}{12} \text{ of } \frac{9}{14} \text{ of } \frac{31}{12} - 5\frac{3}{4} = 6\frac{1}{4} + \frac{31}{32} - 5\frac{3}{4} = 6 - 5 + \\
 & \quad \frac{8+31-24}{32} = 1\frac{15}{32}.
 \end{aligned}$$

$$\begin{aligned}
 (7) \quad & 5\frac{89}{120} - (\frac{4}{5} + \frac{7}{8} + \frac{11}{12}) = 5\frac{89}{120} - (\frac{96+105+110}{120}) = \\
 & 5\frac{89}{120} - 2\frac{71}{120} = 5 - 2 + \frac{89-71}{120} = 3 + \frac{18}{120} = 3\frac{3}{20}.
 \end{aligned}$$

$$\begin{aligned}
 (8) \quad & \frac{1}{3} \text{ of } \frac{3}{4} = \frac{1}{4} = \text{B's pur.}; \quad \frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2} \text{ rem'r.} \\
 & \frac{1}{3} \text{ of } \frac{1}{2} = \frac{1}{6} = \text{C's pur.}; \quad \frac{1}{2} - \frac{1}{6} = \frac{3-1}{6} = \frac{2}{6} = \frac{1}{3} \text{ rem'r.} \\
 & \frac{1}{3} \text{ of } \frac{1}{3} = \frac{1}{9} = \text{D's pur.}; \quad \frac{1}{3} - \frac{1}{9} = \frac{3-1}{9} = \frac{2}{9} = \text{A's rem'r.}
 \end{aligned}$$

## Ex. XLVI. (p. 86.)

$$(1) \quad \frac{1}{3} \times \frac{1}{2} = \frac{1}{12}. \quad (2) \quad \frac{1}{3} \times \frac{5}{8} = \frac{5}{24}. \quad (3) \quad \frac{1}{3} \times \frac{5}{2} = \frac{5}{6}.$$

$$(4) \quad \frac{1}{3} \times \frac{1}{2} = \frac{1}{12}. \quad (5) \quad 7\frac{1}{2} \times 3\frac{1}{2} = \frac{15}{2} \times \frac{10}{3} = 25.$$

$$(6) \quad \frac{1}{2} \text{ of } \frac{1}{3} \times 17\frac{1}{2} = \frac{3}{4} \times \frac{1}{5} \times \frac{35}{2} = \frac{21}{8} = 2\frac{5}{8}.$$

$$(7) \quad \frac{1}{2} \text{ of } 1\frac{1}{2} \times 3\frac{2}{5} \times \frac{1}{2} = \frac{7}{12} \times \frac{8}{7} \times \frac{63}{20} \times \frac{13}{84} = \frac{13}{40}.$$

$$(8) \quad \frac{1}{3} \times 3\frac{2}{7} \times 19\frac{1}{2} \times \frac{1}{6} = \frac{5}{6} \times \frac{35}{11} \times \frac{96}{5} \times \frac{11}{56} = 10.$$

$$(9) \frac{7}{18} \text{ of } 1\frac{1}{10} \text{ of } 1\frac{1}{4} \times 2\frac{1}{2} \times 2\frac{2}{7} = \frac{7}{18} \times \frac{11}{10} \times \frac{27}{14} \times \frac{5}{2} \times \frac{16}{7} =$$

$$\frac{33}{7} = 4\frac{5}{7}$$

$$(10) \frac{1}{8} \text{ of } 3\frac{1}{2} \times 4\frac{1}{2} \text{ of } 2\frac{1}{2} \times 13 = \frac{11}{16} \times \frac{15}{4} \times \frac{24}{5} \times \frac{45}{22} \times \frac{13}{1} =$$

$$\frac{5265}{16} = 329\frac{1}{16}$$

$$(11) 2\frac{1}{2} \text{ of } (4\frac{1}{2} + 3\frac{1}{4}) \times \frac{1}{3} \text{ of } 2\frac{1}{9} \times 1\frac{1}{9} = \frac{57}{23} \times (4 + 3 +$$

$$\frac{14 + 25}{70}) \times \frac{11}{91} \times \frac{39}{19} \times \frac{70}{69} = \frac{57}{23} \times \frac{529}{70} \times \frac{11}{91} \times \frac{39}{19} \times \frac{70}{69} = \frac{33}{7}$$

$$= 4\frac{5}{7}$$

$$(12) (3\frac{5}{8} - 1\frac{7}{2} + 1\frac{1}{3} - 2\frac{1}{2}) \times 38\frac{1}{2} \text{ of } \frac{2}{17} = (3 - 1 + 1 - 2 +$$

$$\frac{60 - 42 + 32 - 11}{72}) \times \frac{153}{4} \times \frac{2}{17} = \frac{37}{24} \times \frac{153}{4} \times \frac{2}{17} = \frac{111}{16} = 6\frac{15}{16}$$

$$(13) \frac{2}{3} \text{ of } (\frac{1}{3} + \frac{1}{2} - 1\frac{1}{6} + \frac{1}{3}) \times \frac{2}{3} \text{ of } (2\frac{3}{8} + \frac{5}{8}) = \frac{3}{4} \text{ of}$$

$$(\frac{15 + 9 - 12 + 5}{45}) \times \frac{2}{3} \text{ of } (2 + \frac{3 + 10}{16}) = \frac{3}{4} \times \frac{17}{45} \times \frac{2}{3} \times \frac{45}{16}$$

$$= \frac{17}{32}$$

$$(14) \{(\frac{1}{2} + \frac{1}{3}) \text{ of } (1\frac{1}{2} + 2\frac{1}{2})\} \times \{(2\frac{1}{4} - 1\frac{1}{2}) \text{ of } (3\frac{1}{10} - 3)\} =$$

$$(\frac{3 + 2}{6}) \times (1 + 2 + \frac{4 + 9}{12}) \times (2 - 1 + \frac{1 - 7}{14}) \text{ of } (3 + \frac{7 - 30}{70})$$

$$= \frac{5}{6} \times \frac{49}{12} \times \frac{4}{7} \times \frac{187}{70} = \frac{187}{36} = 5\frac{7}{36}$$

$$(15) \left\{ 1\frac{1}{2} \text{ of } 26\frac{1}{2} \text{ of } (1 - \frac{1}{3}) \right\} \times \left\{ 2\frac{1}{2} \text{ of } (4\frac{1}{2} - 3\frac{1}{2}) \text{ of } \frac{15}{106} \right\} \\ \frac{10}{7} \text{ of } \frac{53}{2} \text{ of } \frac{1}{3} \times \left( \frac{5}{8} \text{ of } \frac{8}{15} \text{ of } \frac{45}{106} \right) = \frac{10}{7} \times \frac{53}{2} \times \frac{1}{3} \times \frac{21}{8} \times \\ \frac{8}{15} \times \frac{45}{106} = \frac{15}{2} = 7\frac{1}{2}.$$

Ex. XLVII. (p. 86.)

$$(1) \frac{1}{2} \div \frac{1}{5} = \frac{15 \times 7}{20 \times 5} = \frac{21}{20} = 1\frac{1}{20}.$$

$$(2) \frac{2}{5} \div \frac{1}{3} = \frac{2 \times 5}{5 \times 3} = \frac{2}{3}.$$

$$(3) \frac{6}{11} \div \frac{2}{3} = \frac{6 \times 5}{11 \times 3} = \frac{10}{11}.$$

$$(4) 4\frac{1}{2} \div 6\frac{1}{2} = \frac{20}{6} \div \frac{55}{8} = \frac{29 \times 8}{6 \times 55} = \frac{116}{165}.$$

$$(5) 56 \div 5\frac{1}{2} = 56 \div \frac{40}{7} = \frac{56 \times 7}{1 \times 40} = \frac{49}{5} = 9\frac{4}{5}.$$

$$(6) 7\frac{1}{2} \div 4\frac{2}{21} = \frac{54}{7} \div \frac{86}{21} = \frac{54 \times 21}{7 \times 86} = \frac{81}{43} = 1\frac{38}{43}.$$

$$(7) \frac{1}{3} \text{ of } 20\frac{1}{2} \div 10\frac{1}{3} = \frac{1}{3} \times \frac{83}{4} \div \frac{83}{8} = \frac{83}{12} \times \frac{8}{83} = \frac{2}{3}.$$

$$(8) \frac{3}{2} \text{ of } 5\frac{1}{2} \div \frac{1}{2} \text{ of } 9 = \frac{3}{5} \times \frac{11}{2} \div \frac{5}{22} \times \frac{9}{1} = \frac{33}{10} \div \frac{45}{22} = \\ \frac{33 \times 22}{10 \times 45} = 1\frac{46}{75}.$$

$$(9) \left( \frac{3}{2} \text{ of } 7\frac{1}{2} - \frac{8}{7} \right) \div 1\frac{1}{2} = \left\{ \left( \frac{3}{5} \times \frac{15}{2} \right) - \frac{8}{7} \right\} \div \frac{11}{9} = \\ \left( \frac{9}{2} - \frac{8}{7} \right) \div \frac{11}{9} = \frac{137}{34} \div \frac{11}{9} = \frac{137 \times 9}{34 \times 11} = 3\frac{111}{374}.$$

$$(10) \left(\frac{1}{2} + \frac{1}{4} - \frac{1}{8}\right) \div \left(\frac{1}{3} + \frac{1}{6}\right) = \frac{4+15-10}{20} \div \frac{12+10}{15} = \frac{9}{20} \div \frac{22}{15} = \frac{9 \times 15}{20 \times 22} = \frac{27}{88}$$

$$(11) 6\frac{3}{4} \div 216 = \frac{27}{4} \div 216 = \frac{27 \times 1}{4 \times 216} = \frac{1}{32}$$

$$(12) \frac{3}{4} \div 2 = \frac{3 \times 1}{4 \times 2} = \frac{3}{8}$$

$$(13) \frac{4 + \frac{1}{4}}{4 - \frac{1}{4}} = \frac{4\frac{1}{4}}{3\frac{3}{4}} = \frac{17}{4} \div \frac{15}{4} = \frac{17 \times 4}{4 \times 15} = \frac{17}{15} = 1\frac{2}{15}$$

2 is the next whole number;  $2 - 1\frac{2}{15} = \frac{13}{15}$

## EX. XLVIII. (p. 87.)

$$(1) \frac{6\frac{1}{2}}{3\frac{1}{2}} = \frac{4\frac{3}{2} + 2\frac{1}{2}}{2\frac{3}{2}} = \frac{4\frac{3}{2} \times \frac{2}{2}}{2\frac{3}{2}} = \frac{7\frac{3}{2}}{2\frac{3}{2}} = 1\frac{11}{5}$$

$$(2) \frac{6\frac{1}{2}}{2\frac{1}{2}} = 6 + \frac{1}{2} = 6 \times \frac{2}{2} = \frac{13}{2} = 2\frac{1}{2}$$

$$(3) \frac{2\frac{1}{2}}{6} = \frac{2}{4} + 6 = \frac{2}{4} \times \frac{1}{6} = \frac{1}{12}$$

$$(4) \frac{6\frac{1}{2}}{3\frac{3}{8}} = \frac{7\frac{1}{2} + 1\frac{1}{8}}{3\frac{3}{8}} = \frac{7\frac{1}{2} \times \frac{8}{8}}{3\frac{3}{8}} = \frac{7}{1} = 7$$

$$(5) \frac{5}{2\frac{1}{8}} = 5 \div 2\frac{1}{8} = 5 \times \frac{8}{17} = \frac{40}{17} = 2\frac{6}{17}$$

$$(6) \frac{7\frac{1}{5}}{4\frac{1}{6}} = \frac{7}{45} + \frac{145}{36} = \frac{7}{45} \times \frac{36}{145} = \frac{28}{725}$$

$$(7) \frac{1\frac{1}{2} \text{ of } 1\frac{1}{2}}{1\frac{1}{3} \text{ of } \frac{1}{11}} = \frac{\frac{7}{2} \times \frac{7}{2}}{\frac{2}{3} \times \frac{1}{11}} = 2 \times \frac{11}{2} = \frac{11}{1} = 11$$

$$(8) \frac{\frac{7}{2} + \frac{7}{2}}{2\frac{1}{2}} = \frac{\frac{7}{1}}{\frac{5}{2}} = \frac{7}{5} \times \frac{2}{1} = \frac{14}{5}$$

$$(9) \frac{5\frac{1}{2} + 6\frac{3}{4}}{6\frac{3}{4} - 5\frac{1}{2}} = \frac{11\frac{1}{2}}{1\frac{1}{4}} = \frac{15\frac{1}{2}}{1\frac{1}{4}} = \frac{15\frac{1}{2} \times 4}{1} = 62$$



$$(10) \frac{\frac{1}{2} + \frac{1}{3} + \frac{1}{4}}{\frac{2}{3} + \frac{1}{6} - \frac{1}{12}} = \frac{\frac{2}{6} + \frac{2}{6} + \frac{1}{4}}{\frac{2}{3} + \frac{1}{6} - \frac{1}{12}} = \frac{\frac{14}{12}}{\frac{1}{2}} = \frac{14}{6} \times \frac{2}{1} = 1\frac{2}{3}$$

$$(11) \left\{ \frac{3\frac{1}{2}}{7} + \frac{2}{10\frac{1}{2}} - \frac{1}{8} \text{ of } 4 \right\} \times 1\frac{1}{2} = \left( \frac{1}{2} + \frac{1}{5} - \frac{1}{2} \right) \times \frac{3}{2} = \frac{3}{5} \times \frac{3}{2} = \frac{9}{10}$$

$$(12) \left( \frac{5\frac{1}{2}}{31\frac{1}{8}} \text{ of } \frac{9}{14} \right) \div \left( \frac{3\frac{1}{2}}{3\frac{1}{2}} \text{ of } 15 \right) = \frac{1}{2} \times \frac{6}{7} \times \frac{2}{14} \div \frac{1}{2} \times \frac{1}{2} \times 15$$

$$\times 15 = \frac{1}{33\frac{1}{3}} \div \frac{1}{3} = \frac{1}{33\frac{1}{3}} \times \frac{3}{1} = \frac{1}{11}$$

$$(13) \frac{5\frac{1}{2} + 7\frac{1}{2}}{2\frac{1}{2} - 1\frac{1}{2}} \text{ of } \frac{2\frac{1}{2} \times 8\frac{1}{2}}{4\frac{1}{2} + (\frac{1}{2} - \frac{1}{2})} = \frac{5}{2} \text{ of } \frac{1\frac{1}{2}}{2\frac{1}{2}} = 1\frac{1}{2}$$

$$(14) \frac{13}{2\frac{1}{2} + \frac{1}{2}} + \frac{1\frac{1}{2}}{2\frac{1}{2}} - 1\frac{1}{2} = \frac{13}{3} + \frac{1}{2} - 1\frac{1}{2} = \frac{13}{3} + \frac{1}{2} - \frac{3}{2} = \frac{13}{3} - 1 = \frac{10}{3}$$

Ex. XLIX. (p. 88.)

$$(1) \frac{2}{5} \text{ of } \$1 = \frac{2 \times 100}{5} \text{ cts.} = 40 \text{ cts.}$$

$$(2) \frac{3}{8} \text{ ml.} = \frac{3 \times 8}{8} \text{ fur.} = 3 \text{ fur.}$$

$$(3) \frac{3}{7} \text{ cwt.} = \frac{3 \times 4}{7} \text{ qrs.} = 1\frac{5}{7} \text{ qrs.}; \frac{5}{7} \text{ qr.} = \frac{5 \times 25}{7} \text{ lbs.} = 17\frac{6}{7} \text{ lbs.}; \frac{6}{7} \text{ lb.} = \frac{6 \times 16}{7} \text{ oz.} = 13\frac{5}{7} \text{ oz.}; \frac{5}{7} \text{ oz.} = \frac{5 \times 16}{7} \text{ drs.} = 11\frac{3}{7} \text{ drs.}; \therefore \text{ value is } 1 \text{ qr., } 17 \text{ lbs., } 13 \text{ oz., } 11\frac{3}{7} \text{ drs.}$$

$$(4) \frac{9}{20} \text{ of 2 tons, 3 cwt.} = \frac{9 \times 43}{20} \text{ cwt.} = 19\frac{7}{20} \text{ cwt.}; \frac{7}{20} \text{ cwt.}$$

$$= \frac{7 \times 4}{20} \text{ qrs.} = 1\frac{8}{20} \text{ qrs.}; \frac{8}{20} \text{ qrs.} = \frac{8 \times 25}{20} \text{ lbs.} = 10 \text{ lbs.};$$

$\therefore$  value is 19 cwt. 1qr. 10 lbs.

$$(5) \frac{3}{16} \text{ of 3 mls., 2 fur.} = \frac{3 \times 26}{16} \text{ fur.} = 4\frac{7}{8} \text{ fur.}; \frac{7}{8} \text{ fur.} =$$

$$\frac{7 \times 40}{8} \text{ per.} = 35 \text{ per.}; \therefore \text{ value is 4 fur. 35 per.}$$

$$(6) \frac{4}{5} \text{ of 3 ac., 2 per., 3 yds.} = \frac{(3 \text{ ac., 2 per., 3 yds.}) \times 4}{5} =$$

$$\frac{12 \text{ ac., 8 per., 12 yds.}}{5} = 2 \text{ ac., 1 ro., 25 per., 20 yds., 4 ft.,}$$

$$136\frac{1}{2} \text{ in.}$$

$$(7) \frac{5}{6} \text{ of 5 lbs., 13 dwts.} = \frac{(5 \text{ lbs., 13 dwts.}) \times 5}{6} =$$

$$\frac{25 \text{ lbs., 3 oz., 5 dwts.}}{6} = 4 \text{ lbs., 2 oz., 10 dwts., 20 grs.}$$

$$(8) \frac{7}{8} \text{ of 68 yds., 2 nls.} = \frac{(68 \text{ yds., 2 nls.}) \times 7}{8} =$$

$$\frac{476 \text{ yds., 3 qrs., 2 nls.}}{8} = 59 \text{ yds., 2 qrs., } 1\frac{1}{2} \text{ nls.}$$

$$(9) \frac{3}{11} \text{ of } \pounds 26 \text{ 8s. 11d.} = \frac{(\pounds 26 \text{ 8s. 11d.}) \times 3}{11} =$$

$$\frac{\pounds 79 \text{ 6s. 9d.}}{11} = \pounds 7 \text{ 4s. 3d.}$$

$$(10) \frac{6}{7} \text{ of 128 lbs., 2 sc.} = \frac{(128 \text{ lbs., 2 sc.}) \times 6}{7} =$$

$$\frac{768 \text{ lbs., 4 drs.}}{7} = 109 \text{ lbs., 8 oz., 5 drs. } 3\frac{1}{2} \text{ grs.}$$

$$(11) \frac{7}{8} \text{ of } \frac{3}{5} \text{ of } 10\frac{2}{3} \text{ hrs.} = \frac{28}{5} \text{ hrs.} = 5\frac{3}{5} \text{ hrs.}; \frac{3}{5} \text{ hrs.} = 36 \text{ min.}; \therefore \text{value is } 5 \text{ hrs., } 36 \text{ min.}$$

$$(12) \frac{3}{5} \text{ lbs.} = 9\frac{3}{5} \text{ oz.}; \frac{3}{5} \text{ oz.} = 9\frac{3}{5} \text{ drs.}; 7 \text{ lbs., } 9 \text{ oz., } 9\frac{3}{5} \text{ drs.}$$

$$(13) \frac{6}{7} \text{ of } \frac{2}{3} \text{ of } \$42 = \frac{4}{7} \text{ of } \$42 = \$24.$$

$$(14) \frac{3}{10} \text{ dy.} = 7\frac{1}{5} \text{ hrs.}; \frac{1}{5} \text{ hr.} = 12 \text{ min.}; 7 \text{ hrs. } 12 \text{ min.}$$

$$(15) \frac{9}{16} \text{ of } 24 \text{ cds.} = 13\frac{1}{2} \text{ cds.}; \frac{1}{2} \text{ cd.} = 64 \text{ c. ft.};$$

$\therefore \text{value is } 13 \text{ cds., } 64 \text{ c. ft.}$

## Ex L. (p. 88.)

$$(1) 3s. 4d. = 40d., \text{ £}1 = 240d.; \therefore \text{fract}^n = \frac{40}{240} = \frac{1}{6}.$$

$$(2) 2 r., 13 per. = 93 \text{ per.}, 3 ac. = 480 \text{ per.}; \therefore \text{fract}^n = \frac{93}{480} = \frac{31}{160}.$$

$$(3) 3 \text{ wks., } 16 \text{ min.} = 30256 \text{ min.}, \frac{1}{2} \text{ hr.} = 30 \text{ min.};$$

$$\therefore \text{fract}^n = \frac{30256}{30} = \frac{15128}{15}.$$

$$(4) 1 \text{ lb., } 1 \text{ oz., } 3 \text{ dwts.} = 263 \text{ dwts.}, 2 \text{ lbs.} = 480 \text{ dwts.};$$

$$\therefore \text{fract}^n = \frac{263}{480}.$$

$$(5) 1 \text{ lb., } 5 \text{ oz.} = 408 \text{ sc.}, 2 \text{ lbs.}, 1 \text{ sc.} = 577 \text{ sc.};$$

$$\therefore \text{fract}^n = \frac{408}{577}.$$

$$(6) 8 \text{ ac., } 3 \text{ r.} = 1400 \text{ per., } 2 \text{ ac., } 32 \text{ per.} = 352 \text{ per.};$$

$$\therefore \text{fract}^n = \frac{1400}{352} = \frac{175}{44}.$$

$$(7) 4 \text{ yds., } 2 \text{ ft., } 120 \text{ in.} = 3000 \text{ in., } 3 \text{ per., } 13\frac{1}{4} \text{ yds., } 1 \text{ ft.,}$$

$$72 \text{ in.} = 135000 \text{ in.}; \therefore \text{fract}^n = \frac{3000}{135000} = \frac{1}{45}.$$

$$(8) \text{£}1 \text{ } 18\text{s.} = 38\text{s., } \text{£}7 = 140\text{s.}; \therefore \text{fract}^n = \frac{38}{140} = \frac{19}{70}.$$

$$(9) 2 \text{ bu., } 1 \text{ pk.} = 18 \text{ gals., } 4 \text{ bu., } 1 \text{ gal.} = 33 \text{ gals.};$$

$$\therefore \text{fract}^n = \frac{18}{33} = \frac{6}{11}.$$

$$(10) \$209, \$5643; \therefore \text{fract}^n = \frac{209}{5643} = \frac{6}{11}.$$

$$(11) 2 \text{ yds., } 2 \text{ ft.} = 96 \text{ in., } 13 \text{ per., } 3 \text{ yds., } 6 \text{ in.} = 2688 \text{ in.};$$

$$\therefore \text{fract}^n = \frac{96}{2688} = \frac{1}{28}.$$

$$(12) 1 \text{ lb. Troy,} = 5760 \text{ grs., } 1 \text{ lb. avoird.} = 7000 \text{ grs.};$$

$$\therefore \text{fract}^n = \frac{5760}{7000} = \frac{144}{175}.$$

$$(13) 3 \text{ qts., } 7 \text{ bu.} = 224 \text{ qts.}; \therefore \text{fract}^n = \frac{3}{224}.$$

$$(14) 1\frac{1}{4} \text{ yds.} = 54 \text{ in., } 4 \text{ mls., } 2 \text{ fur.} = 269280 \text{ in.};$$

$$\therefore \text{fract}^n = \frac{54}{269280} = \frac{3}{14960}.$$

$$(15) 1 \text{ yd. } 4 \text{ in.} = 1300 \text{ in., } 5 \text{ ac., } 11 \text{ per.} = 31402404 \text{ in.};$$

$$\therefore \text{fract}^n = \frac{1300}{31402404} = \frac{325}{7850601}.$$

## Ex. LI. (p. 89.)

$$(1) \frac{\frac{2}{3} \text{ of } \$14}{\frac{1}{3} \text{ of } \$16} = \frac{2}{7} \times \frac{14}{1} \times \frac{1}{1} \times \frac{1}{16} = \frac{1}{2}.$$

$$(2) \frac{\frac{2}{3} \text{ of } 2 \text{ ac., } 2 \text{ ro.}}{\frac{1}{3} \text{ of } 3 \text{ ac., } 2 \text{ per.}} = \frac{\frac{2}{3} \text{ of } 400 \text{ per.}}{\frac{1}{3} \text{ of } 482 \text{ per.}} = \frac{3}{5} \times \frac{400}{1} \times \frac{9}{1} \times \frac{1}{482} \\ = \frac{1080}{241}.$$

$$(3) \frac{2\frac{1}{2} \text{ of } 3 \text{ lbs., } 6 \text{ dwt.}}{1\frac{1}{2} \text{ of } 6 \text{ lbs., } 12 \text{ grs.}} = \frac{\frac{5}{2} \text{ of } 17424 \text{ grs.}}{\frac{3}{2} \text{ of } 34572 \text{ grs.}} = \frac{5}{2} \times \frac{17424}{1} \\ \times \frac{3}{4} \times \frac{1}{34572} = \frac{5445}{5762}.$$

$$(4) \frac{12\frac{1}{2} \text{ of } 3\text{s. } 6\text{d.}}{\text{£}1} = \frac{5\frac{1}{4} \text{ of } 42\text{d.}}{240\text{d.}} = \frac{51}{4} \times \frac{42}{1} \times \frac{1}{240} = \frac{357}{160}.$$

$$(5) \frac{3\frac{1}{2} \text{ of } 10 \text{ cwt., } 2 \text{ qrs.}}{1 \text{ Ton.}} = \frac{1\frac{1}{2} \text{ of } 42 \text{ qrs.}}{80 \text{ qrs.}} = \frac{10}{3} \times \frac{42}{1} \times \frac{1}{80} = \frac{7}{4}.$$

$$(6) \frac{3\frac{1}{2} \text{ of } 2 \text{ ac., } 3 \text{ ro.}}{2 \text{ ro., } 2\frac{1}{2} \text{ per.}} = \frac{\frac{7}{2} \text{ of } 880 \text{ hf. per.}}{165 \text{ hf. per.}} = \frac{7}{2} \times \frac{880}{1} \times \\ \frac{1}{165} = \frac{56}{3}.$$

$$(7) \frac{\frac{5}{8} \text{ of } 1 \text{ lb. Troy}}{1 \text{ lb. Avoir.}} = \frac{\frac{5}{8} \text{ of } 5760 \text{ grs.}}{7000 \text{ grs.}} = \frac{5}{8} \times \frac{5760}{1} \times \frac{1}{7000} = \frac{18}{35}.$$

$$(8) 1\frac{3}{17} \text{ of } \frac{\text{£}2 \text{ 4s. } 7\frac{1}{2}\text{d.}}{2\text{s.}} = \frac{2\frac{1}{2} \text{ of } 1071 \text{ half-pence}}{120 \text{ half-pence}} = \frac{20}{17} \times \\ \frac{1071}{1} \times \frac{1}{120} = \frac{21}{2}.$$

$$(9) \frac{\frac{2}{11} \text{ of } 2\frac{1}{2} \text{ mls.}}{\frac{1}{3} \text{ of } \frac{2}{3} \text{ mls.}} = \frac{\frac{2}{11} \text{ of } 1\frac{1}{2} \text{ mls.}}{\frac{1}{3} \text{ of } \frac{2}{3} \text{ mls.}} = \frac{3}{11} \times \frac{11}{4} \times \frac{2}{1} \times \frac{9}{7} = \frac{27}{14}.$$

$$(10) \frac{6\frac{1}{2} \text{ of } 3 \text{ cords}}{5 \text{ cord ft.}} = \frac{1\frac{1}{2} \text{ of } 24 \text{ cd. ft.}}{5 \text{ cd. ft.}} = \frac{13}{2} \times \frac{24}{1} \times \frac{1}{5} = \frac{156}{5}.$$

$$(11) \frac{8\frac{1}{2} \text{ of } 6 \text{ lbs., } 2 \text{ sc.}}{1 \text{ lb.}} = \frac{2\frac{1}{2} \text{ of } 1730 \text{ sc.}}{288 \text{ sc.}} = \frac{25}{3} \times \frac{1730}{1} \times \frac{1}{288} = \frac{21625}{432}$$

$$(12) \frac{\frac{1}{7} \text{ of } \frac{2}{3} \text{ of } \$21}{\$7} = \frac{4}{7} \times \frac{2}{3} \times \frac{21}{1} \times \frac{1}{7} = \frac{8}{7}$$

$$(13) \frac{\frac{9}{16} \text{ of } 8 \text{ yds., } 2 \text{ nls.}}{2\frac{1}{2} \text{ ells Eng.}} = \frac{\frac{9}{16} \text{ of } 130 \text{ nls.}}{1\frac{3}{4} \text{ nls.}} = \frac{9}{16} \times \frac{130}{1} \times \frac{4}{3} = \frac{351}{24}$$

$$(14) \frac{2\frac{7}{8} \text{ of } 10 \text{ hrs.}}{1 \text{ dv.}} = \frac{2\frac{3}{4} \text{ of } 10 \text{ hrs.}}{24 \text{ hrs.}} = \frac{23}{8} \times \frac{10}{1} \times \frac{1}{24} = \frac{115}{96}$$

## Ex. LII. (p. 92.)

- (1)  $\frac{2}{3}$  of  $\frac{1}{2} = \frac{1}{3} =$  what  $A$  sells to  $C$ .  
 $\frac{1}{2}$  of  $\frac{1}{2} = \frac{1}{4} =$  what  $A$  sells to  $B$ .  
 $\frac{1}{2} - (\frac{1}{4} + \frac{1}{3}) = \frac{1}{6} = A$ 's remaining portion  
 $\frac{1}{6} + \frac{1}{4} = \frac{2}{3} = B$ 's portion.  
 $\frac{2}{3} = C$ 's portion.
- (2) (1)  $9 + \frac{3}{4} = 24$ .  
 (2)  $4\frac{1}{2} + 3\frac{3}{10} = 8\frac{3}{5}$ ;  $4\frac{1}{2} - 3\frac{3}{10} = \frac{3}{5}$ ;  $8\frac{3}{5} - \frac{3}{5} = 7\frac{3}{5}$ .
- (3) Lesser fraction  $= (\frac{2}{3} - \frac{3}{5}) \div 2 = \frac{1}{15}$ .  
 Greater fraction  $= \frac{2}{3} - \frac{1}{15}$  or  $\frac{1}{10} + \frac{3}{5} = \frac{7}{10}$ .
- (4) (1)  $1\frac{1}{2}$  of  $2\frac{2}{3} = 3\frac{1}{3}$ ;  $3\frac{1}{3} + \frac{1}{3} = 3\frac{2}{3}$ .  
 (2)  $\frac{1}{2}$  of  $2\frac{1}{2} = \frac{5}{4}$ ;  $3\frac{2}{3} - \frac{5}{4} = 1\frac{1}{12}$ .
- (5)  $A$  gives  $B$   $\frac{1}{2}$  of his money;  $\therefore$  he has  $\frac{1}{2}$  rem'g.  
 He then gives  $C$   $\frac{1}{3}$  of  $\frac{1}{2} = \frac{1}{6}$  and has rem'g  $\frac{1}{2} - \frac{1}{6} = \frac{1}{3}$ .  
 He next gives  $D$   $\frac{1}{5}$  of  $\frac{1}{3} = \frac{1}{15}$  and has rem'g  $\frac{1}{3} - \frac{1}{15} = \frac{4}{15}$ .  
 $\therefore A$  has  $\frac{4}{15}$  and  $D$  has  $\frac{1}{15}$ ; or  $A$  has twice as much as  $D$ .
- (6) She spends  $\frac{1}{2}$  leaving  $\frac{1}{2}$ ; next spends  $\frac{1}{4}$  of  $\frac{1}{2} = \frac{1}{4}$ ; hence she has spent  $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$ , and has left  $\frac{1}{4}$ , which by question  $= \$4.20$ ;  $\therefore$  her whole sum was  $\$4.20 \times 4 = \$16.80$ .

- (7)  $\frac{1}{11} = \$90$ ;  $\therefore \frac{1}{1} = \$30$ ;  $\therefore$  value of vessel =  $\$30 \times 11 = \$330$ .  $\therefore \frac{1}{3} = \$110$ .
- (8)  $100 \text{ cts.} - 5 \text{ cts.} = 95 \text{ cts.}$ ;  $\therefore$  whole income =  $1\frac{0}{9}^{\text{a}}$  of  $\$855 = \$900$ .
- (9)  $\frac{4}{5} = \frac{1}{3}$  = amount of reduction; hence  $\frac{1}{3}$  of  $\$54 = \$36$  = amount of reduction.
- (10)  $\frac{1}{4}$  of a rabbit is worth  $\frac{2}{3}$  s.;  $\therefore \frac{1}{1}$  is worth  $\frac{1}{3}$  s. = 2d. and a rabbit is worth  $2\text{d.} \times 7 = 1\text{s. } 2\text{d.}$ ;  $\therefore \frac{2}{3}$  of a rabbit is worth  $8\frac{2}{3}$  d. = the worth of  $\frac{1}{5}$  of a pig;  $\therefore$  a pig is worth  $20 \times 8\frac{2}{3}$  d. = 14s. and 100 pigs are worth  $100 \times 14\text{s.} = \text{£}70$ .
- (11) 1 rifleman shoots  $2\frac{2}{7}$  rounds in 91 minutes, or in 1 minute  $\frac{26}{7 \times 91} = \frac{2}{49}$  of a round;  $\therefore$  37 riflemen in  $4\frac{1}{4}$  hrs. (or 255 min.) will shoot  $(\frac{2}{49} \times 37 \times 255)$  rounds =  $385\frac{5}{7}$  rounds.
- (12)  $\frac{1}{8} = \$12.60$ ;  $\therefore \frac{1}{3} = \$4.20$ , and whole =  $8 \times \$4.20 = \$33.60$ .
- (13) 28 sheep eat as much as 15 cows;  
 $\therefore$  1 sheep eats as much as  $\frac{1}{2}\frac{2}{3}$  cow;  
 $\therefore$  20 sheep eat as much as  $\frac{1}{2}\frac{2}{3} \times 20 = 10\frac{2}{3}$  cows;  
 33 cows and 20 sheep = 33 cows +  $10\frac{2}{3}$  cows =  $43\frac{2}{3}$  cows;  
 15 cows graze in 11 days 5 ac.;  
 $\therefore$  1 cow grazes in 1 day  $\frac{5}{15 \times 11}$  or  $\frac{1}{33}$  ac.;  
 $\therefore$   $43\frac{2}{3}$  cows graze in 1 day  $\frac{1}{33} \times 43\frac{2}{3}$ , or  $\frac{130}{99}$  ac.  
 $\therefore$   $43\frac{2}{3}$  cows graze 18 ac. in  $18 \div \frac{130}{99}$  days, or  $\frac{18 \times 77}{102}$   
 =  $13\frac{1}{3}$  days.
- (14) (1)  $A$  is to have half as much again as  $B$ ,  $\therefore$   $\$94.50$  must be divided into 5 equal shares of which  $A$  is to have 3 and  $B$  2;  $\$94.50 \div 5 = \$18.90$ ;  $\$18.90 \times 3 = \$56.70 = A$ 's share;  $\$18.90 \times 2 = \$37.80 = B$ 's share.

(Continued on next page.)

(14 continued.)

(2) *B* is to have half *A*'s share or *A* is to have twice *B*'s;  $\therefore$  \$94.50 must be divided into 3 equal shares, of which *A* is to have 2 and *B* 1  
 $\$94.50 \div 3 = \$31.50$ ;  $\$31.50 \times 2 = \$63.00 = A$ 's share;  
 $\$31.50 \times 1 = \$31.50 = B$ 's share.

(15) Amount of debt = \$500 + (\$250  $\times$  2) + (\$75  $\times$  3) = \$1225; amount of property = \$625;  $\therefore$  he will pay  $\$1225 \div 5 = \$245$  in the \$ and the first creditor will receive  $\$500 \times \frac{2}{5} = \$200$ .

(16) \$750 would purchase  $\frac{750}{1000} = \frac{3}{4}$  of the mine;  $\therefore$   $\frac{3}{4}$  of the man's share =  $\frac{3}{8}$  of the whole mine; and his entire share =  $(\frac{3}{8} + \frac{1}{8})$  of the mine =  $\frac{1}{2}$ .

(17) The first and second div<sup>ns</sup>. contain  $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$  of the entire school, therefore the remaining, or  $\frac{1}{4}$  must belong to the third div<sup>n</sup>., which by the question contains 80. If  $80 = \frac{1}{4}$ ,  $\frac{1}{4} = \frac{1}{8}$  of 80 = 10, and the whole, or  $\frac{3}{4} = 25 \times 10 = 250$ .

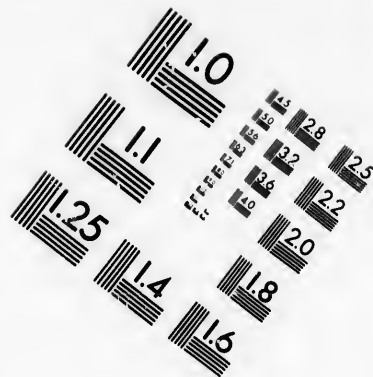
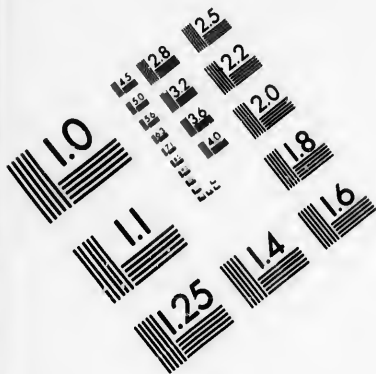
(18) *A* can do in 1 day  $\frac{1}{10}$ ; *B* can do in 1 day  $\frac{1}{12}$ ; therefore *A* and *B* together do in 1 day  $\frac{1}{10} + \frac{1}{12} = \frac{11}{60}$ ;  $\therefore$  no of days in which *A* and *B* will together do the whole work =  $\frac{1}{\frac{11}{60}} = \frac{60}{11} = 5\frac{5}{11}$  days.

(19) Eldest son rec'd  $\frac{1}{2}$  leaving  $\frac{1}{2}$ .  
 Second son rec'd  $\frac{1}{3}$  of  $\frac{1}{2} = \frac{1}{6}$ .  
 Widow rec'd  $1 - (\frac{1}{2} + \frac{1}{6}) = \frac{1}{3}$ .  
 Also by the question  $\frac{1}{2} - \frac{1}{6} = \frac{1}{3}$  (the eldest son's share minus the second son's) = \$1690, or  $\frac{1}{3} =$   
 $\$1690$ ;  $\therefore$  whole property =  $\frac{\$1690}{\frac{1}{3}} = \$5070$ .  
 Eldest son rec'd  $\frac{1}{2}$  of \$5070 = \$2535.  
 Second son rec'd  $\frac{1}{6}$  of 5070 = \$845.  
 Widow rec'd  $\frac{1}{3}$  of \$5070 = \$1690.

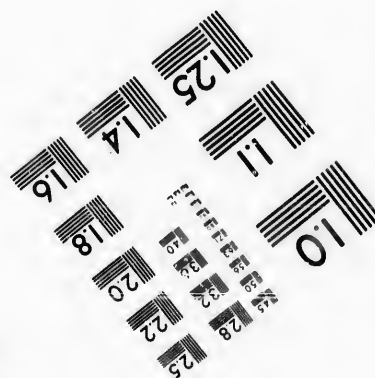
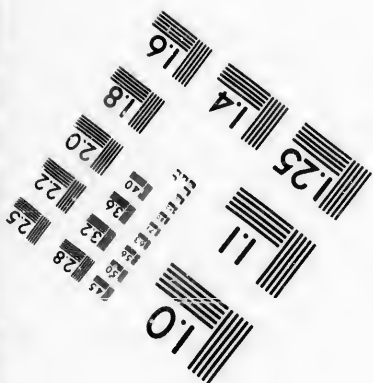
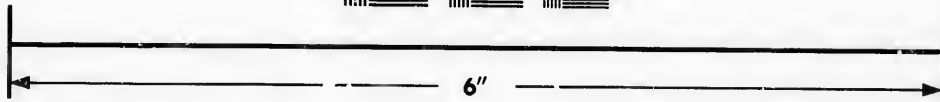
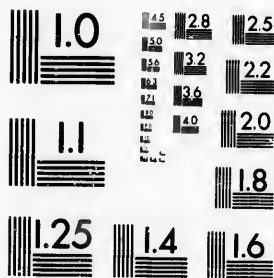
(20) Since *C* receives 9 ac. more than *A* and *B*;  $\therefore$  85 ac., 2 ro. - 9 ac. must be equally divided be-  
 (Continued on next page.)







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(20 continued.)  
 tween  $A$ ,  $B$ , and  $C$ ; hence  $A$ 's and  $B$ 's share =  
 $\frac{76 \text{ ac., } 2 \text{ ro.}}{2} = 38 \text{ ac., } 1 \text{ ro.}$

If  $A$  receives 1,  $B$  receives  $\frac{1}{11}$ ,  $\therefore A$ 's and  $B$ 's =  $1\frac{1}{11}$ .  
 $\therefore A$ 's =  $(38 \text{ ac., } 1 \text{ ro.}) \times \frac{11}{12} = 24 \text{ ac., } 3 \text{ ro.,}$   
 $B$ 's =  $13 \text{ ac., } 2 \text{ ro., } C$ 's =  $47 \text{ ac., } 1 \text{ ro.}$

(21) 3 boys (one out of each third) paid  $(19+30+42)$  cts.  
 = 90 cts.;  $\therefore$  the average payment made by each  
 boy =  $\frac{90}{3} = 30$  cts.;  $\therefore$  no. of boys =  $\frac{1170}{30} = 48$ .

(22) First pipe fills  $\frac{1}{8}$  of the cistern per minute; second  
 and third pipes empty  $\frac{1}{6} + \frac{1}{7} = \frac{13}{42}$  of the cistern per  
 minute;  $\therefore$  part of cistern filled per minute =  $\frac{1}{8} -$   
 $\frac{13}{42} = \frac{1}{24}$ .  $\therefore$  No. of minutes =  $\frac{\text{cistern}}{\text{part filled a min.}} =$   
 $\frac{1}{\frac{1}{24}} = 24$ .

(23) (1)  $A$  and  $B$  do in 1 day  $\frac{1}{30}$  of the work.  
 $B$  does in 1 day  $\frac{1}{70}$  of the work.  
 $\therefore A$  does in 1 day  $\frac{1}{30} - \frac{1}{70} = \frac{2}{105}$  of the work.  
 $\therefore A$  can do the whole in  $\frac{1}{\frac{2}{105}}$  days =  $52\frac{1}{2}$  days.

(2)  $A$  does  $\frac{2}{105} - \frac{1}{70} = \frac{1}{210}$  more than  $B$  in 1 day.  
 $\therefore A$  does  $\frac{1}{210} \times 30 = \frac{1}{7}$  more than  $B$  in 30 days.

(24)  $A$  and  $B$  do  $\frac{1}{20}$  of the work in 1 day.  
 $A$  and  $C$  do  $\frac{1}{15}$  of the work in 1 day.  
 $\therefore 2 A$ ,  $B$ , and  $C$  do  $\frac{1}{20} + \frac{1}{15} = \frac{7}{60}$  of the work in 1  
 day.  
 But  $A$ ,  $B$ , and  $C$  do  $\frac{1}{15}$  of the work in 1 day;  
 $\therefore A$  does  $\frac{7}{60} - \frac{1}{15} = \frac{1}{60}$  of the work in 1 day;  
 $\therefore$  no. of days required by  $A = \frac{\text{whole work}}{\text{part done in 1 day}}$   
 $= \frac{1}{\frac{1}{60}} = 60$  days.

(25)  $\frac{1}{2}$  remains in 1<sup>st</sup>.  $\therefore \frac{1}{2}$  is put into 2<sup>nd</sup>, 3<sup>d</sup>. holds  $\frac{1}{2} -$   
 $(\frac{1}{2} \text{ of } \frac{1}{2}) = \frac{1}{4}$ ; and fills  $\frac{1}{5}$  of 4<sup>th</sup>. cask, which con-  
 (Continued on next page.)

share =

rs = 1 $\frac{1}{4}$ .

+42) cts.  
by each  
 $\frac{1}{4}$  = 48.

; second  
tern per  
te =  $\frac{1}{8}$  -  
1  
min.

(25 continued.)

sequently holds  $\frac{2}{8} + \frac{2}{8} = \frac{4}{8}$ ;  $\therefore$  3<sup>d</sup>. and 4<sup>th</sup>. together hold  $\frac{2}{8} + \frac{4}{8} = \frac{6}{8}$  leaving when taken from first cask  $\frac{2}{8}$ , which by the question is equivalent to 15 gallons;

$\therefore$  1<sup>st</sup>. cask holds  $\frac{15}{28} = 140$  gallons,

2<sup>nd</sup>. cask holds  $\frac{3}{4}$  of 140 = 60 gallons,

3<sup>rd</sup>. cask holds  $\frac{2}{8}$  of 140 = 45 gallons,

4<sup>th</sup>. cask holds  $\frac{1}{4}$  of 140 = 80 gallons.

- (26) While A does  $\frac{1}{3}$  the work B does  $\frac{1}{4}$ ;  
 $\therefore$  while A does the whole work B does  $\frac{3}{4}$ ;  
 $\therefore$  while A does the whole work A and B do  $\frac{7}{4}$ .  
 But A and B do the work in 12 days;  $\therefore$  A requires  $\frac{4}{7}$  of 12 days = 20 days to complete the work alone.

Ex. LIII. (p. 95.)

(1)  $\cdot 3 = \frac{3}{10}$ ;  $\cdot 13 = \frac{13}{100}$ ;  $\cdot 19 = \frac{19}{100}$ ;  $\cdot 301 = \frac{301}{1000}$ ;  $\cdot 270 = \frac{270}{1000}$ ;  $\cdot 5653 = \frac{5653}{10000}$ .

(2)  $\cdot 504 = \frac{504}{1000}$ ;  $\cdot 73201 = \frac{73201}{100000}$ ;  $\cdot 791003 = \frac{791003}{1000000}$ ;  $\cdot 03 = \frac{3}{100}$ ;  $\cdot 0045 = \frac{45}{10000}$ .

(3)  $\cdot 300 = \frac{300}{1000}$ ;  $18.741 = \frac{18741}{1000}$ ;  $2.1 = \frac{21}{10}$ ;  $\cdot 11 = \frac{11}{100}$ ;  $\cdot 000001 = \frac{1}{1000000}$ ;  $5.0007 = \frac{50007}{10000}$ ;  $\cdot 48888 = \frac{48888}{100000}$ .

(4)  $347.02007 = \frac{34702007}{100000}$ ;  $500.005 = \frac{500005}{1000}$ ;  $500.1500 = \frac{5001500}{10000}$ ;  $5.60746805 = \frac{560746805}{100000000}$ ;  $\cdot 0000500 = \frac{500}{100000000}$ .

(5)  $29.0050 = \frac{290050}{10000}$ ;  $20.607 = \frac{20607}{1000}$ ;  $\cdot 28888 = \frac{28888}{100000}$ ;  $5.00038 = \frac{500038}{100000}$ .

Ex. LIV. (p. 96.)

(1)  $\frac{1}{10} = \cdot 1$ ;  $\frac{3}{10} = \cdot 3$ ;  $\frac{23}{10} = 2.3$ ;  $\frac{235}{10} = 23.5$ ;  $\frac{4}{10} = \cdot 4$ ;  $\frac{147}{100} = \cdot 147$ ;  $\frac{47}{100} = \cdot 47$ .

(2)  $\frac{4981}{1000} = 500.1$ ;  $\frac{951}{100000} = \cdot 00951$ ;  $\frac{502}{100} = 5.02$ ;  $\frac{502}{100000} = \cdot 00502$ .

$$(3) \frac{35600}{1000} = 35.6; \frac{1700701}{100000} = 17.00701; \frac{2076854}{1000000} = 0.002076854; \frac{2076854}{100000000} = 0.00002076854; \frac{2076854}{1000000000} = 0.000002076854$$

$$(4) \text{Seven tenths} = .7; \text{thirty thousandths} = .030.$$

$$(5) \text{Three hundred and three thousandths} = 300.003; \text{one ten thousandth} = .0001.$$

$$(6) \text{Four, and five hundred and four millionths} = 4.000504; \text{seventy ten millionths} = .0000070.$$

$$(7) .6 = \text{six tenths}; .17 = \text{seventeen hundredths}; .07 = \text{seven hundredths}.$$

$$(8) .007 = \text{seven thousandths}; .700 = \text{seven hundred thousandths or seven tenths}; 6.3004 = \text{six and three thousand and four ten thousandths}.$$

$$(9) 35.00205 = \text{thirty-five and two hundred and five hundred thousandths}; 400.34000 = \text{four hundred, and thirty-four thousand one hundred thousandths, or four hundred and thirty-four hundredths}.$$

$$(10) 3 \times 10 = 3; 3 \times 100 = 30; 3 \times 10000 = 3000; 3 \times 10000000 = 30000000; .13 \times 10 = 1.3; .13 \times 100 = 13; .13 \times 10000 = 1300; .13 \times 1000000 = 1300000; .013 \times 10 = .13; .013 \times 100 = 1.3; .013 \times 10000 = 130; .013 \times 1000000 = 130000; 54.0003 \times 10 = 540.003; 54.0003 \times 100 = 5400.03; 54.0003 \times 10000 = 540003; 54.0003 \times 1000000 = 540003000; 7420.1 \times 10 = 74201; 7420.1 \times 100 = 742010; 7420.1 \times 10000 = 74201000; 7420.1 \times 1000000 = 7420100000.$$

$$(11) \frac{5.362}{10} = .5362; \frac{5.362}{100} = .05362; \frac{5.362}{1000000} = .000005362; \frac{3}{10} = .03; \frac{3}{100} = .003; \frac{3}{1000000} = .000003$$

(Continued on next page.)

50000 =  
000000 =  
= 20'76854;  
= .030.  
= 300'003;  
Months =  
ths; '07 =

hundred  
and three  
and five  
red, and  
s, or four

000; '3 x  
00 = 13;  
'013 x  
'013 x  
'013 x  
4'0003 x  
4'0003 x  
7420'1 x  
7420'1 x

=  
=

Ex. LV.]

KEY.

(11 continued.)

$$\begin{aligned}
& \cdot 0000003; \frac{70 \cdot 0107}{10} = 7 \cdot 00107 \cdot \frac{70 \cdot 0107}{100} = 7 \cdot 00107; \\
& \frac{70 \cdot 0107}{1000000} = \cdot 0000700107; \frac{5000}{10} = 500; \frac{5000}{100} = 50; \\
& \frac{5000}{1000000} = \cdot 005. \\
& (12) \frac{2 \cdot 03}{1000000} = \cdot 00000203.
\end{aligned}$$

Ex. LV. (p. 97.)

(1)	(2)	(3)
1'085	24	186'8
·00643	185'3009	35'2779
27	·98795	9000
2'2146	3'098	9'201
530'09	·70006	830'05764
<hr/>	<hr/>	<hr/>
560'34603	214'08691	10061'33654

(4)	(5)
94'25	12'5
·008	20'043
187'96099	7'63201
57'3916	·0561
5'998347	<hr/>
<hr/>	40'23111
345'608037	

Again  $12 \cdot 5 = 12 \frac{5}{10} = 12 \frac{1}{2}$   
 $20 \cdot 043 = 20 \frac{43}{1000}$   
 $7 \cdot 63201 = 7 \frac{63201}{100000}$   
 $\cdot 0561 = \frac{561}{100000}$

$$\begin{aligned}
& 12 \frac{1}{2} + 20 \frac{43}{1000} + 7 \frac{63201}{100000} + \frac{561}{10000} = 39 + \\
& \frac{50000 + 4300 + 63201 + 5610}{100000} = 39 + \frac{123111}{100000} = 40 \frac{23111}{100000} \\
& = 40 \cdot 23111.
\end{aligned}$$

(6)

$$\begin{array}{r}
 .0573 \\
 15 \\
 2.04 \\
 567.98075 \\
 \hline
 585.07805 \\
 \frac{573}{10000} + 15 + 2\frac{4}{100} + 567\frac{98075}{100000} = 584 + \\
 \frac{5730 + 4000 + 98075}{100000} = 584\frac{107805}{100000} = 585\frac{7805}{100000} = 585.07805
 \end{array}$$

$$.0573 = 7\frac{573}{100000}$$

$$2.04 = 2\frac{4}{100}$$

$$567.98075 = 567\frac{98075}{100000}$$

(7)

$$\begin{array}{r}
 505.0003 \\
 13.98 \\
 5853.097 \\
 960 \\
 \hline
 7332.0773 \\
 \frac{505\frac{3}{10000} + 13\frac{98}{100} + 5853\frac{97}{1000} + 960 = \\
 7331 + \frac{3 + 9800 + 970}{10000} = 7331\frac{10773}{10000} = 7332\frac{773}{10000} \\
 = 7332.0773.
 \end{array}$$

$$505.0003 = 505\frac{3}{10000}$$

$$13.98 = 13\frac{98}{100}$$

$$5853.097 = 5853\frac{97}{1000}$$

(8)

$$\begin{array}{r}
 6.00734 \\
 54 \\
 15.70087012 \\
 8.00003 \\
 9.987789 \\
 \hline
 93.69602912 \\
 \frac{6\frac{734}{100000} + 54 + 15\frac{70087012}{100000000} + 8\frac{3}{100000} + 9\frac{987789}{1000000} = \\
 92 + \frac{734000 + 70087012 + 3000 + 98778900}{100000000} = 92\frac{169602912}{100000000} \\
 = 93\frac{69602912}{100000000} = 93.69602912.
 \end{array}$$

$$6.00734 = 6\frac{734}{100000}$$

$$15.70087012 = 15\frac{70087012}{100000000}$$

$$8.00003 = 8\frac{3}{100000}$$

$$9.987789 = 9\frac{987789}{1000000}$$



(9)

$$\begin{array}{r} 13 \\ 7\cdot0003 \\ 408\cdot5 \\ 978\cdot \\ \hline \cdot0808 \end{array}$$

$$\begin{array}{r} \cdot13 = \frac{13}{100} \\ 7\cdot0003 = 7\frac{3}{10000} \\ 408\cdot5 = 408\frac{5}{10} \\ \hline \cdot0808 = \frac{808}{10000} \end{array}$$

$$1393\cdot7111$$

$$\frac{13}{100} + 7\frac{3}{10000} + 408\frac{5}{10} + \frac{808}{10000} + 978 = 1393 + \frac{1300 + 3 + 5000 + 808}{10000} = 1393\frac{7111}{10000} = 1393\cdot7111.$$

35-07805

10000

1000

EX. LVI. (p. 98.)

(1)	(2)	(3)	(4)
5·345	26·002	15·67	21·
3·087	18·9564	9·7003	19·9009
<hr/>	<hr/>	<hr/>	<hr/>
2·258	7·0456	5·9697	1·0991

$$\begin{array}{r} (1) \quad 1\cdot3 \\ \cdot13 \\ \hline 1\cdot17 \end{array} \quad \begin{array}{r} 1\cdot3 = 1\frac{3}{10} \\ \cdot13 = \frac{13}{100} \\ \hline 1\cdot17 \end{array} \quad \begin{array}{r} (5) \\ 207\cdot \\ \hline 2\cdot07 = 2\frac{7}{100} \end{array}$$

$$1\frac{3}{10} - \frac{13}{100} = \frac{33}{100} = 1\cdot17; \quad 207 - 2\frac{7}{100} = 204\frac{93}{100} = 204\cdot93.$$

$$(6) \quad \begin{array}{r} 76\cdot3 \\ 7\cdot63 \\ \hline 68\cdot67 \end{array} \quad \begin{array}{r} 76\cdot3 = 76\frac{3}{10} \\ 7\cdot63 = 7\frac{63}{100} \\ \hline 68\cdot67 \end{array} \quad \begin{array}{r} 67\cdot5803 \\ 67\cdot3 \\ \hline 67\cdot2803 \end{array} \quad \begin{array}{r} 67\cdot5803 = 67\frac{5803}{10000} \\ 67\cdot3 = 67\frac{3}{10} \\ \hline 67\cdot2803 \end{array}$$

$$76\frac{3}{10} - 7\frac{63}{100} = 68\frac{67}{100} = 68\cdot67; \quad 67\frac{5803}{10000} - 67\frac{3}{10} = \frac{2803}{10000} = 2803;$$

$$(7) \quad \begin{array}{r} 501\cdot \\ 428\cdot90456 \\ \hline 72\cdot09544 \end{array} \quad \begin{array}{r} 501\cdot \\ 428\cdot90456 \\ \hline 72\cdot09544 \end{array} \quad \begin{array}{r} 428\cdot90456 = 428\frac{90456}{100000} \end{array}$$

$$501 - 428\frac{90456}{100000} = 72\frac{9544}{100000} = 72\cdot09544;$$

(Continued on next page.)

013

9  
0  
302912  
000000

(5 Continued.)

$$\begin{array}{r} 5324 \\ 5324 \\ \hline \end{array}$$

$$5324 = 53,24$$

$$527076$$

$$5324 - 53,24 = 5270,76 = 5270 \cdot 76;$$

$$\begin{array}{r} (1) \ 4 \cdot 42 \\ \cdot 00043 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \cdot 42 = 4,42 \\ \cdot 00042 = 1,00000 \\ \hline \end{array}$$

$$4 \cdot 41958$$

$$4,42 - 1,00000 = 4,41958 = 4 \cdot 41958$$

$$\begin{array}{r} \cdot 007 \\ \cdot 0000007 \\ \hline \end{array}$$

$$\begin{array}{r} \cdot 007 = 1,00000 \\ \cdot 0000007 = 1,0000000 \\ \hline \end{array}$$

$$\cdot 0069993$$

$$1,000 - 1,0000000 = 1,0000000 = \cdot 0069993.$$

(1) $\begin{array}{r} 2 \cdot 3 \\ \cdot 23 \\ \hline 2 \cdot 07 \end{array}$	(6) $\begin{array}{r} 23 \\ \cdot 07 \\ \hline 20 \cdot 93 \end{array}$	(7) $\begin{array}{r} \cdot 1 \\ \cdot 005 \\ \hline \cdot 095 \end{array}$	(9) $\begin{array}{r} 20 \cdot 009 \\ \cdot 029 \\ \hline 19 \cdot 980 \end{array}$
-------------------------------------------------------------------------------	-------------------------------------------------------------------------	-----------------------------------------------------------------------------	-------------------------------------------------------------------------------------

(8) $\begin{array}{r} \cdot 7 \\ \cdot 037 \\ \hline \cdot 613 \end{array}$	$\begin{array}{r} 1 \cdot 2 \\ \cdot 12 \\ \cdot 012 \\ \hline 210 \cdot \\ \hline 211 \cdot 332 \end{array}$	(9) $\begin{array}{r} \cdot 332 = \frac{332}{1000}, 1 - \frac{332}{1000} = \\ \frac{668}{1000} = \frac{167}{250} \end{array}$
-----------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------

(1) $\begin{array}{r} 31 \cdot 25 \\ 3 \cdot 059 \\ \hline 28 \cdot 191 \\ 235 \cdot 6758 \\ \hline 263 \cdot 8668 \\ 184 \cdot 0003 \\ \hline 79 \cdot 8665 \end{array}$	(2) $\begin{array}{r} 215 \cdot 263 \\ 6 \cdot 9504 \\ \hline 208 \cdot 3126 \\ 125 \cdot 3807 \\ \hline 82 \cdot 9319 \end{array}$	(10) $\begin{array}{r} 7 \cdot 0004 \\ \cdot 05 \\ \hline 3 \cdot 9504 \end{array}$	$\begin{array}{r} 45 \cdot 087 \\ 80 \cdot 3007 \\ \hline 125 \cdot 3807 \end{array}$
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------

Ex. LVII. (p. 98.)

(1)	(2)	(3)	(4)
3 <sup>25</sup>	6 <sup>035</sup>	40 <sup>004</sup>	980 <sup>35</sup>
<u>35</u>	<u>27</u>	<u>203</u>	<u>0049</u>
1625	42245	120012	012315
<u>975</u>	<u>12070</u>	<u>80008</u>	<u>272140</u>
1:1375	16:2945	81:20812	3:333715

(5)

20607  
20607  
 144249  
 123643  
41214  
 434648449

(6)  
 60:70  
11  
 60:71 = 60:71  
 667:81  
 60:71  
 $\frac{60:71}{100} \times 11 = \frac{66781}{100} = 667:81;$

57:068  
2:004  
 228272  
114136

$57:068 \times 2:004 = \frac{57068}{10000} \times \frac{2004}{10000} = \frac{11436272}{100000000} = 114:36272;$

114:364272,

5:36  
700

$5:36 \times 700 = \frac{536}{100} \times \frac{700}{100} = 3752;$

3752:00,

7:01509  
50:805

$7:01509 \times 50:805 = \frac{701509}{1000000} \times \frac{50805}{10000} = \frac{35640164745}{10000000000} = 356:40164745;$

3507545  
 5612072  
3507545

356:40164745

48·067  
·00037

(7)

886469  
144201

$$48·067 \times ·00037 = \frac{48067}{1000} \times \frac{37}{10000} = \frac{1778479}{10000000} = ·01778479;$$

·01778479,

54·3047  
9·00005

2715235  
4887423

$$54·3047 \times 9·00005 = \frac{543047}{10000} \times \frac{900005}{100000} = \frac{488745015235}{1000000000} = 488·745015235;$$

488·745015235,

2·568  
·00025

12840  
5136

$$2·568 \times ·00025 = \frac{2568}{1000} \times \frac{25}{10000} = \frac{64200}{10000000} = ·000642.$$

·00064200 = ·000642

(8)

(1) 5·5  
·055

275  
275

·3025  
550

151250  
15125

$$5·5 \times ·055 \times 550 \times ·0055 = \frac{55}{10000} \times \frac{55}{1000} \times \frac{550}{1000} \times \frac{55}{10000} = \frac{9150625}{100000000} = ·9150625;$$

166·3750  
·0055

831875  
831875

·9150625,

(Continued on next page.)

(8 continued.)

(8) 1.75  
6.2

$1.75 \times 6.2 \times 85 \times .0004 = \frac{175}{100} \times \frac{62}{10} \times \frac{85}{1} \times \frac{4}{10000}$   
 $= \frac{3689}{10000} = .3689.$

350  
1050  

---

10850  
85

(9)  
87.85  
7.35

(10)  
365  
.95

5425  
8680

18925  
11355  
26495

1825  
3285

922.25  
.0004

278.1975 yds.

346.75 =  
346 1/4 loaves.

.368900 = .3689.

Ex. LVIII. (p. 100.)

(1)

2.7) 33.372 (12.36  
27

63  
54  

---

97  
81  

---

162  
162  

---

$33.372 \div 2.7 = \frac{33372}{1000} \div \frac{27}{10} = \frac{3336}{100} = 12.36.$

.27) .33372 (1.236

(2)  
 $.33372 \div .27 = \frac{33372}{100000} \times \frac{100}{27} = \frac{1236}{100} = 1.236.$

27) .33372 (.01236

(3)  
 $.33372 \div 27 = \frac{33372}{100000} \times \frac{1}{27} = \frac{1236}{100000} = .01236.$

.27) 33372.00 (123600

(4)  
 $33372 \div .27 = \frac{33372}{100} \times \frac{100}{27} = \frac{3337200}{27} = 123600.$



=  
00000.

(10 continued.)  
 $\cdot 00325) 552\ 53250 (170010, \quad 552\ 5325 + \cdot 00325 =$   
 $\frac{4188884}{100000} \times \frac{100000}{325} = 170010.$

4643) 2·419003 (·00521  
 23215

9750  
 9286  


---

 $2\ 419003 + 4643 = 2418883 \times \frac{100}{4643} =$   
 $\frac{521}{100000} = \cdot 00521;$

17371  
10

4643  
4643

·004643) 2·419003 (521       $2\ 419003 + \cdot 004643 = 2418883$   
 $\times \frac{100000}{4643} = 521.$

2·7) ·000081 (·00003  
 81  
 (12)  
 $\cdot 000081 + 2\ 7 = 1000000 \times \frac{1}{27}$   
 $= \frac{1000000}{27} = \cdot 00003;$

·0027) ·000081 (·03       $\cdot 00081 + \cdot 0027 = \frac{100000}{27} \times \frac{10000}{10000}$   
 $= \frac{1000}{27} = \cdot 03;$

10821  
100.

27000) ·000081 (·000000003,       $\cdot 000081 + 27000 = \frac{100000}{27000}$   
 $= \frac{1000000}{27000} = \cdot 000000003.$

2 x

2·00099) 218051·081884 (108971·6  
 200099  
 (13)

1795208

1600792

1944161  
1800191

$218051\ 081884 + 2\ 00099 =$   
 $\frac{218051081884}{1000000} \times \frac{1000000}{200099} =$   
 $\frac{1089716}{10} = 108971\ 6;$

10000.

1432708  
1400693

320158  
200099

200099) 218051·081884 (1·089716  
 $218051\ 081884 + 200099 =$   
 $\frac{218051081884}{1000000} \times \frac{1}{200099} =$   
 $\frac{1089716}{1000000} = 1\ 089716.$

1200594  
1200594

788 ]

110

KEY.

[ELEM. ARITH.]

(14)

$$11) \cdot 121 \cdot 011 \quad \cdot 121 \div 11 = \frac{121}{1000} \times \frac{1}{11} = \cdot 011;$$

$$\underline{121}$$

$$1100) \cdot 12100 \cdot 00011 \quad \cdot 121 \div 1100 = \frac{121}{10000} \times \frac{1}{1100} =$$

$$\frac{11}{1000000} = \cdot 00011;$$

$$\cdot 0011) \cdot 1210000 \cdot 110 \quad \cdot 121 \div \cdot 0011 = \frac{121}{10000} \times \frac{10000}{11} =$$

$$110.$$

(15)

$$\cdot 000193) 393 \cdot 7200 \cdot 0 \quad (2040000$$

$$\underline{386}$$

$$772$$

$$\underline{772}$$

$$393 \cdot 72 \div \cdot 000193 = \frac{39372}{1000} \times \frac{1000000}{193} =$$

$$2040000;$$

$$1 \cdot 93) 393 \cdot 72 \quad (204 \quad 393 \cdot 72 \div 1 \cdot 93 = \frac{39372}{100} \times \frac{100}{193} =$$

$$\underline{393 \cdot 72} \quad 204;$$

$$193000) 393 \cdot 72000 \cdot 00204 \quad 393 \cdot 72 \div 193000 = \frac{39372}{100000} \times \frac{100000}{193} =$$

$$\underline{39372000} \quad \frac{1}{193000} = \frac{204}{100000} = 00204.$$

(16)

$$\cdot 03275) 590 \cdot 48250 \quad (18030$$

$$\underline{3275}$$

$$26298$$

$$\underline{26200}$$

$$9825$$

$$\underline{9825}$$

$$590 \cdot 4825 \div \cdot 03275 = \frac{5904825}{100000} \times \frac{100000}{3275} =$$

$$18030;$$

$$327500) 590 \cdot 4825000 \cdot 0018030 \quad 590 \cdot 4825 \div 327500 =$$

$$\frac{5904825}{100000} \times \frac{1}{327500} = \frac{1803}{1000000} = \cdot 001803.$$



(17)

1·00103) 213·419596 (213·2  
200206

132185  
100103

320329  
300809

200206  
200206

$$213·419596 + 1·00103 = \frac{213419596}{1000000} + \frac{100103}{1000000} = \frac{213429606}{1000000} = 213\frac{2}{10} = 213·2;$$

100103) 213·419596 (·002132      213·419596 + 100103 =  
 $\frac{213419596}{1000000} \times \frac{1}{100103} = \frac{2132}{1000000} = \cdot002132.$

(18)  
·0024  
24

24) ·2424 (·0101  
24

24  
24

(19)  
-25) ·000200 (·0008  
200

(20)  
1·75) 21·875 (12·5 days,  
175      or 12½ days.

437  
350  
875  
875

(21)  
-75) 64·125 (85·5 times,  
600      or 85½ times.

412  
375  
375  
375

(22)  
·023) ·00070242 (·93054  
69

124  
115  
92  
92

$\frac{372}{00} \times$   
0204.

$\frac{000}{78}$

00 =  
1803.

## Ex. LIX. (p. 101.)

(1)

$$3)1.9000(6.333 \quad 1.9 \div .3 = \frac{19}{10} \times \frac{10}{3} = \frac{19}{3} \times \frac{10}{10} = \frac{1900}{300} \times \frac{10}{10} = \frac{19000}{3000} = 6.333;$$

$$\begin{array}{r} 10 \\ \underline{9} \\ 10 \end{array}$$

$$.03)1.90000(63.333 \quad 1.9 \div .03 = \frac{19}{10} \times \frac{100}{3} = \frac{19}{3} \times \frac{100}{10} = \frac{190000}{3000} \times \frac{1}{1000} = \frac{190000}{3000000} = 63.333;$$

$$300)1.900(.00633 \quad 1.9 \div 300 = \frac{19}{10} \times \frac{1}{300} = \frac{19}{3000} \times \frac{1}{10} = \frac{19000}{3000000} \times \frac{1}{1000} = \frac{19000}{3000000000} = .00633, \text{ or } .006.$$

(2)

$$159)4.937(.031 \quad 4.936 \div 159 = \frac{4937}{1000} \times \frac{1}{159} = \frac{4937}{159000} \times \frac{1}{1000} = \frac{4937}{159000000} = .031;$$

$$\begin{array}{r} 167 \\ \underline{159} \end{array}$$

$$1.59)4.93700(3.105 \quad 4.937 \div 1.59 = \frac{4937}{1000} \times \frac{100}{159} = \frac{4937}{15900} \times \frac{100}{1000} = \frac{493700}{15900000} = 3.105;$$

$$\begin{array}{r} 167 \\ \underline{159} \end{array}$$

$$\begin{array}{r} 800 \\ \underline{795} \end{array}$$

$$1590)4.937(.003 \quad 4.937 \div 1590 = \frac{4937}{1000} \times \frac{1}{1590} = \frac{4937}{1590000} \times \frac{1}{1000} = \frac{4937}{1590000000} = .003.$$

(3).

$$53) 329744 \cdot 000 (6221 \cdot 584$$

$$3 \cdot 29744 + 53 = 329744 \cdot 000 \times \frac{1}{53000} = \frac{6221584}{1000} = 6221 \cdot 584;$$

$$\begin{array}{r} 117 \\ 106 \\ \hline 114 \\ 106 \\ \hline 84 \\ 53 \\ \hline 310 \end{array}$$

$$\begin{array}{r} 310 \\ 265 \\ \hline 450 \\ 424 \\ \hline 260 \\ 212 \end{array}$$

$$\begin{aligned} & \cdot 0053) 329744 \cdot 0000000 (62215849 \cdot 056, \\ 329744 \div \cdot 0053 &= 3297440000000 \times \frac{1}{53000} = \frac{62215849056}{1000} \\ &= 62215849 \cdot 056; \\ 5300) 329744 (62 \cdot 215, & \quad 329744 \div 5300 = 3297440 \times \frac{1}{53000} \\ &= \frac{62215}{1000} = 62 \cdot 215. \end{aligned}$$

Ex. LX. (p. 102.)

(1)

$$\begin{aligned} 4 \overline{) 1 \cdot 00} &; 5 \overline{) 3 \cdot 0} &; 4 \overline{) 6 \cdot 0} &; 5 \overline{) 1 \cdot 0} & \therefore \text{Ans.} = 6 \cdot 2; & 5 \overline{) 39 \cdot 0} \\ & \cdot 25 & \cdot 6 & 1 \cdot 5 & \cdot 2 & 7 \cdot 8 \\ 8 \overline{) 5 \cdot 000} &; 10 \overline{) 3 \cdot 0} & \therefore \text{Ans.} = 5 \cdot 3. \\ & \cdot 625 & \cdot 3 \end{aligned}$$

(2)

$$\begin{aligned} 16 \left\{ \begin{array}{l} 4 \overline{) 3 \cdot 00} \\ 4 \overline{) 7500} \\ \cdot 1875 \end{array} \right. & \quad 16 \left\{ \begin{array}{l} 4 \overline{) 15 \cdot 00} \\ 4 \overline{) 37500} \\ \cdot 9375 \end{array} \right. & \therefore \text{Ans.} = 8 \cdot 9375; \\ 20 \left\{ \begin{array}{l} 5 \overline{) 19 \cdot 0} \\ 4 \overline{) 3 \cdot 80} \\ \cdot 95 \end{array} \right. & \quad 32 \left\{ \begin{array}{l} 4 \overline{) 31 \cdot 00} \\ 8 \overline{) 775000} \\ \cdot 96875 \end{array} \right. & \quad 40 \left\{ \begin{array}{l} 8 \overline{) 37 \cdot 000} \\ 5 \overline{) 4625} \\ \cdot 925 \end{array} \right. \end{aligned}$$

$\therefore \text{Ans.} = 7.925.$

(3)

$$50 \left\{ \begin{array}{l} 5 \mid 47\cdot0 \\ 10 \mid \underline{9\cdot40} \\ \hline \cdot94 \end{array} \right.$$

$$125 \left\{ \begin{array}{l} 5 \mid 7\cdot0 \\ 5 \mid \underline{1\cdot40} \\ 5 \mid \underline{\cdot280} \\ \hline \cdot056 \end{array} \right.$$

 $\therefore \text{Ans.} = 4\cdot056;$ 

$$500 \left\{ \begin{array}{l} 10 \mid 3\cdot0 \\ 10 \mid \underline{\cdot30} \\ 5 \mid \underline{\cdot030} \\ \hline \cdot006; \end{array} \right.$$

$$625 \left\{ \begin{array}{l} 5 \mid 99\cdot00 \\ 5 \mid \underline{19\cdot80} \\ 5 \mid \underline{3\cdot960} \\ 5 \mid \underline{\cdot7920} \\ \hline \cdot1584; \end{array} \right.$$

$$1024 \left\{ \begin{array}{l} 8 \mid 3\cdot000 \\ 8 \mid \underline{\cdot375000} \\ 8 \mid \underline{1\cdot046875000} \\ 2 \mid \underline{\cdot0058593750} \\ \hline \cdot0029296875 \end{array} \right.$$

 $\therefore \text{Ans.} = 84\cdot0029296875.$ 

(4)

$\frac{5}{8} \text{ of } 1\frac{1}{8} = 1\frac{5}{28},$

$$128 \left\{ \begin{array}{l} 4 \mid 65\cdot00 \\ 4 \mid \underline{16\cdot2500} \\ 8 \mid \underline{4\cdot0625000} \\ \hline \cdot5078125; \end{array} \right.$$

$3\frac{1}{8} \text{ of } 2\frac{1}{8} = 8\frac{3}{8},$

$$4 \overline{) 3\cdot00} \quad \therefore \text{Ans.} = 8\cdot75;$$

$3\frac{1}{2} \text{ of } 4\frac{1}{2} \text{ of } 5\frac{1}{8} = 76\frac{5}{4},$

$$64 \left\{ \begin{array}{l} 8 \mid 15\cdot000 \\ 8 \mid \underline{1\cdot875000} \\ \hline \cdot234375 \end{array} \right. \quad \therefore \text{Ans.} = 76\cdot234375.$$

(5)

$1\frac{1}{2} - 1\frac{3}{8} + 3\frac{5}{16},$

$$5 \overline{) 3\cdot0} \quad \therefore 1\frac{1}{8} = 1\cdot6;$$

$1\cdot6 - \cdot8125 = \cdot7875$

$\cdot7875 + 3\cdot125 = 3\cdot9125,$

$$16 \left\{ \begin{array}{l} 4 \mid 13\cdot0 \\ 4 \mid \underline{3\cdot25} \\ \hline \cdot8125 \end{array} \right. \quad \therefore 1\frac{1}{8} = \cdot8125;$$

(Continued on next page.)

(5 continued.)

$$40 \left\{ \begin{array}{l|l} 5 & 5 \\ 8 & \frac{1.000}{.125} \end{array} \right. \therefore 3\frac{4}{5} = 3.125;$$

$$11\frac{1}{2} + .75 \text{ of } \frac{2}{3} \text{ of } 6\frac{1}{2} = 11.5 + .75 \text{ of } \frac{13}{2} = 11.5 + .75 \times 6\frac{1}{2} = 11.5 + .75 \times 6.48 = 11.5 + 4.86 = 16.36.$$

Ex. LXI. (p. 104.)

$$\begin{array}{l} (1) \\ 3 \overline{)20} \quad 9 \overline{)10} \quad 7 \overline{)60} \quad 12 \overline{)70} \quad 15 \left\{ \begin{array}{l|l} 5 & 11.0 \\ 3 & 2.2 \\ & .73. \end{array} \right. \end{array}$$

$$\begin{array}{l} \cdot 6 \\ \cdot 1 \\ \cdot 857142 \\ \cdot 583 \end{array}$$

$$(2)$$

$$81 \left\{ \begin{array}{l|l} 9 & 3 \\ 9 & \frac{33333}{.037} \end{array} \right. \therefore \text{Ans.} = 6.037; \quad 37 \overline{)50} \begin{array}{l} .135 \\ 37 \end{array}$$

$$44 \left\{ \begin{array}{l|l} 4 & 7.00 \\ 11 & \frac{1.75}{.1590} \end{array} \right. \therefore \text{Ans.} = 100.1590; \quad \begin{array}{r} 130 \\ 111 \\ 190 \\ 185 \\ \hline 50 \end{array} \therefore \text{Ans.} = 7.135;$$

$$17) 15.0 \text{ (} \overline{8823529411764705} \text{)}$$

$\therefore \text{Ans.} =$

$$\overline{28823529411764705}.$$

140	50	30	
136	34	17	120
40	160	130	119
34	153	119	100
60	70	110	85
51	68	102	150
90	20	80	136
85	17	63	

$$495 \left\{ \begin{array}{l|l} 5 & 67.0 \\ 9 & 13.4 \\ 11 & 1.48\bar{3} \\ \hline & .13\bar{5} \end{array} \right.$$

$$\therefore \text{Ans.} = 11.13\bar{5};$$

(3)

$$1375 \left\{ \begin{array}{l|l} 5 & 17.0 \\ 5 & 3.40 \\ 5 & .680 \\ 11 & .136 \\ \hline & .0123\bar{6} \end{array} \right.$$

$$\therefore \text{Ans.} = 23.0123\bar{6}.$$

(4)

$$\begin{aligned} \cdot 2 &= \frac{2}{10}; \cdot 0\bar{5} = \frac{5}{100}; \cdot 1\bar{8} = \frac{18}{100} = \frac{9}{50}; \cdot 1\bar{5}\bar{6} = \frac{156}{1000} = \frac{39}{250} = \\ &= \frac{31}{100}; \cdot 02702\bar{7} = \frac{27027}{100000} = \frac{27}{3700}; \\ \cdot 28571\bar{4} &= \frac{285714}{100000} = \frac{7}{25}. \end{aligned}$$

(5)

$$\begin{aligned} \cdot 5\bar{6}\bar{6} &= \frac{566}{1000} = \frac{283}{500} = \frac{17}{100}; \cdot 7\bar{4}\bar{3} = \frac{743}{1000} = \frac{743}{1000} = \frac{38}{100}; \\ \cdot 2023\bar{5} &= \frac{20235}{10000} = \frac{4047}{2000}; 19\cdot 30\bar{5} = 19\frac{305}{100} = 19\frac{61}{20} \\ &= 19\frac{11}{4}; 20\cdot 0291\bar{6} = 20\frac{2916}{10000} = 20\frac{729}{2500} = 20\frac{7}{40}. \end{aligned}$$

(6)

$$\begin{aligned} 6\cdot 181531\bar{5}\bar{3} &= 6\cdot 181\bar{5}\bar{3} = 6\frac{1815315}{1000000} = 6\frac{363063}{200000} = 6\frac{403}{200}; \\ 15\cdot 69230769230\bar{7} &= 15\cdot 69230\bar{7} = 15\frac{692307}{10000} = 15\frac{9}{13}. \end{aligned}$$

(7)

$$\begin{array}{r} 4\cdot 3333333 \\ 16\cdot 4545454 \\ 75\cdot 7352352 \\ \hline \end{array}$$

$$\begin{array}{r} 96\cdot 5231139 \\ \hline \therefore \text{Ans.} = 96\cdot 523114. \end{array}$$

(8)

$$\begin{array}{r} 3\cdot 2333333 \\ 26\cdot 7967967 \\ 7\cdot 4134134 \\ \hline \end{array}$$

$$\begin{array}{r} 37\cdot 4435434 \\ \hline \therefore \text{Ans.} = 37\cdot 443543. \end{array}$$

(9)

$$\begin{array}{r} 3\cdot 8564646 \\ 2\cdot 0387777 \\ \hline \end{array}$$

$$\begin{array}{r} 1\cdot 8176869 \\ \hline \therefore \text{Ans.} = 1\cdot 817686. \end{array}$$

(10)

$$\begin{array}{r} 52\cdot 8666666 \\ 8\cdot 3723572 \\ \hline \end{array}$$

$$\begin{array}{r} 44\cdot 4943094 \\ \hline \therefore \text{Ans.} = 44\cdot 494309. \end{array}$$

(11)

$$\begin{aligned} 7\cdot 6 + 5\cdot 3 &= 7\frac{3}{5} \times 5\frac{1}{2} = 40\frac{3}{2} = 40\cdot 8; 351 \times 73\bar{6} = \frac{351}{10} \times \frac{736}{10} \\ &= \frac{1}{10} \times \frac{2587223}{10} = 258722\bar{3}; 13 \times 2 \times 4 = \frac{1}{10} \times \frac{1}{5} \\ &\times \frac{1}{5} = \frac{2}{10} \times \frac{1}{5} + \frac{1}{5} = \frac{3}{25} = 0118\bar{5}. \end{aligned}$$

ITH.

(12)

$$6\dot{7} \div 2\dot{6} = 6\frac{7}{2} \div 2\frac{6}{2} = \frac{13}{1} \times \frac{1}{2} = \frac{13}{2} = 2\frac{1}{2} = 2.5416; \cdot 2627$$

$$\div 1.926 = \frac{2627-26}{9900} + \frac{1226-22}{9900} = \frac{2801}{9900} + \frac{1204}{9900} = \frac{4005}{9900} \div$$

$$\frac{800}{1734} = \frac{2601}{19074} = .136; \cdot 371 \div 5 = \frac{371-2}{990} \div 5 = \frac{369}{990} \div 5$$

$$= \frac{184}{2475} = .0743; 42.0463 \div 136 = 42\frac{163}{10000} + \frac{136}{10000} =$$

$$42\frac{163}{10000} \times \frac{11}{12} = \frac{4625032}{1200000} = 30.833953.$$

Ex. LXII. (p. 105.)

(1)	(2)	(3)
.75	.875	.625
<u>100</u>	<u>5</u>	<u>100</u>
75.00 cts.	\$4.375	62.500 cts.
Ans. 75 cts.	<u>100</u>	Ans. 62½ cts.
	37.500 cts.	Ans. \$4.37½ cts.

(4)	(5)	(6)
.625 cwt.	.375	.175
<u>4</u>	<u>8</u>	<u>20</u>
2.500 qrs.	3.000 fur.	3.500 cwt.
25	Ans. 3 fur.	<u>4</u>
<u>2500</u>		2.000 qrs.
1000		Ans. 3 cwt. 2 qrs.
<u>12.500 lbs.</u>		
16		
<u>3000</u>		
500		
<u>8.000 oz.</u>	Ans. 2 qrs. 12 lbs. 8 oz.	

$$\begin{array}{r} (7) \\ \cdot 46875 \\ \underline{\phantom{0}50} \end{array}$$

$$\begin{array}{r} 23\cdot 43750s. \\ \underline{\phantom{0}12} \end{array}$$

$$\begin{array}{r} 5\cdot 25000d. \\ \underline{\phantom{0}4} \end{array}$$

$$1\cdot 00000q. \quad \text{Ans. } 23s. 5\frac{1}{2}d.$$

$$\begin{array}{r} (10) \\ 4\cdot 65 \times 4 \text{ a. } 2 \text{ ro.} \\ \underline{4\cdot 65} \\ 18 \end{array}$$

$$\begin{array}{r} 3720 \\ \underline{465} \end{array}$$

$$\begin{array}{r} 83\cdot 70 \text{ ro.} \\ \underline{\phantom{0}40} \end{array}$$

$$28\cdot 00 \text{ per.} \\ \text{Ans. } 83 \text{ ro. } 28 \text{ per., or } 20 \text{ a. } 3 \text{ ro. } 28 \text{ per.}$$

$$\begin{array}{r} (12) \\ 2\cdot 56 \\ \underline{525} \end{array}$$

$$\begin{array}{r} 1280 \\ 512 \\ \underline{1280} \end{array}$$

$$1344\cdot 00 \text{ qrs.} \\ \text{Ans. } 1344 \text{ qrs., or } \text{£}1 \text{ } 8s.$$

$$\begin{array}{r} (8) \\ \cdot 0625 \\ \underline{\phantom{0}90} \end{array}$$

$$\begin{array}{r} 5\cdot 6250d. \\ \underline{\phantom{0}4} \end{array}$$

$$2\cdot 5000q.$$

$$\text{Ans. } 5\frac{1}{2}d. 5q. \quad \text{Ans. } 2 \text{ lbs. } 2 \text{ oz. } 2 \text{ dwt.}$$

$$\begin{array}{r} (9) \\ \cdot 175 \\ \underline{\phantom{0}12} \end{array}$$

$$\begin{array}{r} 2\cdot 100 \text{ oz.} \\ \underline{\phantom{0}20} \end{array}$$

$$2\cdot 000 \text{ dwt.}$$

$$\begin{array}{r} (11) \\ 10\cdot 04 \\ \underline{100} \end{array}$$

$$1004\cdot 00 \text{ per.} \\ \text{Ans. } 1004 \text{ per., or } 6 \text{ a. } 1 \text{ ro. } 4 \text{ per.}$$

$$\begin{array}{r} (13) \\ 5\cdot 00875 \\ \underline{\phantom{0}25} \end{array}$$

$$\begin{array}{r} 2504375 \\ \underline{1001750} \end{array}$$

$$125\cdot 21875 \text{ dys.} \\ \underline{\phantom{0}24}$$

$$\begin{array}{r} 87500 \\ \underline{43750} \end{array}$$

$$5\cdot 25000 \text{ hrs.} \\ \underline{\phantom{0}60}$$

$$\text{Ans. } 125 \text{ dys. } 5 \text{ hrs. } 15 \text{ min.,} \\ \text{or } 17 \text{ wks. } 6 \text{ dys. } 5 \text{ hrs. } 15 \text{ min.} \quad 15\cdot 00000 \text{ min.}$$



z-

wt.  
dwt.

per.

(14)  
 504  
 24

2016  
 1008

12·096 hrs.  
 60

5·760 min.  
 60

45·600 sec.

Ans. 12 dys. 12 hrs. 5 min. 45·6 sec.

(16)  
 £4 1s. = 81s.  
 3·0085  
 81

30085  
 240680

243·6885s.  
 12

8·2620d.  
 4

1·0480q.

Ans. 243s. 8d. 1·048q. or  
 £12 3s. 8½d. 048q.

(15)  
 5 lbs. 2 sc. = 1442 sc.  
 3·05

7210  
 4326

4398·10  
 20

2·00 grs.

Ans. 4398 sc. 2 grs., or 15 lbs.  
 3 oz. 2 drs. 2 grs.

(17)  
 1 ac. 3 ro. 5 po. = 285 po.  
 7·034  
 585

35170  
 56272  
 14068

2004·690 per.  
 30½

20700  
 1725

20·8725 yds.  
 9

7·8525 ft.  
 144

34100  
 34100  
 8525

Ans. 2004 po. 20 yds. 7 ft. 122·76 in.  
 or 12 a. 2 ro. 4 po. 20 yds.  
 7 ft. 122·76 in.

122·7600 in.

(18)

16 lbs. 1 oz. 6 grs. = 92646 grs.

92646

5·005

---

463230

463230

---

463693·230 grs.,

or 80 lbs. 6 oz. 13·23 grs.

(19)  $\frac{3}{4}$  of \$2 =  $\frac{3}{4}$  or  $\frac{1}{4}$  of \$2 = 66 $\frac{3}{4}$  cts.(20)  $\frac{5}{4}$  of 16s. 6d. =  $\frac{5}{4}$  of 198d. = 108d. = 9s.(21)  $\frac{2}{3}$  of a ton =  $\frac{2 \times 20 \times 160}{3}$  of 20 cwt. =  $\frac{2}{3}$  of 20 cwt.  
=  $\frac{7}{3}$  of 20 cwt. = 4 cwt. 3 qrs. 11 lbs. 10 oz. 10 $\frac{1}{2}$  drs.(22) 6·8 $\frac{3}{4}$  of £5 = 6 $\frac{2}{3}$  of £5 = 6 $\frac{2}{3}$  of £5 = 6 $\frac{2}{3}$  of £5  
= £34 $\frac{1}{2}$  = £34 3s. 4d.(23) 2·38 $\frac{3}{4}$  of 2 $\frac{1}{2}$  lbs. =  $\frac{2 \times 2 \times 160}{3}$  of 2 $\frac{1}{2}$  lbs. =  $\frac{2}{3}$  of 2 $\frac{1}{2}$   
lbs. = 2 $\frac{2}{3}$  of 2 lbs. 6 oz. = 2 $\frac{2}{3}$  of 30 oz. = 71 $\frac{1}{2}$  oz. = 5 lbs.  
11 oz. 10 dwt.(24) 6·2 of a c. yd. = 6 $\frac{2}{3}$  of 27 c. ft. = 168 c. ft. = 6 c.  
yds. 6 c. ft.(25) 18·7 $\frac{2}{3}$  of an ac. = 18 $\frac{2}{3}$  ac. = 18 $\frac{2}{3}$  ac. = 18 ac. 2 ro.  
36 po. 11 yds.(26) 2·06 $\frac{3}{4}$  of 1000 guineas =  $\frac{2 \times 1000}{3}$  of 1000 gs. = 2 $\frac{2}{3}$   
of 1000 gs. = 2 $\frac{2}{3}$  of 1000 gs. = 2006 $\frac{1}{3}$  gs. = 2006 gs. 7s.  
= £2166 10s.

(27) £634375

·025

3·16 of 30s. = 3 $\frac{1}{5}$ of 30s. = 3 $\frac{1}{5}$  of 30s.

= 95s. = £4 15s.

---

20

25

---

12·687500s.

125

---

12

50

---

8.250000d.

625s.

---

4

12

---

1·000000q.

7·500d.

---

4

---

2·000 $\therefore$  value req<sup>d</sup> = 12s. 8 $\frac{1}{2}$ d. + 7 $\frac{1}{2}$ d + £4·15 = £5 8s. 3 $\frac{1}{2}$ d.

(28)  $\frac{1}{6}$  of an ac. =  $\frac{1}{3}$  ac. =  $\frac{1}{2}$  ac. = 2 ro. 26 po. 20 yds.  
 1 ft. 72 in.;  $\frac{1}{625}$  of a ro. =  $\frac{1}{625}$  of 40 po. =  $\frac{1}{25}$  po.  $\frac{1}{1}$  po.  
 =  $\frac{1}{1}$  of  $30\frac{1}{4}$  yds. = 11 yds.

2 ro. 26 po. 20 yds. 1 ft. 72 in. + 25 po. 11 yds. = 3 ro.  
 11 po. 9 yds. 1 ft. 72 in.

(29)  $6\frac{714285}{1000000}$  of 1s. 9d. =  $6\frac{142857}{200000}$  of 21d. =  $6\frac{1}{2}$  of 21d.  
 = 141d. = 11s. 9d.;  $0\frac{833}{1000}$  of £7 4s. =  $\frac{233}{1000}$  of 144s. =  
 $\frac{750}{1000}$  of 144s. =  $\frac{3}{4}$  of 144s. = 12s.;  $251190476$  of 6s. 8d.  
 =  $\frac{251190476}{1000000}$  of 80d. =  $\frac{251190476}{1000000}$  of 80d. =  $25\frac{1190476}{100000}$   
 80d. = 1s.  $8\frac{1}{2}$ d.

$\therefore$  value req<sup>d</sup> = 11s. 9d. - 12s. + 1s.  $8\frac{1}{2}$ d. = 1s.  $5\frac{1}{2}$ d.

Ex. LXIII. (p. 106.)

(1) 1 qr. 5 lbs. = 30 lbs.  
 1 cwt. = 4 x 25 = 100 lbs.  
 $\therefore$  fr. req<sup>d</sup> is  $\frac{30}{100}$  or  $\frac{3}{10}$  =  $\frac{3}{10}$ .

or thus:  

$$\begin{array}{r} 25 \overline{) 5} \\ 4 \overline{) 12} \\ \underline{\phantom{4} 3} \end{array}$$

(2) \$2.50 = 250 cts.  
 \$10 = 1000 cts.  
 $\therefore$  fr. req<sup>d</sup> =  $\frac{250}{1000}$  =  
 $\frac{1}{4}$  =  $\frac{1}{4}$ .

(3) 
$$\begin{array}{r} 60 \overline{) 30} \\ 24 \overline{) 35} \\ \underline{\phantom{24} 11} \\ 14583 \end{array}$$

(4) 
$$\begin{array}{r} 40 \overline{) 11} \\ 4 \overline{) 3275} \\ \underline{\phantom{4} 8175} \end{array}$$

(5) 
$$\begin{array}{r} 4 \overline{) 2} \\ 12 \overline{) 65} \\ \underline{\phantom{12} 5416} \end{array}$$

(6) 2 fur. = (2 x 40 x 5 $\frac{1}{2}$  x 3 x 12) in. = 15840 in.

$\therefore$  fr. req<sup>d</sup> is  $\frac{15840}{31780}$  =  $\frac{1584}{3178}$  =  $\frac{792}{1589}$ .

(7) 2 oz. 13 dwt. = 53 dwt.; 1 lb. = 240 dwt.

$\therefore$  fr. req<sup>d</sup> =  $\frac{53}{240}$  =  $\frac{53}{240}$ .

(8) 4 lbs. 2 sc. = 1154 sc.; 1 oz. = 24 sc.

$\therefore$  fr. req<sup>d</sup> =  $\frac{1154}{24}$  =  $48\frac{11}{6}$ .

(9) 
$$\begin{array}{r} 12 \overline{) 73} \\ 12 \overline{) 608333} \\ 9 \overline{) 2506944} \\ \underline{\phantom{9} 2785493827160} \end{array}$$

(10) 1 lb. Troy = 5760 grs.  
 1 lb. Avoir. = 7000 grs.  
 $\frac{5760}{7000}$  =  $\frac{288}{350}$  =  $\frac{144}{175}$  =  $\frac{144}{175}$ .

$$\begin{array}{r} (11) \\ 12 \overline{) 9} \\ 20 \overline{) 10.75} \\ \hline 5875 \end{array}$$

$$\begin{array}{r} (12) \\ 12 \overline{) 7} \\ 20 \overline{) 17.5833} \\ \hline 87916 \end{array}$$

(13) 2 wks  $6\frac{1}{4}$  dys. = 486 hrs.; 4 dys. 3 hrs. = 99 hrs.

$\therefore$  fr. req<sup>d</sup> =  $4\frac{86}{9} = 4.90$ .

(14) 2 lbs. 14 oz. = 46 oz.; 18 lbs. = 288 oz.

$\therefore$  fr. req<sup>d</sup> =  $2\frac{46}{88} = 2\frac{23}{44} = 1.592$ .

Ex. LXIV. (p. 107.)

PAPER I.

(3)

(<sup>1</sup>) 1018269  
20979  
100001050  
54000003000  
400000006  
999990

(<sup>2</sup>) 400001  
300725  

---

99276

54502043294

(<sup>4</sup>)  
268936785  
5689

2420431065  
2151494280  
1613620710  
1344683925

268936785) 1529981369865 (5689  
1344683925

1852974448  
1613620710

2393537386  
2151494280

2420431065  
2420431065

Multiplication may be proved by division and *visa versa*.

6974)27027027027 (3875398<sup>(5)</sup>377  
20922

61050  
55792

52582  
48818

37647  
34870

27770  
20922

68482  
62766

57167  
55792  
1375

3875398  
6974

15501592  
27127786  
34878582  
23252388

27027025652  
1375

27027027027

(6)

mi. fur. per.  
12 2 6  
8

98  
40

3926  
5½

19630  
1963

21598  
3

64779  
12

777348

12 | 777348 in.

3 | 64779 ft.

21593 yds.

5½ | 2

11 | 43186

40 | 3926 per.

8 | 986 per.

122 fur.

12 mi. 2 fur. 6 per.

## PAPER II.

(1)

2	27	36	42	48
2	27	18	21	24
3	27	9	21	12
	9	3	7	4

$$\text{L. C. M.} = 2 \times 2 \times 3 \times 9 \times 7 \\ \times 4 = 3024.$$

3	2	3 <sup>(3)</sup>	5	6	9
	5				2
					3

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

(4)

2	8	14
	4	7

$$\text{L. C. M.} = 2 \times 4 \times 7 = 56; \quad 1000 \div 56 = 17\frac{8}{7}.$$

∴ Ans. 17 times.

(5)

$$(^1) 126\frac{1}{2} + 40\frac{1}{2} + 10\frac{1}{2} + 11\frac{1}{2} + 50\frac{1}{2} = 239\frac{1}{2} \text{ miles.}$$

(^2) 4380000  
 8550000  
 1500000  
 550000  
 7000000  
 560000

\$22540000

957) 87920000 (91870.42  
 8613

1790  
 957

$$(^3) \$22540000 - \$560000 = \\ \$21980000; \quad \$21980000 \div \\ 239\frac{1}{2} = 87920000 \div 957 = \\ \$91870.42 \text{ and } \$8.06 \text{ over. } \dagger$$

8330  
 7656

6740  
 6699

4100  
 3328

2720  
 1914

2720

803

PAPER III.

$$(1) \quad 2\frac{1}{2} \left( \frac{1}{6} + \frac{2}{3} \right) + \frac{1}{3} \left( \frac{2}{3} - \frac{1}{3} \right) = (2\frac{1}{2} \times \frac{5}{6}) + (\frac{1}{3} \times \frac{1}{3}) = \frac{15}{6} + \frac{1}{9} = \frac{14}{9} = 1\frac{5}{9} = 1\frac{11}{9} = 1\frac{14}{9} = 1\frac{1323 + 352}{1512} = 1\frac{1675}{1512} = 2\frac{163}{1512}$$

$$(2) \quad 2\frac{1}{2} \left\{ \left( \frac{1}{6} + \frac{2}{3} \right) + \frac{1}{3} \left( \frac{2}{3} - \frac{1}{3} \right) \right\} = 2\frac{1}{2} \left\{ \frac{5}{6} + \left( \frac{1}{3} \times \frac{1}{3} \right) \right\} = 2\frac{1}{2} \left( \frac{5}{6} + \frac{1}{9} \right) = 2\frac{1}{2} \times \frac{17}{18} = \frac{17}{9} \times \frac{5}{2} = \frac{85}{9} = 9\frac{4}{9}$$

(2)  $\frac{2}{3}$  of  $\frac{1}{2} = \$15000$ , or  $\frac{2}{3} = \$15000$ ;  $\therefore \frac{1}{3} = \$5000$ , and the whole steamer is worth  $\$5000 \times 8 = \$40000$ . If he sells  $\frac{2}{3}$  he has remaining  $\frac{1}{3} - \frac{2}{3} = \frac{1}{3}$ ;  $\frac{1}{3}$  of  $\$40000 = \$5000$ .

$$(1) \quad \frac{7}{12} (8\frac{1}{2} - 2\frac{1}{2}) - \frac{1}{2} \left( \frac{2}{3} - \frac{1}{3} \right) = \frac{7}{12} \times 6 - \frac{1}{2} \times \frac{1}{3} = \frac{7 \cdot 6}{12} - \frac{1}{6} = \frac{42}{12} - \frac{2}{12} = \frac{40}{12} = 3\frac{10}{12} = 3\frac{5}{6}$$

$$(2) \quad \frac{7}{12} \left\{ (8\frac{1}{2} - 2\frac{1}{2}) - \frac{1}{2} \left( \frac{2}{3} - \frac{1}{3} \right) \right\} = \frac{7}{12} \left\{ 6 - \frac{1}{6} \right\} = \frac{7}{12} \times \frac{35}{6} = \frac{245}{12} = 20\frac{5}{12}$$

(4)  $55 \times £5 = £275$ , or  $£2$  15s.;  $5 \cdot 5 \times £5 = £27 \cdot 5$ , or  $£27$  10s., and  $£27$  10s. -  $£2$  15s. =  $£24$  15s.

(5)  $1 \cdot 25$  yds. =  $\frac{5}{8}$  of  $75$  yds.  $\therefore$  No. yds. req<sup>d</sup> =  $\frac{5}{8}$  of  $87 = 145$  yds.; and  $145$  yds. -  $87$  yds. =  $58$  yds.

(6)  $5 = \frac{1}{2}$  = part given to  $A$ ;  $1 - \frac{1}{2} = \frac{1}{2}$  = part remaining;  $\frac{3}{8}$  of  $\frac{1}{2} = \frac{3}{16}$  of  $\frac{1}{2} = \frac{1}{8}$  of  $\frac{1}{2} = \frac{1}{16}$  = part given to  $C$ ;  $\frac{1}{2} + \frac{1}{16} = \frac{8}{16} + \frac{1}{16} = \frac{9}{16}$  = whole part give away;  $1 - \frac{9}{16} = \frac{7}{16}$  = part remaining to  $A$ .

PAPER IV.

(1)  $\frac{1}{3}$  = part sold to  $A$ ;  $\frac{2}{3}$  = part remaining;  $\frac{1}{2}$  of  $\frac{2}{3} = \frac{1}{3}$  = part sold to  $B$ ;  $1 - (\frac{1}{3} + \frac{1}{3}) = \frac{1}{3}$  = part sold to  $C$ , which by the question =  $32$ . If  $\frac{1}{3} = 32$  then  $\frac{1}{6} = 32 \div 2 = 16$ , and  $\frac{1}{6} = 16$  or the whole =  $4 \times 16 = 64$ .

$$(2) \quad 13\frac{1}{2} + 56\frac{1}{2} + 14\frac{1}{2} = 13 + 56 + 14 + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 83 + \frac{3}{2} = 84\frac{1}{2} = 84 \cdot 875$$

$$13\frac{1}{2} = 13 \cdot 5; 56\frac{1}{2} = 56 \cdot 75; 14\frac{1}{2} = 14 \cdot 625$$

∴ Sum is	(3)	
13·5	2·7) 033372 (-01236	97
56·75	27	81
14·625		
<hr/>		
84·875	63	162
	54	162
	<hr/>	

$\frac{9}{3}$   
90.

20  
14  

---

03

$  \begin{array}{r}  27 \times 4 = \$108.00 \\  6 \times 20 = 1.20 \\  9\frac{1}{2} \times 4 \times 5 + 12 = .15\frac{5}{8} \\  \hline  \$109.35\frac{5}{8} \\  \\  3 \times 4 = \$12.00 \\  12 \times 20 = 2.40 \\  7 \times 4 \times 5 + 12 = .11\frac{3}{4} \\  \hline  \$14.51\frac{3}{4}  \end{array}  $	$  \begin{array}{r}  (4) \\  19 \times 4 = \$76.00 \\  5 \times 20 = 1.00 \\  8 \times 4 \times 5 + 12 = .13\frac{3}{4} \\  \hline  \$77.13\frac{3}{4} \\  \\  \$109.35\frac{5}{8} \\  \$ 17.22 \\  \$ 77.13\frac{3}{4} \\  \$198.05 \\  \$ 14.51\frac{3}{4} \\  \hline  \$416.27\frac{5}{8}  \end{array}  $
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

(5)  $\cdot 875 = \frac{875}{1000} = \frac{7}{8}$ ;  $21 = \frac{7}{8}$  of the larger side, or  $\frac{1}{8}$  = 3 and  $\frac{7}{8}$  or the whole = 24;  $21 + 24 = 45$  = whole number of players, which is equal to  $\cdot 625$  or  $\frac{625}{1000}$ , or  $\frac{5}{8}$  of the onlookers; if  $\frac{5}{8} = 45$ ,  $\frac{1}{8} = 45 \div 5 = 9$ , and  $\frac{7}{8}$  or the whole =  $9 \times 8 = 72$ .

(6)  $\cdot 014$  of  $1\frac{1}{2}$  of  $\frac{1\frac{1}{2}}{5\frac{1}{2}}$  of  $\frac{1}{4}$  of  $4\frac{1}{2}$  of  $\frac{\frac{3}{2} + \frac{1}{2}}{\frac{3}{2} - \frac{1}{2}}$  of  $71\frac{1}{2} = \frac{144}{100}$   
of  $\frac{1}{7}$  of  $\frac{\frac{6}{8}}{\frac{27}{8}}$  of  $\frac{1}{4}$  of  $4\frac{1}{2}$  of  $\frac{7}{6}$  of  $\frac{500}{1} = \frac{500}{600}$  of  $\frac{1}{7}$  of  $\frac{2}{3}$  of  $\frac{7}{4}$  of  $\frac{2}{7}$  of  $\frac{500}{1} = 7$ .  
 $\therefore$  one side scores 7 times as many runs as the other.

## PAPER V.

(1) Let 1 represent what  $B$  owes to  $A$ ; then  $\cdot 6$ , or  $\frac{6}{10}$  or  $\frac{3}{5}$  = what  $C$  owes to  $B$ ;  $1 - \frac{3}{5} = \frac{2}{5}$  = how much  $B$ 's debt to  $A$  exceeds that of  $C$ 's to  $B$ . If  $\frac{2}{5} = 5s$ . then  $\frac{1}{5} = 2s$ . 6d., and  $\frac{3}{5}$ , or the whole =  $2s$ . 6d.  $\times 5 = 12s$ . 6d.

(2)  $\frac{1}{2} + 50s$ . = what was first taken out;  $\therefore \frac{1}{2} - 50s$ . = what then remained.  $\cdot 2$  of  $\frac{2}{10}$ , or  $\frac{1}{5}$  of  $(\frac{1}{2} - 50s.) + 30s$ . =  $\frac{1}{10} + 20s$ . = what was next taken;  $(\frac{1}{2} + 50s.) + (\frac{1}{10} + 20s.) = (\frac{6}{10} + 70s.)$  = what had then been taken out;  $\therefore \frac{4}{10} - 70s$ . = what was left.  $\cdot 25$  or  $\frac{25}{100}$ , or  $\frac{1}{4}$  of  $(\frac{4}{10} - 70s.) + 20s$ . =  $\frac{1}{10} - 17\frac{1}{2}s$ . +  $20s$ . =  $\frac{1}{10} + 2\frac{1}{2}s$ . = what was taken out the third time.  $(\frac{6}{10} + 70s.) + (\frac{1}{10} + 2\frac{1}{2}s.) = \frac{7}{10} + 72\frac{1}{2}s$ . = total amount taken out;  $\therefore \frac{3}{10} - 72\frac{1}{2}s$ . = amount remaining in the bag, which by the question =  $10s$ .  $\therefore \frac{3}{10} - 72\frac{1}{2}s$ . =  $10s$ ., or  $\frac{3}{10} = 82\frac{1}{2}s$ ., or  $\frac{1}{10} = 27\frac{1}{2}s$ .,  $\therefore \frac{1}{10}$  or the whole =  $27\frac{1}{2}s$ .  $\times 10 = 275s$ .



(3) *A* supplies 26 cub. yds. in  $3\frac{1}{2}$  hrs., or 8 cub. yds. per hr.; *B* supplies  $12\frac{1}{2}$  cub. yds. in  $2\frac{1}{2}$  hrs., or 5 cub. yds. per hr. Together *A* and *B* supply  $8 + 5 = 13$  cub. yds. per hr. *C* discharges 11.375, or  $11\frac{3}{8}$  cub. yds. in  $1\frac{1}{2}$  hrs., or  $6\frac{1}{2}$  cub. yds. per hr.

In 12 hrs. *A* will supply  $8 \times 12 = 96$  cub. yds.; and *C* will discharge  $6\frac{1}{2} \times 12 = 78$  cub. yds.;  $\therefore$  the number of cub. yds. actually filled will be  $96 - 78 = 18$ . Number cub. yds. requiring to be filled = 75, or  $\frac{3}{4}$  of 286 =  $214\frac{1}{2}$  cub. yds., and number already filled = 18;  $\therefore$  No. remaining to be filled =  $214\frac{1}{2} - 18 = 196\frac{1}{2}$  cub. yds. Now if *A* and *B* together fill 13 cub. yds. per hr. while *C* discharges  $6\frac{1}{2}$  cub. yds. per hr., the number of cub. yds. actually filled per hr. is  $13 - 6\frac{1}{2} = 6\frac{1}{2}$ ; and number of hrs. required to fill  $196\frac{1}{2}$  cub. yds. =  $196\frac{1}{2} \div 6\frac{1}{2} = 30\frac{2}{3}$  hrs., which added to the previous 12 hrs. will amount to  $42\frac{2}{3}$  hrs.

(4)

500 envelopes at 44 cts. per 100	= \$ 2.20
3 boxes elastic bands at 33 cts.	= \$ 0.99
$\frac{1}{2}$ gross penholders at 19 cts. per doz.	= \$ 1.14
$2\frac{1}{2}$ reams foolscap at 21 cts. a quire	= \$10.50
4 doz. quill pens at 9 cts.	= \$ 3.36
13 note books at 27 cts.	= \$ 3.51
250 official envelopes at 48 cts. per 100	= \$ 1.20

(5)

	\$19.90
$7\frac{1}{2}$ lbs. lamb at 10 cts.	= \$0.75
$19\frac{1}{2}$ lbs. mutton at 8 cts.	= \$1.56
18 lbs. ham at 15 cts.	= \$2.70
$5\frac{1}{2}$ lbs. suet at 10 cts.	= \$0.55
9 chops at 4 cts.	= \$0.36

(6)

	\$5.92
17 yds calico at 19 cts.	= \$ 3.23
$25\frac{1}{2}$ yds. — at 55 cts.	= \$14.02 $\frac{1}{2}$
$34\frac{1}{2}$ yds. flannel at 60 cts.	= \$20.70
14 pairs stockings at 38 cts.	= \$ 5.32
5 pairs gloves at \$12 per doz.	= \$ 5.00

\$48.27 $\frac{1}{2}$

## Ex. LXV. (p. 112.)

$$\begin{array}{llll} \text{(1)} & \text{(2)} & \text{(3)} & \text{(4)} \\ \frac{9 \times 12}{4} = 27. & \frac{9 \times 24}{32} = 6\frac{1}{2}. & \frac{6 \times 10}{4} = 15. & \frac{\frac{1}{2} \times \frac{1}{2}}{\frac{1}{4}} = \frac{1}{1}. \end{array}$$

$$\begin{array}{llll} \text{(5)} & \text{(6)} & \text{(7)} \\ \frac{.8 \times .79}{.05} = .12.64. & \frac{10 \times 45}{.3} = 15. & \frac{\frac{1}{2} \times \frac{1}{2}}{\frac{1}{4}} = \frac{1}{1}. \end{array}$$

$$\begin{array}{llll} \text{(8)} & \text{(9)} & \text{(10)} \\ \frac{1.2 \times .29}{1.3} = .86. & \frac{\frac{9}{14} \times \frac{7}{8}}{\frac{1}{2}} = \frac{3}{4}. & \frac{4.22 \times 17.6}{23\frac{1}{2}} = 3.2. \end{array}$$

## Ex. LXVI. (p. 115.)

(1) 8 bus. : 24 bus. :: \$16 is to the price required.

$$\therefore \text{Price required} = \$ \frac{24 \times 16}{8} = \$48.$$

(2) 2 bus. : 33 bus. :: \$1.10 : required price.

$$\therefore \text{Required price} = \$ \frac{33 \times 1.10}{2} = \$18.15.$$

(3) 9 bus. : 4 bus. 20 lbs. :: \$36 : required cost.

$$\therefore \text{Required cost} = \$ \frac{260 \times 36}{540} = \$17.33\frac{1}{3}.$$

(4) 55 cts. : \$21.25 :: 1 bus. : no. of bus. required.

$$\therefore \text{No. required} = \frac{2125 \times 1}{55} \text{ bus.} = 38 \text{ bus. } 21\frac{1}{5} \text{ lbs.}$$

(5) 84 cts. : \$17.20 :: 1 bus. : number required.

$$\therefore \text{No. required} = \frac{1720 \times 1}{84} \text{ bus.} = 20 \text{ bus. } 28\frac{1}{3} \text{ lbs.}$$

(6) 1 oz. : 21 lbs. 4 oz. :: 6s. 5d. : required price.

$$\therefore \text{Required price} = \frac{256 \times 77}{1} \text{ d.} = 19712 \text{ d.} = \text{£}82 \text{ 2s. } 8 \text{ d.}$$

(7) 16 cts. : \$162.36 :: 1 lb. : number required.

$$\therefore \text{No. required} = \frac{46236 \times 1}{16} \text{ lbs.} = 2889\frac{1}{4} \text{ lbs.} = 28 \text{ cwt.}$$

3 qrs. 14 lbs. 12 oz.

(8) \$23856 : \$10496.64 :: \$1 : dividend in \$1.

$$\therefore \text{Dividend required} = \$ \frac{1049664 \times 1}{2385600} = \$44 = 44 \text{ cts.}$$

(9) No. of days in 1864 = 366.  
 366 dys. : 1 dy. :: \$106.14 : amount required.

$$\therefore \text{Amount required} = \frac{10614 \times 1}{366} \text{ cts.} = 29 \text{ cts.}$$

(10) 1 ml. : 20 mls. 5 fur. 22 yds. :: \$393.75 : req<sup>d</sup>. cost.

$$\therefore \text{Required cost} = \$ \frac{393.75 \times 35222}{1760} = \$8126.01 \frac{9}{16}.$$

(11) \$133.12 : \$449.28 :: 6 cwt. 2 qrs. : weight req<sup>d</sup>.

$$\therefore \text{Required weight} = \frac{26 \times 44928}{13312} \text{ qrs.} = 87 \frac{1}{2} \text{ qrs.} =$$

21 cwt. 3 qrs. 18 lbs. 12 oz.

(12) \$32.15 : \$286.66  $\frac{1}{2}$  :: \$183.75 : value required.

$$\therefore \text{Value required} = \$ \frac{183.75 \times 28666 \frac{1}{2}}{3215} = \$1638.40 \frac{535}{1280}.$$

(13) \$10000 : \$3875 :: \$1 : dividend on \$1.

$$\therefore \text{Dividend} = \$ \frac{3875 \times 1}{10000} = 3875 = 38 \frac{1}{2} \text{ cts.}$$

$\therefore$  Each creditor will lose in \$1, \$1 - 38  $\frac{1}{2}$  cts. = 61  $\frac{1}{2}$  cts.

(14) 60 men : 84 men :: 5 months : time required.

$$\therefore \text{Time required} = \frac{85 \times 5}{60} \text{ mos.} = 7 \text{ mos. } 7 \text{ mos.}$$

-5 mos. = 2 months.

(15) 1134 yds. : 5313 yds. :: 3s. 4  $\frac{1}{2}$ d. : value req<sup>d</sup>.

$$\therefore \text{Value req<sup>d</sup>.} = \frac{5313 \times 81}{1134} \text{ half pence} = 15s. 9 \frac{1}{2}d.$$

(16) £1 : 17s. 6d. :: £3057 12s. : value required.

$$\therefore \text{Value of effects} = \frac{210 \times 61152}{240} \text{ s.} = £2675 \text{ 8s.}$$

(17) 10 ft. 8 in. : 1 mi. 1280 yds. :: 4 steps : required number of steps.

$$\therefore \text{No. required} = \frac{109440 \times 4}{128} \text{ steps} = 3420 \text{ steps.}$$

(18) 31 ac. 3 ro. 9 po. 21 yds. : 49 ac. 3 ro. 38 po. 2  $\frac{1}{2}$  yds. :: £3025 12s. 4  $\frac{1}{2}$ d. : required price.

$$\therefore \text{Req<sup>d</sup>. price} = \frac{967769 \times 1452297}{615853} \text{ half pence} = £4754$$

10s. 10  $\frac{1}{2}$ d.

(19) Loss on \$1 = \$1 - 59 cts. = 41 cts.

\$1 : \$13675 :: 41 cts. : required loss.

$$\therefore \text{Loss} = \frac{13675 \times 41}{1} \text{ cts.} = \$5606.75.$$

(20) 6 mi. : 10 mi. :: 1 hr. : time req<sup>d</sup>. by 1<sup>st</sup> boy,

$$\therefore \text{time required} = \frac{10 \times 1}{6} \text{ hrs.} = 1 \text{ hr. } 40 \text{ min.}; \text{ also } 7\frac{1}{2}$$

mi. : 10 mi. :: 1 hr. : time required by 2<sup>nd</sup> boy,  $\therefore$

$$\text{time required} = \frac{10 \times 1}{7\frac{1}{2}} \text{ hrs.} = 1 \text{ hr. } 20 \text{ min.}$$

Therefore since 1 hr. 40 min. - 1 hr. 20 min. = 20 min.  
the first boy must start 20 minutes before second boy.

(21) 55 yds. :  $\frac{1}{2}$  mi. :: 5 ft. : required gain.

$$\therefore \text{Required gain} = \frac{880 \times 5}{55} \text{ ft.} = 80 \text{ ft.} = 26 \text{ yds. } 2 \text{ ft.}$$

(22) 45 cts. : 55 cts. :: 36 doz. pairs : required no. of pairs.

$$\therefore \text{Required no.} = \frac{36 \times 55}{45} \text{ doz.} = 44 \text{ doz.} = 528 \text{ pairs.}$$

(23) 168 dys. : 266 dys. :: 108 men : required no. of men.

$$\therefore \text{Required no.} = \frac{266 \times 108}{168} \text{ men} = 171 \text{ men.}$$

(24) \$12571.87 $\frac{1}{2}$  : \$1 :: \$419.06 $\frac{1}{2}$  : rate per \$.

$$\therefore \text{Rate per } \$ = \$ \frac{419.06\frac{1}{2} \times 1}{12571.87\frac{1}{2}} = 3\frac{1}{2} \text{ cts.}$$

Also, \$1 : \$1794.37 $\frac{1}{2}$  :: 3 $\frac{1}{2}$  cts. : required payment.

$$\therefore \text{Req<sup>d</sup>. payment} = \$ \frac{346875 \times 3\frac{1}{2}}{200} \text{ cts.} = \$57.812\frac{1}{2}.$$

(25) Number of days in 1863 = 365.

Yearly expenditure = \$2500 - \$994.37 $\frac{1}{2}$  = \$1505.62 $\frac{1}{2}$ .

365 dys. : 1 dy. :: \$1505.62 $\frac{1}{2}$  : average daily expenditure.

$$\therefore \text{Req<sup>d</sup>. expenditure} = \$ \frac{1505.62\frac{1}{2} \times 1}{365} = \$4.12\frac{1}{2}.$$

(26) 20 dys. : 27 dys. :: 100 men : req<sup>d</sup>. no. of men.  
 $\therefore$  Req<sup>d</sup>. no. of men =  $\frac{27 \times 100}{20}$  men = 135 men.

(27) 44 ft. : 109 miles :: 1 sec. : time req<sup>d</sup>. by train.  
 $\therefore$  Time required =  $\frac{575520 \times 1}{44}$  sec. = 13080 sec. = 3  
 hrs. 38 min.; 8 hrs. + 3 hrs. 38 min. = 11 hrs. 38 min.

(28) 22 cts. : \$1718.75 :: \$1 : amount of debt.  
 $\therefore$  Required am<sup>t</sup>. =  $\frac{171875 \times 100}{22}$  cts. = \$7812.50.

Also, his amount of indebtedness to first creditor will  
 be \$7812.50 - (\$1250  $\times$  2 + \$816  $\times$  3) = \$7812.50 - \$4948  
 = \$2864.50.

Then \$1 : \$2864.50 :: 22 cts. : what first creditor  
 will receive.

$\therefore$  1st cr. will receive  $\frac{286450 \times 22}{100}$  cts. = \$630.19, and  
 will therefore lose \$2864.50 - \$630.19 = \$2234.31.

(29) 42s. : 70s. :: 4½d. : required cost.  
 $\therefore$  Req<sup>d</sup>. cost =  $\frac{70 \times 9}{42}$  half pence = 7½d.

(30) 5 men + 5 boys = 5 men + 3 men = 8 men.  
 10 men : 8 men :: 15 days : time required.  
 $\therefore$  Time required =  $\frac{8 \times 15}{10}$  days = 12 days.

(31) 1 lb. 10 oz. 10 dwts. : 1 oz. :: £6 3s. 9d. : req<sup>d</sup>.  
 4th term.

$\therefore$  4th proportional =  $\frac{20 \times 1485}{450}$  d. = 5s. 6d.

(32) Expenditure for the year will be \$2034.50 - \$250  
 = \$1784.50. Also, the year 1864 contains 366 days,  
 and January 31 days.

366 days : 31 days :: \$1784.50 : req<sup>d</sup>. expenditure.  
 $\therefore$  Req<sup>d</sup>. expenditure =  $\frac{31 \times 1784.50}{366}$  = \$151.14113.

$$(33) \text{ £1-6d.} = 19\text{s. 6d.}$$

$$19\text{s. 6d.} : \text{£1} :: \text{£877 10s.} : \text{original income.}$$

$$\therefore \text{Original income} = \frac{240 \times 17550}{234} \text{ s.} = \text{£900.}$$

$$(34) \text{ (1) 7d.} : \text{£29 3s. 4d.} :: \text{£1} : \text{required income.}$$

$$\therefore \text{Reqd. income} = \text{£} \frac{7000 \times 1}{7} = \text{£1000.}$$

$$\text{(2) £1-7d.} = 19\text{s. 5d.}$$

$$19\text{s. 5d.} : \text{£1} :: \text{£932} : \text{required income.}$$

$$\therefore \text{Reqd. income} = \text{£} \frac{240 \times 932}{233} = \text{£960.}$$

$$(35) \text{ Weight of gold} = (\text{£150} \div \text{£3 17s. 10}\frac{1}{2}\text{d.}) \text{ oz} = 38\frac{278}{1869} \text{ oz.}$$

$$1 \text{ lb.} : 38\frac{278}{1869} \text{ oz.} :: 54\text{s. 6d.} : \text{required value.}$$

$$\therefore \text{Reqd. val.} = \frac{72000 \times 654}{1869 \times 12} \text{ d.} = \frac{1308000}{623} \text{ d.}$$

$$= 2099\frac{1}{2}\text{d.} = \text{£8 14s. 11}\frac{1}{2}\text{d.}$$

(36) If 25 men can finish the work in 16 days, 1 man in 1 day will do  $\frac{1}{16 \times 25} = \frac{1}{400}$  of the work. If all the men work for 4 days they will do  $\frac{1}{4}$  of the whole work.  $\therefore \frac{3}{4}$  remain to be done.

Then  $\frac{1}{400} : \frac{3}{4} :: 1 \text{ man} : \text{no. that would finish it in 1 day.}$   $\therefore \text{No. reqd.} = \frac{\frac{3}{4} \times 1}{\frac{1}{400}} = \frac{3 \times 1 \times 400}{4} = 300 \text{ men, and}$   
therefore 10 men can finish it in 30 days.

$$(37) 1 \text{ ct.} + 1\frac{1}{2} \text{ cts.} = 2\frac{1}{2} \text{ cts.} \quad \$1 - 2\frac{1}{2} \text{ cts.} = 97\frac{1}{2} \text{ cts.}$$

$$97\frac{1}{2} \text{ cts.} : \$1 :: \$1855 : \text{required income.}$$

$$\therefore \text{Reqd. income} = \$ \frac{1855 \times 100}{97\frac{1}{2}} = \$1902.56\frac{1}{3}.$$

$$(38) \frac{5}{7} \text{ qrs.} : \frac{4}{3} \text{ bus.} :: 54\text{s.} : \text{required price.}$$

$$\therefore \text{Reqd. price} = \frac{\frac{4}{3} \times 54}{\frac{5}{7} \times 8} = \frac{4 \times 54 \times 7}{6 \times 9 \times 8} \text{ s.} = 3\text{s. 6d.}$$

$$(39) 1\frac{1}{3} \text{ cwt.} : \frac{6}{11} \text{ ton} :: \text{£7 3s.} : \text{required price.}$$

$$\therefore \text{Reqd. price} = \frac{\frac{6}{11} \times 20 \times 143}{1\frac{1}{3}} \text{ s.} = \frac{6 \times 20 \times 143 \times 15}{11 \times 13} \text{ s.} = \text{£90.}$$

(40)  $1\frac{3}{5}$  d. : £1 6s. 6d. ::  $1\frac{1}{2}$  of  $\frac{2}{3}$  of  $2\frac{1}{2}$  of 4 lbs : required number of lbs.

$$\therefore \text{Reqd. no. of lbs.} = \frac{1\frac{1}{2} \times \frac{2}{3} \times 2\frac{1}{2} \times 40 \times 318}{1\frac{3}{5}} \text{ lbs.} = 104\frac{1}{2}$$

lbs. = 104 lbs.  $2\frac{1}{2}$  oz.

(41) From 6 A. M. on Sunday till Tuesday noon are 54 hours, and till 1 P. M. on Saturday the clock will indicate 151 hours.

$\therefore$  54 hrs. 24 min. : 151 hrs. :: 24 min. : gain on true time.

$$\therefore \text{Gain on true time} = \frac{151 \times 60 \times 24}{3264} \text{ min.} = 66\frac{3}{4} \text{ min.},$$

$\therefore$  true time will be 1 P. M.  $-66\frac{3}{4}$  min. = 11:53 $\frac{1}{4}$  A. M.

(42) While hour hand travels 5 minutes, minute hand travels 60 minutes,  $\therefore$  the minute hand gains 55 minutes per hour.

$\therefore$  55 min. : 1 hour :: 60 min. : time required.

$$\therefore \text{Time reqd} = \frac{60 \times 60}{55} = 65\frac{1}{11} \text{ min.} = 1 \text{ hour } 5\frac{1}{11} \text{ min.}$$

(43) 5 lbs. : .0625 cwt. :: .0703125 of \$4 : reqd. price.

$$\therefore \text{Reqd. price} = \$ \frac{.0703125 \times 4 \times .0625 \times 20}{5} = \$35.15625$$

= 35.15625 cts.

(44) 1 man =  $\frac{2}{3}$  boys; 1 woman =  $\frac{1}{2}$  boys;  $\therefore$  5 men =  $4\frac{1}{3}$  boys; 4 women =  $2\frac{1}{2}$  boys; therefore 5 men, 4 women and 2 boys =  $(4\frac{1}{3} + 2\frac{1}{2} + 2)$  boys =  $18\frac{1}{6}$  boys.

$\therefore$   $18\frac{1}{6}$  boys : 9 boys :: 18 days : no. required;  $\therefore$  required number of days =  $\frac{2}{3} \times 9 \times 18 = 8\frac{1}{3}$ .

(45) If  $\frac{2}{3}$  of the estate be sold, the remr. will be  $\frac{1}{3}$ .

$\frac{1}{3}$  of  $\frac{7}{9}$  of  $\frac{2}{3}$  :  $\frac{2}{3}$  ::  $1\frac{1}{5}$  of  $\frac{2}{3}$  of £600 : required price.

$$\therefore \text{Required price} = £ \frac{\frac{1}{3} \text{ of } \frac{2}{3} \text{ of } 600 \times \frac{2}{3}}{\frac{1}{3} \text{ of } \frac{7}{9} \text{ of } \frac{2}{3}} = £ \frac{623 \times \frac{2}{3}}{1\frac{1}{3}}$$

$$= £ \frac{623 \times 2}{14 \times 3} = £4005.$$

(46) 1 oz. : 2.683 lbs. :: £4.09 : required price.

$$\therefore \text{Required price} = £4.09 \times 2.683 \times 12 = £4\frac{1}{10} \times 2\frac{21}{100} \times 12 \\ = £ \frac{41 \times 161 \times 12}{10 \times 60} = £132\frac{1}{10} = £132 \text{ Os. } 4\frac{1}{4} \text{ d. } \frac{1}{2} \text{ q.}$$

(47) 7 dys. : 1 dy. :: \$22.12 : amount earned by 4 men and 5 boys per day;  $\therefore$  amount of earnings =  $\frac{22.12 \times 1}{7} = \$3.16$ .

Also, 9 dys. : 1 dy. :: \$28.98 : amount earned by 3 men and 5 boys per day;  $\therefore$  amount =  $\frac{28.98 \times 1}{9} = \$3.22$ .

And if 4 men and 5 boys earn \$3.16 per day, 12 men and 15 boys will earn \$9.48 per day; similarly, if 3 men and 8 boys earn \$3.22 per day, 12 men and 32 boys will earn \$12.88 per day; or, 12 men and 32 boys will earn \$3.40 more than 12 men and 15 boys;  $\therefore$  the \$3.40 must have been earned by the extra 17 boys.

Then 17 boys : 1 boy :: \$3.40 : amount of a boy's earnings per day;  $\therefore$  amount =  $\frac{3.40 \times 1}{17} = 20 \text{ cts.}$

Now if 4 men and 5 boys earn \$3.16 per day, 4 men working alone will earn \$3.16 - \$1 (the earnings of 5 boys), or 4 men will earn \$2.16, or 1 man will earn 54 cts;  $\therefore$  a man and a boy will together earn (54+20) cts. per day = 74 cts.;  $\therefore$  12 men and 12 boys will together earn (74 × 12) cts. = \$8.88 per day.

Then \$8.88 : \$186.48 :: 1 day : req<sup>d</sup>. no. of days.  $\therefore$  Required no. =  $\frac{186.48 \times 1}{8.88} \text{ days} = 21 \text{ days.}$

(48) If *A* completes the work in 5 hrs., in 1 hr. he will do  $\frac{1}{5}$  of it;  $\therefore$  1 hr. : 40 min ::  $\frac{1}{5}$  : amount of work that *A* performs;  $\therefore$  amount that *A* performs =  $\frac{40 \times \frac{1}{5}}{60} = 1\frac{2}{3}$ .

Also, if *B* can finish the work in 9 hrs., in 1 hr. he will do  $\frac{1}{9}$ ;  $\therefore$  1 hr. : 1 $\frac{1}{3}$  hrs. ::  $\frac{1}{9}$  : amount that *B* per-



forms;  $\therefore$  amt. that  $B$  performs =  $\frac{\frac{1}{3} \times 1\frac{1}{2}}{1} = \frac{1}{6}$ .

$1 - (\frac{2}{15} + \frac{1}{6}) =$  amount remaining to be done =  $\frac{7}{10}$ .

Also, if  $C$  can perform the work in 15 hrs., in 1 hr. he will do  $\frac{1}{15}$ ;  $\therefore \frac{1}{15} : \frac{7}{10} :: 1 \text{ hr.} : \text{time required by } C$  to finish the remainder.

$\therefore$  Time required =  $\frac{\frac{7}{10} \times 1}{\frac{1}{15}}$  hours =  $10\frac{1}{2}$  hours.

(49) (1500 + 700) men : 1500 men  $::$  11 months. : time required to consume the remaining provisions.

$\therefore$  Time required =  $\frac{1500 \times 11}{2200}$  mos. =  $7\frac{1}{2}$  mos., which,

added to the 2 months during which the 1500 men had been consuming the provisions, gives  $9\frac{1}{2}$  months.

(50) The first travels  $4\frac{1}{2}$  miles per hr., and the second 3 miles per hr., therefore they together travel  $7\frac{1}{2}$  miles per hour.  $\therefore 7\frac{1}{2}$  miles : 30 mls.  $:: 1 \text{ hr.} : \text{no. of hrs.}$  in which they will meet.

$\therefore$  No. of hrs. =  $\frac{30 \times 1}{7\frac{1}{2}}$  hrs. = 4 hrs.; and 8.30 A. M.

+ 4 hrs. = 12.30 P. M.

Also,  $7\frac{1}{2}$  miles :  $4\frac{1}{2}$  miles  $:: 30 \text{ miles} : \text{distance first travels.}$

$\therefore$  Distance =  $\frac{30 \times 4\frac{1}{2}}{7\frac{1}{2}} = 18$  mls. *i.e.* 12 mls. from Whitby, or 10 miles from the given place.

(51) The 2 trains together go (24 + 27) miles = 51 miles per hour; the length of the 2 trains is (210 + 180) feet = 390 feet.

Therefore, 51 miles : 390 feet  $:: 1 \text{ hr.} : \text{reqd. time.}$

$\therefore$  Required time =  $\frac{390 \times 60 \times 60}{51 \times 5280}$  sec. =  $5\frac{40}{187}$  sec.

Ex. LXVII. (p. 121.)

(1)  $\left. \begin{array}{l} 10 : 15 \\ 9 : 12 \end{array} \right\} :: 4 \text{ weeks} : \text{no. of weeks required.}$

$\therefore$  No. of weeks reqd =  $\frac{4 \times 15 \times 12}{10 \times 9}$  weeks = 8 wks.

$$(2) \begin{array}{l} 1 : 2 \\ 27 : 36 \end{array} \} :: 42 \text{ men} : \text{required number of men.}$$

$$\therefore \text{Required number} = \frac{42 \times 36 \times 2}{27 \times 1} = 112 \text{ men.}$$

$$(3) \begin{array}{l} 135 : 60 \\ 1 : 4 \end{array} \} :: 36 \text{ dys.} : \text{required number of dys.}$$

$$\therefore \text{Req}^d. \text{ no. of days} = \frac{36 \times 4 \times 60}{135 \times 1} \text{ days} = 64 \text{ days.}$$

$$(4) \begin{array}{l} 104 : 102 \\ 34 : 122 \end{array} \} :: \$87.36 : \text{required cost.}$$

$$\therefore \text{Required cost} = \$ \frac{87.36 \times 122 \times 102}{34 \times 104} = \$307.44.$$

$$(5) \begin{array}{l} \$100000 : \$1500000 \\ 3 : 7 \end{array} \} :: \$2500 : \text{required gain.}$$

$$\therefore \text{Required gain} = \$ \frac{2500 \times 7 \times 1500000}{3 \times 100000} = \$87500.$$

$$(6) \begin{array}{l} 7 : 21 \\ \$2.80 : 4.06 \end{array} \} :: 40 \text{ miles} : \text{required no. of miles.}$$

$$\therefore \text{Req}^d. \text{ no. of mls.} = \frac{40 \times 4.06 \times 21}{2.80 \times 7} = 174 \text{ miles.}$$

$$(7) \begin{array}{l} 7 : 45 \\ 20 : 9 \end{array} \} :: \$70 : \text{required cost.}$$

$$\therefore \text{Required cost} = \$ \frac{70 \times 9 \times 45}{20 \times 7} = \$202.50.$$

$$(8) \begin{array}{l} 24 : 16 \\ 560 : 1200 \end{array} \} :: 140 \text{ horses} : \text{req}^d. \text{ no. of horses.}$$

$$\therefore \text{Req}^d. \text{ no.} = \frac{140 \times 1200 \times 16}{560 \times 24} \text{ horses} = 200 \text{ horses.}$$

$$(9) \begin{array}{l} \$250 : \$625 \\ \$2000 : \$5000 \end{array} \} :: 16 \text{ months} : \text{req}^d. \text{ no. of mos.}$$

$$\therefore \text{Req}^d. \text{ no. of mos.} = \frac{16 \times 5000 \times 625}{2000 \times 250} = 100 \text{ months.}$$

$$(10) \begin{array}{l} 1878 : 22536 \\ 336 : 112 \end{array} \} :: 702 \text{ qrs.} : \text{req}^d. \text{ no. of qrs.}$$

$$\therefore \text{Req}^d. \text{ no. of qrs.} = \frac{702 \times 112 \times 22536}{336 \times 1878} = 2808 \text{ qrs.}$$

(11)  $\left. \begin{array}{l} 6 : 24 \\ 4 : 2\frac{1}{2} \end{array} \right\} :: 17\frac{1}{2} \text{ acres} : \text{required no. of acres.}$

$\therefore \text{Req}^d. \text{ no. of ac.} = \frac{17\frac{1}{2} \times 2\frac{1}{2} \times 24}{4 \times 6} = 39 \text{ ac. } 1 \text{ ro. } 20 \text{ po.}$

(12)  $\left. \begin{array}{l} \text{£}240 : \text{£}234 \\ 91 : 49 \\ 56 : 48 \end{array} \right\} :: 20 \text{ months} : \text{req}^d. \text{ no of mos.}$

$\therefore \text{Req}^d. \text{ no. of mos.} = \frac{20 \times 48 \times 49 \times 234}{56 \times 91 \times 240} = 9 \text{ months.}$

(13)  $\left. \begin{array}{l} 100.8 \text{ lbs.} : 5186.16 \text{ lbs.} \\ 51.45 \text{ dys.} : 3 \text{ dys.} \end{array} \right\} :: 20 \text{ men} : \text{required number of men.}$

$\therefore \text{Req}^d. \text{ no. of men} = \frac{20 \times 3 \times 5186.16}{51.45 \times 100.8} = 60 \text{ men.}$

(14)  $\left. \begin{array}{l} 1 : \frac{1}{2} \\ \frac{1}{7} : 1 \end{array} \right\} :: 26 \text{ men} : \text{required number of men.}$

$\therefore \text{Req}^d. \text{ no.} = \frac{26 \times 1 \times \frac{1}{2}}{\frac{1}{7} \times 1} = \frac{26 \times 1 \times 1 \times 7}{2} = 91 \text{ men.}$

or thus:

$\left. \begin{array}{l} 85 \text{ ac.} : 42\frac{1}{2} \text{ ac.} \\ 1\frac{1}{4} \text{ dys.} : 12 \text{ dys.} \end{array} \right\} :: 26 \text{ men} : \text{req}^d. \text{ number of men.}$

$\therefore \text{Req}^d. \text{ no. of men} = \frac{26 \times 12 \times 42\frac{1}{2}}{1\frac{1}{4} \times 85} = 91 \text{ men.}$

(15)  $\left. \begin{array}{l} 16 \text{ men} : 3 \text{ men} \\ 1 : 2 \\ 9 : 10 \end{array} \right\} :: 6 \text{ dys.} : \text{req}^d. \text{ no. of men.}$

$\therefore \text{Req}^d. \text{ no. of men} = \frac{6 \times 10 \times 2 \times 3}{9 \times 1 \times 16} = 2\frac{1}{2} \text{ days.}$

(16)  $\left. \begin{array}{l} 24 : 16 \\ 18400d. : 24840d. \\ \frac{1}{2} : 1 \end{array} \right\} :: 25 \text{ men} : \text{req}^d. \text{ no. of men.}$

$\therefore \text{Required no. of men} = \frac{25 \times 24840 \times 16}{\frac{1}{2} \times 18400 \times 24} = 45 \text{ men.}$

(17)  $\left. \begin{array}{l} 6664 : 798 \\ 57 : 119 \\ \frac{1}{2} : 1 \end{array} \right\} :: 357 \text{ qrs.} : \text{required no. of qrs.}$

$\therefore \text{Req}^d. \text{ no. of qrs.} = \frac{357 \times 1 \times 119 \times 798}{\frac{1}{2} \times 57 \times 6664} = 178\frac{1}{2} \text{ qrs.} =$

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$$(25) \left. \begin{array}{l} 11 : 9 \\ \frac{1}{4} : \frac{2}{3} \\ \frac{3}{7} : \frac{4}{4} \end{array} \right\} :: 55 \text{ men} : \text{reqd. number of men.}$$

$$\therefore \text{Reqd. no. of men} = \frac{55 \times \frac{1}{4} \times \frac{2}{3} \times 9}{\frac{3}{7} \times \frac{1}{4} \times 11} = 180 \text{ men.}$$

$$(26) \left. \begin{array}{l} 15 : 5 \\ 10 : 15 \\ 12 : 5 \\ 1 : 4 \end{array} \right\} :: 3 \text{ feet} : \text{required number of feet.}$$

$$\therefore \text{Required no. of feet} = \frac{3 \times 4 \times 5 \times 15 \times 5}{1 \times 12 \times 10 \times 15} = 2\frac{1}{2} \text{ feet.}$$

Ex. LXVIII. (p. 124.)

- (1) 25 cts. =  $\frac{1}{4}$  of \$1
 

\$75.00 = value at \$1 each.
2
\$150.00 = value at \$2 each.
18.75 = value at 25 cts. each.
\$168.75 = value at \$2.25 each.
- (2) 50 cts. =  $\frac{1}{2}$  of \$1
 

\$105.00 = value at \$1 each.
52.50 = value at 50 cts. each.
\$157.50 = value at \$1.50 each.
- (3) 50 cts. =  $\frac{1}{2}$  of \$1
 

\$910.00 = value at \$1 each.
455.00 = value at 50 cts. each.
237.50 = value at 25 cts. each.
\$1592.50 = value at \$1.75 each.
- (4) 20 cts. =  $\frac{1}{5}$  of \$1
 

\$876.00 = value at \$1 each.
2
\$1752.00 = value at \$2 each.
175.20 = value at 20 cts. each.
\$1927.20 = value at \$2.20 each.
- (5) 25 cts. =  $\frac{1}{4}$  of \$1
 

\$1075.00 = value at \$1 each.
3
\$3225.00 = value at \$3 each.
268.75 = value at 25 cts. each.
\$3493.75 = value at \$3.25 each.

(6) 50 cts. = $\frac{1}{2}$ of \$1	\$1278.00 = value at \$1 each.
	639.00 = value at 50 cts. each.
25 cts. = $\frac{1}{4}$ of 50 cts.	319.50 = value at 25 cts. each.
	159.75 = value at 12 $\frac{1}{2}$ c. each.
12 $\frac{1}{2}$ cts. = $\frac{1}{4}$ of 25 cts.	<u>\$2396.25 = value at \$1.87<math>\frac{1}{2}</math> each.</u>

	£	s.	d.	
(7) 1s. = $\frac{1}{20}$ of £1	397	0	0	= value at £1.
	19	17	0	= value at 1s.
	<u>£416</u>	17	0	= value at £1 1s.

	£	s.	d.	
(8) 5s. = $\frac{1}{4}$ of £1	250	0	0	= value at £1 each.
		2		
2s. 6d. = $\frac{1}{4}$ of 5s.	500	0	0	= value at £2 each.
	62	10	0	= value at 5s. each.
6d. = $\frac{1}{4}$ of 2s. 6d.	31	5	0	= value at 2s. 6d. each.
	6	5	0	= value at 6d. each.
	<u>£600</u>	0	0	= value at £2 8s. each.

(9) 50 cts. = $\frac{1}{2}$ 1f. \$1	\$1324.00 = value at \$1 each.
	3
	<u>\$3972.00 = value at \$3 each.</u>
25 cts. = $\frac{1}{4}$ of 50 cts.	662.00 = value at 50 cts. each.
	331.00 = value at 25 cts. each.
	<u>\$4965.00 = value at \$3.75 each.</u>

	£	s.	d.	
(10) 5s. = $\frac{1}{4}$ of £1	2678	0	0	= value at £1 each.
		2		
2s. 6d. = $\frac{1}{4}$ of 5s.	5356	0	0	= value at £2 each.
	669	10	0	= value at 5s. each.
	334	15	0	= value at 2s. 6d. ea.
	<u>£6360</u>	5	0	= value at £2 7s. 6d. ea.

	£	s.	d.	
(11) 10s. = $\frac{1}{2}$ of £1	973	0	0	=value at £1 each.
5s. = $\frac{1}{4}$ of 10s.	486	10	0	=value at 10s. each.
1s. = $\frac{1}{5}$ of 5s.	243	5	0	=value at 5s. each.
6d. = $\frac{1}{2}$ of 1s.	48	13	0	=value at 1s. each.
2d. = $\frac{1}{3}$ of 6d.	24	6	6	=value at 6d. each.
$\frac{1}{2}$ d. = $\frac{1}{3}$ of 2d.	8	2	2	=value at 2d. each.
	2	0	6 $\frac{1}{2}$	=value at $\frac{1}{2}$ d. each.
	£812	17	2 $\frac{1}{2}$	=value at 16s. 8 $\frac{1}{2}$ d.

	£	s.	d.	
(12) 5s. = $\frac{1}{4}$ of £1	236	0	0	=value at £1 each.
			7	
10d. = $\frac{1}{6}$ of 5s.	1652	0	0	=value at £7 each.
1d. = $\frac{1}{10}$ of 10d.	59	0	0	=value at 5s. each.
	9	16	8	=value at 10d. each.
$\frac{1}{2}$ d. = $\frac{1}{2}$ of 1d.	19	8		=value at 1d. each.
	9	10		=value at $\frac{1}{2}$ d. each.
	£1722	6	2	=val. at £7 5s. 11 $\frac{1}{2}$ d.

	£	s.	d.	
(13) 10s. = $\frac{1}{2}$ of £1	9978	0	0	=value at £1 each.
			8	
3s. 4d. = $\frac{1}{3}$ of 10s.	79824	0	0	=value at £8 each.
4d. = $\frac{1}{10}$ of 3s. 4d.	4989	0	0	=value at 10s. each.
	1663	0	0	=val. at 3s. 4d. each.
$\frac{1}{2}$ = $\frac{1}{3}$ of 4d.	166	6	0	=value at 4d. each.
	20	15	9	=value at $\frac{1}{2}$ d. each.
	£86663	1	9	=value at £8 13s. 8 $\frac{1}{2}$ d.

	£	s.	d.	
(14) 10s. = $\frac{1}{2}$ of £1	15739	0	0	=val. at £1 each.
			9	
6s. 8d. = $\frac{1}{3}$ of £1	141651	0	0	=val. at £9 each.
1s. = $\frac{1}{10}$ of 10s.	7869	10	0	=val. at 10s. each.
1d. = $\frac{1}{12}$ of 1s.	5246	6	8	=val. at 6s. 8d. ea.
$\frac{1}{2}$ d. = $\frac{1}{2}$ of 1d.	786	19	0	=val. at 1s. each.
	65	11	7	=val. at 1d. each.
$\frac{1}{4}$ d. = $\frac{1}{2}$ of $\frac{1}{2}$ d.	32	15	9 $\frac{1}{2}$	=val. at $\frac{1}{2}$ d. each.
	16	7	10 $\frac{1}{4}$	=val. at $\frac{1}{4}$ d. each.
	£155668	10	11 $\frac{1}{4}$	=val. at £9 17s. 9 $\frac{1}{4}$ d.

$$(15) \ 50 \text{ cts.} = \frac{1}{2} \text{ of } \$1 \quad \begin{array}{r} \$27835.00 \\ \hline 9 \end{array} = \text{value at } \$1 \text{ each.}$$

$$12\frac{1}{2} \text{ cts.} = \frac{1}{4} \text{ of } 50 \text{ cts.} \quad \begin{array}{r} \$250515.00 \\ \hline 13917.50 \\ \hline 3479.37\frac{1}{2} \end{array} = \text{value at } \$9 \text{ each.}$$

$$13917.50 = \text{va.}^1 \text{ at } 50 \text{ cts. each.}$$

$$3479.37\frac{1}{2} = \text{va.}^1 \text{ at } 12\frac{1}{2} \text{ c. each.}$$

$$\begin{array}{r} \$267911.87\frac{1}{2} \\ \hline \end{array} = \text{va.}^1 \text{ at } \$9.62\frac{1}{2} \text{ each.}$$

$$(16) \ 50 \text{ cts.} = \frac{1}{2} \text{ of } \$1 \quad \begin{array}{r} \$37832.00 \\ \hline 18 \end{array} = \text{value at } \$1 \text{ each.}$$

$$20 \text{ cts.} = \frac{1}{5} \text{ of } \$1 \quad \begin{array}{r} \$680976.00 \\ \hline 18916.00 \\ \hline 7566.40 \\ \hline 7566.40 \end{array} = \text{value at } \$18 \text{ each.}$$

$$18916.00 = \text{va.}^1 \text{ at } 50 \text{ cts. each.}$$

$$7566.40 = \text{va.}^1 \text{ at } 20 \text{ cts. each.}$$

$$7566.40 = \text{va.}^1 \text{ at } 20 \text{ cts. each.}$$

$$\begin{array}{r} \$715034.80 \\ \hline \end{array} = \text{va.}^1 \text{ at } \$18.90 \text{ each.}$$

$$(17) \ 20 \text{ cts.} = \frac{1}{5} \text{ of } \$1 \quad \begin{array}{r} \$250215.00 \\ \hline \end{array} = \text{value at } \$1$$

$$5 \text{ cts.} = \frac{1}{4} \text{ of } 20 \text{ cts.} \quad \begin{array}{r} 50043.00 \\ \hline 12510.75 \\ \hline 10008.60 \end{array} = \text{value at } 20 \text{ cts.}$$

$$12510.75 = \text{value at } 5 \text{ cts.}$$

$$10008.60 = \text{value at } 4 \text{ cts.}$$

$$4 \text{ cts.} = \frac{1}{5} \text{ of } 20 \text{ cts.} \quad \begin{array}{r} \$72562.35 \\ \hline \end{array} = \text{value at } 29 \text{ cts.}$$

$$(18) \ 50 \text{ cts.} = \frac{1}{2} \text{ of } \$1 \quad \begin{array}{r} \$12815.00 \\ \hline \end{array} = \text{value at } \$1.$$

$$25 \text{ cts.} = \frac{1}{4} \text{ of } 50 \text{ cts.} \quad \begin{array}{r} 6407.50 \\ \hline 3203.75 \\ \hline 9611.25 \end{array} = \text{value at } 50 \text{ cts.}$$

$$3203.75 = \text{value at } 25 \text{ cts.}$$

$$9611.25 = \text{value at } 75 \text{ cts.}$$

$$(19) \ 10\text{s.} = \frac{1}{2} \text{ of } £1 \quad \begin{array}{r} £ \\ \text{s.} \\ \text{d.} \\ 4970 \quad 0 \quad 0 \end{array} = \text{value at } £1.$$

$$1\text{s.} = \frac{1}{10} \text{ of } 10\text{s.} \quad \begin{array}{r} 2485 \quad 0 \quad 0 \\ \hline 248 \quad 10 \quad 0 \\ \hline 20 \quad 14 \quad 2 \\ \hline 10 \quad 7 \quad 1 \end{array} = \text{value at } 10\text{s.}$$

$$1\text{d.} = \frac{1}{12} \text{ of } 1\text{s.} \quad 20 \quad 14 \quad 2 = \text{value at } 1\text{s.}$$

$$\frac{1}{2}\text{d.} = \frac{1}{24} \text{ of } 1\text{d.} \quad 10 \quad 7 \quad 1 = \text{value at } \frac{1}{2}\text{d.}$$

$$\begin{array}{r} £2764.11 \quad 3 \\ \hline \end{array} = \text{value at } 11\text{s. } 1\frac{1}{2}\text{d.}$$

$$(20) \ \frac{1}{2}\text{d.} = \frac{1}{2} \text{ of } 1\text{d.} \quad \begin{array}{r} \text{d.} \\ 83 \\ \hline 11 \end{array} = \text{value at } 1\text{d. per yd.}$$

$$\begin{array}{r} £3 \quad 16 \quad 1 \\ \hline 3 \quad 5\frac{1}{2} \\ \hline 3 \quad 19 \quad 6\frac{1}{2} \\ \hline 5\frac{1}{4} \end{array} = \text{value at } 11\text{d. per yd.}^1$$

$$3 \quad 5\frac{1}{2} = \text{value at } \frac{1}{2}\text{d. per yd.}$$

$$3 \quad 19 \quad 6\frac{1}{2} = \text{value at } 11\frac{1}{2}\text{d. per yd.}$$

$$\frac{1}{2} \text{ of } 11\frac{1}{2} =$$

$$\begin{array}{r} £4 \quad 0 \quad 0\frac{1}{4} \\ \hline \end{array} = \text{value of } 83\frac{1}{2} \text{ yds.}$$



	£ s. d.	
6d. = $\frac{1}{2}$ of 1s.	2 17 0	=value at 1s. per yd.
	1 8 6	=value at 6d. per yd.
4d. = $\frac{1}{3}$ of 1s.	19 0	=value at 4d. per yd.
	5 4 6	=value at 1s. 10d. per yd.
$\frac{1}{2}$ of 1s. 10d. =	1 4 $\frac{1}{2}$	
	£5 5 10 $\frac{1}{2}$	=value of 57 $\frac{1}{2}$ yds.
	s. d.	
$\frac{1}{2}$ d. = $\frac{1}{12}$ of 9d.	9 10	=value at 1d. per yd.
	9	
	4 8 6	=value at 9d. per yd.
	7 4 $\frac{1}{2}$	=value at $\frac{1}{2}$ d. per yd.
	£4 15 10 $\frac{1}{2}$	=value at 8 $\frac{1}{2}$ d. per yd.

£	s.	d.
4	0	0 $\frac{1}{2}$
5	5	10 $\frac{1}{2}$
4	15	10 $\frac{1}{2}$

£14 1 9 $\frac{1}{2}$  = total amount.

Ex. LXIX. (p. 126.)

(1) 20 lbs. = $\frac{1}{5}$ of 1 bus.	\$1.20 = value of 1 bushel.
	55
	\$66.00 = value of 55 bushels.
	40 = value of 20 lbs.
5 lbs. = $\frac{1}{4}$ of 20 lbs.]	10 = value of 5 lbs.
	\$66.50 = value of 55 b. 25 lbs.

	10 cts. = value of 1 lb.,
(2) 2 qrs. = $\frac{1}{2}$ of 1 cwt.	∴ \$10.00 = value of 1 cwt.
	16
	\$160.00 = value of 16 cwt.
	5.00 = value of 2 qrs.
10 lbs. = $\frac{1}{2}$ of 2 qrs.	.1.00 = value of 10 lbs.
10 lbs. = $\frac{1}{2}$ of 2 qrs.	1.00 = value of 10 lbs.
	\$167.00 = value of 16 cwt.
	2 qrs. 20 lbs.

(3) 2 ro. = $\frac{1}{2}$ of 1 ac.	\$15.50	= value of 1 ac.
	8	
	\$124.00	= value of 8 ac.
	12	
	\$1488.00	= value of 96 ac.
10 per. = $\frac{1}{3}$ of 2 ro.	7.75	= value of 2 ro.
	96870	= value of 10 per.
	\$1496.71875	= val. of 96 ac. 2 ro. 10 per.

(4) 10 dwt. = $\frac{1}{2}$ of 1 oz.	s. d.	
	7 1	= value of 1 oz.
	32	
2 dwt. = $\frac{1}{5}$ of 10 dwt.	£11 6 8	= val. of 2 lbs. 8 oz.
1 dwt. = $\frac{1}{5}$ of 2 dwt.	3 6 $\frac{1}{2}$	= value of 10 dwt.
	8 $\frac{1}{2}$	= value of 2 dwt.
	4 $\frac{1}{2}$	= value of 1 dwt.
	£11 11 3 $\frac{1}{2}$	= val. of 2 lbs. 8 oz. 13 dwt.

(5) 1 ft. 6 in. = $\frac{1}{2}$ of 1 yd.	s. d.	
1 foot = $\frac{1}{2}$ of 1 yard.	12 6	= value of 1 yd.
	15	
1 inch = $\frac{1}{12}$ of 1 foot.	£9 7 6	= value of 15 yds.
	6 3	= val. of 1 ft. 6 in.
	4 2	= value of 1 ft.
	4 $\frac{1}{2}$	= value of 1 in.
	£9 18 3 $\frac{1}{2}$	= value of 15 yds. 2 ft. 7 in.

(6) 72 in. = $\frac{1}{2}$ of 1 s. ft.	£ s. d.	
	1 7 0	= value of 1 s. ft.
	259	
	£349 13 0	= value of 259 s. ft. or 28 s. yds. 7 s. ft.
36 inches = $\frac{1}{2}$ of 72 in.	13 6	= value of 72 in.
2 inches = $\frac{1}{36}$ of 36 in.	6 9	= value of 36 in.
	4 $\frac{1}{2}$	= value of 2 in.
	£350 13 7 $\frac{1}{2}$	= val. of 28 s. yds. 7 s. ft. 110 in.

(7) 2 fur. = $\frac{1}{4}$ of 1 mi.	\$11000.00 = value of 1 mile.
	11
1 fur. = $\frac{1}{2}$ of 2 fur.	\$121000.00 = value of 11 mi.
	2750.00 = value of 2 fur.
	1375.00 = value of 1 fur.
55 yards = $\frac{1}{2}$ of 1 mi.	343.75 = value of 55 yds.
	\$125468.75 = value of 11 miles
	3 fur. 55 yds.

(8) $57\frac{1}{4}$ lbs. $\times 2 = 115$ lbs.
$73\frac{1}{4}$ lbs. $\times 3 = 221\frac{1}{4}$ lbs.

336 $\frac{1}{4}$  lbs. = 3 cwt. 36 $\frac{1}{4}$  lbs.

25 lbs. = $\frac{1}{4}$ of 1 cwt.	\$25.00 = value of 1 cwt.
	3
	\$75.00 = value of 3 cwt.
10 lbs. = $\frac{1}{10}$ of 1 cwt.	6.25 = value of 25 lbs.
1 lb. = $\frac{1}{10}$ of 10 lbs.	2.50 = value of 10 lbs.
$\frac{1}{4}$ lb. = $\frac{1}{4}$ of 1 lb.	.25 = value of 1 lb.
	.06 $\frac{1}{4}$ = value of $\frac{1}{4}$ lb.
	\$84.06 $\frac{1}{4}$ = value of 3 cwt. 36 $\frac{1}{4}$ lbs.

(9) 50 ft. = $\frac{1}{2}$ of 100 ft.	\$5.00 = value per 100 feet.
	34
	\$170.00 = value of 3400 feet.
10 feet = $\frac{1}{5}$ of 50 feet.	2.50 = value of 50 feet.
	.50 = value of 10 feet.
	\$173.00 = value of 3460 feet.

(10) 500 = $\frac{1}{2}$ of 1000	\$4.00 = value per 1000 bricks.
	24
	\$96.00 = value of 24000.
100 = $\frac{1}{5}$ of 500	2.00 = value of 500.
50 = $\frac{1}{2}$ of 100	.40 = value of 100.
	.20 = value of 50.
	\$98.60 = value of 24650.

$$(11) 500 = \frac{1}{2} \text{ of } 1000 \quad \begin{array}{r} \$10.25 \\ 40 \end{array} = \text{value per } 1000 \text{ ft.}$$

$$50 = \frac{1}{10} \text{ of } 500.$$

$$25 = \frac{1}{2} \text{ of } 50.$$

$$10 = \frac{1}{5} \text{ of } 50.$$

$$5 = \frac{1}{2} \text{ of } 10.$$

$$\begin{array}{r} \$471.50 \\ \hline \end{array} = \text{value of } 46000 \text{ ft.}$$

$$5 \cdot 125 = \text{value of } 500 \text{ feet.}$$

$$\cdot 5125 = \text{value of } 50 \text{ feet.}$$

$$\cdot 25625 = \text{value of } 25 \text{ feet.}$$

$$\cdot 1025 = \text{value of } 10 \text{ feet.}$$

$$\cdot 05125 = \text{value of } 5 \text{ feet.}$$

$$\begin{array}{r} \$477 \cdot 54750 \\ \hline \end{array} = \text{value of } 46590 \text{ ft.}$$

$$(12) \quad \begin{array}{r} 19\frac{1}{2} \\ 17 \end{array} \text{ cts.} = \text{value of } 1 \text{ yard.}$$

$$\frac{1}{2} \text{ of } 19\frac{1}{2} \text{ cts.} = \begin{array}{r} \$3.31\frac{1}{2} \\ 12\frac{3}{8} \end{array} = \text{value of } 17 \text{ yards.}$$

$$\begin{array}{r} \$3.43\frac{1}{8} \\ \hline \end{array} = \text{value of } 17\frac{1}{2} \text{ yards.}$$

$$\begin{array}{r} 55\frac{1}{2} \\ 35 \end{array} \text{ cts.} = \text{value of } 1 \text{ yard.}$$

$$\frac{2}{3} \text{ of } 55\frac{1}{2} = \begin{array}{r} \$19.42\frac{1}{2} \\ 31\frac{1}{2} \end{array} = \text{value of } 35 \text{ yards.}$$

$$\begin{array}{r} \$19.73\frac{3}{4} \\ \hline \end{array} = \text{value of } 35\frac{2}{3} \text{ yards.}$$

$$\begin{array}{r} 70\frac{1}{2} \\ 96 \end{array} \text{ cts.} = \text{value of } 1 \text{ yard.}$$

$$\frac{3}{4} \text{ of } 70\frac{1}{2} \text{ cts.} = \begin{array}{r} \$67.68 \\ 51\frac{3}{4} \end{array} = \text{value of } 96 \text{ yards.}$$

$$\begin{array}{r} \$68.19\frac{3}{4} \\ \hline \end{array} = \text{value of } 96\frac{3}{4} \text{ yards.}$$

$$\begin{array}{r} 32\frac{1}{2} \\ 104 \end{array} \text{ cts.} = \text{value } 1 \text{ yard.}$$

$$\frac{5}{8} \text{ of } 32\frac{1}{2} \text{ cts.} = \begin{array}{r} \$33.80 \\ 27\frac{1}{2} \end{array} = \text{value of } 104 \text{ yards.}$$

$$\begin{array}{r} \$34.07\frac{1}{2} \\ \hline \end{array} = \text{value of } 104\frac{1}{2} \text{ yards.}$$

$17\frac{1}{2}$  cts. = value of 1 yard.  
12

$\frac{2}{3}$  of  $17\frac{1}{2}$  cts. =

$\$2.07$  = value of 12 yards.  
 $.06\frac{1}{2}$

$\$2.13\frac{1}{2}$  = value of  $12\frac{2}{3}$  yards.

$\$ 3.43\frac{1}{8}$   
 $19.73\frac{3}{4}$   
 $68.19\frac{3}{4}$   
 $34.07\frac{1}{2}$   
 $2.13\frac{1}{2}$

$\$127.57\frac{5}{8}$  = total amount.

(13)

$12\frac{1}{2}$  cts. = value of 1 pound.  
25

$\frac{1}{3}$  of  $12\frac{1}{2}$  =

$\$3.12\frac{1}{2}$  = value of 25 lbs.  
 $10\frac{5}{6}$

$\$3.23\frac{1}{3}$  = value of  $25\frac{1}{3}$  lbs.

11 cts. = value of 1 pound.  
19

$\frac{1}{2}$  of 11 =

$\$2.09$  = value of 19 lbs.  
 $10\frac{1}{2}$

$\$2.19\frac{1}{2}$  = value of  $19\frac{1}{2}$  lbs.

$8\frac{1}{2}$  cts. = value of 1 pound.  
35

$\frac{2}{3}$  of  $8\frac{1}{2}$  =

$\$2.97\frac{1}{2}$  = value of 35 lbs.  
 $.07\frac{1}{6}$

$\$3.04\frac{1}{6}$  = value of  $35\frac{1}{3}$  lbs.

$6\frac{1}{2}$  cts. = value of 1 pound.  
17

$\frac{1}{2}$  of  $6\frac{1}{2}$  =  $\$1.10\frac{1}{2}$  = value of 17 lbs.  
.03 $\frac{1}{2}$

$\$1.13\frac{1}{4}$  = value of  $17\frac{1}{2}$  lbs.

$\$3.23\frac{1}{4}$   
2.19 $\frac{1}{2}$   
3.04 $\frac{1}{8}$   
1.13 $\frac{1}{4}$

$\$9.61\frac{1}{8}$  = total amount.

(14)  $12\frac{1}{2}$  cts. = value of 1 pound.  
17

$\frac{1}{3}$  of  $12\frac{1}{2}$  =  $\$3.12\frac{1}{2}$  = value of 17 lbs.  
.11 $\frac{1}{2}$

$\$2.23\frac{1}{8}$  = value of  $17\frac{8}{9}$  lbs.  
 $17\frac{1}{2}$  cts. = value of 1 pound.  
18

$\frac{2}{4}$  of  $17\frac{1}{2}$  =  $\$3.15$  = value of 18 lbs.  
.13 $\frac{1}{2}$

$\$3.28\frac{1}{3}$  = value of  $18\frac{2}{3}$  lbs.  
75 cts. = value of 1 pound.  
5

$\frac{1}{3}$  of 75 =  $\$3.75$  = value of 5 pound.  
.20 $\frac{5}{8}$

$\$3.95\frac{5}{8}$  = value of  $5\frac{1}{8}$  lbs.  
40 cts. = value of 1 pound.  
10

$\frac{4}{7}$  of 40 =  $\$4.00$  = value of 10 lbs.  
.28 $\frac{4}{7}$

$\$4.28\frac{4}{7}$  = value of  $10\frac{4}{7}$  lbs.

25 cts. = value 1 pound.  
7

$\frac{1}{2}$  of 25 =  $\frac{\$1.75}{.18\frac{1}{2}}$  = value of 7 lbs.

$\frac{\$1.93\frac{1}{4}}{\$2.23\frac{1}{2}}$  = value of 7 $\frac{1}{2}$  lbs.  
3.28 $\frac{1}{2}$   
3.95 $\frac{1}{2}$   
4.28 $\frac{1}{2}$   
1.93 $\frac{1}{4}$

$\$15.69\frac{1}{4}$  = total amount.

Ex. LXX. (p. 123.)

(1)  $\frac{\$217.25}{8}$   
 $\$17.3800 = \text{int.}$   
 $\$17.38 + \$217.25 = \$234.63$   
= amount.

(3)  $\frac{\$527.37\frac{1}{2}}{7}$   
 $\$36.91625$   
3

$\$110.74875 = \text{int.}$   
 $\$527.37\frac{1}{2} + \$110.74875 =$   
 $\$638.12375 = \text{amount.}$

(4)  $\frac{\$93.50}{6}$   
 $\$5.6100$   
2

$\$11.22 = \text{int.}$   
 $\$93.50 + \$11.22 = \$104.72$   
= amount.

(2)  $\frac{\$217.25}{8}$   
 $\$17.3800$   
2

$\$34.76 = \text{int.}$   
 $\$217.25 + \$34.76 =$   
 $\$252.01 = \text{amt.}$

(5)  $\frac{\$75.75}{7}$   
 $\$5.9025$   
 $5\frac{1}{2}$

$\$10.6050$   
 $2.65125$   
 $\$13.25625 = \text{int.}$   
 $\$75.75 + \$13.25625 =$   
 $\$89.00625 = \text{amt.}$

(6) £ 62 s. d.  
18 9½  
8

503 10 4  
3½

1510 11 0  
251 15 2

£1762 7 2  
20

12·47s.  
12

5·66d.  
4

2·64q.

£17 12s. 5½d. = interest.  
£62 18s. 9½d. + £17 12s. 5½d.  
= £80 11s. 3d. = amt.

(9) £7500  
3½

22500  
9375

£234·375

£234·375  
174

937500  
1640625  
234375

(7) \$1075.75  
8

\$86·0600  
4½

\$344.24  
21·515

\$365·755 = int.  
\$1075.75 + \$365·755 =  
\$1441·505 = amt.

(8) \$684.00  
8

\$54·7200  
5

\$273.60

12 : 8 :: \$54.72 : int. for 8  
mos.; \$  $\frac{54.72 \times 8}{12}$  = \$36.48.

\$273.60 + \$36.48 = \$310.08  
= interest.

\$684.00 + \$310.08 =  
\$994.08 = amt. pt.

No. of days from May 5th  
to October 26th = 174.

365 : 174 :: £234·375 :  
interest req<sup>d</sup>. ∴ Int. req<sup>d</sup>.

= £  $\frac{234·375 \times 174}{365}$  ;

£40781·250, or £40781 5s. ;  
(Continued on next page.)



£ s. £ s. d.  
 365(40781 5(111 14 7 $\frac{1}{3}$  = interest.  
 365

£7500 + £111 14s. 7 $\frac{1}{3}$ d. =  
 £7611 14s. 7 $\frac{1}{3}$ d. = amt.

428  
 365

631  
 365

1675  
 1460

266  
 20

215  
 12

5325  
 365

2580  
 2555

1675

3 $\frac{1}{3}$  =  $\frac{1}{3}$

(10) £ s. d.  
 4865 11 5  
 5 $\frac{1}{2}$

24327 17 1  
 1824 11 9 $\frac{1}{2}$

26152 8 10 $\frac{1}{2}$  ÷ 100 = £261 10s. 5 $\frac{1}{2}$ 86375d. ;

Number of days from Jan. 1st to Aug. 28th, 1868 =  
 240. 366 : 240 :: £261 10s. 5 $\frac{1}{2}$ 86375d. : interest req<sup>d</sup>.

∴ Interest req<sup>d</sup>. = £  $\frac{261 \text{ 10s. } 5 \cdot 86375 \text{d} \times 240}{366}$  = £171 9s.

9 $\cdot$ 94d. Amount = £4865 11s. 5d. + £171 9s. 9 $\cdot$ 94d. =  
 £5037 1s. 2 $\cdot$ 94d.

(11) Interest = amt. - principal = \$994.56 - \$672.00  
 = \$322.56. Interest on \$672.00 at 8 per cent. for one  
 year = \$53.76.

Hence, \$53.76 : \$322.56 :: 1 year : time required.

∴ Time required =  $\frac{32256 \times 1}{5376}$  years = 6 years.

(12) \$816 : 100 ::  $\frac{1}{2}$  of \$346.80 : rate required.

∴ Rate required =  $\frac{69 \cdot 36 \times 100}{816}$  = 8 $\frac{1}{2}$ .

(13) £100 will amount in 15 months at 5 per cent. to £106 5s. Hence, £106 5s. : £138 2s. 6d. (given amt.)  
 ∴ £100 : sum required.

$$\therefore \text{Sum required} = \frac{100 \times 33150}{25500} = £130.$$

(14)	£	fl.	c.	m.
	578	3	1	2½
				2½

1156	6	2	50
289	1	5	625

14·45	7	8	125
			2½

28·91	5	6	250
3·61	4	4	53125

$$£32·53 \ 0 \ 0 \ 78125 = £32 \ 5\text{fl.} \ 3\text{c.} \ 0·078125\text{m.}$$

(15) \$2293.75 : \$100 ∴  $\frac{1}{4}\%$  of \$2293.75 : rate req<sup>d</sup>.

$$\therefore \text{Rate required} = \frac{91·75 \times 100}{2293·75} = 4.$$

Ex. LXXI. (p. 130.)

$$(2) \quad \begin{array}{r} \$742 \\ \underline{\quad\quad} \\ 8 \end{array}$$

$$\begin{array}{r} \$59.36 = \text{int. for 1}^{\text{st}} \text{ yr.} \\ \therefore \$801.36 = 2^{\text{nd}} \text{ principal.} \\ \underline{\quad\quad} \\ 8 \end{array}$$

$$(1) \quad \begin{array}{r} \$800 \\ \underline{\quad\quad} \\ 7 \end{array}$$

$$\begin{array}{r} \$56.00 = \text{int. for 1}^{\text{st}} \text{ yr.} \\ \therefore \$856.00 = 2^{\text{nd}} \text{ principal.} \\ \underline{\quad\quad} \\ 7 \end{array} \quad \begin{array}{r} \$64.1088 = \text{int. for 2}^{\text{nd}} \text{ yr.} \\ \therefore \$865.4688 = 3^{\text{rd}} \text{ principal.} \\ \underline{\quad\quad} \\ 8 \end{array}$$

$$\begin{array}{r} \$59.92 = \text{int. for 2}^{\text{nd}} \text{ yr.} \\ \therefore \text{Comp. int.} = \$56.00 + \\ \$59.92 = \$115.92. \quad \text{Amt.} = \\ \$800 + \$115.92 = \$915.92. \end{array} \quad \begin{array}{r} \$69.237504 = \text{int. for 3}^{\text{rd}} \text{ yr.} \\ \therefore \text{Comp. int.} = \$59.36 + \\ \$64.1088 + \$69.237504 = \\ \$192.70 +. \quad \text{Amt.} = \$742 + \\ \$192.70 + = \$934.70 +. \end{array}$$

(3) \$560  
10

\$56.00 = int. for 1<sup>st</sup> yr.

∴ \$616.00 = 2<sup>nd</sup> principal.  
10

\$61.60 = int. for 2<sup>nd</sup> yr.

∴ \$677.60 = 3<sup>rd</sup> principal.  
10

\$67.76 = int. for 3<sup>rd</sup> yr.

∴ \$745.36 = 4<sup>th</sup> prinl.  
10

\$74.536 = int. for 4<sup>th</sup> yr.

∴ \$819.896 = 5<sup>th</sup> principal.  
10

\$81.9896 = int. for 5<sup>th</sup> year.

\$81.9896

\$74.536

\$67.76

\$61.60

\$56.00

\$341.8856 = comp. int.,

or \$341.88 +. Amt. = \$341.88

+ \$560 = \$901.88 +.

(4)

1st pay't of int. = \$308.

$\times \frac{1\frac{1}{2}}{100} = \$4.62$

2nd pay't of int. = \$312.62

$\times \frac{1\frac{1}{2}}{100} = \$4.6893$

3rd pay't of int. = \$317.3093

$\times \frac{1\frac{1}{2}}{100} = \$4.7596395$

4th pay't of int. = \$322.1689395

$\times \frac{1\frac{1}{2}}{100} = \$4.8335340925$

5th pay't of int. = \$327.0024735925

$\times \frac{1\frac{1}{2}}{100} = \$4.9050371088875$

6th pay't of int. = \$331.9075107013875

$\times \frac{1\frac{1}{2}}{100} = \$4.9786126605208125$

∴ Comp. interest = \$28.7861233619083125

or, \$28.78 +.

∴ Amount = \$308.00 + \$28.78 + = \$336.78 +.

(5)

$$\begin{aligned}
 \text{1st pay't of interest} &= \$610. & \times \frac{1}{100} &= \$24.40 \\
 \text{2d pay't of interest} &= \$634.40 & \times \frac{1}{100} &= \$25.376 \\
 \text{3d pay't of interest} &= \$659.776 & \times \frac{1}{100} &= \$26.39104 \\
 \text{4th pay't of interest} &= \$686.16704 & \times \frac{1}{100} &= \$27.4466816
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{Comp. interest} &= \$103.6137216 \\
 &\underline{\$610.00}
 \end{aligned}$$

$$\text{Amount} = \$713.61+.$$

(6)

$$\begin{aligned}
 \text{1st pay't of int.} &= \$1000. & \times \frac{3\frac{1}{2}}{100} &= \$35. \\
 \text{2d pay't of int.} &= \$1035. & \times \frac{3\frac{1}{2}}{100} &= \$36.225 \\
 \text{3d pay't of int.} &= \$1071.225 & \times \frac{3\frac{1}{2}}{100} &= \$37.492875 \\
 \text{4th pay't of int.} &= \$1108.717875 & \times \frac{3\frac{1}{2}}{100} &= \$38.805125625 \\
 \text{5th pay't of int.} &= \$1147.523000625 & \times \frac{3\frac{1}{2}}{100} &= \$40.163305021875 \\
 \text{6th pay't of int.} &= \$1187.68630534375 & \times \frac{3\frac{1}{2}}{100} &= \$41.56902070453125
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{Comp. interest} &= \$229.25532635140625 \\
 &\text{or } \$229.25+.
 \end{aligned}$$

$$\text{Amount} = \$1000 + 229.25 \dots = \$1229.25\dots$$

(7)

	£62.678
	£61.60
	<hr style="width: 50%; margin-left: auto; margin-right: 0;"/>
( <sup>1</sup> ) £880	£1.078
3½	20
<hr style="width: 50%; margin-left: 0; margin-right: auto;"/>	<hr style="width: 50%; margin-left: auto; margin-right: 0;"/>
2640	1.560s.
440	12
<hr style="width: 50%; margin-left: 0; margin-right: auto;"/>	<hr style="width: 50%; margin-left: auto; margin-right: 0;"/>
£30.80	6.72d.
2	4
<hr style="width: 50%; margin-left: 0; margin-right: auto;"/>	<hr style="width: 50%; margin-left: auto; margin-right: 0;"/>
£61.60 = simple int.	2.88q.

$$\text{£1 1s. 6½d. 88q.}$$

(Continued on next page.)

(7 continued.)

(1) £880  
3½

£30·8 = int. for 1st yr.  
 ∴ £910·8 = 2d principal.  
3½

£31·878 = int. for 2<sup>nd</sup> yr.  
 £30·8 + £31·878 = comp. int.  
 = £62·678.

(2) £178·7116  
171·75

£6·9616  
20

19·232s.  
12

2·784d.  
4

3·136q.

£6 19s. 2½d. 136q.

(2) £1431·25  
4

£57·2500  
3

£171·75 = simp. int.

£1431·25  
4

£57·25 = int. for 1st yr.  
 ∴ £1488·5 = 2d principal.  
4

£59·54 = int. for 2d yr.  
 ∴ £1548·04 = 3d principal.  
4

£61·9216 = int. for 3d yr.  
 £59·54  
 £57·25

£178·7116 = comp. interest.

Ex. LXXII. (p. 133.)

(1) \$108 : \$216 :: \$100 : present worth.

∴ Present worth =  $\$ \frac{100 \times 216}{108} = \$200.$

(2) \$121 : \$968 :: \$100 : present worth.

∴ Present worth =  $\$ \frac{100 \times 968}{121} = \$800.$

(3) \$103 : \$1236 :: \$100 : present worth.

∴ Present worth =  $\$ \frac{100 \times 1236}{103} = \$1200.$

(4) \$107.50 : \$225.25 :: \$100 : present worth.

$$\therefore \text{Present worth} = \$ \frac{100 \times 225.25}{10750} = \$209.53+.$$

(5) \$117.50 : \$1057.50 : \$100 : present worth.

$$\therefore \text{Present worth} = \$ \frac{100 \times 1057.50}{11750} = \$900.$$

(6) £125 : £161 13s. 5½d. :: £100 : present worth.

$$\therefore \text{Present worth} = £ \frac{100 \times 155205}{120000} = £129 \text{ 6s. 9d.}$$

(7) £107 18s. 4d. : £193 17s. 4½d. :: £100 : present worth.

$$\therefore \text{Present worth} = £ \frac{100 \times 186113}{103600} = £179 \text{ 12s. } 10\frac{1}{4}\text{d.}$$

$$2\frac{2}{3}\frac{3}{4}\text{q.}$$

(8) £100 8s. 5¾d. : £458 8s. 9½d. :: £100 : present worth.

$$\therefore \text{Present w'th} = £ \frac{100 \times 440101}{1759440} = £ \frac{440101 \times 100 \times 73}{4 \times 1759440}$$

$$= £456 \text{ 9s. } 11\frac{1}{2}\text{d. } 7\frac{1}{3}\frac{1}{4}\text{q.}$$

(9) \$124 : \$217 :: \$24 : discount.

$$\therefore \text{Discount} = \$ \frac{217 \times 24}{124} = \$42.$$

(10) \$110.50 : \$221 :: \$10.50 : discount.

$$\therefore \text{Discount} = \$ \frac{1050 \times 221}{11050} = \$2100.$$

(11) \$105 : \$2000 :: \$5 : discount.

$$\therefore \text{Discount} = \$ \frac{5 \times 2000}{105} = \$95.23\frac{1}{7}.$$

(12) \$106 : \$1750 :: \$6 : discount.

$$\therefore \text{Discount} = \$ \frac{6 \times 1750}{106} = \$99.05\frac{2}{5}.$$

(13) £100 18s. 10 $\frac{1}{3}$ d. : £345 16s. 3d. :: 18s. 10 $\frac{1}{3}$ d.  
: discount.

$$\therefore \text{Dis't} = \frac{16512 \times 6058635}{1768512} \text{d.} = \frac{16512 \times 6058635 \times 73}{73 \times 73 \times 1768512} \text{d.} = 2137570 \text{d.} = \text{£}3 \text{ 4s. } 6\frac{1}{2} \text{d. } 5\frac{2}{3} \text{q.}$$

(14) £100 $\frac{2}{3}$  : £549 :: £ $\frac{3}{4}$  : discount.

$$\therefore \text{Discount} = \text{£} \frac{40077 \times 32 \times 73}{7332 \times 73 \times 73} = \text{£}2 \text{ 7s.}$$

11d.  $\frac{1}{6}$ q.

Also, £100 : £549 :: £ $\frac{3}{4}$  : interest on £549.

$$\therefore \text{Interest} = \text{£} \frac{549 \times 32}{100 \times 73} = \text{£}2 \text{ 8s. } 1\frac{1}{2} \text{d. } \frac{1}{6} \text{q.}$$

$$\text{£}2 \text{ 8s. } 1\frac{1}{2} \text{d. } \frac{1}{6} \text{q.} - \text{£}2 \text{ 7s. } 11 \text{d. } \frac{1}{6} \text{q.} = 2\frac{1}{2} \text{d. } \frac{1}{6} \text{q.}$$

(15) £100 $\frac{1}{3}$  : £450 :: £ $\frac{1}{4}$  : discount.

$$\therefore \text{Discount} = \text{£} \frac{32850 \times 73 \times 45}{7345 \times 73 \times 73} = \text{£}2 \text{ 15s.}$$

1 $\frac{1}{4}$ q.

Also, £100 : £450 :: £ $\frac{1}{4}$  : interest.

$$\therefore \text{Interest} = \text{£} \frac{450 \times 45}{100 \times 73} = \text{£}2 \text{ 15s. } 5\frac{1}{2} \text{d.}$$

$$\text{£}2 \text{ 15s. } 5\frac{1}{2} \text{d.} - \text{£}2 \text{ 15s. } 1\frac{1}{4} \text{q.} = 4\frac{1}{4} \text{d.}$$

(16) In 18 months the tradesman allows 5s. or 3s. 4d. per year on £3 6s. 8d., that is  $\frac{1}{20}$  of the whole.

Then 1 :  $\frac{1}{20}$  :: 100 : rate of discount.  $\therefore$  Rate =  $\frac{100 \times 1}{1 \times 20} = 5$  per cent.

EX. LXXIII. (p. 137.)

(1) \$126.50 : \$527.25 :: \$100 : amount required.

$$\therefore \text{Amount reqd.} = \$ \frac{52725 \times 100}{12650} = \$416.79+$$

(2) \$102.50 : \$800 :: \$100 : amount required.

$$\therefore \text{Amount required} = \$ \frac{800 \times 100}{102.50} = \$780.48\frac{1}{2}$$

(3) \$100 : \$1556 :: \$98 : required value.

$$\therefore \text{Value} = \$ \frac{98 \times 1556}{100} = \$1524.88.$$

(4) \$99 : \$525.50 :: \$7 : required income.

$$\therefore \text{Required income} = \$ \frac{52550 \times 7}{99} = \$27.15\frac{5}{9}.$$

(5) \$7\frac{1}{2} : \$900 :: \$125\frac{1}{3} : income required.

$$\therefore \text{Income} = \$ \frac{5023 \times 900 \times 2}{15 \times 40} = \$15069.$$

(6) \$100 : \$2140 :: \$65 : amount required.

$$\therefore \text{Amount required} = \$ \frac{65 \times 2140}{100} = \$1391.$$

(7) (1) £90\frac{3}{4} : £666 8s. 3d. :: £3 : gross income.

$$\therefore \text{Income} = £ \frac{666 \text{ 8s. 3d.} \times 3}{90\frac{3}{4}} = £22.$$

Income tax = (22 × 4)d. = 88d. = 7s. 4d. Net income = £22 - 7s. 4d. = £21 12s. 8d. Half-yearly gain = £21 12s. 8d. ÷ 2 = £10 16s. 4d.

(2) Income tax on £100 = (100 × 4)d. = 400d. = £1 13s. 4d.; ∴ £100 income would yield £100 - £1 13s. 4d. = £98 6s. 8d., or £98\frac{1}{2}. Hence, £90\frac{3}{4} : £98\frac{1}{2} :: £3 : req<sup>d</sup>. rate.

$$\therefore \text{Req<sup>d</sup>. rate} = £ \frac{3 \times 98\frac{1}{2}}{90\frac{3}{4}} = £ \frac{3 \times 295 \times 8}{3 \times 727} = £3 \text{ 4s. } 11\frac{6}{7} \text{ d.}$$

(8) £136 : £100 :: £8 : required rate.

$$\therefore \text{Rate required} = \frac{8 \times 100}{136} = 5.88 + \text{ or nearly 6 per ct.}$$

(9) £136 : £100 :: £8 : Int. received from *B* of Montreal.

$$\therefore \text{Rate of Interest} = \frac{100 \times 8}{136} = 5.88 +$$

£104 : £100 :: £7.5 : Int. received from *B* of Toronto.

$$\therefore \text{Rate of Interest} = \frac{7.5 \times 100}{104} = 7.21 +$$

Therefore the Bank of Toronto is the better investment.



(10) £93 : £4650 :: £100 : quantity of 3 per cent. stock bought.

$$\therefore \text{Quantity of stock bought} = \pounds \frac{4650 \times 100}{93} = \pounds 5000.$$

The stock stood at 93: now having fallen  $\frac{1}{4}$  per cent., it stands at  $92\frac{3}{4}$ .

$\therefore 100 : 5000 :: 92\frac{3}{4} : \text{value of stock.}$

$$\therefore \text{Value of stock} = \pounds \frac{5000 \times 92\frac{3}{4}}{100} = \pounds 4625$$

$$\therefore \text{Loss of property} = \pounds 4650 - \pounds 4625 = \pounds 25.$$

(11) £90 $\frac{1}{2}$  : £99 $\frac{1}{2}$  :: £29000 : quantity of 3 per cent. stock.

$$\therefore \text{Quantity of 3 per cent stock} = \pounds \frac{29000 \times 99 \times 8}{725} = \pounds 31680.$$

$$\text{1st income} = \pounds \frac{29000 \times 3\frac{1}{2}}{100} = \pounds 1015$$

$$\text{2d income} = \pounds \frac{31680 \times 3}{100} = \pounds 950 \text{ 8s.}$$

$$\therefore \text{Loss} = \pounds 1015 - \pounds 950 \text{ 8s.} = \pounds 64 \text{ 12s}$$

(12) \$115 : \$2000 :: \$8 : gain.

$$\therefore \text{Gain} = \$ \frac{2000 \times 8}{115} = \$ 139\frac{1}{3}$$

(13) £100 : £95 :: £5000000 : value of in. £5000000 in 3 per cts.

$$\therefore \text{Value} = \pounds \frac{5000000 \times 95}{100} = \pounds 4750000.$$

$$\text{Amount still due} = \pounds 5016000 - \pounds 4750000 = \pounds 266000.$$

£3 : £3 $\frac{1}{2}$  :: £95 : value of the 3 $\frac{1}{2}$  per cents.

$$\therefore \text{Value} = \pounds \frac{3\frac{1}{2} \times 95}{3} = \pounds 110\frac{1}{6}$$

£110 $\frac{1}{6}$  : £100 :: £266000 : amount of 3 $\frac{1}{2}$  per cent. stock.

$$\therefore \text{Amount of 3}\frac{1}{2} \text{ stock} = \pounds \frac{266000 \times 100}{110\frac{1}{6}} = \pounds 240000$$

(14) £93½ : £18700 :: £3½ : income.

$$\therefore \text{Income} = \pounds \frac{18700 \times 3\frac{1}{2}}{93\frac{1}{2}} = \pounds 700.$$

½ of £18700 = £9350; ¼ of £18700 = £4675;

∴ £96 : £3740 :: £4 : income from 1st investment.

$$\therefore \text{Income} = \pounds \frac{3740 \times 4}{96} = \pounds 155 \text{ 16s. 8d.}$$

£90 : £14960 :: £3 : income from 2d investment.

$$\therefore \text{Income} = \pounds \frac{14960 \times 3}{90} = \pounds 498 \text{ 13s. 4d.}$$

∴ total income = £155 16s. 8d. + £498 13s. 4d. = £654 10s.

Hence loss = £700 - £654 10s. = £45 10s.

This question may be solved by obtaining the am't of stock in each case and then the incomes.

(15) £91 : £5460 :: £100 : am't of 3 per cent. st'k.

$$\therefore \text{Amount} = \pounds \frac{100 \times 5460}{91} = \pounds 6000.$$

£100 : £93½ :: £2000 : produce from 1st sale.

$$\therefore \text{Produce} = \pounds \frac{2000 \times 93\frac{1}{2}}{100} = \pounds 1870.$$

£100 : £85 :: £4000 : produce from 2d sale.

$$\therefore \text{Produce} = \pounds \frac{4000 \times 85}{100} = \pounds 3400;$$

∴ total amount realized = £3400 + £1870 = £5270.

£102 : £5720 :: £100 : amount of 4½ per cent. st'k.

$$\therefore \text{Amount} = \pounds \frac{5720 \times 100}{102} = \pounds 5166 \text{ 13s. 4d.}$$

$$\text{Income from 3 per cent. stock} = \pounds \frac{6000 \times 3}{100} = \pounds 180.$$

$$\text{Income from 4½ per ct. st'k} = \pounds \frac{5166 \text{ 13s. 4d.} \times 4\frac{1}{2}}{100} =$$

£232 10s.

$$\therefore \text{Gain} = \pounds 232 \text{ 10s.} - \pounds 180 = \pounds 52 \text{ 10s.}$$

(16) £3 : £350 :: £100 : is to amount invested in 3 per cents.

$$\therefore \text{Amount invested} = \text{£} \frac{100 \times 350}{3} = \text{£}11666\frac{2}{3}$$

£100 : £11666 $\frac{2}{3}$  :: £87 $\frac{1}{2}$  : value of 3 per cent. stock.

$$\therefore \text{Value} = \text{£} \frac{349 \times 35000}{100 \times 3 \times 4} = \text{£}10179\frac{1}{2}$$

£104 $\frac{1}{2}$  : £10179 $\frac{1}{2}$  :: £5 : income from 5 per cents.

$$\therefore \text{income from 5 per cents} = \text{£} \frac{5 \times 61075 \times 8}{839 \times 3} =$$

£485 5s. 11 $\frac{1}{2}$ d.  $\frac{897}{3}$ q.

$$\text{£}485 \text{ 5s. } 11\frac{1}{2}\text{d. } \frac{897}{3}\text{q.} - \text{£}350 = \text{£}135 \text{ 5s. } 11\frac{1}{2}\text{d. } \frac{897}{3}\text{q.}$$

## Ex. LXXIV. (p. 141.)

(1) \$100 : \$4300 ::  $\frac{1}{2}$  : commission required.

$$\therefore \text{Commission} = \$ \frac{4300 \times \frac{1}{2}}{100} = \$5.37\frac{1}{2}$$

(2) \$100 : \$9626.55 :: \$2.60 : premium required.

$$\therefore \text{Premium required} = \$ \frac{2.60 \times 9626.55}{100} = \$250.2903.$$

(3) \$1560 stock : \$100 stock :: \$4.60 : per cent.

$$\therefore \text{Per cent.} = \frac{4.60 \times 100}{1560} = \$\frac{1150}{390} = 29\frac{1}{3}\text{ cts.}$$

per cent.

(4) \$2.40 : \$100 :: \$45.60 : sum required.

$$\therefore \text{Sum required} = \$ \frac{45.60 \times 100}{2.40} = \$1900.$$

(5) 25 yds.  $\times$  36 = 900 yds. : 900 yds. at 10 $\frac{1}{2}$ d per yd. = £39 7s. 6d.

(1) £39 7s. 6d. - (£32 16s. 3d. + 6s. 3d.) = £6 5s. = whole gain.

(2) £33 2s. 6d. : £100 :: £6 5s. : required gain per cent.

$$\therefore \text{gain per cent.} = \frac{24000 \times 125}{7950}\text{s.} = \text{£}18 \text{ 17s. } 2\frac{1}{2}\text{d. } \frac{11}{3}\text{q.}$$

(6) Cost of 1280 bus. at \$1.20 per bus. = \$1536.00

(1)  $(1280 \times 3\frac{1}{4})$ cts. = carriage etc. expenses = \$48.00.

Total expenses = \$1536.00 + \$48.00 = \$1584.00.

1280 bus. at \$1.40 per bushel = \$1792 = selling price.

$\therefore$  Gain = \$1792 - \$1584 = \$208;

(2) \$1584 : \$100 :: \$208 : gain per cent.

$\therefore$  Gain per cent. =  $\frac{100 \times 208}{1584} = \$13\frac{1}{3}$

(3) Also to have gained \$400 he should have sold the wheat for \$1584 + \$400 = \$1984.

And \$1984 ÷ 1280 = \$1.55 = required price per bus.

(7) (1) If he buys for 6s. 8d. and sells for 7s. 4d. he gains 8d.

$\therefore$  6s. 8d. : 100d. :: 8d. : required gain per cent.

$\therefore$  Gain per cent. =  $\frac{8 \times 100}{80} = 10$  per cent.

Also if he buys for 7s. 4d. and sells for 6s. 8d. he loses 8d.

(2)  $\therefore$  7s. 4d. : 100d. :: 8d. : required loss per cent.

$\therefore$  Loss per cent. =  $\frac{8 \times 100}{88} = 9\frac{1}{11}$  per cent. = £9 1s.

9½d.  $\frac{2}{11}$ q.

(8) If it cost \$96 per cwt. the price per lb. will be 96 cents.

$\therefore$  \$100 : \$125 :: 96 cents : price required.

$\therefore$  Price required =  $\frac{96 \times 125}{100}$  cents = \$120

(9) \$6 per cwt. = 6 cents per lb.

$\therefore$  Gain per lb. = (10 - 6)d. = 4 cents.

6 cents : \$100 :: 4 cents : gain per cent.

$\therefore$  Gain per cent. =  $\frac{10000 \times 4}{6} = \$66.66\frac{2}{3} = 66\frac{2}{3}$  per ct.

(10) £100 : 112½ :: 4s. 8d. : required price.

$\therefore$  Required price =  $\frac{56 \times 112\frac{1}{2}}{100}$ d. = 63d. = 5s. 3d.

(11) £112½ : 4s. 8d. :: £1000 : prime cost.

$$\therefore \text{Prime cost} = \frac{24000 \times 56}{27000} \text{d.} = 4\text{s. } 1\frac{1}{2}\text{d. } \frac{1}{4}\text{q.}$$

(12) 40 lbs. @ 84c. = \$33.60

44 lbs. @ 93c. = \$40.92

55 lbs. @ \$1.08 = \$59.40

Total cost = \$133.92

$\therefore$  Gain = \$188.16 - \$133.92 = \$54.24.

\$133.92 : \$100 :: \$54.24 : required gain per cent.

$$\therefore \text{Gain} = \frac{100 \times 54.24}{133.92} = 40\frac{1}{2}\frac{1}{4}\text{ per cent.}$$

(13) 26 lbs. @ 5s. 3d. cost £6 16s. 6d.

32 lbs. @ 5s. 7d. cost £8 18s. 8d.

36 lbs. @ 6s. 1d. cost £10 19s.

$\therefore$  94 lbs. cost £26 14s. 2d.

£100 : £40 :: £26 14s. 2d. : gain.

$$\therefore \text{Gain} = \frac{6410 \times 40}{100} \text{d.} = £10 13\text{s. } 8\text{d.}$$

$\therefore$  Selling price will be £26 14s. 2d. + £10 13s. 8d. = £37 7s. 10d.

$\therefore$  Price per lb. will be £37 7s. 10d. ÷ 94 = 7s. 11½d. ¼q.

(14) £90 : £100 :: 15s. : buying price.

$$\therefore \text{Buying price} = \frac{15 \times 100}{90} \text{s.} = 16\text{s. } 8\text{d.}$$

£100 : £110 :: 16s. 8d. : required selling price.

$$\therefore \text{Required price} = \frac{200 \times 110}{100} \text{d.} = 220\text{d.} = 18\text{s. } 4\text{d.}$$

(15) He gains on 11 eggs the price of 7 eggs.

$\therefore$  11 : 7 :: £100 : required gain.

$$\therefore \text{Gain} = \frac{100 \times 7}{11} = £63 12\text{s. } 8\frac{1}{2}\text{d. } \frac{1}{4}\text{q.}$$

(16) \$130 : \$100 :: \$1.56 : cost price.

$$\therefore \text{Cost price} = \$ \frac{1.56 \times 100}{130} = \$1.20.$$

## Ex. LXXV. (p. 142.)

(1)	(2)	(3)
104	\$4.25	87·8
96	\$5.75	87·7
92	\$6.60	87·6
90	\$7.80	86·5
82	\$3.50	85·0
81	\$5.58	84·5
6) 545	6) \$33.48	83·8
90·83̄	\$5.58	78·0
		77·9
		77·6
		10) 836·7
		83·67

(4)

United ages of 17 children = 102 years.

United ages of 26 children = 195 years.

United ages of 35 children = 323·75 years.

United ages of 20 children = 200 years.

United ages of 8 children = 98 years.

∴ United ages of 106 = 918·75 years.

∴ Average age = 918·75 years ÷ 106 = 8·667 ... years.

(5)

United ages of 27 men = 1539 years.

United ages of 11 men = 583 years.

United ages of 8 men = 474 years.

∴ United ages of 19 men = 1057 years.

∴ The united ages of the remaining 8 men = (1539 - 1057) years = 482 years. ∴ The average age = 482 ÷ 8 = 60½ years.

(5)  $100 : 112 :: 31526 : \text{population of 1st in 1861.}$

$$\therefore \text{Population} = \frac{31526 \times 112}{100} = 35085.12.$$

$100 : 110 :: 42324 : \text{population of 2d in 1861.}$

$$\therefore \text{Population} = \frac{42324 \times 110}{100} = 46556.4.$$

$100 : 82 :: 6706 : \text{population of 3d in 1861.}$

$$\therefore \text{Population} = \frac{6706 \times 82}{100} = 5498.92.$$

$\therefore \text{United population in 1861} = 35085.12 + 46556.4 + 5498.92 = 87140.44.$

$$\therefore \text{Average population} = 87140.44 \div 3 = 29046.81\bar{3}.$$

(7) Whole gain from 1853 to 1863 = £184 11s. 6d.  $\times$  11 = £2030 6s. 6d.

£2030 6s. 6d. + £151 9s. 10d. = whole gain = £2181 16s. 4d.

£2181 16s. 4d. - £76 8s. 4d. = £2105 8s. = whole gain during 11 years.  $\therefore$  Average gain = £2105 8s.  $\div$  11 = £191 8s.

EX. LXXVI. (p. 145.)

(1)  $(1) 2+3+4 = 9.$

$9 : 12 :: 1008 : \text{1st part.}$

$$\therefore \text{1st part} = \frac{1008 \times 2}{9} = 224.$$

$9 : 3 :: 1008 : \text{2d part.}$

$$\therefore \text{2d part} = \frac{1008 \times 3}{9} = 336.$$

$9 : 4 :: 1008 : \text{3d part.}$

$$\therefore \text{3d part} = \frac{1008 \times 4}{9} = 448.$$

(2)  $5+11+16 = 32.$

$32 : 5 :: \$260 : \text{1st part.}$

$$\therefore \text{1st part} = \$ \frac{260 \times 5}{32} = \$40.62\frac{1}{2}.$$

(Continued on next page.)

(1 Continued.)

$$32 : 11 :: \$260 : 2d \text{ part.}$$

$$\therefore 2d \text{ part} = \$ \frac{260 \times 11}{32} = \$89.37\frac{1}{2}.$$

$$32 : 16 :: \$260 : 3d \text{ part.}$$

$$\therefore 3d \text{ part} = \$ \frac{260 \times 16}{32} = \$130.$$

$$^{(3)} 11 : 5 :: 145 \text{ ac., } 3 \text{ ro., } 33 \text{ po.} : \text{share of 1st.}$$

$$\therefore \text{Share of 1st.} = \frac{145 \text{ ac., } 3 \text{ ro., } 33 \text{ po.} \times 5}{11} = 66 \text{ ac.,}$$

1 ro., 15 po.

$$11 : 6 :: 145 \text{ ac., } 3 \text{ ro., } 33 \text{ po.} : \text{share of 2d.}$$

$$\therefore \text{Share of 2d} = \frac{145 \text{ ac., } 3 \text{ ro., } 33 \text{ po.} \times 6}{11} = 79 \text{ ac., } 2 \text{ ro.,}$$

18 po.

$$^{(4)} \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} = \frac{77}{60}.$$

$$\frac{77}{60} : \frac{1}{2} :: £110 : \text{share of 1st.}$$

$$\therefore \text{Share of 1st.} = £ \frac{110 \times 60}{77 \times 2} = £42 \text{ } 17\text{s. } 1\frac{1}{2}\text{d. } \frac{2}{3}\text{q.}$$

$$\frac{77}{60} : \frac{1}{3} :: £110 : \text{share of 2d.}$$

$$\therefore \text{Share of 2d} = \frac{110 \times 60}{77 \times 3} = £28 \text{ } 11\text{s. } 5\frac{1}{2}\text{d.}$$

$$\frac{77}{60} : \frac{1}{4} :: £110 : \text{share of 3d.}$$

$$\therefore \text{Share of 3d} = £ \frac{110 \times 60}{77 \times 4} = £21 \text{ } 8\text{s. } 6\frac{1}{2}\text{d. } \frac{2}{3}\text{q.}$$

$$\frac{77}{60} : \frac{1}{5} :: £110 : \text{share of 4th.}$$

$$\therefore \text{Share of 4th} = £ \frac{110 \times 60}{77 \times 5} = £17 \text{ } 2\text{s. } 10\frac{1}{2}\text{d. } \frac{1}{3}\text{q.}$$

$$^{(2)} \text{ } ^{(1)} \$320 + \$560 + \$720 = \$1600.$$

$$\$1600 : \$320 :: \$680 : A's \text{ share of the gain.}$$

$$\therefore A's \text{ share} = \$ \frac{680 \times 320}{1600} = \$136.$$

$$\$1600 : \$560 :: \$380 : B's \text{ share of the gain.}$$

$$\therefore B's \text{ share} = \$ \frac{680 \times 560}{1600} = \$238.$$

(Continued on next page.)



(2 continued.)

$$\$1600 : \$720 :: \$680 : C's \text{ share of the gain.}$$

$$\therefore C's \text{ share} = \$ \frac{680 \times 720}{1600} = \$306.$$

$$(^2) \text{ £175} + \text{£210} + \text{£265} = \text{£650.}$$

$$\text{£650} : \text{£210} :: \text{£422 } 10s. : C's \text{ share.}$$

$$\therefore C's \text{ share} = \text{£} \frac{422\frac{1}{2} \times 210}{650} = \text{£136 } 10s.$$

$$(3) 48 \cdot 856 + 43 \cdot 265 = 92 \cdot 121.$$

$$100 - 92 \cdot 121 = 7 \cdot 879 = \text{per centage of hydrogen.}$$

$$100 : 48 \cdot 856 :: 2240 : \text{No. of lbs. of oxygen.}$$

$$\therefore \text{Lbs. of oxygen} = \frac{2240 \times 48 \cdot 856}{100} = 1094 \cdot 3744.$$

$$100 : 43 \cdot 265 :: 2240 : \text{No. of lbs. of carbon.}$$

$$\therefore \text{Lbs. of carbon} = \frac{2240 \times 43 \cdot 265}{100} = 969 \cdot 136.$$

$$100 : 7 \cdot 879 :: 2240 : \text{No. of lbs. of hydrogen.}$$

$$\therefore \text{No. of lbs. of hydrogen} = \frac{2240 \times 7 \cdot 879}{100} = 176 \cdot 4896$$

$$(4) 3 : 2 :: 100 : \text{per centage of gold.}$$

$$\therefore \text{Per centage of gold} = \frac{100 \times 2}{3} = 66\frac{2}{3}.$$

$$3 : 1 :: 100 : \text{per centage of silver.}$$

$$\therefore \text{Per centage of silver} = \frac{100 \times 1}{3} = 33\frac{1}{3}.$$

$$(5) \text{ Equated time} = \frac{150 \times 2 + 210 \times 6 + 120 \times 7}{150 + 210 + 120} = 5 \text{ mos.}$$

$$(6) \text{ Equated time} = \frac{(1000 \times 6) - (400 \times 3)}{1000 - 400} = 8 \text{ mos.}$$

$$(7) \$4000 \times 2 = \$8000 = A's \text{ contribution.}$$

$$\$300 \times 2 + 300 \times 1\frac{1}{2} = \$1050 = B's \text{ contribution.}$$

$$\$200 \times 2 + 500 \times 1 = \$900 = C's \text{ contribution.}$$

$$\$8000 + \$1050 + \$900 = \$9950.$$

$$\$9950 : \$3000 :: \$7950 : A's \text{ share of the gain.}$$

$$\therefore A's \text{ share} = \$ \frac{7950 \times 8000}{9950} = \$6400.$$

(Continued on next page.)

(7 continued.)  
 $\$9950 : \$1050 :: \$7960 : B\text{'s share of the gain.}$   
 $\therefore B\text{'s share} = \frac{1050 \times 7960}{9950} = \$840.$

$\$9950 : \$900 : \$7960 : C\text{'s share of the gain.}$   
 $\therefore C\text{'s share} = \frac{900 \times 7960}{9950} = \$720.$

(8) 10 per cent. of £1600 = £160; £1600 - £160 = £1440.

$\pounds 6400 : \pounds 2400 :: \pounds 1440 : A\text{'s share of the gain.}$   
 $\therefore A\text{'s share} = \pounds \frac{2400 \times 1440}{6400} = \pounds 540, \text{ which added to}$

$\pounds 130 = \pounds 700.$

$\pounds 6400 : \pounds 4000 :: \pounds 1440 : B\text{'s share of the gain.}$   
 $\therefore B\text{'s share} = \pounds \frac{4000 \times 1440}{6400} = \pounds 900.$

(9) Since the keep of a horse : the keep of a sheep  
 $:: 3 : 1$ , therefore 20 horses are equivalent to 60 sheep.  
 In the same manner 15 oxen are equivalent to 30 sheep.

$\therefore A$  puts in 60 sheep,  
 $B$  puts in 30 sheep,  
 $C$  puts in 10 sheep.

$60 + 30 + 10 = 100.$

$100 : 60 :: \$60 : A\text{'s share of the rent.}$

$\therefore A\text{'s share} = \$ \frac{60 \times 60}{100} = \$36.$

$100 : 30 :: \$60 : B\text{'s share of the rent.}$

$\therefore B\text{'s share} = \$ \frac{60 \times 30}{100} = \$18.$

$100 : 10 :: \$60 : C\text{'s share of the rent.}$

$\therefore C\text{'s share} = \$ \frac{60 \times 10}{100} = \$6.$

(10)

: V

5 :

: C

If o

15 pts

pts. =

= (15)

much

48 pts

ber of

(1) 1

1

24

(2) 8

4

49

(3) 2

1

89

(4) i

1

21

2

221

(10) 9 : 10 ::  $1\frac{1}{2}$  pts. : widow's share.

∴ Widow's share =  $\frac{1\frac{1}{2} \times 10}{9}$  pts. =  $1\frac{2}{3}$  pts.

5 : 6 ::  $1\frac{2}{3}$  pts. : old man's share.

∴ Old man's share =  $\frac{1\frac{2}{3} \times 6}{5}$  pts. = 2 pts.

If one widow receive  $1\frac{2}{3}$  pts. 9 will receive  $(9 \times 1\frac{2}{3}) = 15$  pts.: similarly 6 single women will receive  $(6 \times 1\frac{1}{2})$  pts. = 9 pts. ∴ The total amount given to the women =  $(15+9)$  pts. = 24 pts. But the men had twice as much as the women, ∴ the men received  $(24 \times 2)$  pts. = 48 pts.; and as each man received 2 pts. the total number of men must have been  $48 \div 2 = 24$ .

## Ex. LXXVII. (p. 149.)

$$\begin{array}{r} (1) \quad 196 \quad (14) \\ \quad 1 \\ \hline 24 \overline{) 96} \\ \quad 96 \\ \hline \end{array}$$

$$\begin{array}{r} 289 \quad (17) \\ \quad 1 \\ \hline 27 \overline{) 189} \\ \quad 189 \\ \hline \end{array}$$

$$\begin{array}{r} 625 \quad (25) \\ \quad 4 \\ \hline 45 \overline{) 225} \\ \quad 225 \\ \hline \end{array}$$

$$\begin{array}{r} (2) \quad 841 \quad (29) \\ \quad 4 \\ \hline 49 \overline{) 441} \\ \quad 441 \\ \hline \end{array}$$

$$\begin{array}{r} 900 \quad (30) \\ \quad 9 \\ \hline 60 \overline{) 00} \\ \quad 00 \\ \hline \end{array}$$

$$\begin{array}{r} 1764 \quad (42) \\ \quad 16 \\ \hline 82 \overline{) 164} \\ \quad 164 \\ \hline \end{array}$$

$$\begin{array}{r} (3) \quad 2401 \quad (49) \\ \quad 16 \\ \hline 89 \overline{) 801} \\ \quad 801 \\ \hline \end{array}$$

$$\begin{array}{r} 7569 \quad (87) \\ \quad 64 \\ \hline 167 \overline{) 1169} \\ \quad 1169 \\ \hline \end{array}$$

$$\begin{array}{r} 9604 \quad (98) \\ \quad 81 \\ \hline 188 \overline{) 1504} \\ \quad 1504 \\ \hline \end{array}$$

$$\begin{array}{r} (4) \quad 12421 \quad (111) \\ \quad 1 \\ \hline 21 \overline{) 28} \\ \quad 21 \\ \hline 221 \overline{) 221} \\ \quad 221 \\ \hline \end{array}$$

$$\begin{array}{r} 40000 \quad (200) \\ \quad 4 \\ \hline 400 \overline{) 0000} \\ \quad 0000 \\ \hline \end{array}$$

$$\begin{array}{r} 388129 \quad (623) \\ \quad 36 \\ \hline 122 \overline{) 281} \\ \quad 244 \\ \hline 1243 \overline{) 3729} \\ \quad 3729 \\ \hline \end{array}$$

170

KEY.

[ELEM. ARITH.]

(5) 494209 (703)  
49
$$\begin{array}{r} 1403 \overline{)4209} \\ \underline{4209} \end{array}$$
582169 (763)  
49
$$\begin{array}{r} 146 \overline{)921} \\ \underline{876} \\ 1523 \overline{)4569} \\ \underline{4569} \end{array}$$
259081 (509)  
25
$$\begin{array}{r} 1009 \overline{)9081} \\ \underline{9081} \end{array}$$

(6) 1234321 (1111)

$$\begin{array}{r} 1 \\ 21 \overline{)23} \\ \underline{21} \end{array}$$

$$\begin{array}{r} 221 \overline{)243} \\ \underline{221} \end{array}$$

$$\begin{array}{r} 2221 \overline{)2221} \\ \underline{2221} \end{array}$$

28547649 (5843)

$$\begin{array}{r} 25 \\ 103 \overline{)354} \\ \underline{309} \end{array}$$

$$\begin{array}{r} 1064 \overline{)4576} \\ \underline{4256} \end{array}$$

$$\begin{array}{r} 10633 \overline{)32049} \\ \underline{32049} \end{array}$$
(7) 62504836 (7906)  
49
$$\begin{array}{r} 149 \overline{)1350} \\ \underline{1341} \\ 15806 \overline{)94836} \\ \underline{94836} \end{array}$$
33016516 (5746)  
25
$$\begin{array}{r} 107 \overline{)801} \\ \underline{749} \end{array}$$

$$\begin{array}{r} 1144 \overline{)5265} \\ \underline{4576} \end{array}$$

$$\begin{array}{r} 11486 \overline{)68916} \\ \underline{68916} \end{array}$$
49112064 (7008)  
49
$$\begin{array}{r} 14008 \overline{)112064} \\ \underline{112064} \end{array}$$
(8) 182493081 (13509)  
1
$$\begin{array}{r} 23 \overline{)82} \\ \underline{69} \\ 265 \overline{)1349} \\ \underline{1325} \end{array}$$

$$\begin{array}{r} 27009 \overline{)243081} \\ \underline{243081} \end{array}$$
47.61 (6.9)  
36
$$\begin{array}{r} 12.9 \overline{)11.61} \\ \underline{11.61} \end{array}$$

(9) 008886 (094  
00

09 | 88  
81  
184 | 736  
736

445-336609 (21-103  
4

41 | 45  
41  
421 | 433  
421  
42203 | 126609  
126609

(10) 000633679929 (025173

4  
45 | 283  
225  
501 | 867  
501  
5027 | 86699  
35189  
50343 | 151029  
151029

0000000009 (00003  
9

(11) 51-0000000 (7-1414  
49

141 | 200  
141  
1424 | 5900  
5696  
14281 | 20400  
14281  
142424 | 611900  
569696

51000000 (7141  
49

141 | 200  
141  
1424 | 5900  
5696  
14281 | 20400  
14281

(12)  $5 \cdot 1000000 \div (2 \cdot 2583)$

$$\begin{array}{r} 4 \\ 42 \overline{) 110} \\ \underline{84} \\ 2600 \\ 445 \overline{) 2600} \\ \underline{2225} \\ 37500 \\ 4508 \overline{) 37500} \\ \underline{36064} \\ 143600 \\ 45163 \overline{) 143600} \\ \underline{135489} \end{array}$$

$05100000 \div (2258)$

$$\begin{array}{r} 4 \\ 42 \overline{) 110} \\ \underline{84} \\ 2600 \\ 445 \overline{) 2600} \\ \underline{2225} \\ 37500 \\ 4508 \overline{) 37500} \\ \underline{36064} \\ 1436 \end{array}$$

(13)  $8065200000 \div (28 \cdot 03992 \cdot 96304 \cdot 99300000) (310 \cdot 3304)$

$$\begin{array}{r} 4 \\ 48 \overline{) 406} \\ \underline{384} \\ 2252 \\ 563 \overline{) 2252} \\ \underline{1689} \\ 5669 \overline{) 56300} \\ \underline{51021} \\ 56789 \overline{) 527900} \\ \underline{511101} \\ 567982 \overline{) 1679900} \\ \underline{1135964} \end{array}$$

$$\begin{array}{r} 9 \\ 61 \overline{) 63} \\ \underline{61} \\ 20499 \\ 6203 \overline{) 20499} \\ \underline{18609} \\ 62063 \overline{) 189030} \\ \underline{186189} \\ 6206604 \overline{) 28410000} \\ \underline{24826416} \end{array}$$

(14)  $333333 \div (577)$

$$\begin{array}{r} 25 \\ 107 \overline{) 833} \\ \underline{749} \\ 1147 \overline{) 8433} \\ \underline{8029} \end{array}$$

(15)  $027777 \div (166)$

$$\begin{array}{r} 1 \\ 26 \overline{) 177} \\ \underline{156} \\ 326 \overline{) 2177} \\ \underline{1956} \end{array}$$

(16)  $4\frac{1}{3} = 4.734693 \dots$

$4.734693 \div (2 \cdot 175)$

$$\begin{array}{r} 4 \\ 41 \overline{) 73} \\ \underline{41} \\ 427 \overline{) 3246} \\ \underline{2989} \\ 4345 \overline{) 25793} \\ \underline{21725} \end{array}$$

(17)  $2304 \div (48)$

$$\begin{array}{r} 16 \\ 88 \overline{) 704} \\ \underline{704} \\ 3481 \div (59) \\ 25 \\ 109 \overline{) 981} \\ \underline{981} \end{array}$$

$\therefore \sqrt{3481} = 59.$

(18) 
$$\begin{array}{r} 44\bar{1} \text{ (21)} \\ 4 \\ \hline 41 \overline{) 41} \\ \underline{41} \end{array}$$
 
$$\begin{array}{r} 64 \text{ (8 } 2 \cdot 1 + \cdot 8 = 2 \cdot 625) \\ 64 \\ \hline \end{array}$$

(19) 5832 sovereigns = 13906780 pence and 2s. 6d. = 30d.; ∴ the sovereigns were worth (1399680+30) times the box = 46656.

The square root of 46656 is 216; ∴ the sovereigns were worth 216 times the shillings and the shillings were worth 216 times the box. But the value of the box is 2s. 6d.; ∴ the value of the shillings will be 216 times 2s. 6d. or 540 shillings.

Ex. LXXVIII. (p. 152.)

(1) 
$$\begin{array}{r} 1728 \text{ (12 } 8000 \text{ (20 } 5832 \text{ (18)} \\ 1 \quad 8 \quad 1 \\ \hline 3 \times 1^2 = 3 \quad 728 \quad \boxed{000} \quad 3 \times 1^2 = 3 \quad 4832 \\ 3 \times 10^2 = 300 \quad \underline{000} \quad 3 \times 10^2 = 300 \\ 3 \times 10 \times 2 = 60 \quad 3 \times 10 \times 8 = 240 \\ 2^2 = 4 \quad 8^2 = 64 \\ \hline 364 \quad 604 \\ 2 \quad 8 \\ \hline 728 \quad 728 \quad 4832 \quad 4832 \end{array}$$

(2) 
$$\begin{array}{r} 74088 \text{ (42 } 421875 \text{ (75)} \\ 64 \quad 343 \\ \hline 3 \times 4^2 = 48 \quad 10088 \quad 3 \times 7^2 = 147 \quad 78875 \\ 3 \times 40^2 = 4800 \quad 3 \times 70^2 = 14700 \\ 3 \times 40 \times 2 = 240 \quad 3 \times 70 \times 5 = 1050 \\ 2^2 = 4 \quad 5^2 = 25 \\ \hline 5044 \quad 15775 \\ 2 \quad 5 \\ \hline 10088 \quad 10088 \quad 78875 \quad 78885 \end{array}$$

(Continued on next page.)

(2 continued.)

778688 (92)  
729

(3)

912678 (97)  
729

$$\begin{array}{r}
 3 \times 9^2 = 243 \\
 3 \times 90^2 = 24300 \\
 3 \times 90 \times 2 = 540 \\
 \quad 2^2 = 4 \\
 \hline
 24844 \\
 \quad 2 \\
 \hline
 49688
 \end{array}$$

49688

$$\begin{array}{r}
 3 \times 9^2 = 243 \\
 3 \times 90^2 = 24300 \\
 3 \times 90 \times 7 = 1890 \\
 \quad 7^2 = 49 \\
 \hline
 26289 \\
 \quad 7 \\
 \hline
 183678
 \end{array}$$

183678

183678

1092727 (103) (4)  
1134217728 (512)  
125

$$\begin{array}{r}
 3 \times 1^2 = 3 \\
 3 \times 10^2 = 300 \\
 3 \times 100^2 = 30000 \\
 3 \times 100 \times 3 = 900 \\
 \quad 3^2 = 9 \\
 \hline
 30909 \\
 \quad 3 \\
 \hline
 92727
 \end{array}$$

92727

$$\begin{array}{r}
 3 \times 5^2 = 75 \\
 3 \times 50^2 = 7500 \\
 3 \times 50 \times 1 = 150 \\
 \quad 1^2 = 1 \\
 \hline
 7651 \\
 \quad 3 \times 51^2 = 7803 \\
 3 \times 510^2 = 780300 \\
 3 \times 510 \times 2 = 3060 \\
 \quad 2^2 = 4 \\
 \hline
 783364 \\
 \quad 2 \\
 \hline
 1566728
 \end{array}$$

9217

7651

1566728

1566728

64481201 (401)  
64

$$\begin{array}{r}
 3 \times 4^2 = 48 \\
 3 \times 40^2 = 4800 \\
 3 \times 400^2 = 480000 \\
 3 \times 400 \times 1 = 1200 \\
 \quad 1^2 = 1 \\
 \hline
 481201
 \end{array}$$

481201

481201



(5)

444194947 (76·3  
348

$3 \times 7^2 = 147$	101194
$3 \times 70^2 = 14700$	
$3 \times 70 \times 6 = 1260$	
$6^2 = 36$	
15996	95976
$3 \times 76^2 = 17328$	
$3 \times 760^2 = 1732800$	5218947
$3 \times 760 \times 3 = 6840$	
$3^2 = 9$	
1739649	
3	
5218947	5218947

090202262003 (0587  
125

$3 \times 5^2 = 75$	77262
$3 \times 50^2 = 7500$	
$3 \times 50 \times 8 = 1200$	
$8^2 = 64$	
8764	70112
$3 \times 58^2 = 10092$	
$3 \times 580^2 = 1009200$	7150003
$3 \times 580 \times 7 = 12180$	
$7^2 = 49$	
1021429	7150003

(6)

$$\begin{array}{r}
 181\ 019108039 \text{ (5-079)} \\
 \underline{125} \\
 3 \times 5^2 = 75 \quad 6019108 \\
 3 \times 50^2 = 7500 \\
 3 \times 500^2 = 750000 \\
 3 \times 500 \times 7 = 10500 \\
 \quad 7^2 = 49 \\
 \hline
 760549 \quad 5323843 \\
 3 \times 507^2 = 771147 \quad 695265039 \\
 3 \times 5070^2 = 77114700 \\
 3 \times 5070 \times 9 = 136890 \\
 \quad 9^2 = 81 \\
 \hline
 77251671 \quad 695265039
 \end{array}$$

F 408518488000 (7420)

343

$$\begin{array}{r}
 3 \times 7^2 = 147 \quad 65518 \\
 3 \times 70^2 = 14700 \\
 3 \times 70 \times 4 = 840 \\
 \quad 4^2 = 16 \\
 \hline
 15556 \quad 62224 \\
 3 \times 74^2 = 16428 \quad 3294488 \\
 3 \times 740^2 = 1642800 \\
 3 \times 740 \times 2 = 4440 \\
 \quad 2^2 = 4 \\
 \hline
 1647244 \quad 3294488 \\
 \hline
 \quad \quad \quad 000
 \end{array}$$

$$(7) \quad \sqrt[3]{27} = 3 \quad \sqrt[3]{64} = 4 \quad \therefore \sqrt[3]{21} = 4$$

(8)  $\sqrt[3]{8} = 2$

	200000000 (648
	216
$3 \times 6^2 = 108$	50000
$3 \times 60^2 = 10800$	
$3 \times 60 \times 4 = 720$	
$4^2 = 16$	
<u>11536</u>	46144
$3 \times 64^2 = 12288$	4522666 }
$3 \times 640^2 = 1228800$	
$3 \times 640 \times 3 = 5760$	
$3^2 = 9$	
<u>1234569</u>	<u>353707</u>

(9)  $\sqrt[3]{3^3} = 3$

	3-800000000 (1560
	1
$3 \times 1^2 = 3$	2800
$3 \times 10^2 = 300$	
$3 \times 10 \times 5 = 150$	
$5^2 = 25$	
<u>475</u>	2375
$3 \times 15^2 = 675$	425000
$3 \times 150^2 = 67500$	
$3 \times 150 \times 6 = 2700$	
$6^2 = 36$	
<u>70236</u>	421416
$3 \times 156^2 = 73008$	3584000
$3 \times 1560^2 = 7300800$	
$3 \times 1560 \times 0 = 0$	
$0^2 = 0$	
<u>7300800</u>	

(10)  $\sqrt[3]{1} = 1$

(11)

$$\begin{array}{r}
 100000000 \text{ (464)} \\
 \underline{64} \\
 3 \times 4^2 = 48 \quad 33000 \\
 3 \times 40^2 = 4800 \\
 3 \times 40 \times 6 = 720 \\
 \underline{6^2 = 36} \\
 5556 \quad 33336 \\
 3 \times 46^2 = 6348 \quad 2664000 \\
 3 \times 460^2 = 634800 \\
 3 \times 460 \times 4 = 5520 \\
 \underline{4^2 = 16} \\
 640336 \quad 2561344
 \end{array}$$

(12)

$$\begin{array}{r}
 010000000 \text{ (215)} \\
 \underline{8} \\
 3 \times 2^2 = 12 \quad 2000 \\
 3 \times 20^2 = 1200 \\
 3 \times 20 \times 1 = 60 \\
 \underline{1^2 = 1} \\
 1261 \quad 1261 \\
 3 \times 21^2 = 1323 \quad 739000 \\
 3 \times 210^2 = 132300 \\
 3 \times 210 \times 5 = 3150 \\
 \underline{5^2 = 25} \\
 135475 \quad 677375
 \end{array}$$

(13)

	0'000000000 (2'154
	8
$3 \times 2^2 = 12$	2000
$3 \times 20^2 = 1200$	
$3 \times 20 \times 1 = 60$	
$1^2 = 1$	
1261	1261
$3 \times 21^2 = 1323$	789000
$3 \times 210^2 = 132300$	
$3 \times 210 \times 5 = 3150$	
$5^2 = 25$	
135475	677375
$3 \times 215^2 = 138675$	61625000
$3 \times 2150^2 = 13867500$	
$3 \times 2150 \times 4 = 25800$	
$4^2 = 16$	
13893316	55573264

(14)

	037373737 (333
	27
$3 \times 3^2 = 27$	10873
$3 \times 30^2 = 2700$	
$3 \times 30 \times 3 = 270$	
$3^2 = 9$	
2979	8937
$3 \times 33^2 = 3267$	1486737
$3 \times 330^2 = 326700$	
$3 \times 330 \times 3 = 2970$	
$3^2 = 9$	
329679	989037

Ex. L7 . (p. 152.)

## PAPER 2.

(1)	oz.	(2)	
{	16	4) 553553	144 : 175 :: 12 oz. : popor-
		4) 138388—1 4 × 0 +	tion of a lb. Avoirdupoise.
		[1=1 oz.]	$\frac{175 \times 12}{144} = 14\frac{7}{12}$ .
{	28	4) 84597—0	∴ 1 cz. Avoir. : 1 oz. Troy
		7) 8649—1 4 × 4 +	∴ 14 $\frac{7}{12}$ : 16 or as 175 : 192.
		[1=17 lbs.]	∴ 1oz. Avoir. is $\frac{175}{144}$ of 1 oz.
		4) 1235—4	Troy.
	20) 308—3 qrs.		

15 tons, 8 cwt.  
15 Tons, 8 cwt., 3 qrs.,  
17 lbs., 1 oz.

(3)	£	fl.	c.	m.	
	2.	0.	7.	0.	= value of 1 cwt.
				16	
2 qrs. = $\frac{1}{2}$ of 1 cwt.	32	11	2	0	= value of 16 cwt.
1 qr. = $\frac{1}{4}$ of 2 qrs.	1	0	3	5	= value of 2 qrs.
14 lbs. = $\frac{1}{4}$ of 1 qr.	5	1	7	5	= value of 1 qr.
2 lbs. = $\frac{1}{7}$ of 14 lbs.	2	5	8	75	= value of 14 lbs.
			3	6	96423571 = val. of 2 lbs.
	£34.	9.	6.	8	21428571 = value of
					[16 cwt., 3 qrs., 14 lbs.]

$$(4) \text{ (1) } 20803) \overline{67273} \text{ (3)} \\ \underline{62403}$$

$$4864) \overline{20803} \text{ (4)} \\ \underline{19456}$$

$$1347) \overline{4864} \text{ (3)} \\ \underline{4041}$$

$$823) \overline{1347} \text{ (1)}$$

$$\text{(2)} \quad 2) \overline{8, 9, 10, 12, 15, 18, 35, 84} \\ \underline{823} \text{ (1)}$$

$$2) \overline{4, 5, 15, 9, 35, 42} \\ \underline{524} \text{ (1)}$$

$$3) \overline{2, 15, 9, 35, 21} \\ \underline{299} \text{ (1)}$$

$$\therefore \text{L. C. M.} = 2 \times 2 \times 3 \times 2 \times 3 \times 35 = 2520. \quad \begin{array}{r} 225 \text{ (1)} \\ \underline{74} \text{ (24)} \\ 225 \text{ (3)} \\ \underline{222} \\ 74 \end{array}$$

$$3) \overline{74} \text{ (24)} \\ \underline{72}$$

$$2) \overline{3} \text{ (1)} \\ \underline{2}$$

$$\underline{1}$$

$\therefore 1$  is the G. C. M.

$$(5) \text{ (1) } \frac{8}{8} \text{ of } \frac{5}{17} \text{ of } 99\frac{1}{8} = \frac{5}{17} \text{ of } \frac{5}{17} \text{ of } 144\frac{1}{8} = 17 \\ \frac{5}{7} \text{ of } \frac{2}{3} \text{ of } 69\frac{3}{10} = \frac{2}{3} \text{ of } \frac{5}{7} \text{ of } \frac{5}{10} = 11 \\ \frac{2}{7} \text{ of } \frac{2}{3} \text{ of } 306\frac{1}{4} = \frac{2}{7} \text{ of } \frac{2}{3} \text{ of } 122\frac{1}{4} = 35 \\ 17 + 11 + 35 = 63.$$

$$\text{(2) } 13s. 1\frac{1}{2}d. = 315 \text{ half pence} \\ \frac{3}{4} \text{ of } 1\frac{1}{2} \text{ of a guinea} = \frac{3}{4} \text{ of } \frac{3}{2} \text{ of } 504 \text{ h'f p.} = 567 \text{ h'f p.} \\ \therefore \text{Fraction required is } \frac{315}{567} = \frac{5}{9}.$$

(Continued on next page.)

(5 continued.)

$$(3) \frac{197}{448} \text{ of a ton} = \frac{107 \times 20}{448} \text{ cwt.} = 4\frac{27}{112} \text{ cwt.}$$

$$\frac{27}{112} \text{ of a cwt.} = \frac{87 \times 4}{112} \text{ qrs.} = 3\frac{2}{7} \text{ qrs.}$$

$$\frac{2}{7} \text{ of a qr.} = \frac{3 \times 28}{28} \text{ lbs.} = 3 \text{ lbs.}$$

4 cwt., 3 qrs., 3 lbs.

(6)  $\cdot 37) 7792 \cdot 20$  (21060

$$\begin{array}{r} 74 \\ \hline 39 \\ 37 \\ \hline 222 \\ 222 \\ \hline 0 \end{array}$$

$7792 \cdot 2 = 7792\frac{1}{5}$

$\cdot 37 = \frac{37}{100}$

$$7792\frac{1}{5} + \frac{37}{100} = 22961 \times \frac{100}{37} = 21060.$$

(370)  $\cdot 0077922$  ( $\cdot 00002106$

$$\begin{array}{r} 74 \\ \hline 39 \\ 37 \\ \hline 222 \\ 222 \\ \hline 0 \end{array}$$

$\cdot 007792 = \frac{7792}{100000000}$

$$\frac{7792}{100000000} \times \frac{370}{370} = \frac{2106}{100000000} = \cdot 00002106.$$

## PAPER II.

(1) (1) \$7300

34

$\$21900$

5475

$\$273.75$

365 : 120 :: \$273.75 :  
interest required.

$$\therefore \text{Int. req}^d = \$ \frac{273.75 \times 120}{365}$$

$= \$90$

(2) Int. on £100 for  $2\frac{1}{2}$  yrs.

at  $3\frac{1}{2}$  per cent. = £9 12s. 6d.

£109 12s. 6d. : £3204 14s. 1d.

:: £9 12s. 6d. : disc't req<sup>d</sup>∴ Disc't =  $\frac{769129 \times 2310}{26310}$  d. $= 67599$  d. = £281 7s. 5d.



(2)  $\$3320 - \$2656 = \$664.$   
 $\$2656 : \$100 :: \$664 : \text{required gain per cent.}$

$\therefore \text{Required gain} = \$ \frac{664 \times 100}{2656} = \$25.$

$\$3320 : \$100 :: \$664 : \text{loss per cent.}$

$\therefore \text{Loss per cent.} = \$ \frac{664 \times 100}{3320} = \$20.$

(3) (1)  $930372004 (30502$

$$\begin{array}{r} 9 \\ 605 \overline{) 3037} \\ \underline{3025} \\ 61002 \overline{) 122004} \\ \underline{122004} \end{array}$$

(2)  $16777216 (256$

$$\begin{array}{r} 8 \\ 3 \times 2^3 = 12 \overline{) 8777} \\ 3 \times 20^2 = 1200 \\ 3 \times 20 \times 5 = 300 \\ \underline{5^2 = 25} \\ 1525 \quad 7625 \\ 3 \times 25^2 = 1875 \quad 1152216 \\ 3 \times 250^2 = 187500 \\ 3 \times 250 \times 6 = 4500 \\ \underline{6^2 = 36} \\ 192036 \quad 1152216 \end{array}$$

(3) Surface of square = 2533 sq. ft., 64 sq. in. or 364816 sq. inches;  $\therefore$  side of square =  $\sqrt{364816}$  sq. in. = 604 in. = 16 yds., 2 ft., 4 in.;  $\therefore$  perimeter of square = 16 yds., 2 ft., 4 in.  $\times 4 = 67$  yds., 4 in.

(4) $\begin{array}{r} 365 \\ 5 \\ \hline 1825 \end{array}$	$\begin{array}{r} 365 \\ 20 \\ \hline 7300 \end{array}$	$\begin{array}{r} 365 \\ 300 \\ \hline 109500 \end{array}$	$\begin{array}{r} 109500 \\ 7300 \\ 1825 \\ \hline 118625 \end{array}$
------------------------------------------------------------	---------------------------------------------------------	------------------------------------------------------------	------------------------------------------------------------------------

(5) 
$$\begin{array}{r} 2) 22932 \\ \hline \end{array}$$

$$\begin{array}{r} 2) 11466 \\ \hline \end{array}$$

$$\begin{array}{r} 3) 5733 \\ \hline \end{array}$$

$$\begin{array}{r} 3) 1911 \\ \hline \end{array}$$

$$\begin{array}{r} 7) 637 \\ \hline \end{array}$$

$$2 \times 2 \times 3 \times 3 \times 7 \times 7 \times 13.$$

$$\begin{array}{r} 7) 637 \\ \hline \end{array}$$

$$\begin{array}{r} 7) 91 \\ \hline \end{array}$$

$$13$$

(6) If he travels  $22\frac{1}{2}$  miles per hour, he will travel 20 miles in  $\frac{20}{22\frac{1}{2}}$  of an hour, or  $\frac{2}{3}\frac{1}{2}$  hours.

He then travels the remaining 32 miles at the rate of ( $\frac{1}{2}$  of  $22\frac{1}{2}$ ) miles per hour =  $3\frac{1}{2}$  miles per hour.

$\therefore$  To travel 32 miles he would require ( $32 \div 3\frac{1}{2}$ ) hrs. =  $8\frac{1}{2}$  hrs. which added to the above  $\frac{2}{3}\frac{1}{2}$  hr. =  $9\frac{1}{3}\frac{1}{2}$  hrs. or 9 hrs.,  $34' 27\frac{3}{4}''$ .

If he start at 9 A. M. and travel for 9 hrs.  $34' 27\frac{3}{4}''$  he will arrive at his journey's end at 6 h.  $34' 27\frac{3}{4}''$  P. M.

## PAPER III.

(1) If  $A$  fire twice in 3 minutes, he requires  $1\frac{1}{2}$  minutes to fire once;  $\therefore$  to fire 55 cartridges he requires ( $55 \times 1\frac{1}{2}$ ) minutes =  $82\frac{1}{2}$  minutes.

Similarly  $B$  will require ( $55 \times 1\frac{1}{2}$  minutes =  $91\frac{1}{2}$  minutes;  $\therefore B$  will be firing ( $91\frac{1}{2} - 82\frac{1}{2}$ ) minutes after  $A$  has ceased =  $9\frac{1}{2}$  minutes: and as he requires  $1\frac{1}{2}$  minutes to fire once, he will fire ( $9\frac{1}{2} \div 1\frac{1}{2}$ ) times =  $5\frac{1}{2}$  times.

$$(2) (1) \frac{17}{20 \times 8} = \frac{17}{160}$$

$$160) 17 \cdot 0 \text{ (10625} \\ \underline{160}$$

$$1000$$

$$\underline{960}$$

$$400$$

$$\underline{320}$$

$$800$$

$$\underline{800}$$

$$(2) 3s. 0\frac{1}{2}d. = 73 \text{ half pence}$$

$$\pounds 5 = 2400 \text{ half pence}$$

$$\therefore \text{Fraction} = \frac{73}{2400} \text{ and dec.} =$$

$$2400) 73 \cdot 00 \text{ (030416}$$

$$\underline{7200}$$

$$10000$$

$$\underline{9600}$$

$$4000$$

$$\underline{2400}$$

$$16000$$

(Continued on next page.)

(2 Continued.)

(2)  $\cdot 36$  of a guinea =  $\frac{36}{100} = \frac{9}{25}$  of a guinea.

$$\begin{array}{r} 25) 9 \\ \underline{21} \\ 189 \text{ (7s. } 6\frac{1}{2}\text{d.} \\ \underline{175} \\ 14 \\ \underline{12} \\ 168 \\ \underline{150} \\ 18 \end{array}$$

$$\begin{array}{r} \cdot 36 \text{ of a } \pounds = \frac{36}{100} = \frac{9}{25} \text{ of a } \pounds \\ \underline{4} \\ 20 \\ \underline{11) 80} \\ 7\text{s. } 3\frac{1}{4}\text{d.} \end{array}$$

$\therefore \cdot 36$  of a guinea = 7s.  $6\frac{1}{2}$ d.

and  $\cdot 36$  of a  $\pounds$  = 7s.  $3\frac{1}{4}$ d.

$\therefore \cdot 36$  of a guinea is the greater.

(4) 7s.  $6\frac{1}{2}$ d. - 7s.  $3\frac{1}{4}$ d. =  $3\frac{1}{2}$ d.

(3) Int. of \$100 for 15 mo's at 5 per cent. = \$6.25.]

\$106.25 : \$552.50 :: \$100 : required sum.

$\therefore$  Sum required =  $\$ \frac{100 \times 552.50}{106.25} = \$520.$

(4) Number of sq. ft. on the walls =  $143 \times 3 \times 2 = 858$

This is obtained from  $(2 \text{ length} + 2 \text{ breadth}) \times 11.$

$\therefore (2 \text{ length} \times 2 \text{ breadth}) \times 11 = 858.$

or  $2 \text{ length} + 2 \text{ breadth} = 78$ ; but  $\text{length} = 2 \text{ breadth}.$

$\therefore 3 \text{ breadth} = 39. \therefore \text{breadth} = 13 \text{ ft. and length} = 26 \text{ ft.}$

No. of sq. ft. in floor =  $26 \times 13 = 338$ , or  $37 \text{ sq. yds.}$   
5 sq. ft.

(5) From 9 A. M. on Tuesday till 11 A. M. on Wednesday there are 26 hours, during which time the slow clock loses 10 minutes.

Also from 11 A. M. till 9 P. M. on Wednesday there are 10 hours.

26 hours : 10 hours :: 10 minutes : No. of minutes

which the slow clock loses in 10 hours =  $\frac{10 \times 10}{26} \text{ min.} =$

3 minutes,  $50\frac{1}{3}$  seconds.

$\therefore$  The clock must be put on 10 minutes + 3 minutes,  $50\frac{1}{3}$  seconds = 13 minutes,  $50\frac{1}{3}$  seconds.

(6) 43 shares at £11½ = £494½.

∴ 128 : 494½ :: 100 stock : stock required.

$$\therefore \text{Stock required} = \frac{494\frac{1}{2} \times 100}{128} = 386\frac{3}{4}.$$

Annual income therefrom at 6 per cent = £23 3s. 7½d.

## PAPER IV.

(1) (1)  $\frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \frac{4}{5} = \frac{20}{60} + \frac{40}{60} + \frac{30}{60} + \frac{24}{60} = \frac{114}{60} = 1\frac{19}{15}$   
 $1\frac{1}{3}$  of  $\frac{4}{27} = \frac{4}{3} \times \frac{5}{27} = \frac{20}{81}$  ∴ Fraction required is  $\frac{1\frac{19}{15} - \frac{20}{81}}{1\frac{19}{15}} = \frac{\frac{17}{15}}{\frac{17}{15} \times \frac{5}{12}} = \frac{17}{12}$ .

(2) .027) 3.330 (123½  
 27

---

63

54

---

90

81

— ∴ .027 can be taken 123 times from  
 $\frac{3}{27} = \frac{1}{9}$  3.33 and the fraction remaining is  $\frac{1}{9}$ .

(2) Each person received £3 3s. 4½d. ∴ The 43 persons received £3 3s. 4½d. × 43 = £136 5s. 1½d.

Then (£1 - 6d.) : £1 :: £136 5s. 1½d. : original am't

Or 19s. 6d. : £1 :: £136 5s. 1½d. : original am't

∴ Original amount =  $\frac{65403 \times 40}{39}$  half pence = 67080

half pence = £139 15s.

(3) (1) 13 cwt. 2 qrs. 19 lbs. : 41 cwt., 1 lb. } ∴ £4 17s.  
 35 : 49

6d. : required amount.

Or 1531 lbs. : 4593 lbs. } ∴ 1170d. : required amount  
 35 : 49

in pence.

∴ Am't =  $\frac{1170 \times 4593 \times 49}{1531 \times 35}$  d. = 4914d. = £20 9s. 6d.

(2) The bankrupt owes  $D$  \$2085 - (\$235 + \$325 + \$525)  
 = \$2085 - \$1085 = \$1000.

\$1000 : \$1 :: \$525 : required payment in the \$.

∴ Payment in the \$ = \$  $\frac{525 \times 1}{1000}$  = 52½ cts.

(4) £112½ : 45s. ∴ £100 : original cost per dozen.

∴ Original cost per doz. =  $\frac{2000 \times 45}{2250}$  s. = 40s.

Since there are 52 dozen in a butt, the average cost for a butt will be  $(40 \times 52)$ s. = £104; and for three butts the cost will be  $£(104 \times 3)$  = £312. But the first and second butts together cost  $£(120 + 110)$  = £230. ∴ The third butt costs  $£310 - £230$  = £82.

(5) 2 Turkeys and 9 fowls cost £2 18s. 6d.

∴ 10 turkeys and 45 fowls cost £14 12s. 6d.; also 5 turkeys and 2 fowls cost £4 8s. 2d..

∴ 10 turkeys and 4 fowls cost £8 16s. 4d.

But 10 turkeys and 45 fowls cost £14 12s. 6d.

∴ 41 fowls cost £5 16s. 2d., and one fowl costs 2s. 10d.

And if 2 turkeys and 9 fowls cost £2 18s. 6d., 2 turkeys will cost £2 18s. 6d. -  $(9 \times 2$ s. 10d.) = £2 18s. 6d. - £1 5s. 6d. = £1 13s. ∴ 1 Turkey will cost £1 13s. + 2 = 16s. 6d.

(6) Area of field = 13 ac., 81 yds. = 63001 sq. yds.

∴ One side of field =  $\sqrt{63001}$  yds. = 251 yds. ∴ Perimeter of field = 251 yds.  $\times 4$  = 1004 yds.

3½ mls. : 1004 yds. ∴ 60 min. : required time.

∴ Required time =  $\frac{60 \times 1004}{5866\frac{2}{3}}$  min. =  $\frac{60 \times 3012}{17600}$  min. =

10 min. 16⅓ sec.,

