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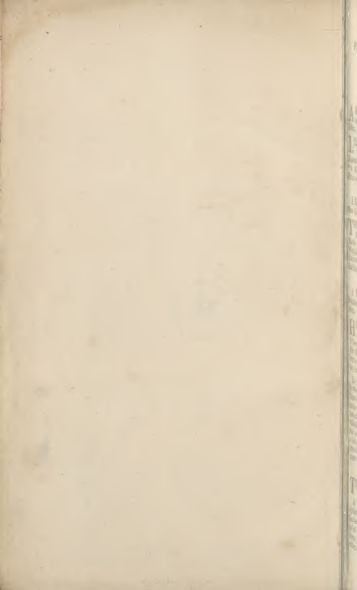
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To write any number in figures.

1. 1080.—2 64090.—3. 70002010.—4. 100062811.
1. DCCCLXXIX.—2. MDCCCLXXXVIII. or M.CM.IIXC.

SIMPLE ADDITION.

ANSWERS.

1.	227	3.	19102	5.	314819	7.	392993
2.	2092	4.	24613	6.	233428	8.	301871

9.
```
  12
  34
  56
  78
  91
  23
  45
  67
  89
 ───
 495
```

10.
```
  234
  567
  891
  234
  567
  892
  345
  678
  906
 ────
 5314
```

11.
```
  9876
  5432
  1987
  6543
  2198
  7654
  3210
  6786
  4693
 ─────
 48379
```

12.
```
  6408
  3467
  5986
  7642
  8569
  2398
  8675
 21904
   686
 ─────
 65735
```

13.
```
  6845
  2867
  8490
   684
  1267
  4681
 20680
  8045
 ─────
 53559
```

14.
```
  5408
  1467
  4500
    89
   423
 60456
  8401
    96
 ─────
 80840
```

15.
```
 54936
   789
    45
  3100
  7093
 84506
   379
   480
 ──────
 151328
```

16.
```
  79685
  37986
  48798
  76548
 497634
  56783
 696796
  49768
   9873
 ───────
 1555871
```

17.
```
   4869
  75486
  98743
    486
     97
  54868
  79633
 976854
 796877
 ───────
 2087913
```

18.
```
   987548
    69537
     6548
   898756
    48687
   796843
  6854868
  5487695
 76854876
 ────────
 92005358
```

19.
```
  283
  476
 3552
 7684
   27
  876
 2985
 ─────
 15883
```

20.
```
 1761
   69
 ────
 1830
```

21.
```
 B.   £30
 C.    48
 D.   120
 E.   209
 F.    44
 G.  1340
 Lent in all £1791
```

22.
```
 B.  £2359
 C.    549
 D.    875
 E.    965
 F.   1897
 G.   1231
 H.   2197
 I.    978
 K.    841
 Owes in all £11892
```

SIMPLE SUBTRACTION.

ANSWERS.

1. 462	9. 1480	13. 4000000	17. 786278456
2. 2913	996	2300681	257564257
3. 36922	484	1699319	528714199
4. 46092			
5. 969859	10. 5809	14. 5400001	18. 10548796
6. 1697083	4080	60084	7976540
	1729	5339917	2572256
7. 6894			
4086	11. 846789	15. 7654869	19. 847684536
2808	242316	3976640	371547682
	604473	3678329	476136854
8. 1000	12. 6805389	16. 25486974	20. 643285
850	950178	19548796	256742
150	5855211	5938178	386543

21. From the present year,
    Take the year in which he was born, 1732,
    And the remainder will be his age.

22. 73 Present age.
    37 Age at the birth of his daughter.
    36 Daughter's age.

SIMPLE MULTIPLICATION.

1. 68945734	4. 80670912	6. 4606870	8. 8970681
2	9	18	96
137891468	726038208	36854960	53824086
		4606870	80736129
2. 48096784		82923660	861185376
3			
144290352		7. 2345678	
		47	
3. 48679048	5. 98765432	16419746	
6	12	9382712	
292074288	1185185184	110246866	

9. 459068
185
—————
2295340
3672544
459068
—————
84927580

10. 7549636
345
—————
37748160
30198544
22648908
—————
2604624420

11. 3276894
672
—————
6553788
22938258
19661364
—————
2202072768

12. 9768458
894
—————
39073832
87916122
78147664
—————
8733001452

13. 7280473
289
—————
65524257
58243784
14560946
—————
2104056697

14. 809601
2400
—————
323840400
1619202
—————
1943042400

15. 601570
3068
—————
4812560
3609420
1804710
—————
1845616760

16. 406894
85237
—————
2848258
2848258
1220682
813788
2034470
3255152
—————
34682423878

17. 238906
216894
—————
955624
2150154
1911248
1433436
238906
477812
—————
51817277964

18. 54986304
729634
—————
219945216
164958912
329917824
494876136
109972608
384904128
—————
40119876932736

RULE II.

1. 68094568	2. 4096731	3. 748695
4	6	6
272378272	24580386	4492170
6	6	8
1634269632	147482316	35937360

4. 947658	7. 8976543	9. 549
6	12	5
5685948	107718516	2745
9	9	9
51173532	969466644	24705
		9
5. 386909		222345
9		
3482181		
9		
31339629		

6. 729654		
4		
2918616	8. 52	10. 53
4	5	4
11674464	260	212
7	9	8
81721248	2340	1696

SIMPLE DIVISION.

1. 2)84667
   42333½

2. 3)489764
   163254⅔

3. 4)386457
   96614¼

4. 5)490680
   98136

5. 6)867059
   144509⅚

6. 7)732845
   104692⅐

7. 8)411678
   51459⅝

8. 9)4912037
   545781⅞

9. 14)8695340(621095¹⁰⁄₁₄
      29
      ──
      15
      134
      ──
       80
      ──
       10

10. 20)1234567(61728⁷⁄₂₀
       34
       ──
       145
        56
       ──
       167
         7

11. 38)7865432(206985$\frac{32}{38}$
$$\begin{array}{r} 265 \\ \hline 374 \\ \hline 323 \\ \hline 192 \\ \hline 2 \end{array}$$

15. 87)9876540(113523$\frac{39}{87}$
$$\begin{array}{r} 117 \\ \hline 306 \\ \hline 455 \\ \hline 204 \\ \hline 300 \\ \hline 39 \end{array}$$

12. 46)75846972(1648847$\frac{10}{46}$
$$\begin{array}{r} 298 \\ \hline 224 \\ \hline 406 \\ \hline 389 \\ \hline 217 \\ \hline 332 \\ \hline 10 \end{array}$$

16. 108)14680598(135931$\frac{50}{108}$
$$\begin{array}{r} 388 \\ \hline 640 \\ \hline 1005 \\ \hline 339 \\ \hline 158 \\ \hline 50 \end{array}$$

13. 59)54906734(930622$\frac{36}{59}$
$$\begin{array}{r} 180 \\ \hline 367 \\ \hline 133 \\ \hline 154 \\ \hline 36 \end{array}$$

17. 384)81407910(21199$\frac{294}{384}$
$$\begin{array}{r} 460 \\ \hline 767 \\ \hline 3839 \\ \hline 3831 \\ \hline 3750 \\ \hline 294 \end{array}$$

14. 75)48372864(644971$\frac{39}{75}$
$$\begin{array}{r} 337 \\ \hline 372 \\ \hline 728 \\ \hline 536 \\ \hline 114 \\ \hline 39 \end{array}$$

18. 563)72986543(129638$\frac{349}{563}$
$$\begin{array}{r} 1668 \\ \hline 5426 \\ \hline 3595 \\ \hline 2174 \\ \hline 4853 \\ \hline 349 \end{array}$$

19.
747)987213472(1321570⁴⁵⁵⁄₇₄₇

2402
1611
1173
4264
5297
682

21.
4726)729684786(154397

25508
20784
18807
46298
37646
4564

20. 1374)428638726(311964¹⁰⁵⁰⁄₁₃₇₄

1643
2698
13247
8812
5686
190

22.
1809)40608370(22447¹⁷⁴⁷⁄₁₈₀₉

4428
5103
8677
14410
1747

23. 314689)51406745(163¹²⁴³⁸⁸⁄₃₁₄₆₈₉

1993784
1056505
112438

RULE II.

1.
48 $\begin{cases} (8)459323 \\ (6)\ 57415 \cdot\cdot 3 \\ \hline 9569 \cdot\cdot 1 \times 8 + 3 = \frac{11}{48} \end{cases}$

2.
56 $\begin{cases} (8)287536 \\ (7)\ 35942 \\ \hline 5134\frac{4}{7} \end{cases}$

3.
84 $\begin{cases} (12)679195 \\ (7)56599 \cdot\cdot 7 \\ \hline 8085 \cdot\cdot 4 \times 12 + 7 = \frac{55}{84} \end{cases}$

4. $\quad 96 \begin{cases} 8)7384675 \\ 12)923084 \;..\; 3 \end{cases}$
$\qquad\qquad \overline{76923} \;..\; 8 \times 8 + 3 = \frac{67}{96}$

5. $\quad 108 \begin{cases} 9)5498653 \\ 12)610961 \;..\; 4 \end{cases}$
$\qquad\qquad \overline{50913} \;..\; 5 \times 9 + 4 = \frac{49}{108}$

6. $\quad 121 \begin{cases} 11)8965437 \\ 11)\,815039 \;..\; 8 \end{cases}$
$\qquad\qquad \overline{74094} \;..\; 5 \times 11 + 8 = \frac{63}{121}$

7. $\quad 112 \begin{cases} 4)3846973 \\ 4)\,961743 \;..\; 1 \\ 7)\,240435 \;..\; 3 \end{cases}$
$\qquad\qquad \overline{34347} \;..\; (6 \times 4 + 3) \times 4 + 1 = \frac{109}{112}$

8. $\quad 168 \begin{cases} 7)549657 \\ 6)\,78522 \;..\; 3 \\ 4)\,13087 \end{cases}$
$\qquad\qquad \overline{3271} \;..\; 3 \times 6 \times 7 + 3 = \frac{123}{168}$

RULE III.

1. $\quad 3,0)4128,5$
$\qquad\quad \overline{1376}\; \frac{5}{6}$

2. $\quad 1,00)724,00$
$\qquad\quad \overline{724}$

3.
$24,0 \begin{cases} 4)4597,3 \\ 6)1119 \;..\; 1 \end{cases}$
$\qquad\quad \overline{191} \;..\; 3 \times 4 + 1 = \frac{13}{24}$

4. $\quad 7,000)39,768$
$\qquad\quad 5\frac{768}{1000}$

5.
$73,000)39768,438(544\frac{438}{1000}$
$\qquad\qquad\quad 326$
$\qquad\qquad\quad \overline{348}$
$\qquad\qquad\quad \overline{56438}$

6. $\quad 16 \begin{cases} 4)512 \\ 4)128 \end{cases}$
$\qquad\quad \overline{32}\text{ feet.}$

SUPPLEMENT TO MULTIPLICATION AND DIVISION.

I. When the multiplier contains a fraction.

```
  1. 7854769            4. 3864738
        9¾                 312 5/11
  4)23564307          11)23188428
    5891076¾            2108038 4/11
    70692921            7729476
    76583997¾           3864738
                        11594214
                        1207906294 1/11

  2. 3768473            5. 4)3864738
       16⅝                   416½
  8)11305419               961692
    1413177⅜              23080608
    22610838              3846768
     3768473             15387072
    61708745⅝           1601217180

  3. 2965497             6. 2)7486742
       26⅞                    98½
  9)20758479              3743371
    2306497⅝            59893936
    17792982            67380678
     5930994           737444087
    79409419⅞
```

II. When the divisor contains a fraction.

```
  1. 9¼) 785476          2.  3876549
      4      4                 3      3
     37)3141904(84916 4/37   5,0)1162964,7
        181                       232592 47/50
        339
         60
        234
         12
```

3. 21¼) 5469874
        5
108 { 9)27349370
    { 12) 3038818 .. 8
         253234 .. 10×9+8 = ⁹⁸⁄₁₀₈

4. 41½) 7321095
        8
335)58568760(174832⁵⁴⁵⁄₃₃₅
    2506
    1618
    2787
    1076
     710
      40

5. 29½) 5486953
        2
59)10973906(185998¹⁴⁄₅₉
    507
    353
    589
    580
    496
     24

6. 31¼¼)7654869
    16   4
   507   30619476
                 4
   507)122477904(241573³¹³⁄₅₀₇
       2107
        797
       2909
       3740
       1914
        393

REDUCTION.

1. 12s. 11¼d.   2. 20s.   4)7343 farth.
        12   240d.   12)1835¾d.
    ─────   ─────   20) 152s. 11¾d.
    155 pence.   240d.   ───────────────
        4   4   £7, 12s. 11¾d.
    ─────   ─────
    622 farthings   960f.

£40. 10s. 6d.
810s.
9726d.
19452 halfp.
38904 farth.

5. 12s. 2½d.
146d.
293 halfp.

6. 900 gs.
18900s.
37800 sixp.
226800d.

7. £309, 15s. 10¾d.
6195s.
74350d.
297403 farth.

8. 4)912 farth.
12)228d.
19s.

9. 4)4089 farth.
12)1022¼d.
20)85s. 2¼d.
£4, 5s. 2¼d.

10. 2)4009 halfp.
12)2004½d.
20)167s. 0¼d.
£8, 7s. 0¼d.

11. 4)42336 far.
12)10584d.
21)882s.
Gs. 42

12. 4)7200 farth.
12)1800d.
5)150s.
Crowns 30

13. £736, 17s. 11¼d.
14737 shill.
176855 pence.
353711 halfp.

14. £275, 10s. 10¾d.
5519 shill.
66130 pence.
264523 farth.

15. £205, 16s. 2¼d.
4116 shill.
49394 pence.
197577 farth.

16. £210, 10s. 6d.
4210 shill.
8421 sixp.

17. £2000, 17s. 8d.
40017 shill.
120053 fourp.

18. 4)74867 farth.
12)18716¾ pence.
2,0)155,9s. 8¾d.
£77, 19s. 8¾d.

19. 2)650967 halfp.
12)325483½ pence.
21)27123s. 7½d.
Gs. 1291,12s.7½d.

20. 4)74894 threep.
2,0)1872,3s. 6d.
£936, 3s. 6d.

21. £7486
21 { 3)149720 shill.
   { 7)49906 .. 2
   Gs. 7129 .. 3×3+2=11s.

22.
A Crown=240 farthings.
Half-Crown=120
Sixpence= 24
Penny=   4
        ————
        388)10864 far.
        Of each 28

23. 40 guineas.
     21
     ————
     2,0)84,0s.
     £42

24.
A Shill.= 2 six.   £283, 9s. 6d.
H.Cro.= 5
Crown= 10   17)11339 sixp.
        17   667 of each.

25. 842 crowns.
      5
     ————
     21)4210s.
     200 gs. 10s.

26. 6 lb. 10 oz. 5 grs.
     12
     ————
     82 oz.
     20
     ————
     1640 dwt.
     24
     ————
     39365 grs.

27.
24 { 6)213212 grs.
   { 4) 35533 .. 2 }
   { 2,0)888,3 .. 3 } 20 grs.
   ——————————
   12)444 oz. 3dwt. 20gr.
   37 lb. 3dwt. 20gr.

28. 24)9120 grs.
     10)380 dwt.
     Ans. 38 spoons.

29. 2 lb. 10 oz. 10 dwt.
     34 oz.
     ————
     690 dwt.
     16560 grs. in one ingot.
     149040 grs. in nine.

30. 2 lb.
     12
     ————
     24 oz.
     8
     ————
     192 drs.
     3
     ————
     576 sc.
     20
     ————
     11520

31. 546 lb. 18 gr.
     6552 oz.
     52416 drs.
     157248 sc.
     3144978 grs.

32.
3)56789 sc.
8)18929 drs. 2 sc.
12)2366 oz. 1 dr. 2 sc.
197 lb. 2 oz. 1 dr. 2 sc.

33. 6 cwt. 1 qr. 1
4
‾‾‾‾
25 qrs.
28
‾‾‾‾
718 lbs.
16
‾‾‾‾
11488 oz.
16
‾‾‾‾
183808 drs.

34. 30 t. 18 c. 2 qrs. 20 lbs. 12 oz. 15 drs.
618 cwt.
‾‾‾‾‾‾
2474 qrs.
69292 lbs.
1108684 oz.
‾‾‾‾‾‾‾‾
17738959 drs.

35. 16)215040 oz.
28)13440 lbs.
4)480 cl.
20)120 cwt.
‾‾‾‾‾‾
6 tons.

36. 540 parcels.
18¼ lbs.
28)9855 lbs.
4)351 qrs. 27 lbs.
‾‾‾‾‾‾
87 cwt. 3 qrs. 27 lbs.

37. 2 weys.
6½
‾‾‾
13 tods.
2
‾‾‾
26 stones.
14
‾‾‾
364 lbs.

38. 7)13104 lbs.
2)1872 cl.
2)936 st.
6½)468 t.
2   2
‾‾‾   ‾‾‾
13) 936
2) 72 w.
12) 36 s.
‾‾‾
3 lasts.

39. 8 lasts.
96 sacks.
‾‾‾‾
192 weys.
1248 tods.
‾‾‾‾‾
2496 st.

40. 2 loads.
36
‾‾‾
72 tr.
36
‾‾‾
2592 lbs.

B 2

41. 56)10080 lbs.
    36)180 tr.
       5 loads.

42. 3 ld. 30 tr. 42 lbs.
    8322 lbs.

43. 400 yds.
    1600 qrs.
    6400 nls.

44. 4)500 nails.
    4)125 qrs.
       31 yds. 1 qr.

45. 764 ells Eng.
    4)3820 qrs.
      955 yds.

46. 20½ yds.
        6 pieces.
    123 yds.
     492 qrs.
    1968 nls.
    4428 in.

47. 1 mile.
       8
     8 f.
      40
    320 po.
      5½
   1760 yds.
      3
   5280 ft.
     12
  63360 inches.

48. 12)1362240 lbs.
    3)113520 ft.
    1760)37840 yds.
       21 m. 880 yds. or
          21½ miles.

49. 360 m. 4 f. 27 p. 2½ y.
    2884 furlongs.
    115387 poles.
    634631 yards.
    1903893 feet.
    22846716 inches.

50. 3)7486973 feet.
    5½)2495657 yds. 2 ft.
       2   2
    11)4991314

    4,0)45375,5 ÷ 9 = 4½ pols
    8)11343 fur. 35 poles.
    1417m. 7f. 35p. 5y. 6 in.

51. 44 m.
    77440 ft.
    18½)232320 ft.
        2   2
    37) 464640
       12557⁷⁄₃₇ times.

52. 360°
        69
    24840 m.
    43718400 ft.
    131155200 ft.
    1573862400 in.

53. 6817 ml. 2 f. 7 p.
    54538 furlongs.
    2181527 poles.
    11998398 yds. .. 1 foot 6 inch.
    35595195 feet.
    431942346 inches.

55. 30¼)172425 yds.
        4
    121) 689700
    4,0)570,0 po.
    4)142 ro. 20 po.
    35ac. 2 ro. 20 po.

54. 20 ac. 2 ro.
     4
    82 ro.
    40
    3280 poles.

56. 674 ac. 6 po.
    2696 ro.
    107846 po.
    3262341½ yds.

57. 144 { 12)20047964 sq. in.
        { 12)1670663 .. 8
    9)139221 .. 11 } 140 inches.
    30¼)15469 yards.
    4,0)51,1 per. .. 45 = 11½ yds.
    4)12 ro. 31 per.
    3 ac. 31 per. 11 y. 3 f. 32 in.

58. 740 ac. 5½ yds.
    2960 roods.
    118400 perches.
    3581605½ yards.
    32234449½ feet.

59. 9)7854796 square feet.
    30¼)872755 yds. 1 foot.
    4,0)2885,1 per. .. 49 = 12½ yds.
    4)721 ro. 11 per.
    180 ac. 1 ro. 11 per. 12 yds. 3½ feet.

60. 52 yds.
    27
    1404 ft.
    1728
    2426112 in.

61. 1728)13856832 in.
    27)8019 ft.
    297 yds.

62. 840 qrs. 3 pks.
        8

  6720 bush.
      4

26883 pks.

63. 47 qrs. 6 bush.
    382 bush.

  1528 pks.

64. 4)649 pks.
   8)162 bush. 1 pk.
     20 qrs. 2 bush. 1 pk.

65. 4)6750 pks.
   8)1687 bush. 2 pks.
     210 qrs. 7 bush. 2 pks.

66. 142 chal. $\times$ 12 = 1704 sacks $\times$ 3 = 5112 bush. $\times$ 4 = 20448 pecks.

67. 11808 pecks $\div$ 4 = 2952 bush. $\div$ 3 = 984 sks. $\div$ 12 = 82 chal.

68. 32 chal. $\times$ 12 + 6 = 390 sks. $\times$ 3 + 2 = 1172 bush.

69. 15 gal. $\times$ 4 = 60 qts. $\times$ 2 = 120 pts.

70. 2 tuns $\times$ 2 = 4 pipes $\times$ 2 = 8 hhds. $\times$ 63 = 504 gal. $\times$ 4 = 2016 qts.

71. 3424 pts. $\div$ 2 = 1712 qts. $\div$ 4 = 428 gal. $\div$ 63 = 6 hhds. 50 gal.

72. 23 tuns $\times$ 2 + 1 = 47 pipes $\times$ 2 + 1 = 95 hhds. $\times$ 63 + 14 = 5999 gal. $\times$ 4 = 23996 qts. $\times$ 2 = 47992 pts. $\times$ 4 = 191968 gills.

73. 20 bar. $\times$ 2 = 40 kil. $\times$ 2 = 80 fir. $\times$ 9 = 720 gal. $\times$ 4 = 2880 qts.

74. 36 hhds. $\times$ 1$\frac{1}{2}$ = 54 bar. $\times$ 2 = 108 kil. $\times$ 2 = 216 fir. $\times$ 9 = 1944 gal. $\times$ 4 = 7776 qts. $\times$ 2 = 15552 pts.

75. 3456 gal. $\div$ 9 = 384 fir. $\div$ 2 = 192 kil. $\div$ 2 = 96 bar. $\div$ 1$\frac{1}{2}$ = 64 hhds. $\div$ 2 = 32 butts.

76. 4608 pts. $\div$ 2 = 2304 qts. $\div$ 4 = 576 gal. $\div$ 9 = 64 fir. $\div$ 2 = 32 kil. $\div$ 2 = 16 bar.

77. 7 spin. $\times$ 4 = 28 sl. $\times$ 6 = 168 he. $\times$ 2 = 336 cuts.

78. 48960 th. $\div$ 120 = 408 cuts $\div$ 2 = 204 he. $\div$ 6 = 34 slips.

79. 27 sp. × 4 = 108 sL. × 6 = 648 he. × 2 = 1296 cuts × 120 + 80 = 155600 th.

80. 71 sL. × 6 + 4 = 430 he. × 2 + 1 = 861 cuts × 120 + 64 = 103384 th. × 90 + 25 = 9304585 in.

81. 36″ × 60 + 24 = 2184′ × 60 + 35 = 131075″.

82. 120836″ ÷ 60 = 2013′ : 56″ ÷ 60 = 33′, 33′, 56″ ÷ 30 = 1′, 3′, 33′, 56″.

83. 4° × 30 + 14 = 134° × 60 + 15 = 8055′ × 60 + 44″ = 483344″.

84. 365 days × 24 + 6 = 8766 hrs. × 60 = 525960 m. × 60 = ₊1557600 sec.

85. 1818 years × 365¼ = 664024½ days × 24 = 15936588 hours.

86. 365 days × 24 + 5 = 8765 hrs. × 60 + 48 = 525948 m. × 60 + 48 = 31556928 sec.

87. Mar. 22 + Ap. 30 + May 31 + June 30 + July 31 + Aug. 31 + Sept. 30 + Oct. 31 + Nov. 30 + Dec. 25 = 291 days and 291 × 24 = 6984 hrs.

88. 500000000 ÷ 100 = 5000000 m. ÷ 60 = 83333 hrs. 20 m. ÷ 24 = 3472 da. 5 ho. 20 m. ÷ 365 = 9 common yrs. 187 d. 5 h. 20 m.

89. 200 ÷ 18 = £11, 2s. 2⅔d.

90. 200 ÷ 12 = £16, 13s. 4d.

91. 9 ro. × 36 + 20 = 344 yds. × 9 = 3096 square feet.

92. 520 st. × 16 + 12 = 8332 lb. × 16 + 14 = 133326 ounces.

93. 4600 yds. × 36 = 165600 inches ÷ 37 = 4475$\frac{25}{37}$ Scotch ells.

94. 50 ch. × 16 + 10 = 810 bo. × 4 + 2 = 3242 fir. × 4 + 1 = 12969 pk. × 4 + 2 = 51878 lippies.

95. 42 ac. × 4 + 3 = 171 ro. × 40 + 10 = 6850 falls × 36 = 246600 sq. ells.

96. 25 hhd. × 16 = 400 gal. × 4 = 1600 qt. × 2 = 3200 pts. × 2 = 6400 chopins × 2 = 12800 mu. × 4 = 51200 gills.

97. 218 × 17¼ = 3815 oz. ÷ 22 = 173 lb. 9 oz.

98. 240 × 22 = 5280 oz. ÷ 16 = 330 lb. av.

COMPOUND ADDITION.

ANSWERS.

	£	s.	d.		£	s.	d.		£	s.	d.
1.	31	2	4	3.	3830	0	8¼	5.	2987	14	0½
2.	220	19	8¼	4.	362	3	2¾	6.	2382	11	9¼

7.	£	s.	d.
	450	16	10
	34	18	9
	545	16	7¾
	44	14	8½
	300	9	10
	84	14	0
	£1461	10	9¼

8.	£	s.	d.
	326	12	3¼
	274	15	4
	432	16	5¼
	376	19	8½
	741	14	5¼
	279	2	4
	£2432	0	6¾

9.	£	s.	d.
	471	15	2¼
	296	17	8¼
	1432	15	4½
	273	12	6
	354	14	5¼
	2471	13	4
	£5301	8	6¼

10.	£	s.	d.
	28	12	5¼
	437	16	3
	7328	12	5½
	456	14	10
	3284	17	8¾
	27	16	3
	£11564	9	11½

11.	£	s.	d.
	246	14	5¼
	741	13	2¼
	79	2	8
	4284	16	2
	456	15	3
	36	8	4¾
	2841	12	9
	£8687	2	8½

12.	£	s.	d.
	287	14	5¼
	742	9	4
	28	17	5¼
	4684	12	9½
	356	14	6
	3284	16	5¾
	4721	15	2¼
	£14107	0	2½

13.	£	s.	d.
	38	14	6¼
	276	13	5
	29	10	7¼
	4324	17	9¾
	742	6	2¾
	5426	15	3
	45	4	10½
	2143	14	5
	£13027	17	1½

14.

£	s.	d.
1568	16	9½
5769	17	10½
8769	19	4¼
7698	15	4
49987	17	6½
50987	14	7¾
97854	8	6½
9768	3	5¼
376	9	7½
88768	15	6¼
£321550	18	2¼

15.

£	s.	d.
100	10	0
0	18	6
1	18	0
0	12	8¾
£103	19	2¾

16.

£	s.	d.
0	10	10½
0	5	9½
0	15	6
0	0	5¼
0	10	3
0	0	10¾
0	6	8
£2	10	5¼

17.

£	s.	d.
8	9	6½
5	10	0
3	11	9½
12	10	8¾
20	8	4½
£50	10	4¾

18. Ans. 369 tons, 4 cwt. 3 qrs.

19. Ans. 133 lbs. 15 oz. 9 dr.

20. Ans. 301 lbs. 4 oz. 7 dwt. 23 grs.

21.

lb.	oz.	dw.	gr.
50	11	14	20
40	10	15	—
62	8	—	20
34	8	14	—
36	4	10	19
54	—	—	15
279	7	16	2

22.

lb.	oz.	dr.	sc.	g.
45	6	5	14	
23	8	6	—	12
31	4	3	2	—
27	10	2	5	—
—	—	3	1	15
2	5	7	2	10
131	—	4	2	11

23.

cwt.	qr.	lb.	oz.	dr.
—	3	4	12	4
—	1	15	10	—
4	1	6	14	—
5	3	—	—	—
2	2	26	10	12
13	3	25	15	—

24.

yds.	qr.	nls.
308	2	1
500	1	3
54	3	—
60	3	3
924	2	3

25.

m.	fu.	po.	yds.
5	1	8	—
19	—	18	—
—	6	18	4
—	5	36	4
30	1	1	2½

26.

tun.	hhd.	ga.	qt.
1	2	—	—
2	58	—	
1	8	3	
3	50	2	
3	1	54	1

27.

ac.	ro.	po.	yds.	ft.
6	2	20	—	
20	1	15	—	
15	3	4	—	
2	2	—	24	8
1	1	39	28	5
46	2	39	22½	4

COMPOUND SUBTRACTION.

ANSWERS.

	£	s.	d.		£	s.	d.		£	s.	d.
1.	1	18	10	3.	19	17	4½	5.	647	0	4½
2.	5	16	1¾	4.	156	19	11¾				

	£	s.	d.		£	s.	d.		£	s.	d.
6.	14	10	8	8.	436	17	4¼	10.	3045	0	0
	10	11	10¼		298	14	6¾		3000	10	8
	3	18	9¾		138	2	9¾		44	9	4

	£	s.	d.		£	s.	d.		£	s.	d.
7.	40	16	0	9.	978	5	2¼	11.	100	0	0
	30	18	6½		284	16	4½		48	16	10½
	9	17	5¾		693	8	9¾		51	3	1¼

	£	s.	d.		£	s.	d.
12.	2843	12	8½	13.	7846	0	4½
	1761	13	4½		471	12	9¾
	1081	19	3¾		7374	7	6¾

14.
£	s.	d.
1000	8	9 owing.
108	14	4
112	10	6½
258	8	5¼
479	13	4¼ rec. in all.
520	15	4½ rem. due.

15.
£	s.	d.	£	s.	d.
480	6	7	100	6	8
3005	14	8	70	19	8
788	10	6¾	169	16	10½
850	18	9¼	341	3	2¼
5125	10	7 he has.			
341	3	2¾ he owes.			
4784	7	4½ his stock.			

16.
£	s.	d.	
30	5	6¼	wages of the three.
22	7	6¼	wages of oldest woman and the man.
7	18	0¼	youngest woman's wages.
21	3	5	youngest woman and the man.
7	18	0¼	youngest woman's wages.
13	5	4¾	man's wages.
22	7	6¼	oldest woman and the man.
13	5	4¾	man's wages.
9	2	1¼	oldest woman's wages.

```
17. lb. oz. dw. g.   20. m. fur. po. yd.   23. ch. sks. bu. p.
    20  8 10  0          50  0  0  0           32  7  2  3
    14  8 14 16          30  6 21  3           21  4  1  2
     5 11 15  8          19  1 18  2½          11  3  1  1

18. t. cwt. qr. lb. oz.   21. qr. bu. p.    24.   £   s.  d.
     4  6  1  — —             111  7  2          100   0   0
     1  0  0 20—               54  4  3          —   —  —½
     1 10  1  4 14             57  2  3           99  19  11¼
     2 10  1 24 14
     1 15  3  3  2

19. yds. qr. nl.     22. tu. hd. gal. qt.   25.     £   s.  d.
    850  —  —             4  0   0  0       Received 8  17  2½
    500  2  1             — 2  40  2        Paid     8  13  4¼
    349  1  3             3 1  22  2        On hand  —   3 10
```

COMPOUND MULTIPLICATION.

```
(1.) 1s.  4¼d.      (6.) —  5¼d.       (10.) 12s. 6d.      (13.) 8s. 4½d.
        2                  10                    5                    4
   —————————         ————————           —————————           —————————
   2     8½          4    7             3 15   0            1 13   5
                                              4                   8
                                        —————————           —————————
                                        £15  0   0          £13  7   4

(2.) 2s.  8¾d.      (7.) —  4½d.
        3                  12                     (11.) 7s.  3½d.     (14.) 14s. 6½d.
   —————————         ————————                              7                    7
   8     2¼          4    3                         —————————           —————————
                                                   2 11   0½           4  7   1½
(3.) —  9½d.        (8.) —  3¼d.                          7                    4
        4                   7                       —————————           —————————
   —————————         ————————                      £10  0   9          £26  2   9
   3     2           2    0½
                           2
(4.) — 4s. 6d.                                    (12.) 9½d.          (15.) 16s. 3½d.
        6          (9.) —  5¾d.                           4                    4
   —————————                4                      —————————           —————————
   1  7   0         ————————                       4    9             5 14   0½
                    1   11                                5                    5
(5.) — 10¼d.                                        —————————           —————————
        8                                          £1   3   9          £45 12   4
   —————————
   6 10
```

(16.) £1, 4s. 6d.
```
        10
     _____
     12  5  0
            6
     _____
     73 10  0
```

(17.) 8s. 6d.
```
            9
       _____
        3 16  6
              8
       _____
     £30 12  0
```

(18.) 1¾d.
```
          10
      _____
       1  5½
          10
      _____
     14s. 7d.
```

(19.) £1, 5s. 3d.
```
        9
    _____
    11  7  3
          12
    _____
   136  7  0
```

(20.) £4, 7s. 6d.
```
         10
     _____
    43 15  0
           12
     _____
   525  0  0
```

(21.) cwt. qrs. lbs.
```
    14   2  17
              7
     _____
   102   2   7
              5
     _____
   512   3   7
```

(22.) ac. ro. per. yd.
```
    15   2  19  22½
                  3
    _____
    46   3  19   7
                  9
    _____
   421   3  13   2½
```

(23.) galls. qts. pts.
```
     54   3   1½
               7
     _____
    384   2   0½
               7
     _____
   2691   3   1½
```

(24.)
```
  lbs. oz. dw. gr.          lbs. oz. dw. gr.
    0   2  11  17             0   0  19  23
           12                        12
  _____          _____
    2   7   0  12             0  11  19  12
            5                         6
  _____          _____
   12  11   2  12             5  11  17   0
    5  11  17   0
  _____
   18  10  19  12
```

(25.) 6s. 3d. × 1
```
       4
    _____
   1  5  0
       4
    _____
   5  0  0
      6  3
    _____
 £5  6  3
```

(26.) 2s. 6d. × 1
```
       7
    _____
   17  6
       4
    _____
  3 10  0
     2  6
    _____
 £3 12  6
```

(27.) 4s. 4½d. × 1
```
       6
    _____
  1  6  3
       6
    _____
  7 17  6
     4  4½
    _____
 £8  1 10½
```

28. £0, 10s. 6d. × 1	**32.** £0, 16s. 11¾d. × 2

28. £0, 10s. 6d. × 1

$$
\begin{array}{r}
9 \\
\hline
4\ 14\ 6 \\
5 \\
\hline
23\ 12\ 6 \\
10\ 6 \\
\hline
24\ 3\ 0 \\
\end{array}
$$

29. £0, 14s. 8¼d. × 2

$$
\begin{array}{r}
5 \\
\hline
3\ 13\ 6\tfrac{1}{2} \\
10 \\
\hline
36\ 15\ 5 \\
1\ 9\ 5 \\
\hline
38\ 4\ 10 \\
\end{array}
$$

30. £0, 9s. 8¾d. × 2

$$
\begin{array}{r}
10 \\
\hline
4\ 17\ 3\tfrac{1}{8} \\
9 \\
\hline
43\ 15\ 7\tfrac{1}{2} \\
19\ 5\tfrac{1}{2} \\
\hline
44\ 15\ 1 \\
\end{array}
$$

31. £24, 6s. 2d. × 5

$$
\begin{array}{r}
10 \\
\hline
243\ 1\ 8 \\
10 \\
\hline
2430\ 16\ 8 \\
121\ 10\ 10 \\
\hline
2552\ 7\ 6 \\
\end{array}
$$

32. £0, 16s. 11¾d. × 2

$$
\begin{array}{r}
10 \\
\hline
8\ 9\ 9\tfrac{1}{2} \\
5 \\
\hline
42\ 8\ 11\tfrac{1}{2} \\
1\ 13\ 11\tfrac{1}{2} \\
\hline
44\ 2\ 11 \times 1 \\
4 \\
\hline
176\ 11\ 8 \\
7 \\
\hline
1236\ 1\ 8 \\
44\ 2\ 11 \\
\hline
1280\ 4\ 7 \\
\end{array}
$$

33. £15, 7s. 11¼d. × 1

$$
\begin{array}{r}
4 \\
\hline
61\ 11\ 9 \\
10 \\
\hline
615\ 17\ 6 \\
15\ 7\ 11\tfrac{1}{4} \\
\hline
600\ 9\ 6 \\
\end{array}
$$

34. £19, 17s. 9¾d. × 1

$$
\begin{array}{r}
2 \\
\hline
39\ 15\ 7\tfrac{1}{2} \\
11 \\
\hline
437\ 11\ 10\tfrac{1}{4} \\
19\ 17\ 9\tfrac{3}{4} \\
\hline
457\ 9\ 8\tfrac{1}{4} \\
\end{array}
$$

35. £0, 2s. 5¾d.

$$
\begin{array}{r}
6 \\
\hline
0\ 14\ 10\tfrac{1}{2} \\
3 \\
\hline
2\ 4\ 7\tfrac{1}{2} \\
7 \\
\hline
15\ 12\ 4\tfrac{1}{2} \\
9 \\
\hline
140\ 11\ 4\tfrac{1}{2} \\
\end{array}
$$

36. £0, 1s. 4½d. × 3
```
              10
   0 13   9 × 5
   ─────────
   6 17   6
          2
   ─────────
  13 15   0
   3  8   9
   0  4  1½
   ─────────
  17  7 10½
```

37. £0, 19s. 1d. × 5
```
   9 10  10 × 6
   ─────────
  95  8   4
          3
   ─────────
 286  5   0
  57  5   0
   4 15   5
```
Take 348 5 5 spends yearly.
From 500 0 0 his income.
```
 ───────────
 151 14   7 saves yearly.
```

38. £2, 13s. 4½d. × 6
```
              10
  26 13   9 × 8
   ─────────
 266 17   6
          4
   ─────────
1067 10   0
 213 10   0
  16  0   3
 ───────────
1297  0   3
```

39. £0, 18s. 7¼d. × 10
```
   9  6  0¼ × 8
              10
   ─────────
  93  0   5 × 8
              10
   ─────────
 930  4   2
          4
  ───────────
3720 16   8
 744  3   4
  74  8   4
  ───────────
4539  8   4
```

40. £3, 17s. 6½d. × 9
```
              10
  38 15  2½ × 8
              10
   ─────────
 387 12   1 × 7
              10
   ─────────
3876  0  10
          3
  ────────────
11628  2   6
 2713  4   7
  310  1   8
   34 17  8½
  ────────────
14686  6  5½
```

41. £2, 11s. 2¾d. × 6
```
              10
  25 12  3½ × 8
              10
   ─────────
 256  2  11 × 7
              10
   ─────────
2561  9   2
1793  0   5
 204 18   4
  15  7  4½
  ────────────
4574 15  9½
```

42.	cwt.	qr.	lb.
	14	1	20 × 5
			10
	144	1	4 × 4
			10
	1442	3	12
			3
	4328	2	8
	577	0	16
	72	0	16
	4977	3	12

43.	st.	cl.	lbs.
	3	1	5
			10
	38	1	1 × 3
			10
	385	1	3 × 4
	3857	0	2
	7714	0	4
	1542	1	5
	115	1	3
	9372	1	5

44.	hhd.	ga.	qts.	pt.
	3	54	2	1 × 1
				9
	34	50	2	1
				5
	174	1	0	1
	3	54	2	1
	177	55	3	0

45.	qr.	bu.	pk.
	2	3	3 × 5
			10
	24	5	2 × 6
			10
	246	7	0
	740	5	0
	148	1	0
	12	2	3
	901	0	3

46.	to.	cw.	qr.	lb.	oz.
	0	4	1	18	12
					10
	2	4	0	19	8
					2
	4	8	1	11	0

BILLS OF PARCELS.

1. £	s.	d.	2. £	s.	d.	3. £	s.	d.
1	0	0	21	0	0	2	5	6
1	7	9	13	1	0	1	4	9
4	10	1½	22	12	0	23	8	9
2	17	3½	66	5	0	12	11	8½
0	7	0	3	16	0	1	16	8
10	2	2	3	10	2	2	13	10
			130	4	2	44	1	2½

c 2

COMPOUND DIVISION.

1. £ s.
    2)3 10
    ―――――
    1 15

2. £ s. d.
    3)8 6 6
    ―――――――
    2 15 6

3. £ s. d.
    4)9 10 10
    ―――――――――
    2 7 8½

4. £ s. d.
    5)18 16 9½
    ――――――――――
    3 15 4½

5. £ s. d.
    6)17 13 0
    ――――――――
    2 18 10

6. £ s. d.
    7)20 6 7
    ――――――――
    2 18 1

7. £ s. d.
    8)21 8 0
    ――――――――
    2 13 6

8. £ s. d.
    9)271 1 2½
    ―――――――――――
      30 2 4½

9. £ s. d.
    10)43 16 0½
    ―――――――――――
       4 7 7½

10. £ s. d.
  16 { 5)340 10 0
      { 4)85 2 6
       ――――――――――――
         21 5 7½

11. £ s. d.
  35 { 5)248 17 3½
      { 7)49 15 5½
       ――――――――――――
          7 2 2½

12. £ s. d.
    53)3590 12 6(£67
       410
       ―――
        39
        20
       ―――
    53)792½(14s.
       262
       ―――
        50
        12
       ―――
    53)606(11d.
        76
       ―――
        23
         4
       ―――
    53)92¼(½
       39

13. £ s. d.
  96 {12)5672 14 0
     { 8)472 14 6
      ―――――――――――――
        59 1 9½

14. £ s. d.
  365)630 7 8½(£1
      265
       20
      ―――――
     5307(14s.
     1657
      197
       12
      ―――――
     2372(6d.
      182
        4
      ―――――
      730(¼

15.   £   s. d.
801)17843 18 10½(£22
    1823
     221
      20
  4438(5s.
   433
    12
 5206(6d.
  400
    4
 160z(¼

16. cwt. qr. lb.
11)345 1 8
  31 1 16

17. lb. oz. dwt.
7)47 2 13
 6 8 19

18. lb. oz. dr. sc. gr.
5)19 6 3 2 17
 3 10 7 0 8

19. tu. c. hhd. gal.
25 {5)169 1 1 48
   {5)33 1 1 60
     6 1 1 12

20. yd. qr. nl.
28 {7)540 3 1
   {4)77 1 0½
    19 1 1 2⅛

21. ac. ro. po.
51)51 1 11(1 ac.
   0
   4
   1(0 ro.
  40
  51(1 pole.

22. gal. qt. pt.
63 {7)307 0 1
   {9)43 3 1
     4 3 1

23. t. cwt. q. lb.
7)2 7 3 14
 0 6 3 10

24. £ s. d.
6)1 7 0
 0 4 6

25. £ s. d.
9)1 8 10½
 0 3 2½

26. s. d.
12)4 3
  0 4½

27. £ s. d.
24 {6)16 15 6
   {4)2 15 11
    0 13 11¾

28. £ s. d.
29)5 2 1¼(£0
   20
  102(3s.
   15
   12
  181(6d.
    7
    4
  29(¼

29. £ s. d.
45 {9)113 12 6
   {5)12 12 6
     2 10 6

30.
£ s. d.
12)128 11 2
  10 14 3 $\frac{1}{12}$

33.
£ £ s. d.
742)3850(5 3 9¼ $\frac{1}{7}\frac{1}{42}$
    140
     20
   2800(3s.
    574
     12
   6888(9d.
    210
      4
    840(¼
     98

31.
£ s. d.
3)740 0 0
 246 13 4

32.
£ s. d.
84 { 12)51 7 3
     7)4 5 7¼
       0 12 2¾

34. First, £560, 12s. ÷ 12 = £46 14s. 4d. a-month.
Secondly, £560, 12s. ÷ 52 = 10 15 7 $\frac{5}{13}$ a-week.
Lastly, £560, 12s. ÷ 365 = 1 10 8 $\frac{4}{13}\frac{5}{73}$ a-day.

35. First £6, 12s. = 264 sixpences, and 5s. 6d. = 11 sixp. Then 264 ÷ 11 = 24 persons.

36. First £1152, 10s. 6d. = 46101 sixpences, and £9, 10s. 6d. = 381 sixp. Then 46101 ÷ 381 = 121 patients.

37. First £569, 16s. 3d. = 45585 threepences, and £1, 2s. 6d. = 90 threep. Then 45585 ÷ 90 = 506 ac. 2 ro.

38. First 1s. 4d. = 7½d. = 8½d. = 17 halfpence, saves daily; and £20, 17s. 2½d. = 10013 halfpence. Then 10013 ÷ 17 = 589 days.

39.
£ s. d.   £ s. d.
0 14 6¼   0 14 6¼
      8   3
5 16 4   8)2 3 7½
5 5] 5¾   5 5¼ or ¾
6 1 9¼ ¾

40.
£ s. d.   s. d.
0 6 2   6 2
     12
3 14 0   4)18 6
   4 7½   4 7½
3 18 7½

41.
s. d.   s. d.   £ s. d.
                  11 9¾ × 14 = 8 5 4½
11 9¾ × 5 + 8 = 2 19.0¾ ÷ 8 = 0 7 4½ $\frac{4}{8}$
                              8 12 9¾

42. £0, 15s. 6¾d. × 1½

```
 £  s.  d.
 3  2  3
       7
---------
21 15  9
 0 15  6¾
 0  5  2¼
---------
22 16  6
```

43. £0, 6s. 7¾d. × 1⅞

```
 £  s.  d.
 1  3  2¼
       5
---------
14 19  0½
    6  7⅞
    2  5¾ ⅜
---------
15  8  2¼ ⅜
```

44.
20 lb. 2 oz. 7 dwt. 21 grs.×4 = 80 lb. 9 oz. 11 dwt. 12 grs.
20 lb. 2 oz. 7 dwt. 21 grs.×⅜
48 lb. 1 oz. 3 dwt. 15 grs.÷5=12 lb. 1 oz. 8 dwt. 17¼ grs.
                    Ans. 92 lb. 11 oz. 0 dwt. 5⅝ grs.

45.
24 cwt. 1 qr. 14 lb. 10 oz. × 8 = 195 cwt. 0 qr. 5 lb. 0 oz.
24 cwt. 1 qr. 14 lb. 10 oz. × ⅞
48 cwt. 3 qr. 1 lb. 4 oz.÷7 =   6 cwt. 3 qr. 24 lb. 2⅔ oz.
                    Ans. 202 cwt. 1 qr. 1 lb. 2⅔ oz.

46.
20 m. 3 fur. 30 po. 2 yd. × 9 = 184 m. 1 fur. 33 po. 1½ yd.
20 m. 3 fur. 30 po. 2 yd. × ⅛
40 m. 7 fur. 20 po. 4 yd.÷8 = 13 m. 5 fur. 6 po. 5 yd.
                    Ans. 197 m. 7 fur. 0 po. 1 yd.

47.
120 yds. 2 qrs. 1 nl. × 10 = 1205 yds. 2 qrs. 2 nls.
120 yds. 2 qrs. 1 nl. × ⅜
482 yds. 1 qr. 0 nl. ÷ 9 = 53 yds. 2 qrs. 1⅓ nls.
                    Ans. 1259 yds. 0 qrs. 3⅓ nls.

48.   40 ac. 3 ro. 30 po. × 11 = 450 ac. 1 ro. 10 po.
       40 ac. 3 ro. 30 po. × ⅜
      122 ac. 2 ro. 10 po. ÷ 7 = 17 ac. 2 ro. 7½ po.
                    Ans. 467 ac. 3 ro. 17½ po.

49.

Tu.	p.	hhd.	ga.	qt.	pt.		Tu.	p.	hhd.	ga.	qt.	pt.
28	0	1	24	0	1 × 7 = 198	0	1	42	3	1		
28	0	1	24	0	⅞							
56	1	0	48	1	0÷3 = 18	1	1	37	0	0½		

                    Ans. 217 0 1 16 3 1½

```
50.    £  s.  d.          51.  13½)£15  0  0
    17¼) 8  12                    3   3
      4                      ───────────────
  ───────────              40 )45  0  0
  69 )34  10  0(£0, 10          £1  2  6
      20
  ───────
     690
      69
  ───────
       0
```

```
52.  22⅔)£12,  6s.  8¼d.
        4          4
     ──────────────────
     91 ) 49   6   10 (£0, 10s. 10⅚⅔d.
          20
        ──────
         986
          91
        ──────
          76
          12
        ──────
         922
          91
        ──────
          12
```


53. As the boy gets ⅔ of a man's share, it is the same as dividing the sum among 5⅔ men; wherefore 5 × 3 ÷ 2 = 17 and £276, 16s. 8d. × 3 = £830, 10s., then £830, 10s. ÷ 17 = £48, 17s. 0¼d. ¼⅔ a man's share, which × 2 and ÷ 3 = £32, 11s. 4¼d. ⅝⅓ boy's share.

54. ⅞ × 7 = ⁴⁹⁄₈ = 5⅝ + 9 = 14⅝.
£200, 14s. 6d. ÷ 14⅝ = £1204, 7s. ÷ 89 =
   13 10 7¼ ⅞⅝ a man's share, then
   13 10 7¼ ⅞⅝ × 5 ÷ 6 = £67, 13s. 2⅜d. ⅛⅜ ÷ 6 =
   11   5 6¼ ⅛⅜ a woman's share.

55. First, £114, 8s. 4d. × 5 ÷ 8 = £572, 1s. 8d. ÷ 8 = £71, 10s. 2½d. A's share; then £114, 8s. 4d. ÷ 4 = £28, 12s. 1d. B's share; and £114, 8s. 4d. ÷ 8 = £14, 6s. 0¼d. C's share.

BILLS OF PARCELS.

£ s. d.	5. £ s. d.	6. £ s. d.	7. £ s. d.
1 1 0	6 11 10	26 1 9½	27 15 0
0 18 11½	0 19 11½	8 8 5½ ⅜	13 5 1½
0 9 8	2 2 6	4 9 7	3 8 3½
0 4 8	7 4 6	6 2 0⅞	19 14 7½
3 7 6	11 7 7½	0 14 5½	64 3 0½
	14 13 4	1 0 7½	
6 1 9½	42 19 8½	46 16 11¾ ⅜	

SIMPLE PROPORTION.

yds. yds.	s. d.
2 : 16 ::	4 6

```
        12
       ————
        54
        16
      ——————
    2)864
   12)432
   2,0)3,6
   £1, 16s.
```

S. yds. yds.	s. d.
4½ :: 20 :	12 8½

```
      2    2    152d.
      9   40   610£.
                40
      9)24400
      4)2711½
     12)672½ ⅛
    2,0)5,6s. 5d.
    £2, 16s. 5⅞d. ⅛
```

2. yds. yds.	£ s.
16 : 2 ::	1 16

```
        20
       ———
        36
         2
    16 { 4)72
       { 4)18
         4s. 6d.
```

4. yds. yds.	£ s.
20 : 4 ::	2 16 5⅞d.

```
      2    2    56s.
     40    9   677d.
                 9
    4,0)2400,0
       4)610
      12)152½
      12s. 8¼d.
```

5. $1\frac{1}{4}$ yd. : $24\frac{1}{2}$ yds. :: 2s. 6d. = 5 qrs. : 98 qrs.
:: 30d. $= \dfrac{30 \times 98}{5} = \dfrac{2940}{5} = 588d. = 49s. =$ £2, 9s.

6. $24\frac{1}{2}$ yds. : $1\frac{1}{4}$ yd. :: £2, 9s. = 98 qrs. : 5 qrs.
:: 49s. $= \dfrac{49 \times 5}{98} = \dfrac{245}{98} = 2$s. 6d.

7. 1 lb. : $1\frac{1}{2}$ cwt. :: $10\frac{1}{2}$d. = 1 lb. : 168 lb.
:: 42£. $= 42 \times 168 = 7056$d. $= 1764$d. $= 147$s. = £7, 7s.

8. $1\frac{1}{2}$ cwt. : 1 lb. :: £7, 7s. = 168 lb. : 1 lb. ::
1764d. $= \dfrac{1764}{168} = 10\frac{1}{2}$d.

9. $1\frac{1}{2}$ oz. : 24 lb. :: $6\frac{3}{4}$d. = 5 qr. oz. : 1536 qr. oz.
:: 27£. $= \dfrac{27 \times 1536}{5} = \dfrac{41472}{5} = 8294\frac{2}{5}$£ = £8, 12s. $9\frac{1}{2}$d. $\frac{2}{5}$.

10. 24 lb. : $1\frac{1}{2}$ oz. :: £8, 12, $9\frac{1}{2}$£. $\frac{2}{5}$ = 1536 : 5 ::
$41472 = \dfrac{41472 \times 5}{1536 \times 5} = \dfrac{41472}{1536} = 27$ £ = $6\frac{3}{4}$d.

11. 1 oz. : $2\frac{1}{2}$ cwt. :: $6\frac{3}{4}$d. = 1 oz. : 4480 oz. :: 26£.
= 26 × 4480 = 116480£. = £121, 6s. 8d.

12. $2\frac{1}{2}$ cwt. : 1 oz. :: £121, 6s. 8d. = 4480 oz. : 1 oz.
:: 29120d. = 29120 ÷ 4480 = $6\frac{1}{2}$d. $\frac{3}{4}$

13. First $30\frac{1}{2}$ yds. × 3 = $91\frac{1}{2}$ yds. Then 3 qrs. : $91\frac{1}{2}$ yds. :: 3s. 6d. = 3 qrs. : 366 qrs. :: 42£. $= \dfrac{42 \times 366}{3} = \dfrac{15372}{3} = 5124$£. = £21, 7s.

14. $91\frac{1}{2}$ yds. : 3 qrs. :: £21, 7s. = 366 : 3 :: 427s. $= \dfrac{427 \times 3}{366} = \dfrac{1281}{366} = 3$s. 6d.

15. 4 cwt. 1 qr. 14 lb. : : 1 oz. : £40, 16s. 8d. = 840 oz. : : $9800 = 9800 - 7840 = 1960$

16. 1 oz. : 4 cwt. 1 qr. 14 lb. : : 1¼d. = 1 : 7840 : : 5 $= 5 \times 7840 = 39200f. =$ £40, 16s. 8d.

17. 1½ oz. : 5 cwt. 3 qrs. 18 lb. : : 2¼d. = 3 half-f. : 21184 half-oz. : : 10f. $= \dfrac{21184 \times 10}{3} = 70613\frac{1}{3}f. =$ 73, 11s. 1¼d. ⅓.

18. 5 cwt. 3 qrs. 18 lb. : 1½ oz. : : £73, 11s. 1¼d. ⅓ = 21184 half-oz. : 3 half-oz. : : 70613⅓ $= \dfrac{70613\frac{1}{3} \times 3}{21184}$
$\dfrac{21840}{21184} = 10f. = 2\frac{1}{4}d.$

19. 1½ lb. : 2 t. : : 1½d. = 3 half-lb. : 8960 half-lb. : : f. $= \dfrac{8960 \times 6}{3} = 17920f. =$ £18, 13s. 4d.

20. 1 gal. : 1 pipe : : 13s. 6d. = 1 gal. : 126 gal. : : 162d. $= 20412d. =$ £85, 1s.

21. 3½ cwt. : 1 lb. : : £8, 11s. 6d. = 392 lb. : 1 lb. : : 2058d. = 5¼d.

22. First 15¼ lb. × 10 = 152½ lb. Then 1 lb. : 152½ lb. : : 6¾d. = 2 : 305 : 27f. $= \dfrac{27 \times 305}{2} = \dfrac{8235}{2} = 4117\frac{1}{8}f. =$ £4, 5s. 9¼d. ⅛.

23. 7 days : 365 : : £17, 13s. 9¼d. = 7 : 365 : : 16992f. $= \dfrac{16992 \times 365}{7} = \dfrac{6198430}{7} = 885490f. =$ £922, 7s. 8¼d. spent yearly, and £922, 7s. 8¼d. + £500 = £1422, 7s. 8¼d. yearly income.

24. 1 day : 2½ years : : £3240, 9s. 9½d. = 1d. :
912½d. : : 3110870£ : 288866²875£. = £2956946, 14s.
10¾d.

25. 4 qrs. : 5 qrs. : : 74d. = $\frac{74 \times 5}{4} = \frac{370}{4} =$
92½d. = 7s. 8½d.

26. 1 t. : 2½ lb. : : £23, 6s. 8d. = 2240 lb. : 2½ : :
5600d. = $\frac{5600 \times 2½}{2240} = \frac{14000}{2240} = 6¼$d.

27. 1 day : 313 (number of days in a year, exclusive
of Sundays) : : 74£. : 23162£. = £24, 2s. 6½d.

28. 1 ac. : 400 ac. 2½ ro. : : £2, 2s. = 8 half-
ro. : 3205 half-ro. : : 42s. = $\frac{42 \times 3205}{8} = \frac{134610}{8} =$
16826s. 3d. = £841, 6s. 3d.

29. 1 qr. : 61 qrs. 7 bu. : : 18s. 8d. = 8 bu. : 495 bu.
: : 224d. : 13860d. = £57, 15s.

30. £20, 9s. 4d. : 6s. 4½d. : : 100 yds. = 19648£. :
: 307£. : : 100 = 30700 ÷ 19648 = 1 yd. 2 qrs. 1 nl.

31. 1 cwt. 2 qrs. 16 lb. × 4 = 6 cwt. 2 qrs. 8 lb. :
1 cwt. : : £23 = 736 lb. : 112 lb. : : £23 = 23 × 112
÷ 736 = 2576 ÷ 736 = £3, 10s.

32. £1 : £900 : : 30d. : 27000d. = £112, 10s.

33. £1200 : £1 : : 750 = 750 × 20 ÷ 1200 =
12s. 6d.

34. 12s. 6d. : £750 : : £1 = 150d. : 180000d. = £1
: £1200.

35. 20s. : 180010s. : : 186d. = 33481860 ÷ 20 =
1674093d. = £6975, 7s. 9d.

36. First 2½ lb. × 6 = 13½ lb. = 3240 dwt. Then 1
: 3240 : : 4s. = 12960s. = £648.

37. 1¾ oz. : 24½ lb. : : 9s. 7¼d. = 7 : 1176 : : 462£.
= 543312 ÷ 7 = 77616£. = £80, 17s.

38. 18 st. × 14 = 252 oz. : 28 st. × 14 = 3528 lbs, and 3528 lb. : 1 lb. : : £109, 4s. = 3528 lb. : 1 lb. : : 26208d. : 7¼d. ⅘.

39. 1 lb. : 100 lb. : : 66d. : 6600d. = £27, 10s. prime cst, from which deduct £2s, leaves £25 selling price. Then 100 lb. = 1600 oz. : 1 oz. : : £25 = 6000d. : 3¾d.

40. 30 — 22½ = 7½ gal. = 15 h. g. (quantity in the cistern at the end of an hour) : 400 h. g. : : 1 h. : 26 hrs. 40 m.

41. To £8, 13s. 4d. (prime cost) add £2, 2s. (gain), the sum £10, 15s. 4d. is the selling price. Then 2 cwt. = 224 lbs. = 3584 oz. : 1 lb. : : £10, 15s. 4d. = 2584d. : 1¼d.

42. From 4 tuns or 1008 gal. take 48 gal. remain 960 gl. to be sold. Then 960 : 1 gal. : : £640 or 12800s. : 13s. 4d.

43. 1 ell : 240 yds. : : 16s. 10½d. = 5 qrs. : 960 qrs. : : 810£ = 777600 ÷ 5 = 155520£. = £162.

44. £5840 : £1 : : £109, 10s. = 26280d. : 26280 ÷ 21 = 22¼ oz. ÷ 21 = 10 oz. 10½ drs.

45. 10½ m. : 8 m. : : 14 oz. : 21 : 16 : : 14 = 14 × 8 ÷ 21 = 22¼ oz. ÷ 21 = 10 oz. 10½ drs.

46. £100 : £47 : : £4, 10s. or 90s. = 47 × 90 ÷ 100 = 42s. 3¼d. ⅜ = £2, 2s. 3¼d. ⅜.

47. 24 m. : 14 m. : : 6 days, or 4 m. : 14 m. : : 1 d. 14 ÷ 4 = 3 d. 5 h.

48. 24s. : 30s. : : 3 lb. = 90 ÷ 24 = 3 lb. 12 oz.

49. 1 g. : 50 pts. : : 3½d.; or 1 g. : 200 g. : : 3½d. = 200 × 3½d. = 700d. = £2, 18s. 4d.

50. 1 oz : 4 cwt. 2 qrs. 20 lbs. : : 3¼d. = 1 oz. : 8384 oz : 15£ = 125760£. £131 selling price, from which subtract £113, 10s. 8d. prime cost, the remainder £17, 1s. 4d. is the gain.

51. 1¼ pks. : 8 ch. 10s. 2 bush. : : 10½d.; or 3 : 2560 : : ½d. = 2560 × 10½ ÷ 3 = 26880 ÷ 3 = 8960d. = £37, 6s. 8d.

52. 1 sq. yd. : 900] ac. : : 3£, or 2 : 8716840 : : 3
= 8716840 × 3 ÷ 2 = 26150520 ÷ 2 = 13075260£. =
£13620, 1s. 3d.

53. £3, 2s. 6d. × 13½ cwt. = £42, 3s. 9d. And 6s.
8d. : £42, 3s. 9d. : : 1 yd. : 126 yds. 2 nl.

54. 3 qrs. : 1½ yds. : : 3¾ yds., or 3 qrs. : 6 qrs. : : 15
qrs. = 15 × 6 ÷ 3 = 90 ÷ 3 = 30 qrs. = 7½ yds.

55.	£	s.	d.
Shalloon,	33	15	10¾ ½
Flannel,	4	1	4½
Meal,	14	10	10
Clover-seed,	3	17	3½
Iron,	2	14	11¾
Train-oil,	37	19	6
Ans.	96	19	9¾ ¼

56.	£	s.	d.
Sugar,	65	12	0
Tea,	45	0	0
	110	12	0
Calico,	20	1	0½
Diaper,	17	3	9½ ½
	37	4	9½ ½
Ans.	73	7	2½ ¼

BOOK DEBTS.

8.	£	s.	d.
Salt,	38	3	9
Paper,	35	6	10¾ ¾
Rum,	273	0	0
Cheese,	1430	12	6
Sugar,	80	11	9½
Whisky,	85	1	0
Meal,	83	11	8½
Ans.	2026	7	7½ ½

COMPOUND PROPORTION.

1. $\left\{\begin{array}{l}£100 : £60 \\ 12m. : 9m.\end{array}\right\} : : £5 : \dfrac{60 \times 9 \times 5}{100 \times 12} = \dfrac{2700}{1200} = £2, 5s.$

2. $\left\{\begin{array}{l}£5 : £2, 5s. \\ 9m. : 12m.\end{array}\right\} : : £100 : \dfrac{45 \times 12 \times 100}{100 \times 9} = 5 \times 12 = £60.$

2. $\left\{\begin{array}{l} \text{£60} : \text{£100} \\ \text{£5} : \text{£2, 5s.} \end{array}\right\}$ :: 12m. : $\dfrac{100 \times 45 \times 12}{100 \times 60} = \dfrac{45}{5} =$ 9 months.

3. $\left\{\begin{array}{l} \text{£60} : 100 \\ 9m. : 12m. \end{array}\right\}$ :: £2, 5s. : $\dfrac{100 \times 12 \times 45}{60 \times 9} =$ $\dfrac{100 \times 12 \times 5}{60} = \dfrac{100 \times 60}{60} =$ 100s. = £5.

5. $\left\{\begin{array}{l} 16m. : 48m. \\ 21d. : 84d. \end{array}\right\}$ :: 24 ac. : $\dfrac{48 \times 84 \times 24}{16 \times 21} = 3 \times 4 \times 24 =$ 228 ac.

6. $\left\{\begin{array}{l} 3h. : 24h. \\ 1w. : 52w. \end{array}\right\}$ :: 14 pks. : $\dfrac{24 \times 52 \times 14}{3 \times 1} = 8 \times 52 \times 14 = 5824$ pks. = 1456 bush.

7. $\left\{\begin{array}{l} 12r. : 48r. \\ 6d. : 24d. \end{array}\right\}$ :: 14 ac. : $\dfrac{48 \times 24 \times 14}{12 \times 6} = 4 \times 4 \times 14 =$ 224 ac.

8. $\left\{\begin{array}{l} 8m. : 64m. \\ 6d. : 32d. \end{array}\right\}$ :: £3, 10s. : $\dfrac{64 \times 32 \times 70}{8 \times 6} = \dfrac{8 \times 16 \times 70}{3} =$ $\dfrac{8960}{3} = 2986s. \ 8d. = £149, 6s. 8d.$

9. $\left\{\begin{array}{l} 2 \text{ horses} : 16 \text{ horses} \\ 6d. \times 8h. : 156d. \times 12\frac{1}{2}h. \end{array}\right\}$ :: $4\frac{1}{2}$ ac. :

$\dfrac{16 \times 156 \times 12\frac{1}{2} \times 4\frac{1}{2}}{2 \times 6 \times 8} = 2 \times 26 \times 2\frac{1}{2} \times 12\frac{1}{2} = 1462$ ac. 32 ro.

10. $\left\{\begin{array}{l}117 \text{ grs. : } 468 \text{ grs.} \\ 9d. \text{ : } 45d.\end{array}\right\}$ :: 654s. : $\dfrac{468 \times 45 \times 654}{117 \times 9} =$

$4 \times 5 \times 654 = 13080$ soldiers.

11. $\left\{\begin{array}{l}4 \text{ m. : } 6 \text{ m.} \\ 12 \text{ d.} \times 14 \text{ h. : } 6 \text{ d.} \times 8 \text{ h.}\end{array}\right\}$ :: 20 ro. : $\dfrac{6 \times 4 \times 8 \times 20}{4 \times 12 \times 14} =$

$\dfrac{8 \times 20}{2 \times 14} = \dfrac{4 \times 10}{7} = \dfrac{40}{7} = 5$ ro. 25 yds. $6\frac{2}{3}$ ft.

12. $\left\{\begin{array}{l}248 \text{ m. : } 62 \text{ m.} \\ 4 \text{ cwt. : } 8 \text{ cwt. } 3 \text{ qrs. } 14 \text{ lbs.}\end{array}\right\}$ :: £6, 8s. :

$\left\{\begin{array}{l}248 \text{ m. : } 62 \text{ m.} \\ 448 \text{ lb. : } 994 \text{ lb.}\end{array}\right\}$ :: 128s. : $\dfrac{62 \times 994 \times 128}{248 \times 448} = \dfrac{994 \times 2}{4 \times 7} =$

$\dfrac{497}{7} = 71$s. = £3, 11s.

13. $\left\{\begin{array}{l}50\text{ft.} \times 14\text{ft.} \times 2\text{ft. : } 500\text{ft.} \times 16\text{ft.} \times 4\text{ft.} \\ 60 \text{ m. : } 20 \text{ m.}\end{array}\right\}$ :: $12d.$:

$\left\{\begin{array}{l}1400 \text{ sol. ft. : } 32000 \text{ s. ft.} \\ 60 \text{ m. : } 20 \text{ m.}\end{array}\right\}$ :: $12d.$: $\dfrac{32000 \times 20 \times 12}{1400 \times 60} =$

$\dfrac{320 \times 12}{14 \times 3} = \dfrac{160 \times 12}{7} = \dfrac{640}{7} = 91\frac{3}{7}$ days.

14. $\left\{\begin{array}{l}1500 \text{ m. : } 1000 \text{ m.} \\ 8 \text{ w. : } 5 \text{ w.}\end{array}\right\}$ :: 16 oz. : $\dfrac{1000 \times 5 \times 16}{1500 \times 8} =$

$\dfrac{10 \times 5 \times 2}{15} = \dfrac{20}{3} = 6\frac{2}{3}$ oz.

15. $\left\{\begin{array}{l}30 \text{ m. : } 24 \text{ m.} \\ 660 \text{ yds. : } 1100 \text{ yds.}\end{array}\right\}$ :: $\begin{array}{l}\text{days.}\\30\end{array}$: $\dfrac{24 \times 1100 \times 30}{660 \times 30} =$

$\dfrac{24 \times 10}{6} = 4 \times 10 = 40$ days.

reapers. reapers.   days.

16. $100 : 60 :: 20 : \dfrac{60 \times 20}{100} = 2 \times 6 = 12$

days, which, added to 10, gives 22 days, the time in which the whole was cut down. This question is only simple proportion.

17. $\left\{\begin{array}{l} 1 \text{ w.} : 6 \text{ w.} \\ 4 \text{ da.} : 20 \text{ da.} \end{array}\right\} :: 24 : \dfrac{6 \times 20 \times 24}{4} = 6 \times 20 \times 6 = 720$ men.

18.   feet.   feet.
$\left\{\begin{array}{l} 5 : 6 \\ 3 : 15 \\ 40 \text{ bolls} : 30 \text{ bolls} \end{array}\right\} :: 12 : \dfrac{6 \times 5 \times 30 \times 12}{5 \times 3 \times 40}$
$= 2 \times 3 \times 3 = 18$ feet long.

PRACTICE.

1.	2.	3.
¼d.=⅛d. 348 at ⅓d.	1d.=₇⁄₈s. 560 at 1⅛	2d.=½s. 430 at 2
12)87	⅛=¼ 46 8	2,0)7,1 8
7s. 3d.	11 8	£3 11 8
	2,0)5,8 4	
	£2 18 4	
¼d.=⅛d. 348 at ⅓d.	1⅛d.=⁹ s. 560 at 1⅛	2d.=½s. 430 at 2½
12)17½	2,0)7,0 0	½=¼ 71 8
14s. 6d.	£3 10	8 11½
		2,0)8,0 7½
		£4 0 7½
²⁄₄d.=₇⁄₁₆s. 348 at ¾d.	1⅛d.=₇⁄₈s. 560 at 1¼	2½d.= 430 at 2½
2,0)2, 1 9	½=¼ 70	½=¼ 71 8
£1,1s.9d.	11 8	17 11
	2,0)8,1 8	2,0)8,9 7
	£4 18	£4 9 7
2.		
1d.=₇⁄₈s. 560 at 1¼		
2,0)4,6 8		
£2, 6s. 8d.		

3.

2d.=⅒s. 430 at 2¾d.
¾=1/12   71 8
          26 10½
2,0)9.8   6½
    £9 8   6½

4.

3d.=¼s. 96 at 3d.
2,0)2,4
    £1 4

3d.=¼s. 96 at 3¼d.
¼=1/12   24
           2
2,0)2.6
    £1 6

3d.=¼s. 96 at 3½d.
½=⅛   24
         4
2,0)2.8
    £1 8

3d.=¼s. 96 at 3¾d.
¾=¼   24
          6
2,0)3.0
    £1 10

5.

4d.=⅓s. 84 at 4d.
2,0)2,8
    £1 8

4d.=⅓s. 84 at 4¼d.
¼=1/12   28
           1 9
2,0)2,9 9
    £1 9 9

4d.=⅓s. 84 at 4½d.
½=⅛   28
         3 6
2,0)3.1 6
    £1 11 6

4d.=⅓s. 84 at 4¾d.
¾=1/12   28
           5 3
2,0)3,3 3
    £1 13 3

6.

4d.=⅓s. 54 at 5d.
1=¼   18
         4 6
2,0)2.2 6
    £1 2 6

4d.=⅓s. 54 at 5¼d.
1=¼   18
¼=1/16   1 1½
2,0)2.3 7½
    £1 3 7½

4d.=⅓s. 54 at 5½d.
1½=⅛   18
         6 9
2,0)2.4 9
    £1 4 9

4d.=⅓s. 54 at 5¾d.
1½=⅛   18
         6 9
          1 1½
2,0)2.5 10½
    £1 5 10½

7.

6d.=½s. 45 at 6d.
2,0)2,2 6
    £1 2 6

6d.=½s. 45 at 6¼d.
¼=1/24   22 6
           0 11¼
2,0)2,3 5¼
    £1 3 5¼

6d.=½s. 45 at 6½d.
½=1/12   22 6
           1 10½
2,0)2,4 4½
    £1 4 4½

6d.=½s. 45 at 6¾d.
¾=⅛   22 6
          2 9¼
2,0)2.5 3¼
    £1 5 3¼

8.

6d.=½s. 58 at 7d.
1=⅙   29
         4 10
2,0)3,3 10
    £1 13 10

6d.=½s. 58 at 7¼d.
1=⅙   29
         4 10
          1 2½
2,0)3,5 0½
    £1 15 0½

```
d.=⅓s. 58 at 7½d.   | 9.                    | 11.
⅛=¼    29           | 6d.=⅓s. 85 at 8¾d.    | 6d.=⅓s. 57 at 10d.
        7  3        | 2 =½    42  6         | 4 =⅓   28  6
2,0)3.6   3         | ½=½    14  2          |        19
£1 16  3            | ¼=¼     3  6½         | 2,0)4.7   6
                    |         1  9½         | £2 7  6
                    | 2,0)6,1  11½          |
                    | £3 1  11½             |

d.=⅓s. 58 at 7¾d.   | 10.                   | 6d.=⅓s. 57 at 10¼d.
⅛=¼    29           | 6d.=⅓s. 88 at 9d.     | 4 =⅓   28  6
        7  3        | 3 =¼    44            | ½=1/8  19
        1  2½       |         22            |         1  2½
2,0)3.7   5½        | 2,0)6,6               | 2,0)4.8   8½
£1 17  5½           | £3 6                  | £2 8  8½

d.=⅓s. 85 at 8d.    | 6d.=⅓s. 88 at 9¼d.    | 6d.=⅓s. 57 at 10½d.
=¼     42  6        | 3 =¼    44            | 4 =⅓   28  6
       14  2        | ½=1/8   22            | ½=⅛    19
2,0)5,6   8         |          1 10         |         2  4½
£2 16  8            | 2,0)6,7 10            | 2,0)4.9  10½
                    | £3 7 10               | £2 9  10½

d.=⅓s. 85 at 8½d.   | 6d.=⅓s. 88 at 9½d.    | 6d.=⅓s. 57 at 10¾d.
¼=¼    42  6        | 3 =¼    44            | 4 =⅓   28  6
       14  2        | ½=⅛     22            | ½=⅛    19
        1  9½       |          3  8         |         3  6½
2,0)5,8   5½        | 2,0)6,9  8            | 2,0)5.1  0¾
£2 18  5½           | £3 9  8               | £2 11  0¾

d.=⅓s. 85 at 8¾d.   | 6d.=⅓s. 88 at 9¾d.    | 12.
¼=¼    42  6        | 3 =¼    44            | 6d.=⅓s. 94 at 11d.
       14  2        | ½=⅛     22            | 4 =⅓    47
        3  6½       |          5  6         | ½=⅓    31  4
2,0)6,0   2½        | 2,0)7,1  6            |         7 10
£3 0  2½            | £3 11 6               | 2,0)8,6   2
                    |                       | £4 6  2
```

12.	13. 1s. = £⅞ 96 at 12⅜d.
6d. =⅛s. 94 at 11¼d.	¾d. = ₁'₆ 4 16
4 =½ 47	6
1 =½ 31 4	£5 2
¼ =¼ 7 10	
1 11½	14.
2,0)8,8 1½	1s. = £₃'₆ 100 at 1s. 1⅛d.
£4 8 1½	1d. = ₁'₂ 5
	¼ =¼ 0 8 4
6d. =⅛s. 94 at 11½d.	0 2 1
4 =½ 47	£5 10 5
1½ =¼ 31 4	
11 9	15.
2,0)9,0 1	1s. = £₁'₆ 200 at 2s. 2½d.
£4 10 1	2d. = ₁'₆ 20
	½ =¼ 1 13 4
6d. =⅛s. 94 at 11¾d.	0 8 4
4 =½ 47	£22 1 8
1½ =¼ 31 4	
11 9	16.
1 11½	2s. = £₁'₆ 256 at 3s. 3¼d.
2,0)9.2 0½	1s.3d. = ₁'₆ 25 12
£4 12 0½	¾ = ₂'₆ 16
	0 16
13.	£42 8
1s. = £₃'₆ 96 at 12d.	
£4 16 0	17. 4s. = £⅕ 40 at 4s 4½d.
	4d. = ₁'₁₂ 8
1s. = £₃'₆ 96 at 12½d.	¼ = ₁'₆ 0 13 4
¼d. = ₂'₆ 4 16	0 10
2	£8 14 2
£4 18	
	18. 5s. = £¼ 37 at 5s. 5⅛d.
1s. = £₃'₆ 96 at 12½d.	5d. = ₁'₁₂ 9 5
¼d. = ₂'₆ 4 16	½ = ₁'₁₀ 0 15 5
0 4	0 1 6½
£5 0	£10 1 11½

9. 4s. = £⅕   24 at 6s. 6¼d.
6d. = ⅛   4 16
               3 0
¼ = 1/18   0 0 6
              £7 16 6

5s. = £¼   19 at 7s. 7½d.
6d. = ⅛   4 15
1½ = ⅛   2 7 6
               0 2 4½
              £7 4 10½

8d. = £⅛   12 at 8s. 8¾d.
2s. = 1/10   4
               1 4
¾d. = 1/10   0 0 9
              £5 4 9

5s. = £¼   18 at 9s. 9¼d.
4 = ⅕   4 10
6d. = ⅛   3 12
3 = 1/12   0 9
¼ = 1/12   0 0 4½
              £8 15 10½

10s. = £½   300 at 10s. 10½d.
8d. = 1/15   150
¼ = ⅛   12 10
               0 12 6
             £163 2 6

10s. = £½   408 at 11s. 11½d.
8d. = ⅛   204
3 = 1/40   34
½ =   5 2
               1 5 6
             £244 7 6

25.
10s. = £½   50 at 12s. 1½d.
2s. = ⅕   25
1d. = 1/24   0 4 2
¼ = ¼   0 10 5½
             £30 5 2½

26.
10s. = £½   55 at 13s. 2½d.
2s. 6d. = ¼   27 10
7½ = ⅛   6 17 6
1 = 1/12   1 14 4½
               0 4 7
             £36 6 5½

27.
10s. = £½   68 at 14s. 3½d.
4 = ⅕   34
3d. =   13 12
¼ = ¼   0 17
               0 10 5
             £48 10 5

28.
10s. = £½   54 at 15s. 4½d.
5 = ¼   27
3d. =   13 10
1½ =   0 13 6
               0 6 9
             £41 10 3

29.
10s. = £½   490 at 16s. 5½d.
5 = ¼   245
1 =   122 10
5d. =   24 10
¼ = ¼   10 4 2
               0 10 2½
            £402 14 4½

30.	35.

Left column:

30.
10s. = £½   454   at 17s. 6½d.
6s. 8d. = ⅓ 227
10 = ½   151 6 8
½ = 1/20   18 18 4
              0 18 11
             £398 3 11

31.
10s. = £½   898   at 18s. 7¾d.
5s. = ¼   224 10
3s. 4d. = ⅓
3 = ½   149 13 4
¾ = 1/12   11 4 6
              2 16 1½
             £837 3 11½

32.
10s. = £½   405   at 19s. 9½d.
4 = ½   202 10
4 = ½   101 5
8d. = ½   81
¼ =   13 10
              0 8 5½
             £398 13 5½

33.
10s. = £½   276   at £1, 14s.
4 = ½   138
              55 4
             £469 4

34.
                         £ s. d
10s. = £½   358   at 3 18 4
              3
5 = ½   1074
             179
              89 10
              59 13 4
            £1402 3 4

Right column:

35.
                         £   s. d.
4s. = £½   541   at 2 6 8½
              2
            1082
2 = ½   108 4
8d. = ⅓   54 2
¼ = 1/20   18 0 8
              0 11 3½
           £1262 17 11¼

36.
                         £   s. d.
10s. = £½   256   at 5 12 2½
              5
            1280
2 = ½   128
2d. = 1/12   25 12
¼ =   2 2 8
               0 10 8
            £1436 5 4

37.
                         £   s. d.
2s. = 1/10   842   at 4 2 6¾
              4
            3368
6d. = ¼   84 4
¾ =   21 1
               2 12 7½
            £3475 17 7½

38.
5s. = £¼   273   at £1, 9s. 4d.
4d. = 1/12   54 12
               4 11
¼ =   0 7 4
            £400 15 4

39. £ s. d. | **43.**

39.
£ s. d.
10s. = £½ 751 at 17 10½
2
———
1502
5 = ⅕ 375 10
2 = ⅕ 187 15
6d. = ⅟₄₀ 75 2
2 = ½ 25 0 8
6 5 2
½ 1 8 11
———
£2173 1 9

43.
2 pks. = ⅛ bush. 14s. 6d.
7
———
5 1 6
1 pk. = ¼ 7 3
3 1½
———
£5 12 4½

40.
£ s. d.
0s. = £½ £408 at 15s. 6d.
5 = ¼ 204
6d. = ⅟₁₀ 102
10 4
¾ 0 11 7½
———
£316 11 7½

44.
2 ro. = ½ ac. £2, 10s. 6d.
6
———
15 3 0
5
———
75 15 0
1 ro. = ac 1 5 3
20 po. = ½ ro. 12 7½
3 3¾
———
£77 19 2¼

41.
£ s. d.
1. = £½ 762 at 11 2 6
8s. 6d. = ¼ 381
95
¾ 19 6
———
£1239 4 6

45.
2 qts. = ½ gal. £2, 8s. 6d.
4
———
9 14 0
5
———
48 10 0
1 qt. = ½ gal. 1 4 3
1 pt. = ½ qt. 12 1½
6 0¾
———
£50 12 5½

42.
£ s. d.
3s. 8d. = £½ 231 at 7s. 9¾d.
1s. = ⅟₂₀ 77
1½d. = ⅛ 11 11
1 8 10½
4 10½
———
£90 4 8¾¾

46. 2 qrs. = ½ cwt. £4, 5s. 8d.
6
———
25 14 0
4
———
102 16 0
14 lb. = ½ of 2 qr. 2 2 10
0 10 8½
———
£105 9 6¼

47.
2 qrs.= ⅛ £3, 18s. 6d.
                    8

                31   8   0
1 qr. = ½   1 19   3
14 lb. = ⅖ qr.   19   7½
2   = ⅐   9   9⅔
                     1   4⅜ ⁷⁄₉
          £34 18   1½ ²⁷⁄₆₃

48.
1 qr. = ¼ cwt. £2, 16s. 10d.
                    16

                45   9   4
14 lb. = ½   0 14   2½
4   = ²⁄₇   7   1½
                    2   0½ ²⁄₇
          £46 12   6⅜ ⁴⁄₇

49. 2 qrs. = ⅛ £3, 18s. 4½d.
                    87

               340 18   7½
1 qr. = ½   1 19   2½
16 lb. = ⅖   0 15   9³⁄₇₀
4   = ¼   0 11   2½ ¹⁄₇₀
                    0   9¼ ³⁄₇₀
          £344 11   4⅜ ⁷⁄₈

50. 2 qrs. = ⅛ £4, 19s. 7½d.
                    129

               526   9   7½
14 lb. = ½   0 10   2¼ ²⁄₂₈
7   = ½   5 13   ²⁸⁄₂₈
4   = ⁴⁄₇   5   1⁹⁄₂₈
2   = ½   2 10⁹⁄₂₈
                    1 5⁴⁄₂₈
          £529 10   1¼ ¹⁄₄

51. 4 oz. = ¼ £3, 6s. 0d.
                    29

                95 14   0
16 dwt. = ⅘   1   2   0
                 0   4   4⅘ ½
          £97   0   4⅘ ½ ⁴⁄₅

52. 6 oz. = ⅜ £0, 8s. 6d.
                    31

                13   3   6
1 oz. = ⅙   4   3
10 dwt. = ½   0   8½
2 dwt. = ⅕   4½ ⅕
4 grs. = ¹⁄₁₅   1½ ¹⁄₅
          £13   8 10½ ¹⁄₁₅

53. 2 qrs. = ½ £1, 12s. 6¼d.
                     6

                 9 15   3
                 3   6
                58 11   6
1 qr. = ½   0 16   3½ ½
1 nail = ¼   8   1⁵⁄₈
                 2   0¼ ⅛
          £59 17 11½ ⅛

54. 2 bu. = ¼ £3, 17s. 10½d.
                    59

               229 14   7½
1   = ½   0 19   5¼ ²⁄₃
2 pks. = ⅓   9   8¼ ⅔ ½
1 pk. = ½   4 10¼ ⅔
                 2   5¼ ⅛ ½
          £231 11   1¼ ¹⁄₁₂

		£ s. d.
ro. = $\frac{1}{4}$	£4, 15s. 6d.	
	540	
	2578 10 0	
per. = $\frac{1}{4}$	2 7 9	
	0 11 11$\frac{1}{4}$	
= $\frac{1}{10}$	5 11$\frac{1}{2}$	
	4 9$\frac{1}{2}\frac{1}{2}$	
	£2582 0 5$\frac{1}{2}\frac{1}{4}$	

		£ s. d.
58.		
10s. = $\frac{1}{2}$	798.$\frac{4}{5}$ at 3 17 6	
	3	
	2394	
5 = $\frac{1}{2}$	399	
2s. 6d. = $\frac{1}{4}$	199 10	
	99 15	
$\frac{1}{5}$ =	1 0 8	
	£3093 5 8	

		£ s. d.
3 ft. = $\frac{1}{3}$	£0, 15s. 6$\frac{1}{4}$d.	
	784	
	609 4 8	
3 = $\frac{1}{3}$	5 2$\frac{2}{3}$	
	5 2$\frac{2}{3}$	
36 in. = $\frac{1}{12}$	0 5$\frac{1}{2}\frac{1}{4}$	
	£609 15 5$\frac{1}{4}\frac{1}{12}$	

		£ s. d.
59.		
10s. = $\frac{1}{2}$	206.$\frac{6}{17}$ at 1 16 10	
	1	
	206	
6s. 8d. = $\frac{1}{3}$	103	
2 = $\frac{1}{3}$	68 13 4	
	14 4	
$\frac{1}{17}$ =	1 19 0	
	£379 18 6	

		£ s. d.
qrs. = $\frac{1}{4}$	£4, 18s. 6$\frac{1}{4}$d.	
	963	
	4745 15 8$\frac{1}{4}$	
4 lb. = $\frac{1}{7}$	2 9 3$\frac{1}{4}$	
7 = $\frac{1}{7}$	0 12 3$\frac{1}{2}$	
4 = $\frac{1}{12}$	6 1$\frac{1}{4}\frac{1}{2}$	
	3 6$\frac{1}{2}\frac{1}{4}$	
	£4749 6 11$\frac{3}{4}\frac{1}{4}\frac{1}{12}$	

		£ s. d.
60.		
10s. = $\frac{1}{2}$	509.$\frac{4}{9}$ at 15 16 8	
	15	
	2545	
	509	
	7635	
6s. 8d. = $\frac{1}{3}$	254 10	
	169 13 4	
$\frac{4}{9}$ =	2 7 6	
	£8061 10 10	

TARE AND TRET.

1. 2 cwt. 1 qr. 12 lb. gross.
   　　　　1　　4
   ─────────────
   2　　0　　8
   　　　　　3
   ─────────────
   6　　0　　24
   　　　　　5
   ─────────────
   31　　0　　8 net weight.

2. 7 lb. = $\frac{1}{16}$ | 95 cwt. 2 qrs. 8 lb. gross.
   　　　　　　5　　3　　25　　　tare.
   4 = $\frac{1}{8}$ | 89　　2　　11　　tare suttle.
   　　　　　　3　　1　　21$\frac{9}{16}$　tret.
   2 = 1$\frac{1}{8}$ | 86　　0　　17$\frac{7}{16}$　tret suttle.
   　　　　　　0　　2　　1$\frac{17}{128}$　cloff.
   ─────────────
   　　85　　2　　15$\frac{45}{128}$ net weight.

3. 3 cwt. 1 qr. 5 lb. gross.
   　　　　　　　　　7
   14 lb. = $\frac{1}{8}$ cwt. 23　　0　　7
   3$\frac{1}{2}$ = $\frac{1}{4}$ |　　2　　3　　14$\frac{6}{8}$
   　　　　　　　　2　　24$\frac{4}{8}$
   ─────────────
   　　　　　　3　　2　　11$\frac{1}{8}$　tare.
   $\frac{1}{16\frac{1}{2}}$ = $\frac{1}{16}$ | 19　1　23$\frac{5}{8}$　tare suttle.
   　　　　　　　　2　　27$\frac{6}{8}$　tret.
   ─────────────
   　　　18　　2　　23$\frac{7}{8}$　net weight.

4. 15 cwt. 3 qrs. 14 lb. gross.
   　　　　　1　　14　　　tare.
   ─────────────
   15　　2　　0　　tare suttle.
   　　　　　14
   ─────────────
   217　　0　　0
   $\frac{1}{28}$ = | 8　　1　　10$\frac{4}{8}$　tret.
   ─────────────
   208　　2　　17$\frac{4}{8}$　tret suttle.
   $\frac{1}{168}$ = | 1　　0　　27$\frac{6}{8}$　cloff.
   ─────────────
   207　　1　　18$\frac{6}{8}$　net weight.

5. 1 cwt. 3 qrs. 10 lb.
                    19

	34	3	22	gross.

$8 \text{ lb.} = \frac{1}{14} =$ 2   1 $27\frac{1}{7}$ tare.

| | 32 | 1 | $22\frac{6}{7}$ | tare suttle. |

$\frac{1}{8} =$ 1   0 $27\frac{13}{28}$ tret.

| | 31 | 0 | $22\frac{3}{8}$ | tret suttle. |

$\frac{1}{168} =$ 0   0 $20\frac{148}{168}$ cloff.

| | 31 | 0 | $1\frac{43}{168}\frac{5}{6}$ | net weight. |

6. 8 cwt. 3 qrs. 16 lb.
                    30

| | 266 | 3 | $12\frac{1}{2}$ | gross. |

$16 \text{ lb.} = \frac{1}{7} =$ 38   0 $12\frac{1}{2}$

$\frac{1}{2} =$ 4   3 $1\frac{1}{2}$

| | 42 | 3 | $14\frac{1}{2}$ | tare. |

$\frac{1}{8} =$ 223   1 $17\frac{1}{7}$ tare suttle.

| | 8 | 2 | $12\frac{5}{8}\frac{1}{7}$ | tret. |

| | 215 | 1 | $5\frac{1}{12}\frac{1}{7}$ | tret suttle. |

$\frac{1}{168} =$ 1   1 $3\frac{1}{14}\frac{1}{8}$ cloff.

| | 214 | 0 | $1\frac{4}{12}\frac{2}{17}\frac{9}{18}$ | net weight. |

7. 2 cwt. 2 qrs. 22 lb. gross.

| | 0 | 0 | 3 | tare. |

| | 2 | 2 | 19 | tare suttle. |
                    12

| | 32 | 0 | 4 |

$\frac{1}{26} =$ 1   0   26   tret.

| | 30 | 3 | 6 | tret suttle. |

$\frac{1}{168} =$ 0   0 $20\frac{5}{14}$ cloff.

| | 30 | 2 | $13\frac{11}{14}$ | net weight, |

or $3429\frac{11}{14}$ lbs. at 1s. $3\frac{1}{4}$d. = £217, 18s. $3\frac{1}{4}$d. $\frac{11}{14}$.

8. 16 lb. $= \frac{1}{7}$ cwt.   10 cwt. 1 qr. 11 lb. gross.

$\frac{1}{2} =$ 1   1 $25\frac{4}{7}$
                              $20\frac{5}{14}$ tare.

| | 1 | 2 | $18\frac{1}{14}$ | tare. |

| | 8 | 2 | $20\frac{5}{14}$ | net weight of the oil, then |

E 2

7½ lb. : 8 cwt. 2 qrs. 20⅔¼ lbs. :: 1 g.

$$\begin{array}{cc} 4 & 4 \\ \overline{50} & \overline{34} \\ 14 & 28 \\ \overline{420} & \overline{292} \\ & 68 \\ & \overline{972} \\ & 56 \\ \hline & \overline{54473} \end{array}$$

54473 ÷ 420 = 129⅔⁸⁸ gallons of oil.

PARTNERSHIP.

1. $1+2+3 = 6$: 1 :: £140 : £23, 6s. 8d.
             6 : 2 :: 140 : 46 13 4
             6 : 3 :: 140 : 70 0 0
                         £140 0 0 proof.

The 2d and 3d answers might have been found by multiplying the 1st by 2 and 3.

2. $30 + 40 + 56 = 126$, then
    126 : 30 :: £130 : £30, 19s. 0¼d. ... A's share.
    126 : 40 :: 130 : 41 5 4 ... B's share.
    126 : 56 :: 130 : 57 15 6¼ ... C's share.

3. $250 + 280 + 300 + £102, 10s. = £932, 10s.$
    £932, 10s. : £250 :: £600 : 160 17 ... B's
    932, 10s. : 280 :: 600 : 180 3 ... C's
    932, 10s. : 300 :: 600 : 193 0 7 ... D's
    932, 10s. : 102, 10s. :: 600 : 65 19 0¼ ... E's

4. $300 + 350 + 200 = 850$, then
    £850 : 300 :: 200 : 70 ac. 2 ro. 14 4/17 po. ... R's.
    850 : 350 :: 200 : 82 1 16 4/17 ... S's.
    850 : 200 :: 200 : 47 0 9 1/17 ... T's.

5.　　　　　3 + 5 + 8 = 16, then

16 : 3 :: £200 : £37, 10s. A's stock.
16 : 5 :: 200 : 62, 10s. B's stock.
16 : 8 :: 200 : 100   C's stock.

6. C has 7 shares out of 84, which is equal to $\frac{1}{12}$, wherefore £21804, 16s. $0\frac{1}{4}$d. ÷ 12 = £1817, 1s. 4$\frac{3}{4}$d. $\frac{1}{4}$ C's share.

7. $(12 \times 3\frac{1}{3}) + (8 \times 8\frac{1}{2}) + (10 \times 5) = 42 + 68 + 50$ = 160, then

160 : 42 :: £30, 10s. : £8, 0s. 1$\frac{3}{4}$d. A.
160 : 68 ::   30 10 : 12 19 3   B.
160 : 50 ::   30 10 : 9 10 7$\frac{1}{4}$ C.

8. First A's proportional part = 250 × 8 + (250 + 80) × 8 = 2000 + 2640 = 4640, and B's = 360 × 12 + (360 − 90) × 4 = 4320 + 1080 = 5400, and their sum = 10040, therefore

10040 : 4640 :: £510 : £235, 13s. 11$\frac{1}{4}$d. $\frac{47}{251}$ A's gain.
10040 : 5400 :: 510 : 274 6   0$\frac{3}{4}$ $\frac{204}{251}$ B's gain.

9. 1500 × 4 + (500 + 150) × 2 + (650 − 350) × 6 = 6000 + 1300 + 1800 = 5100 A's proportional ; 300 × 6 + (300 + 400) × 3 + (700 − 600) × 3 = 1800 + 2100 + 300 = 4200 B's proportional ; and 200 × 12 = 2400 C's proportional ; now 5100 + 4200 + 2400 = 11700, and 11700 − 150 = £350, the sum to be divided among the three, whence

11700 : 5100 :: 350 : £152, 11s. 3$\frac{9}{13}$d. A's share of gain.
11700 : 4200 :: 350 : 125 12   9$\frac{5}{13}$ B's share of it.
11700 : 2400 :: 350 :   71 15 10$\frac{10}{13}$ C's proportional
share, and this added to £150, gives £221, 15s. 10$\frac{10}{13}$d. for what C receives altogether.

10. Since the values of the land allotted to each claimant are respectively 20s. 25s. 30s. 40s. 50s. and 60s. per

acre, it is evident, had their estates been equal in value, that he who got land at 20s. was entitled to 3 times as much as he who got land at 60s.; hence when the values of their estates are unequal, their shares must be as the values of their estates, divided by the value of the land which they receive, or as 75, 80, 100, 90, 80, and 80; now the sum of these is 505; therefore

ac. ro. per.　　　　　　　ac. ro. per.
505 : 75 : : 500 2 30 : 74 1 17$\frac{4}{101}$ share of the 1st.
505 : 80 : : 500 2 30 : 79 1 10$\frac{7}{101}$ share of 2, 5, and 6.
505 : 100 : : 500 2 30 : 99 0 23$\frac{73}{101}$ share of the 3d.
505 : 90 : : 500 2 30 : 89 0 37$\frac{7}{101}$ share of the 4th.

11. A pays £$\frac{9}{16}$ = 8s. for one ox; B £$\frac{11}{16}$ = 9$\frac{3}{4}$s. for one ox; C £1$\frac{1}{4}$ = 12$\frac{1}{2}$s. for one ox; and D £1$\frac{7}{16}$ = 6$\frac{3}{4}$s. for one ox; now 8 + 9$\frac{3}{4}$ + 12$\frac{1}{2}$ + 6$\frac{3}{4}$ = 36$\frac{11}{12}$s. paid for one ox in 6 months, whence

36$\frac{11}{12}$: 8 : : 6 : 1$\frac{11}{101}$ months, A's oxen continued.
36$\frac{11}{12}$: 9$\frac{3}{4}$: : 6 : 1$\frac{110}{101}$ months, B's oxen continued.
36$\frac{11}{12}$: 12$\frac{1}{2}$: : 6 : 2$\frac{17}{101}$ months, C's oxen continued.
36$\frac{11}{12}$: 6$\frac{3}{4}$: : 6 : 1$\frac{7}{101}$s months, D's oxen continued.

SIMPLE INTEREST.

1. £85　　　　　　　　　　2. £108, 10s.
　　5　　　　　　　　　　　　　　4
　4,25　　　　　　　　　　£4,34 0
　　20　　　　　　　　　　　　20
　5,00　　　　　　　　　　　6,80
Ans. £4, 5s.　　　　　　　　　12
or δ=$\frac{1}{20}$£85　　　　　　　　9,60
£4, 5s.　　　　　　　　　　　4
　　　　　　　　　　　　　　2,$\frac{1}{1}$40
　　　　　　　　　　　　Ans. £4, 6s. 9$\frac{3}{4}$d, $\frac{1}{2}$.

3. £1000
  4½
  ____
  4000
  500
  ____
  £45,00

7. ¼)£342 16 9
    _____
    £85 14 2¼

8. ⅒)£815 10 0
    ¼)42 5 6
    _____
    £10 11 4½

4. £40, 10s.
   3¼
   ____
   121 10
   20 5
   _____
100)141 15

  £1 8 4½d. ½ Int. for
      3   a year.
  _____
  4 5 0½ ½ for 3 y.
  40 10 0
  _____
  £44 15 0½ ⅞ amount.

9. ⅒ £248 10 10
   6 m. = ½ y. 4 19 5
              = ⅓ 2 9 9½
                   0 16 6½
                   _____
                   £3 6 3¼ ½

5. 5)£119, 1s. 8d.
    _____
     23 16 4

10. 345
    2¼
    ____
    690
    172 10
    _____
    8,62 10
    20
    _____
    12,50
    12
    ____
    6,00

⅒ ⅒ £450 8 6
½ = ¼   4
            _____
         22 10 5½ ⅖ ⅒
          4
         _____
         90 1 8¼ ⅒ ⅒
¼ = ⅓ of ⅔ 11 5 2½ ⅒
          5 12 7½ ⅒ ⅒
          _____
         £106 19 8⅜ ⅒

£8 12 6 Ans.

11. £295 8 4 now 6 m. = ⅓ y. £8 17 3
          3   4 8 7½
          _____   2 19 1
          8,86 5 0   _____
          20   £7 7 8½
          _____
          17,25
          12
          ____
          3,00

10. 345
    2¼

11. £295 8 4 now 6 m. = ⅓ y. £8 17 3
    4 = ⅓   4 8 7½
             2 19 1
             _____
            £7 7 8½

12. £360
    2½
    ____
    720
    180
    _____
26 weeks = ½ year. 9)9,00
          £4, 10s.

13.
4s. = £$\frac{1}{5}$　£152
6d. = $\frac{1}{2}$　　30　8
　　　　　　　　3　16

　　　　　　　34　4
　　　　　　　　　20
　　　　　　　6,84
　　　　　　　　12
　　　　　　10,08
　　　　　　　　4
　　$\frac{1}{1\frac{1}{6}} = \frac{6}{7\frac{1}{5}}$　　　Ans. 6s. 10$\frac{1}{2}$d. $\frac{1}{7\frac{1}{5}}$

14. £240
　　　4$\frac{1}{2}$ now 26 w. = $\frac{1}{2}$ y. £10, 4s.
　　　960　　2　　= $\frac{1}{1\frac{1}{2}}$　5　2
　　　60　　　　　　　　7 10$\frac{4}{26}$
　　10,20　　　　　　£5　9 10$\frac{4}{26}$
　　　20
　　4,00

15. £195, 5s. × 10$\frac{1}{4}$ ÷ 100 = £2050, 2s. 6d. + 10
= £20, 10s. 0$\frac{1}{4}$d. $\frac{1}{2}$.

16. £710 × 103$\frac{1}{2}$ ÷ 100 = £73573, 15s. ÷ 100 =
£735, 14s. 8d.

17. £918, 14s. × 127$\frac{3}{4}$ ÷ 100 = 117363, 18s. 6d. ÷
100 = £1173, 12s. 9$\frac{1}{4}$d. $\frac{1}{8}$.

18. £816 × 85$\frac{3}{8}$ ÷ 100 = £69666 ÷ 100 = £696
13s. 2$\frac{1}{4}$d. $\frac{1}{2}$.

19. £2018, 15s. 6d. × 140$\frac{1}{4}$ ÷ 100 = £283133, 3
10$\frac{1}{4}$d. ÷ 100 = £2831, 6s. 7$\frac{1}{4}$d. $\frac{3}{7}$.

20. £8000 × 100 ÷ 213 = £3755, 17s. 4$\frac{1}{4}$d. $\frac{6}{7}$ stock.

21. £1000 × 100 ÷ 72$\frac{1}{2}$ = £1384, 1s. 7$\frac{3}{4}$d. $\frac{36}{58}$ stock.

22. £8500 × 100 ÷ 96$\frac{1}{4}$ = £8808, 5s. 9$\frac{1}{4}$d. $\frac{148}{154}$ stock.

23. £100 × 3 ÷ 63$\frac{1}{4}$ = £4$\frac{4}{5}$ $\frac{44}{59}$ per cent.

24. £100 × 4 ÷ 90⅔ = £4 $\frac{108}{272}$ per cent.

25. £100 × 4 ÷ 5 = £80 per cent.

26. £100 × 3 ÷ 5 = £60 per cent.

27. £1000, 10s. 6d. × 12 ÷ 7300 = £12006, 6s. ÷ 7300 = £1, 12s. 10¼d. $\frac{1446}{7300}$.

28. £345 × 80 ÷ 7300 = £27600 ÷ 7300 = £3, 15s. ÷ $\frac{600}{730}$.

29. £250, 10s. 6d. × 40 × 7 ÷ 73000 = 70147 ÷ 7000 = 19s. 2¼d. $\frac{147}{7000}$ interest + £250, 10s. 6d. = £251, 9s. 8¼d. $\frac{147}{7000}$ amount.

30. May 19 + June 30 + July 31 + Aug. 31 + Sept. 30 + Oct. 31 + Nov. 19 = 191 days, and 191 × £184 ÷ 7300 = 35144 ÷ 7300 = £4, 16s. 3¼d. $\frac{244}{730}$.

31. £408 × 60 × 8 ÷ 73000 = 195840 ÷ 73000 = £2, 13s. 7¾d. $\frac{640}{7300}$.

32. £245, 16s. × 2½ ÷ 100 = £614, 10s. ÷ 100 = £6, 2s. 10¾d. ⅛, interest for 1 year, and since 73 days = ⅕ of a year, £6, 2s. 10¾d. ⅛ ÷ 5 = £1, 4s. 6⅝d. $\frac{7}{40}$.

33. March 26 + April 30 + May 31 + June 30 + July 31 + Aug. 6 = 154 days, and 154 × £351 × 9 ÷ 73000 = 486486 ÷ 73000 = £6, 13s. 3¼d. $\frac{41286}{73000}$.

34.

Dates.		Sums.	Days.	Products.
April 20,	due	400	× 56 =	22400
June 15,	paid	110		
	bal.	290	× 50 =	14500
Aug. 4,	paid	28		
	bal.	262	× 59 =	15458
Oct. 2,	paid	262		

7300)52358(£7, 3s. 5⅜d. $\frac{4758}{7300}$.

35.

Dates.	Sums.	Days.		Products.
Jan. 10, due	£350	× 31	=	10850
Feb. 10, paid	70			
bal.	280	× 28	=	7840
Mar. 10, paid	70			
bal.	210	× 31	=	6510
Apr. 10, paid	70			
bal.	140	× 30	=	4200
May 10, paid	70			
bal.	70	× 31	=	2170
June 10. paid	70			
				31570
				9

73,000)284,130

Interest, £3, 17s. 10d.

36.

Dates.	Sums.	Days.		Products.
April 4, due	£1000	× 36	=	36000
May 10, paid	150			
bal.	850	× 63	=	53550
July 12, paid	250			
bal.	600	× 68	=	40800
Sept. 18, paid	300			
bal.	300	× 53	=	15900
Nov. 10, paid	100			
bal.	200	× 71	=	14200
Jan. 20, paid	150			
bal.	50	× 43	=	2150
Int.	20	0 11		162600
March 4, paid	70	0 11		9

73,000)1463,400

Interest, £20, 0s. 11⅔d.

37.

Dates.	Dr.or Cr.	Sums.	Days.	Dr.Prod.	Cr.Prod.
Jan. 8.	Dr.	100	37	3700	
Feb. 14	Dr.	114			
	Dr.	214	29	6206	
Mar. 15.	Cr.	250			
	Cr.	36	40		1440
April 24.	Dr.	400			
	Dr.	364	36	13104	
May 30.	Cr	100			
	Dr.	264	19	5016	
June 18.	Dr.	70			
	Dr.	334	14	4676	
July 2.	Cr.	400			
	Cr.	66	28		1848

Due to M. N. 32702　3288 due to B. D.
　　　　　　　 8　　　　10 double the rate.
　　　　　 261616　 32880
　　　　　　32880

$73000)228736(£3$, 2s. 8d. $_{7\frac{3\,3}{7\,3}\tau}$ int. due
　　9736　　　　　　　　to M. N.
　　194720s.
　　48720
　　584640d.
　　 640
　　73000 $= \tau\frac{3\,3}{7\,3}\tau$

F

38.

Dates.	Dr.orCr.	Sums.	Days.	Dr.Prod.	Cr. Prod.
April 3.	Dr.	£135	59	7965	
June 1.	Cr.	397			
	Cr.	262	45		11790
July 16.	Dr.	270			
	Dr.	8	54	432	
Sept. 8.	Cr.	214			
	Cr.	206	42		8652
Oct. 20.	Dr.	258			
	Dr.	52	24	1248	
Nov. 13.	Cr.	128			
	Cr.	76	32		2432
Dec. 15.	Dr.	460			
	Dr.	384	17	6528	
Jan. 1.	Cr.	231			
	Dr.	615	29	17835	
— 30.	Cr.	296			
	Dr.	319	47	14993	
Mar. 18.	Cr.	374			
31.	Cr.	55	13		715
				49001	23589
				9	10
				441009	235890
				235890	

73,000)205,119

£2, 16s. 2¼d.

		£	s.	d.
. 1, 1824,	Bond due, of	500	0	0
d Interest at 5 per cent. for 498 days,		34	2	2¼
	Amount,	534	2	2¼
y 14, 1825,	Paid in part,	100	0	0
	Balance,	434	2	2¼
Interest on do. for 331 days,		19	13	8
	Amount,	453	15	10¼
ril 10, 1826,	Paid in part,	200	0	0
	Balance,	253	15	10¼
Interest on do. for 417 days,		14	9	11¼
	Amount,	268	5	9¾
n. 1, 1827,	Paid in part,	150	0	0
	Balance,	118	5	9¾
Interest on it for 426 days,		6	18	0½
	Amount,	125	3	10¼
ug. 1, 1828,	Paid the			

		£	s.	d.
lay 14, 1825,	Bor. on bond at 4½ per cent.	700	0	0
dd Interest on it for 383 days,		33	1	0¾
	Amount,	733	1	0¾
une 1, 1826,	Paid in part,	250	0	0
	Balance,	483	1	0¾
Interest on it for 394 days,		23	9	3½
	Amount,	506	10	4¼
une 30, 1827,	Paid in part,	200	0	0
	Balance,	306	10	4¼
Interest on it for 375 days,		14	3	5
	Amount,	320	13	9¼
uly 10, 1828,	Paid in part,	200	0	0
	Balance,	120	13	9¼
Interest on it for 437 days,		6	10	0¼
	Amount,	127	3	9¾
Sept. 20, 1829,	Paid the			

DISCOUNT.

1. First 365 da. : 100 da. : : £5 : £1, 7s. 4¾d. int. of £100 for 100 days. Then £101, 7s. 4¾d. : £100 : : £240 : £236, 15s. 1¼d. $\frac{1476}{8284}$, the present worth.

2. First 365 days : 48 da. : : £5 : 13s. 1¼d. int. of £100 for 48 days. Then £100, 13s. 1¼d. : £100 : : £560, 10s. : £556, 16s. 9¼d. $\frac{27459}{48253}$, the present worth.

3. First 365 da. : 70 da. : : £5 : 19s. 2d. int. of £100 for 70 days. Then £100, 19s. 2d. : 19s. 2d. : : £1000 : £9, 9s. 10d. $\frac{1400}{14375}$, the discount.

4. First 365 da. : 184 da. : : £3, 10s. : £1, 15s. 3⅜d. Then £101, 15s. 3⅜d. : £1, 15s. 3⅜d. : : £284, 8s. 6d. : £4, 18s. 7¼d. $\frac{23465}{244253}$, the discount.

5. 365 da. : 350 da. : : £5 : £4, 15s. 10½d. Then £104, 15s. 10½d. : £100 : : £842, 5s. : £803, 14s. 5d. $\frac{7}{1510}$, the present worth.

EQUATION OF PAYMENTS.

$$
\begin{array}{r}
1. \quad £100 \times 50 = 5000 \\
130 \times 40 = 5200 \\
230 \times 140 = 32200 \\
\hline
460 \quad)42400(92\frac{8}{28} \text{ days.}
\end{array}
$$

$$
\begin{array}{r}
2. \quad £60 \times 40 = 2400 \\
180 \times 96 = 17280 \\
50 \times 200 = 10000 \\
190 \times 410 = 77900 \\
\hline
480 \quad)107580(224\frac{1}{2} \text{ days.}
\end{array}
$$

3. $\{(100 \times 60) + (200 \times 8) + (350 \times 180) + (500 \times 365)\} \div (100 + 200 + 350 + 500) = 267500$ and $267500 \div 1150 = 232\frac{11}{23}$ days, the equated time.

COMPOUND INTEREST.

1. $\frac{1}{20}$ £200   1st year's principal
           10   interest add
       $\frac{1}{20}$ 210   2d year's principal
           10 10   interest add
       $\frac{1}{20}$ 220 10   3d year's principal
           11 0 6   interest add
           231 10 6   Amount.
           200 0 0   Principal.
           £31, 10s. 6d. Interest.

2. $\frac{1}{20}$ £300   1st year's principal
           15   interest add
       $\frac{1}{20}$ 315   2d year's principal
           15 15   interest add
       $\frac{1}{20}$ 330 15   3d year's principal
           16 10 9   interest add
       $\frac{1}{20}$ 347 5 9   4th year's principal
           17 7 3½ ⅘   interest add
           £364, 13s. 0¼d. ⅖ Amount.

3. $\frac{1}{25}$ £500   1st year's principal
           20   interest add
       $\frac{1}{25}$ 520   2d year's principal
           20 16   interest add
       $\frac{1}{25}$ 540 16   3d year's principal
           21 12 7½ ⅘   interest add
           £562 8 7½ ⁶⁄₂₅ Amount.
           500 0 0   Principal.
           £62 8 7½ ⁶⁄₂₅ Interest.

4.   £240, 10s.   £240, 10s.   1st year's principal
         3   7   4   3½d. interest add
      ‾‾‾‾‾‾‾   ‾‾‾‾‾‾‾‾‾‾‾‾‾
      7,21 10   247 14   3½   2d year's principal
         20   3
      ‾‾‾‾‾‾‾   ‾‾‾‾‾‾‾‾‾‾‾‾‾
      4,30   7,43   2 10½
         12   20
      ‾‾‾‾‾‾‾   ‾‾‾‾‾‾‾‾‾‾‾
      3,60   8,62
          4   12
      ‾‾‾‾‾‾‾   ‾‾‾‾‾‾‾‾‾‾‾
      2,40   7,54
                                  4
                             ‾‾‾‾‾‾‾
                             2,18

£247, 14s. 3½d. 2d year's principal
    7   8   7½   interest add
 ‾‾‾‾‾‾‾‾‾‾‾‾‾
 255   2   11   3d year's principal
                3
 ‾‾‾‾‾‾‾‾‾‾‾‾‾
 7,65   8   9
      20
 ‾‾‾‾‾‾‾   2)£7, 13s. 1d.
 13,08   ‾‾‾‾‾‾‾‾‾‾‾
    12   3 16   6½ interest for ½ year
 ‾‾‾‾‾‾‾   255   2 11   3d year's principal
 1,05   ‾‾‾‾‾‾‾‾‾‾‾‾‾
                    £258 19   5½ Amount.

5.   £129, 15s. 0d.   £129, 15s. 0d.   £135, 11s. 9½d.
                   4½   5 16   9½   6   2   0½
      ‾‾‾‾‾‾‾‾‾‾   ‾‾‾‾‾‾‾‾‾‾‾‾   ‾‾‾‾‾‾‾‾‾‾‾
      519   0   0   135 11   9½   141 13   9½
       64 17   6   4   4½
      ‾‾‾‾‾‾‾‾‾‾   ‾‾‾‾‾‾‾‾‾‾‾   ‾‾‾‾‾‾‾‾‾‾
      £5,83 17 6   542   7   1   566 14   2
             20   67 15 10½   70 16 10½
      ‾‾‾‾‾‾‾   ‾‾‾‾‾‾‾‾‾‾‾‾‾   ‾‾‾‾‾‾‾‾‾‾‾
      16,77   £6,10   2 11½   6,37 11   0¾
         12   20   20
      ‾‾‾‾‾‾‾   ‾‾‾‾‾‾‾   ‾‾‾‾‾‾‾
      9,30   2,02   7,51
          4   12   12
      ‾‾‾‾‾‾‾   ‾‾‾‾‾‾‾   ‾‾‾‾‾‾‾
      1,20   35   6,12
                             4
                         ‾‾‾‾‾‾‾
                         1,40

£141, 13s. 9¼d.	6 m. = ½ year	£6, 13s. 3d.
6 7 6	3 m. = ¼	3 6 7½
148 1 3½	10 da. = ⅓	1 13 3¾
4½		0 3 8¼
592 5 2		5 3 7½
74 0 7¾		148 1 3½
£6,66 5 9¾		£153 4 11 Amount.
20		129 15 0 Principal.
13,25		£23 9 11 Interest.
12		
3,09		

PROFIT AND LOSS.

Case I.

1. £63 − £50, 8s. = £12, 12s. gain per hhd. Then
£50, 8s. : £12, 12s. :: 100 : £25, gain per cent.

2. 4s. 10d. − 4s. 6d. = 4d. Then 4s. 6d. : 4d. ::
100 : £7₁₁⁴.

3. 18s. 6d. − 15s. 4d. = 3s. 2d. loss per yard. Then
18s. 6d. : 3s. 2d. :: £100 : £17₁₁₁⁷.

4. 1s. : 3¼d. :: £100 : £29¹⁄₆.

Case II.

5. 100 : 125 :: £50, 8s. : £63, selling price.

6. 100 : 107½ :: 4s. 6d. : 4s. 10d.

7. 112 lb. : £3, 3s. :: 1 lb. : 6¾d. prime cost per lb.
Then 100 : 112 :: 6¾d. : 7¼d. ₂₅₄.

8. 100 : 117½ :: 8¼d. : 10d.

Case III.

9. 117½ : 100 :: 10d. : 8½d. prime cost.

10. 92 : 100 : : 5s. 6d. : 5s. 11¼d. $\frac{11}{23}$.

11. £134⅘ : £100 : : £5, 9s. 8d. : £4, 1s. 8d. and £4, 1s. 8d. ÷ 112 = 8¾d. prime cost per lb.

CASE IV.

12. 5s. 9d. : 115 : : 6s. : 120, from which subtract 100, there remains £20 gain per cent.

13. 8s. : 112 : : 7s. : 98, which subtracted from 100 leaves £2 loss per cent.

14. 18s. 6d. : 112 : : 16s. 10d. : 102$\frac{18}{37}$ from which subtracting 100 we have £2$\frac{18}{37}$ the gain per cent.

15. 5s. 10d. : 84 : : 6s. 3d. : 90 and 100 − 90 = £10, the loss per cent.

VULGAR FRACTIONS.

REDUCTION.—PROBLEM I.

1. Common measure 60)120(2
$\underline{120}$
$60)\frac{120}{180}(= \frac{2}{3}.$

2. 46)356(7
$\underline{34}$)46(1
$\underline{12}$)34(2
$\underline{10}$)12(1
Common measure 2)10(5.

$2)\frac{356}{460}(= \frac{5}{6}.$

3. 2)$\frac{12}{18}$π$ = \frac{6}{9}$π.

4. 13)$\frac{91}{130}$ = $\frac{7}{10}$.

5. 729)$\frac{729}{1458}(= \frac{1}{2}.$

6. 78625)$\frac{78625}{786250}(= \frac{1}{10}.$

PROBLEM II.

1. $\frac{5 \times 4 + 3}{4} = \frac{23}{4}.$ 2. $\frac{7 \times 5 + 1}{5} = \frac{36}{5}.$

$$\frac{6 \times 9 + 1}{9} = \frac{55}{9}. \qquad 5. \quad \frac{19 \times 27 + 3}{27} = \frac{516}{27}.$$

$$\frac{8 \times 17 + 16}{17} = \frac{152}{17}. \qquad 6. \quad \frac{29 \times 19 + 11}{19} = \frac{562}{19}.$$

Problem III.

$101 \div 4 = 25\frac{1}{4}.$ 4. $1425 \div 24 = 59\frac{9}{24}.$

4. $146 \div 4 = 36\frac{1}{2}.$ 5. $7854 \div 27 = 290\frac{24}{27}.$

3. $341 \div 14 = 24\frac{5}{14}.$ 6. $54867 \div 371 = 147\frac{330}{371}.$

Problem IV.

1. $\dfrac{2 \times 3}{3 \times 4} = \dfrac{6}{12} = \dfrac{1}{2}.$ 3. $\dfrac{4 \times 10 \times 7}{5 \times 13 \times 12} = \dfrac{280}{780} = \dfrac{14}{39}.$

2. $\dfrac{5 \times 2}{3 \times 7} = \dfrac{10}{21}.$ 4. $\dfrac{11 \times 13 \times 16}{12 \times 14 \times 23} = \dfrac{2288}{3864} = \dfrac{286}{483}.$

5. $\dfrac{2 \times 4 \times 5 \times 9}{3 \times 7 \times 11 \times 2} = \dfrac{4 \times 5 \times 3}{7 \times 11} = \dfrac{60}{77}.$

6. $\dfrac{5 \times 4 \times 3 \times 106}{9 \times 11 \times 16 \times 13} = \dfrac{5 \times 53}{3 \times 11 \times 2 \times 13} = \dfrac{265}{858}.$

Problem V.

1. $\dfrac{2 \times 8}{5 \times 8}$ and $\dfrac{7 \times 5}{8 \times 5} = \dfrac{16}{40}$ and $\dfrac{35}{40},$ fractions required.

2. $\dfrac{5 \times 7}{6 \times 7}$ and $\dfrac{2 \times 6}{7 \times 6} = \dfrac{35}{42}$ and $\dfrac{12}{42},$ fractions required.

3. $\dfrac{1\times4\times9}{2\times4\times9}$, $\dfrac{2\times3\times9}{2\times4\times9}$, and $\dfrac{3\times4\times2}{2\times4\times9} = \dfrac{36}{72}$, $\dfrac{54}{72}$,

and $\dfrac{40}{72}$, the fractions required.

4.
$\dfrac{5\times9\times15\times21}{8\times9\times15\times21}$ $\dfrac{4\times8\times15\times21}{8\times9\times15\times21}$ $\dfrac{8\times8\times9\times21}{8\times9\times15\times21}$

and $\dfrac{11\times8\times9\times15}{5\times9\times15\times21} = \dfrac{14175}{22680}$, $\dfrac{10080}{22680}$, $\dfrac{12096}{22680}$ and $\dfrac{11880}{22680}$

5. $\frac{1}{8}$ of $\frac{3}{4}$, $\frac{1}{2}$, $4\frac{1}{2}$ and $\frac{5}{7} = |\frac{1}{8}, \frac{1}{2}, \frac{9}{2}, \frac{5}{7}$, which by the rule are $=$

$\dfrac{3\times9\times2\times7}{8\times9\times2\times7}$ $\dfrac{8\times4\times2\times7}{8\times9\times2\times7}$ $\dfrac{8\times9\times9\times7}{8\times9\times2\times7}$ $\dfrac{8\times9\times2\times5}{8\times9\times2\times7}$

$= \dfrac{378}{1008}, \dfrac{448}{1008}, \dfrac{4536}{1008}, \dfrac{720}{1008}.$

6. $\frac{1}{8}$ of $\frac{2}{3}$ of $3\frac{1}{2}$, $\frac{7}{16}$, $1\frac{1}{2}$, $7\frac{2}{3}$, and $\frac{1}{3}$ of $7\frac{3}{4} = \frac{7}{12}, \frac{7}{16}, \frac{3}{2}, \frac{14}{2},$

$\sqrt{}$, and $\frac{1\cdot2}{8\cdot4} =$

$\dfrac{7\times12\times16\times6\frac{1}{2}}{8\times12\times16\times6\frac{1}{2}}$ $\dfrac{7\times8\times16\times6\frac{1}{2}}{8\times12\times16\times6\frac{1}{2}}$

$\dfrac{11\times8\times12\times6\frac{1}{2}}{8\times12\times6\times6\times6\frac{1}{2}}$ $\dfrac{47\times8\times12\times16\times64}{8\times12\times16\times6\times64}$ $\dfrac{183\times8\times12\times16\times64}{8\times12\times16\times6\times64}$

$= \dfrac{516096}{589824}, \dfrac{344064}{589824}, \dfrac{405504}{589824}, \dfrac{4620288}{589824}$, and $\dfrac{1686528}{589824} =$

$\dfrac{168}{192}, \dfrac{112}{192}, \dfrac{132}{192}, \dfrac{1504}{192}$, and $\dfrac{549}{192}.$

PROBLEM VI.

1. $\frac{2}{9}$ of $\frac{3}{4}$ of $\frac{7}{12}$ of $\frac{7}{15} = \frac{2\cdot7}{9\cdot45} = \frac{7}{180}.$

2. $\frac{7}{12\cdot13} \times \frac{8\cdot9}{5} \times \frac{5}{7} \times \frac{3}{4} = \frac{8\cdot9}{13\cdot14} = \frac{6}{13}.$

3. $\frac{9}{8} \times \frac{7}{12} \times \frac{7}{16} = \frac{1}{16} = \frac{1}{16}.$

4. $\frac{4}{5} \times \frac{1}{4} \times \frac{7}{12} \times \frac{8}{21} = \frac{2}{8\times4\times8}.$

5. $\frac{3}{4} \times \frac{1}{6} = \frac{3}{24} = \frac{1}{8}$.

6. $\frac{1}{2} \times \frac{1}{3} \times \frac{1}{10} = \frac{1}{60} = \frac{1}{60}$.

7. $\frac{2}{7} \times \frac{21}{22} = \frac{42}{154}$.

8. $\frac{1}{3} \times \frac{1}{8} = \frac{1}{24}$.

9. $\frac{1}{5} \times \frac{1}{13} \times \frac{5}{8} = \frac{5}{520} = \frac{1}{104}$.

10. $\frac{2}{3} \times \frac{5}{20} \times \frac{1}{12} = \frac{10}{720} = \frac{1}{72}$.

11. $\frac{2}{7} \times \frac{1}{8} \times \frac{1}{13} = \frac{2}{728} = \frac{1}{364}$.

12. $\frac{1}{12} \times \frac{7}{17} \times \frac{2}{9} = \frac{14}{1836} = \frac{7}{918}$.

13. $\frac{1}{240} \times \frac{20}{1} \times \frac{12}{1} = \frac{240}{240} = \frac{3}{3}$.

14. $\frac{1}{240} \times \frac{20}{1} \times \frac{12}{1} = \frac{240}{240} = \frac{2}{3}$.

1. 6s. 4d. = 76d. and £1 = 240d. hence $\frac{76}{240} = \frac{19}{60}$.

2. 2¼d. = 9 f. and 1s. = 48 f. hence $\frac{9}{48} = \frac{3}{16}$.

3. 8¼d. = 17 h. p. and a cr. = 120 h. p. hence $\frac{17}{120}$.

4. 2 ro. 15 po. = 95 po. and an ac. = 160 po. hence $\frac{95}{160} = \frac{19}{32}$.

5. 3 cwt. 14 lb. = 350 lb. and a ton = 2240 lb. hence $\frac{350}{2240} = \frac{5}{32}$.

6. 6¾ in. = 27 qr. in. and a foot = 48, hence $\frac{27}{48} = \frac{9}{16}$.

Problem VII.

1.	2.	3.
2	5	3
20	50	21
3)40s.	8)100s.	4)63s.
13s. 4d.	12s. 6d.	15s. 9d.

4.	5.
4	3
2½	16
5)10s.	7)48 oz.
2s.	6 oz. 13½ drs.

6. 4
    4
  9)16
  ―――――
  1 qr. 21 lb. 12 oz. 7½ dr.

7. 3
    12
  7)36 oz.
  ―――――
  5 oz. 2 dwt. 20⅘ grs.

8. 3
    5
  8)15 qrs.
  ―――――
  1 qr. 3⅛ nl.

9. 4
    8
  5)32 fu.
  ―――――
  6 fu. 16 po.

10. 5
     63
  6)315 gal.
  ―――――
  52½ gal. 2 qts.

11. 3
     4
  8)12 ro.
  ―――――
  1 ro. 20 po.

12. 3
     24
  5)72 ho.
  ―――――
  14 ho. 24 min.

―――――――

ADDITION.

1. $\frac{2}{5} + \frac{3}{4} = \frac{8 + 15}{20} = \frac{23}{20} = 1\frac{3}{20}$.

2. $\frac{2}{8} + \frac{4}{9} = \frac{6}{16} + \frac{12}{16} = \frac{21}{16} = 1\frac{5}{16}$.

3. $\frac{3}{4} + \frac{2}{5} + \frac{5}{6} = \frac{90 + 48 + 100}{120} = \frac{238}{120} = 1\frac{59}{60}$.

4. $\frac{2}{3} + \frac{5}{6} + \frac{3}{5} = \frac{60 + 75 + 54}{90} = \frac{189}{90} = \frac{21}{10} = 2\frac{1}{10}$.

5. $4\frac{1}{2} + 6\frac{3}{5} = 6 + 4 + \frac{1}{2} + \frac{3}{5} = 10 + \frac{1}{2} + \frac{3}{5} = 10 + \frac{5}{10} + \frac{6}{10} = 10 + \frac{11}{10} = 10\frac{1}{10}$.

6. $6\frac{1}{4} + 2\frac{1}{9} + 3\frac{2}{3} = 6 + 2 + 3 + \frac{1}{4} + \frac{1}{9} + \frac{2}{3} = 11 + \frac{1}{4} + \frac{1}{9} + \frac{2}{3} = 11 + \frac{1}{2} = 11\frac{1}{2}$.

7. First $\frac{1}{2} + \frac{7}{9} + \frac{3}{4} = \frac{36 + 56 + 54}{72} = \frac{146}{72} = 2\frac{1}{36}$;
then $5 + 6 + 4 + 2\frac{1}{36} = 17\frac{1}{36}$.

8. $\frac{2}{3} + 4\frac{1}{6} + \frac{1}{4}$ of $\frac{6}{7} = \frac{2}{3} + \frac{25}{6} + \frac{3}{14} + 4 = \frac{2}{3} + \frac{1}{6} + \frac{3}{14}$

$+ 4 = \frac{56 + 42 + 18}{84} + 4 = \frac{116}{84} + 4 = \frac{29}{21} + 4 = 1\frac{8}{21}$;

$+ 4 = 5\frac{8}{21}$.

9. $\frac{8}{15}$s. $+ \frac{5}{8}$d. $= \frac{8}{15} \times \frac{12}{1} + \frac{5}{8} = \frac{32}{5}$d. $+ \frac{5}{8}$d. $= 8$d. $+ \frac{1}{8}$d.

$= 8\frac{1}{8}$d. $\frac{1}{8}$.

10. $\frac{£2}{3} \times \frac{20}{1} = \frac{40}{3}$s. and $\frac{5}{9} \times \frac{1}{12} = \frac{5}{108}$s.; then $\frac{40}{3} + \frac{5}{9}$

$+ \frac{5}{108} = \frac{21600 + 972 + 75}{1620} = \frac{22647}{1620}$s. $= 13$s. $11\frac{3}{4}$d. $\frac{1}{47}$.

11. $\frac{12}{13} \times \frac{5}{1} = \frac{60}{13} = 4\frac{8}{13}$s. $= \frac{8}{13}$s., $\frac{12}{13}$s., and $\frac{4}{13} \times \frac{12}{1}$

$= \frac{48}{13} = \frac{9}{13}$s.; then $\frac{60}{13}$s. $+ \frac{48}{13}$s. $+ \frac{9}{13}$s. $+ \frac{8}{13}$s.

$= \frac{47628 + 22680 + 2592 + 224}{6048} = \frac{73124}{6048}$s. $= 12$s. $1\frac{2}{8}$d. $\frac{1}{8}$.

12.   yds. ft. in.
        —   —   9
        —   2   —
        1540   —   —
        1540   2   9

14.   cwt. qr. lb. oz.
        = 8   1   9   5\frac{1}{2}
        = —   3   7   10\frac{1}{2}
        9   0   16   15\frac{1}{2}

13.   yds. qrs. nL.
        = 5   2   —
        = 5   3   —
        —   —   \frac{1}{2}
        11   1   \frac{1}{2}

15.   ho. m. sec.
        = 8   —   —
        = —   12   30
        8   12   30

SUBTRACTION.

1. $\frac{3}{4} - \frac{5}{9} = \frac{27 - 20}{36} = \frac{7}{36}$.

2. $\frac{4}{5} - \frac{9}{20} = \frac{80 - 45}{100} = \frac{35}{100} = \frac{7}{20}$.

3. $\frac{7}{9}$ of $\frac{3}{4} - \frac{1}{2}$ of $\frac{4}{9} = \frac{7}{12} - \frac{2}{9} = \frac{7}{12} - \frac{1}{2} = \frac{7}{10} - \frac{1}{10} = \frac{1}{10}$.

4. $\frac{4}{9}$ of $\frac{3}{7} = \frac{12}{9}$; and $1\frac{1}{3} = \frac{14}{9}$; then $\frac{12}{9} - \frac{14}{9} = $

$\dfrac{162 - 50}{45} = \dfrac{112}{45} = 2\frac{24}{45}.$

5. $16\frac{1}{4}$ of $\frac{4}{9}$ and $\frac{5}{6}$ of $\frac{19}{4} = \frac{95}{6} = \frac{19}{4}$; then $\frac{6}{4} - \frac{1}{4}$

$= \dfrac{65 - 48}{4} = \dfrac{17}{4} = 4\frac{1}{4}.$

6. $\dfrac{2}{5} \times \dfrac{1}{20} = \dfrac{2}{100} = £\dfrac{1}{50}$ and $\dfrac{3}{4} - \dfrac{1}{50} = \dfrac{150 - 4}{200} = $

$£\frac{146}{200} = 14s. 7\frac{3}{5}d.$

7. $\dfrac{4}{7} \times \dfrac{21}{20} = £\dfrac{84}{140} = £\dfrac{21}{35}$ and $\dfrac{21}{35} - \dfrac{1}{3} = £\dfrac{63 - 35}{105} = $

$= £\frac{28}{105} = £\frac{4}{15} = 5s. 4d.$

8. $£\frac{4}{5} - \frac{1}{6}$ of $\frac{4}{5}s. = \frac{4}{5} \times \frac{20}{1} s. - \frac{1}{6}s. = \frac{14}{9}°s. - \frac{1}{6}s. = $

$\dfrac{35}{2} - \dfrac{1}{3} = \dfrac{103}{6} s. = \dfrac{103}{6} s. = 17s. 2d.$

9. $\dfrac{4}{5} \times \dfrac{20}{1} = \dfrac{80}{5}$ dwt. $= \dfrac{16}{1}$ and $\dfrac{16}{1} - \dfrac{3}{8} = \dfrac{128 - 3}{8} = $

$\frac{125}{8}$ dwt. $= 15$ dwt. 15 grs.

10. $3\frac{1}{4} = \frac{7}{2}$ and $15\frac{5}{7}$ lb. $= \frac{110}{7}$ × $\frac{1}{112} = \frac{110}{1120}$ cwt.

then $\dfrac{7}{2} = \dfrac{159}{1120} = \dfrac{7840 - 318}{2240} = \dfrac{7522}{2240}$ cwt. $= 3$ cwt.

1 qr. $12\frac{1}{5}$ lb.

MULTIPLICATION OF VULGAR FRACTIONS.

1. $\frac{3}{4} \times \frac{4}{7} = \frac{12}{28} = \frac{3}{7}.$

2. $\frac{4}{9} \times \frac{3}{8} = \frac{12}{72} = \frac{1}{6}.$

3. $\frac{7}{18} \times \frac{4}{15} = \frac{28}{240} = \frac{9}{5}.$

4. $4\frac{1}{2} = \frac{9}{2}$ and $\frac{2}{9}$ of $\frac{3}{4} = \frac{6}{12} = \frac{1}{2}$; then $\frac{9}{2} \times \frac{1}{2} = \frac{9}{4} = 2\frac{1}{4}.$

5. $\frac{6}{7} \times \frac{2}{3} \times \frac{5}{6} = \frac{60}{126} = \frac{10}{21}.$

6. $48\frac{1}{2} \times 7 = \frac{126}{2} \times \frac{7}{1} = \frac{651}{2} = 337\frac{1}{2}.$

7. $\frac{1}{3}$ of $9 \times \frac{7}{8} = \frac{9}{3} \times \frac{7}{8} = \frac{21}{4} = 1\frac{1}{4}\frac{3}{4}$.

8. $\frac{2}{3}$ of $\frac{3}{4} \times \frac{1}{5}$ of $\frac{5}{6} = \frac{1}{2} \times \frac{1}{6} = \frac{1}{12} = \frac{1}{72}$.

9. $\frac{2}{3}$ of $\frac{1}{5} = \frac{2}{15}$ and $\frac{1}{3}$ of $2\frac{1}{7} = \frac{5}{7}$, then $\frac{2}{15} \times \frac{5}{7} = \frac{2 \times 5}{15 \times 7} = \frac{10}{105} = \frac{2}{21}$.

10. $14\frac{1}{4} \times \frac{1}{15} = \frac{57}{4} \times \frac{1}{15} = £\frac{19}{20} = £3$, 18s. 4¼d.

DIVISION OF VULGAR FRACTIONS.

1. $\frac{1}{7} \div \frac{3}{8} = \frac{1}{7} \times \frac{8}{3} = \frac{8}{21} = \frac{8}{21}$.

2. $\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \times \frac{2}{1} = \frac{6}{4} = \frac{3}{2} = 1\frac{1}{2}$.

3. $3\frac{1}{2} \div \frac{1}{8} = \frac{11}{8} \div \frac{1}{8} = \frac{66}{8} = 1\frac{1}{16}$.

4. $18 = \frac{1}{3} = \frac{18}{1} \times \frac{3}{1} = \frac{54}{1} = 48$.

5. $14\frac{1}{2} \div \frac{2}{3}\frac{1}{1} = \frac{29}{2} \times \frac{9}{8} = \frac{1001}{45} = 18\frac{1}{45}\frac{4}{5}$.

6. $456\frac{1}{2} \div 3\frac{1}{2} = \frac{2139}{7} \div \frac{112}{7} = \frac{6264}{48} = 130\frac{1}{16}\frac{1}{2}$.

7. $\frac{7}{2} \div \frac{4}{5} \div \frac{1}{2} = \frac{7}{2} \times \frac{5}{4} \times \frac{2}{1} = \frac{5}{4}$.

8. $8\frac{3}{4} \div \frac{4}{3} \div \frac{1}{11} = \frac{35}{4} \times \frac{3}{4} \times \frac{11}{1} = \frac{1155}{4} = 32\frac{1}{16}$.

9. $\frac{1}{3}$ of $4 \div \frac{2}{3}$ of $\frac{5}{7} = \frac{4}{3} \times \frac{2}{1} = 4$.

10. $£2150\frac{1}{2} \div 40\frac{1}{2} = \frac{19801}{10} \div \frac{507}{5} = \frac{19801}{8} \times \frac{5}{507}$
$= £\frac{99005}{1216} = £60$, 12s. 11$\frac{1}{104}$d.

PROPORTION OF VULGAR FRACTIONS.

1. $5\frac{1}{4} = \frac{21}{4}$, then $\frac{3}{4}$ yd. : $\frac{1}{3}$ yd. :: £$\frac{21}{4}$: $\frac{4 \times 21 \times 7}{3 \times 4 \times 9}$ =
£$\frac{147}{36}$ = £5, 8s. 10¼d. $\frac{3}{4}$.

2. $\frac{2}{3}$ gal. $\times \frac{1}{15} \times \frac{1}{4} = \frac{2}{180}$ tun : $\frac{3}{5}$ t. : : £$\frac{8}{6}$: $\frac{1818}{1815} \times$
$\frac{3}{5} \times \frac{2}{1} = £\frac{7800}{75} = £105$.

3. £445, 15s. = $\frac{8915}{20} = £\frac{1783}{4}$, then $\frac{1}{5}$ yr. : : £$\frac{1783}{4}$
: £$\frac{22349}{100}$ = £780, 12s. 3d.

4. $31\frac{1}{2} = 94$ qrs = $\frac{94}{4} = \frac{47}{2}$ yd., then $\frac{3}{5}$ yd. : $\frac{5}{7}$ yd.
: : £$\frac{19}{4}$: £$\frac{940}{48} = £19$, 11s. 8d.

5. $1\frac{5}{9}$ lb. $= \frac{14}{9}$ lbs., £61$\frac{4}{5}$ = £$\frac{112}{5}$, $\frac{7}{8}$ grs. × $\frac{9}{14}$ × $\frac{5}{112}$ = $\frac{45}{9000}$ lbs., then $\frac{14}{9}$ lb. = $\frac{1}{9000}$ lb. = $\frac{£112}{5}$: £3$\frac{9}{13}$ = 3d.

6. $\frac{1}{11} : \frac{1}{18} = \frac{22413}{20} : \frac{27413}{20}$ = £345, 19s. 3d.

7. A in one day performs $\frac{1}{10}$ of the work, B $\frac{1}{12}$, and C. $\frac{1}{14}$; therefore $\frac{1}{10} + \frac{1}{12} + \frac{1}{14} = \frac{26}{210}$ of the work performed by the three in one day; again $\frac{26}{210}$: 1 :: 1 d. : $\frac{210}{26}$ d. = 4$\frac{2}{13}$ days.

8. A, B, and C, in one day perform $\frac{1}{10}$ of the work, and A and B $\frac{1}{12}$ of it; hence $\frac{1}{10} - \frac{1}{12} = \frac{1}{60}$, the part performed by C in one day, and $\frac{1}{60}$: 1 :: 1 d. : $\frac{60}{1}$ d. = 36 days, the time in which C alone could do it. Now B and C perform $\frac{1}{18}$ of it in 1 day; therefore $\frac{1}{10} - \frac{1}{18} = \frac{1}{48}$, and $\frac{1}{48}$: 1 :: 1 d. : $\frac{48}{1}$ d. = 48 days, the time in which A alone could do it. Again, B and C do $\frac{1}{18}$ of it in one day, and C alone does $\frac{1}{36}$ of it; whence $\frac{1}{18} - \frac{1}{36} = \frac{1}{36}$, and $\frac{1}{36}$: 1 :: 1 d. : $\frac{36}{1}$ d. = 28$\frac{4}{5}$ days, the time in which B alone could do it. Lastly, A does $\frac{1}{48}$ of it in one day, and C $\frac{1}{36}$ of it; consequently $\frac{1}{48} + \frac{1}{36} = \frac{7}{144}$, and $\frac{7}{144}$: 1 :: 1 d. : $\frac{144}{7}$ d. = 20$\frac{4}{7}$ days, the time in which A and C could do it working together.

DECIMAL FRACTIONS.

REDUCTION.—PROBLEM I.

1. 4)1·00   2)1·0   4)3·00   6. 12)7·000
   ·25   ·5   ·75   ·583*

2.   5)3·0
     ·6

7. 44)15·000 (·3409$\frac{4}{11}$
    180
    400
      4

3.   8)1·000
    ·125

4.   8)3·000
    ·375

8.
1264)1$\frac{3}{4}$4·0000 (·0981, $\frac{1}{8}$
    10240
    1280
     16

5.   8)5·000
    ·625

PROBLEM II.

```
1.  4)3·00         3.  12)6·0
   12)6·75            20)8·5
   20)15·5625         £·425
    £·778125

                   4.  4)2·0
2. 12)9·00            12)8·5
   20)·75             21)12·708333⅓
    £·0375         Gs. ·605158⁷²⁶
```

5. 6½d. = 13 halfpence, and 1s. = 24 halfpence, then $\frac{13}{24}$ = ·5416⅔.

6. 8 oz. 12 dwt. 16 grs. = 4144 grs., and a lb. = 5760 grs. then $\frac{4144}{5760}$ = ·71944⁴⁴⁴⁄₉.

7. 2 qrs. 16 lb. = 72 lb., and a cwt. = 112 lb, then $\frac{72}{112}$ = ·642857¹⁄₇.

8. 20 yds. 2 ft. 6 in. = 750 in., and a mile = 63360 in. then $\frac{750}{63360}$ = ·0118371¹³⁴⁴.

9. 2 qrs. 2 nls. = 10 nls., and a yard = 16 nls., then $\frac{10}{16}$ = ·625.

10. 1 ro. 20 po. = 60 po., and an acre = 160 po., then $\frac{60}{160}$ = ·375.

11. 3 bush. 1 pk. = 13 pks., and a qr. = 32 pks., then $\frac{13}{32}$ = ·40625.

12. A tun = 252 gal., then $\frac{15}{252}$ = ·05952382⁴⁄₇.

13. 6¾ in. = 27 qr. in., and a foot = 48 qr. in., then $\frac{27}{48}$ = ·5625.

PROBLEM III.

```
1.  £·85        2. £·1875      3. ·125s.
     20              20             12
   17·00s.        3·7500s.       1·500d.
                     12             4
                  9·00d.         2·0£.
```

a 2

4. ·6845 cwt.	6. ·03125 bar.
$\overline{2\cdot 73\cdot 0}$ qrs.	36
$\overline{20\cdot 66\cdot 4}$ lb.	$\overline{1\cdot 12500}$ gall.
$\overline{10\cdot 62\cdot 4}$ oz.	8
$\overline{9\cdot 98\cdot 4}$ drs.	$\overline{1\cdot 000}$ pt.

	7. ·28 mile.
5. ·121	$\overline{2\cdot 24}$ fur.
252	$\overline{9\cdot 60}$ po.
$\overline{30\cdot 492}$ gall.	$\overline{3\cdot 30}$ yds.
$\overline{1\cdot 968}$ qts.	$\overline{\cdot 90}$ ft.
$\overline{1\cdot 936}$ pts.	$\overline{10\cdot 80}$ in.

PROBLEM IV.

1. Half the number of shillings (6) gives 3 for the first decimal figure; and the number of farthings in the remainder (4½d.) gives 18 for the second and third figures. Then to complete the decimal, call those two last figures (18) pence, the farthings in them (72) increased by 3, because they amount to 72, give 75 for other two figures. The answer therefore is £·31875.

2. Half the even number of shillings (8) gives 4 for the first decimal figure; and the number of farthings in the remainder (1s. 6¾d.) 75 decreased by 3, because they amount to 72, give 78 for the next two figures. Call the excess of these two figures above 75, pence, the farthings in the remainder (3) give 12 for the next two figures. Again, call these two last figures pence, the farthings in them (48) increased by 2, give 50 for the next two figures. The answer therefore is £·478125.

3. Half the number of shillings (10) gives 5 for the first decimal figure; the number of farthings in the remainder (8¼d.) 33 increased by 1, because they exceed 24, give 34 for the next two figures; call the excess of these two figures above 25 (9) pence, the farthings in them (36) increased by 1, give 37 for the next two figures. Again,

call the excess of these two figures above 25 (12) pence, the farthings in them (48) increased by 2, give 50 for the next two figures. The answer therefore is £·534375.

4. Half the number of shillings gives 6 for the first decimal place, and the number of farthings in 7¾d. increased by 1 as they exceed 24, give 32 for the next two places; then the excess of these two figures above 25 taken as pence and reduced into farthings, adding 1 since they exceed 24, give 29 for the next two figures; again, taking away 25 from these four figures, and multiplying the remainder by 4, we get 16 for the next two figures; and, since these do not amount to 25, we multiply them by 4: and, as the product exceeds 48, add 2, which gives 66 for the next two figures; lastly, taking away 50 from these, the remainder is again 16, which will give us the same figures as before; hence 66 will be continually repeated, and the answer is therefore £·6322916.

5. Half the number of shillings gives 8 for the first decimal place, and the number of farthings in 11¾d. increased by their 24th part, give 46¾½ or 46875 as the remaining figures of the decimal. The answer is therefore £·846875.*

6. Half the even number of shillings gives 9 for the first decimal figure, and the remainder 1s. 11¾d. reduced into farthings, and increased by its 24th part, gives 98¾½ or 989583 as the other figures of the decimal. The answer is therefore £·9989583.

Problem V.

1. Double the first figure (3) gives 6s.; the other two figures (18) are farthings = 4½d. The answer then is 6s. 4½d.

2. Double the first figure (4), to which add 1, because the next figure is above 5, gives 9s.; from the remainder

---

* Instead of proceeding as taught by the rule, it is the same thing, and in many cases more compendious, to increase the farthings in the remainder by their 24th part, which at once gives the decimal.

(28) deduct 1, because it exceeds 25, and there remains 27 farthings = 6¾d. The answer then is 9s. 6¾d.

3. Double the first figure (5) gives 10s, from the next two figures (34) deduct 1, because they exceed 25, and there remains 33 farthings = 8¼d. The answer therefore is 10s. 8¼d.

4. Double the first figure + 1, as the second figure is above 5, gives 15s, and the remainder is 19 farthings = 4¾d. The answer is therefore 15s. 4¾d.

5. Double the first figure + 1 = 19s. and 34 — 1 = 33 farthings = 8¼d. Then the answer is 19s. 8¼d.

6. Double the first figure + 1 = 19s. and 44 — 1 = 43 farthings = 10¾d. Then the answer is 19s. 10¾d.

ADDITION AND SUBTRACTION.

1.	2·64
	85·6
	·945
	14·8
	5·3456
	84·
	193·3306

2.	785·1
	84·35
	1·654
	·8956
	·009
	10·161
	882·1696

3.	25·3
	2·78
	324·67
	1·294
	63·14
	345·6
	762·784

4.	325·7
	63·451
	275·34
	6·473
	25·68
	287·435
	984·079

5.	3285·64
	287·458
	4550·67
	38·4526
	324·578
	4761·29
	13248·0886

1. ·84060	3. 246·0000
·58975	·8154
·25085	245·1846

2.   84·9500
    3·6954
  81·2546

4.   20·78125
£14, 18s. 9d.   = 14·93750
£5, 16s. 10½d. = 5·84375

5.   40 yds. 2 qrs.   = 40·500
                 29·625
10 yds. 3 qrs. 2 nls. = 10·875

MULTIPLICATION.

1.   346·519
     3·15
 1732745
  346519
1039647
1091·62935

3.   ·84615
    ·065
  423075
 507690
·05499975

5.   £·83125
     365
  415625
 498750
249375
£303·40625
    20
8·12500s.
   12
1·500d.
    4
2·0f.

2.   516·8945
     44·89
46520505
41351560
20675780
20675780
23203·394105

4.   ·346809
    ·00546
 2080854
 1387236
1734045
·00189357714

DIVISION.

1.   6)176·4
    4)29·4
      7·35

2. $3 \cdot 68)45 \cdot 3496(12 \cdot 32^{100}$
    854
  1189
   856
   120

3. ·45)24·694(54·2ᵘᵘ   6. ·075)80468(10·72ᵘᵘ
     219   546
     394   218
      34   68

4. ·546)8496(15560ᵘᵘᵘ   7. 25)8·4567(·33821⁷
     3036   95
     3060   206
     3300   67
      240   17

5. 2·5)21468(·08581¹⁹   8. 215)06548(·00030ᵘᵘ
     146   98
     218
      18   9. 100)216·4(
                            2·164

10. £3·85 ÷ 112 = £·034375 = 8¼d. prime cost per lb.; then 8¼d. + 1¼d. = 9½d. is the selling price per lb.

PROPORTION.

1. 1·25 yd. : 30·75 yd. : : £·625 = 30·75 × ·625 ÷ 1·25 = 19·21875 ÷ 1·25 = £15·375 = £15, 7s. 6d.

2. 1st : 50·5 st. : : £·33125 : £16·728125 = £16, 14s. 6¾d.

3. ·25 lb. : 20·5 lb. : : £·425 : (8·7125 ÷ ·25) = £34·85 = £34, 17s.

4. 1 lb. : 378 lbs. : : £·034375 : £12·99375 prime cost of the whole, which deduct from the selling price £16·5375 the remainder £3·54375 = £3, 10s. 10½d. is the gain upon the whole. Then £12·99375 : £3·54375 : : £100 : £27⁷/₁₁ gain per cent.

INTERMINATE DECIMALS.

Reduction.—Rule I.

1. $\cdot\dot{5} = \frac{5}{9}$; $\cdot\dot{7} = \frac{7}{9}$; $\cdot\dot{3}\dot{7} = \frac{37}{99}$; $\cdot\dot{4}\dot{5} = \frac{45}{99} = \frac{5}{11}$; $\cdot\dot{3}2\dot{7}$
$= \frac{327}{999} = \frac{109}{333}$; $\cdot\dot{7}1428\dot{6} = \frac{714286}{999999} = \frac{5}{7}$.

2. $\cdot2\dot{7}\dot{6} = \frac{276-2}{990} = \frac{274}{990} = \frac{137}{495}$; $\cdot3\dot{8}\dot{1} = \frac{381-3}{990} =$
$\frac{378}{990} = \frac{21}{55}$; $\cdot3\dot{4}\dot{5} = \frac{345-3}{990} = \frac{342}{990} = \frac{19}{55}$; $\cdot9\dot{7}142857\dot{ } =$
$\frac{9714285\dot{7} - 97}{9999990} = \frac{97142760}{99999990} = \ldots$

Rule II.

1. £·7̇5̇6̇	4. £3·63̇4̇
15·13ṡṡ.	7·26̇9ṡ.
1·6̇d.	3·23̇1d.
2·4̇ far.	Ans. 7s. 3$\frac{7}{33}$d.
Ans. 15s. 1$\frac{3}{4}$d.	
	5. ·5307 guineas.
2. ·47̇9 cwt.	11·1453 shil.
1·920 qrs.	1·7441 pence.
25·76 lbs.	2·9765 farth.
12·16 oz.	Ans. 11s. 1$\frac{3}{4}$d. $\frac{8 6 5}{9 9 9}$
Ans. 1 qr. 25 lb. 12$\frac{7}{25}$ oz.	
	6. ·7386 crown.
3. ·87̇6 acres.	2·9547 qrs.
3·506 roods.	26·7329 lbs.
20·26 perches.	11·7268 oz.
Ans. 3 ro. 20$\frac{1}{8}$ per.	11·6298 drs.

Rule III.

1. ·436363636̇   2. ·729999999
   ·573689689   ·548618648
                      ·736545454

3. ·754545454545454545454545454545

·333333333333333333333333333333

·729829829829829829829829829829̇8

·718697486974869748697486974869̇7

ADDITION.

1.	·4712̇	3.	$16\frac{1}{9}$ = 16·111111111
	3·7777		$24\frac{1}{7}$ = 24·142857142
	·5466		$3\frac{1}{6}$ = 3·166666666
	·3333		$5\frac{11}{24}$ = 5·458333333
	———		$256\frac{7}{18}$ = 256·388888888
	5·1290		—————
			305·267857142

2.	4·78333
	54·72111
	7·66666
	·33333
	·54769
	———
	68·05214

4.   ·718616618
34·673473473
·218939938
25·712636636
—————
61·323667394

5. $\frac{8}{9}$ = ·892857141
$3\frac{11}{14}$ = 3·783571428
$56\frac{1}{9}$ = 56·909090900
$49\frac{8}{9}$ = 49·888888889
$257\frac{9}{11}$ = 257·942307769
—————
369·418858591

SUBTRACTION.

1.	74·5285̇	2.	21·5462̇
	5·6666		18·7555
	———		———
	68·8616		2·7906

3. 27·38363636̇
   7·18698698̇
   ─────────
   20·19664937

4. 1·872636363636̇
   ·7542875428754̇
   ──────────
   1·118348820760̇9

───────

MULTIPLICATION.

1. 74·7386̇
   258
   ─────
   5979093
   37369333
   149477333
   ─────
   19282·5760

4. 3)7·3846̇
   2½
   ─────
   2·46154882
   14·76922292̇
   ─────
   17·23054175̇

2. 38·5436̇
   29
   ─────
   3468927
   7708727
   ─────
   1117·765̇4

5. 5·4763̇
   239
   ─────
   492870
   1642900
   10952666
   ─────
   11)1308·8436̇
   118·98578̇

3. 384·5763̇
   47·5
   ─────
   19228817
   269203430
   1538305430
   ─────
   18267·37698

6. 38·729̇
   500
   ─────
   11)19364·64̇
   1760·4221̇, &c.

───────

DIVISION.

1. 21) 7·3846̇
   999
   ─────
   20979)7377·29000
   ·35165,₈₈₈₈

M

```
2.  15·3̇) 3·4̇8̇6̇          4.  ·9̇3̇) 8·1̇
      3      3                  99   99
    46 )10·64               93·00)803·0
        ·22739 ₃₃                 8·6344 ₃₃

3.  16·6̇)27·6̇54          5.  2·7̇6̇)27·3̇
      3     3                  3    3
    50 )82·963             8·30)82·0
       1·65926                 9·879518 ₃₃

          6.  82·7̇3̇) 4·7̇3̇6
                99    99
              8190·6 )648·9
                     ·05724855 ₃₃₃₃
```

EXTRACTION OF THE SQUARE ROOT.

```
1.  1,44(12            4.  5,31,11,81,16(23046
    1                      4
  22) 44                 43)131
      44                    129
                        4604)21181
                             18416
                       46086)276516
                             276516

2.  17,28(41·5         5.  56,08,51,21(7489
    16                     49
  81)128                 144)708
     81                      576
 825)4700              1488)13251
     4125                   11904
      575             14969)134721
                             134721

3.  4,08,04(202        6.  1,00,04,00,04(10002
    4                      1
  402)804              20002)40004
      804                    40004
```

7. 1,02,03,04,03,02,01(101010
   1
 201)203
     201
   20201)20403
         20201
     2020201)2020201
             2020201

8. ·00,00,22,09(·0047
    16
   87)609
      609

9. ·29,16(·54
   25
   104)416
       416

10. 42·16,85(6·49
    36
   124)616
       496
   1289)12085
         11601
          484

11. √289 = 17, and √576 = 24; then $\frac{17}{24}$ the root.

12. √51$\frac{11}{25}$ = √$\frac{1296}{25}$ = √1296 ÷ √25 = $\frac{36}{5}$ = 7$\frac{1}{5}$.

13. √(16 × 9) = √144 = 12 mean proportional.

14. √(64 × 9) = √576 = 24 mean proportional.

15. √505521 = 711, the number of trees in the side, then 711 × 6 = 4266 feet, length of the side.

16. The fields together contain 15 ac. 1 po. = 2401 po. whence √2401 = 49 poles, the side of the square.

17. 200 × 200 × 3 = 120000 and √120000 = 346·4$\frac{104}{692}$ feet, the diameter.

18. 14² = 196 and 196 + $\frac{8}{9}$ of 196 = 352·8, then √352·8 = 18·78 feet, the diameter.

19. √(48² + 36²) = √(2304 + 1296) = √3600 = 60 feet, the length of the ladder.

20. √(205² − 140²) = √(42025 − 19600) = √22425 = 149·75 feet, the height of the steeple.

EXTRACTION OF THE CUBE ROOT.

1.

$$1,728(12 \text{ root.}$$
$$\underline{1}$$
$$)\,728$$

$$
\begin{aligned}
1^2 \times 300 &= 300 \\
1 \times 2 \times 30 &= 60 \\
2^2 &= \underline{4} \\
\overline{364} \times 2 &= 728
\end{aligned}
$$

2.

$$54,872(38 \text{ root.}$$
$$\underline{27}$$
$$)\,27872$$

$$
\begin{aligned}
3^2 \times 300 &= 2700 \\
3 \times 8 \times 30 &= 720 \\
8^2 &= \underline{64} \\
\overline{3484} \times 8 &= 27872
\end{aligned}
$$

3.

$$48,228,544(364$$
$$\underline{27}$$
$$)\,21228$$

$$
\begin{aligned}
3^2 \times 300 &= 2700 \\
3 \times 6 \times 30 &= 540 \\
6^2 &= \underline{36} \\
\overline{3276} \times 6 &= 19656
\end{aligned}
$$

$$)\,1572544$$

$$
\begin{aligned}
36^2 \times 300 &= 388800 \\
36 \times 4 \times 30 &= 4320 \\
4^2 &= \underline{16} \\
\overline{393136} \times 4 &= 1572544
\end{aligned}
$$

4.

$$41,063,625(345$$
$$\underline{27}$$
$$)\,14063$$

$$
\begin{aligned}
3^2 \times 300 &= 2700 \\
3 \times 4 \times 30 &= 360 \\
4^2 &= \underline{16} \\
\overline{3076} \times 4 &= 12304
\end{aligned}
$$

$$)\,1759625$$

$$
\begin{aligned}
34^2 \times 300 &= 346800 \\
34 \times 5 \times 30 &= 5100 \\
5^2 &= \underline{25} \\
\overline{351925} \times 5 &= 1759625
\end{aligned}
$$

5.

$$40,107,047,967(3423$$
$$27$$
$$\overline{)13107}$$

3^2	$\times\ 300$	$=\ 2700$	
3	$\times 4 \times 30$	$=\ 360$	
	4^2	$=\ 16$	

$$\overline{3076} \times 4 = 12304$$

34^2	$\times\ 300$	$=\ 346800$	$)\ 803047$
34	$\times 2 \times 30$	$=\ 2040$	
	2^2	$=\ 4$	

$$\overline{348844} \times 2 = 697688$$

342^2	$\times\ 300$	$=\ 35089200$	$)105359967$
342	$\times 3 \times 30$	$=\ 30780$	
	3^2	$=\ 9$	

$$\overline{35119989} \times 3 = 105359967$$

6.

$$12,821,119,155,125(23405$$
$$8$$
$$\overline{)4821}$$

2^2	$\times\ 300$	$=\ 1200$	
2	$\times 3 \times 30$	$=\ 180$	
	3^2	$=\ 9$	

$$\overline{1389} \times 3 = 4167$$

23^2	$\times\ 300$	$=\ 158700$	$)\ 651119$
23	$\times 4 \times 30$	$=\ 2760$	
	4^2	$=\ 16$	

$$\overline{161476} \times 4 = 645904$$

234^2	$\times\ 300$	$=\ 16426800$	$)\ 8215155125$
2340^2	$\times\ 300$	$=\ 1642680000$	
$2340 \times 5 \times 30$		$=\ 351000$	
	5^2	$=\ 25$	

$$\overline{1643031025} \times 5 = 8215155125$$

7.

$$14,706 \cdot 125(24 \cdot 5$$
$$8$$
$$\overline{)6706}$$

2^2	$\times\ 300$	$=\ 1200$	
2	$\times 4 \times 30$	$=\ 240$	
	4^2	$=\ 16$	

$$\overline{1436} \times 4 = 5824$$

Carried over, 172800 $)\ 882125$

```
Brought over,  172800       )882125(·5
24 × 5 × 30 =    3600
        5² =      25
               176425 × 5 = 882125
```

```
8.                          51·064,811(3·71
                                   27
3²  ×  300 =  2700          )24064
3 × 7 × 30 =   630
        7² =    49
              3379 × 7 = 23653
37² × 300 = 410700       )  411811
37 × 1 × 30 =  1110
         1² =     1
              411811 × 1 = 411811
```

9. $\sqrt[3]{13824} = 24$ and $\sqrt[3]{42875} = 35$, whence $\frac{24}{35}$ is the root.

10. $\sqrt[3]{91\frac{1}{8}} = \sqrt[3]{\frac{7\,2\,9}{8}} = \frac{9}{2} = 4\frac{1}{2}$ the root.

11. $\sqrt[3]{32768} = 32$ feet, side of equal cube.

12. $840 \times 340 \times 500 = 142800000$ cubic feet solidity, and $\sqrt[3]{142800000} = 522.68$ feet, side of equal cube.

13. $\sqrt[3]{(277.27384 \times 100)} = \sqrt[3]{27727.384} = 30.267$ in. side of the vessel.

14. $12^3 : 18^3 :: 30 : 101\frac{1}{4}$ lb. the weight.

15. $\sqrt[3]{(16^3 \times 6)} = \sqrt[3]{24576} = 29.07$ inches diameter.

16. $\sqrt[3]{(10^3 \times 6)} = \sqrt[3]{6000} = 18.17$ feet, the length.

$\sqrt[3]{(4.5^3 \times 6)} = \sqrt[3]{546.75} = 8.177$ feet, the breadth.

$\sqrt[3]{(3^3 \times 6)} = 3 \times \sqrt[3]{6} = 3 \times 1.81712 = 5.45136$ ft. the thickness.

DUODECIMALS.

1. 6ft. 3in.
   3   2
 ————
18   9
 1 0 6″
 ————
19 9 6

6. 48ft. 7in.
  36 6
 ————
1749
  24 3 6″
 ————
1773 3 6

2. 4ft. 5in.
   3 6
 ————
13 3
 2 2 6″
 ————
15 5 6

7. 6ft. 4in. 3″
   4 3 6
 ————
25 5 0
 1 7 0 9‴
   3 2 1 6⁗
 ————
27 3 2 10 6

3. 5ft. 6in.
   4 3
 ————
22 0
 1 4 6″
 ————
23 4 6

8. 56ft. 1in. 4″
   48 3 6
 ————
2693 4 0
  14 0 4
   2 4 0 8‴
 ————
2709 8 4 8

4. 6ft. 6in.
   3 8
 ————
19 6
 4 4
 ————
23 10

9. 68ft. 8in.
   9 10 11″
 ————
618   0
 57 2 8
  5 2 11 4‴
 ————
680 5 7 4

5. 24ft. 3in.
 16 7
 ————
388 0
 14 1 9″
 ————
402 1 9

MENSURATION.

Problem I.

10. 12ft. 0in.
```
      0   8   6"
    ------------
      8   6   0
```

13. 20ft. 9in.
```
      1   0   6"
    --------------
     20   9   4
         10   4   6"
    --------------
     21   7   4   6
```

11. 16ft. 6in.
```
      1   2
    ------------
     16   6
      2   9
    ------------
     19   3
```

14. 10ft. 4in.
```
      0   8   3"
    --------------
      6  10   8
          2   7
    --------------
      7   1   3
```

12. 15ft. 6in.
```
      0  10   6"
    --------------
     12  11
          7   9
    --------------
     13   6   9
```

15. 1ft. 3in.
```
      0  10
    2)2   1
    --------------
      1   0   6"
     12   9
    --------------
     13   3   4   6'''
```

Problem II.

16. 1ft. 2in.
```
      1   2
    ------------
      1   2
          2   4"
    ------------
      1   4   4
          2
    ------------
      2   8   8
          8
    ------------
     21   9   4
```

18. 1ft. 8in.
```
      1   8
      1   8
    --------------
      1   1   4"
      2   9   4
     24   6
    --------------
     66   8   0
      1   4   8
    --------------
     68   0   8
```

17. 0ft. 10in. 6"
```
      0  10   6
    --------------
      0   8   9
          5   3'''
    --------------
      0   9   2   3
          2
    --------------
      1   6   4   6
          7
    --------------
     10   8   7   6
```

19. 1ft. 2in.
```
      0   9
    --------------
      0  10   6"
     18   6
    --------------
     15   9
          5   3
    --------------
     16   2   3
```

20. 1ft. 6in. 　0　10 　1　 3 　　　 2 ―――― 　2　 6 　　　 9 ―――― 22　 6	**24.** 4)3ft. 6in. 　0　10　6″ 　0　10　6 ――――― 　0　 8　9 　　　　5　3‴ ――――― 　0　 9　2　3 　　　　　　3 ――――― 　2　 3　6　9 　　　　　　10 ――――― 22　11　7　6
21. 1ft. 3in. 　0　 4　6″ 　0　 5 ―――― 　0　 7　6‴ 15　 3 ―――― 　7　 0　4　6 　1　 4　10　6‴ ――――― 　7　11　9　4　6	**25.** 4ft. 0in. 　3　 6 　3　 6 ―――― 3)10　6 4)3　 6 ―――― 　0　10　6″ 　0　10　6 ――――― 　0　 8　9 　　　　5　3‴ ――――― 　0　 9　2　3 28　 6 ――――― 21　 5　3　0 　4　 7　1　6′″ ――――― 21　 9　10　1　6
22. 2ft. 6in. 　1　10 　2　 6 　2　 1 　4　 7 38　 9 ―――― 174　 2 　3　 5　3″ ――――― 177　 7　3	**26.** 5)8 feet. 　1·6 　1·6 ―――― 　96 　16 ―――― 　2·56 2048 1024 ―――― 122·88 feet.
23. 4)3ft. 9in. 　0　11　3″ 　0　11　3 ――――― 　0　10　3　9‴ 　　　　2　9　9″″ ――――― 　0　10　6　6　9 　　　　　　　5 ――――― 　4　 4　8　9　9 　　　　　　　5 ――――― 21　11　8　0　9	

                         27. 9·43 feet.
                              7·92
                              6·15
                              4·74
                              3·16
                           5)31·40
                           5)6·28
                              1·256
                              1·256
                              7536
                              6280
                              2512
                              1256
                            1·577536
                               34·5 feet.
                              7887680
                              6310144
                              4732608
                            54·4249920 feet.

BOARD OR SUPERFICIAL MEASURE.

28.	14ft.	0in.
	1	6
	21	0

29.	9ft.	0in.
	1	5 6″
	13	1 6

30.	11ft.	3in.
	0	7 9″
	6	6 9
	0	8 5 3‴
	7	3 2 3

31.	9ft.	9in.
	1	1 3″
	9	9
		9
		2 5 3‴
	10	9 2 3

32.	8ft.	3in.
	1	10
	8	3
	6	10 6″
	15	1 6

33.	14ft.	6in.	**35.**	24ft.	9in.
	1	8		1 9	3″
	14	6		24 9	
	9	8		18 6 9	
	24	2		6 2	3‴
				43 8 9 11	3
			36.	12ft.	3in.
				0 9	
34.	18ft.	6in.		9 2	3″
	1	2	**37.**	30ft.	0in.
	18	6		1 10	
	3	1		55 0	
	21	7			

EQUAL-SIDED, OR ROUND TIMBER.

38.	1ft.	3in.	**41.**	18ft.	0in.
	1	3		0	8
	1	3		12	0
	0 3	9″		0	8
	1	6		8	0
	18	0			
	28 1	6			
39.	1ft.	4in.	**42.**	1ft.	3in.
	1	4		1	3
	1	4		1	3
	5	4″		0 3	9″
	1 9	4		1 6	9
	14	0		12	
	24 10	8		18 9	0
40.	16ft.	3in.	**43.**	0ft. 8in.	6″
	0 9½			0 8	6
	12 2	3″		0 5	8
	8 1	6″		0 0 4	3″
	12 10 4	6		0 6 0	3
	0 9½			22	0
	9 7 9 4	6‴		11 0 5	6
	6 5 2 3				
	10 2 2 6	9			

44. 27ft. 6in.
```
        1   7
       27   6
       16   0   6″
       43   6   6
        1   7
       43   6   6
       25   4   9   6‴
       68  11   3   6
```

45. 6ft. 9in.
```
        1  10   3″
        6   9
        5   7   6
        1   8   3‴
       12   6   2   3
        1  10   3
       12   6   2   3
       10   5   1  10   6⁗
        3   1   6   6   9‴‴
       23   2   5   8   9
```

46. 2ft. 6in. 9″
```
        2   6   9
        5   1   6
        1   3   4   6″
            1  11   0   9⁗
        6   6   9   6   9
       24   6
      157   7   1   6   0
        3   3   4   9   4  6‴
      160  10   6   3   4  6
```

47. 34ft. 0in.
```
        0   6½
       17   0
        1   5
       18   5
        0   6½
        9   2   6″
            9   2   6‴
        9  11   8   6
```

48. 1ft. 2in.
```
        1   2
        1   2
        0   2   4″
        1   4   4
        9
       12   3   0
```

49. 1ft. 4in.
```
        1   4
        1   4
        1   4
            5   4″
        1   9   4
        4
        7   1   4
```

50. 1ft. 5in.
```
        1   5
        1   5
            7   1″
        2   0   1
       13
       26   1   1
```

51. 1ft. 6in. 6″	54. 2ft. 8in. 3″

```
51. 1ft. 6in. 6″              54. 2ft. 8in. 3″
      1   6   6                   2   8   3
   1  6   6                    5   4   6
      9   3                    1   9   6
             9   3‴                        8   0‴ 9″
   2  4   6   3″               7   2   8   0   9
  15  6                       24
  35  7   9   9              173   4   1   6   0
   1  2   3   1  6‴
  36 10   0  10  6            55. 2ft. 7in.
                                 2   7
52. 1ft. 1in.                    5   2
      1   1                    1   6   1″
   1  1                        6   8   1
      1   1″                  29   3
   1  2   1                  193   6   5
  17                           1   8   0   3‴
  19 11   5                  195   2   5   3

53. 2ft. 4in.                56. 40ft. 9in.
      2   4                       1   7
   4  8                       40   9
      9   4‴                  23   9   3″
   5  5   4                   64   6   3
  19  6                        1   7
 103  5   4                   64   6   3
   2  8   8                   37   7   7   9‴
 106  2   0                  102   1  10   9
```

UNEQUAL-SIDED TIMBER OR STONE.

```
57. 2ft. 8in.                58. 1ft. 1in.
      1   6                       0  10
   2  8                        0  10  10″
   1  4                       18
   4  0                       16   3   0
  14  6
  58  0
```

I

59.	14ft.			
0	7¼in.			
8	2			
0	7			
8	9			
0	8½			
5	10			
	4	4″	6‴	
6	2	4	6	

60.	1ft.	2in.		
0	11½			
1	0	10″		
0	0	7		
1	1	5		
9				
10	0	9		

61.	1ft.	7in.		
0	8	9″		
1	0	8		
	1	2	3‴	
1	1	10	3	
24				
27	8	6	0	

62.	1ft.	3in.	6″		
0	0	3			
0	3	10	6″		
0	0	3	10	6‴	
0	4	2	4	6	
16					
5	7	2	0	0	

63.	16ft.	0in.	
0	9		
12	0		
0	11		
11	0		

64.	41ft.	0in.	
1	5		
58	1		
0	11		
53	2	11″	

65.	18ft.	9in.		
1	7			
18	9			
10	11	3″		
29	8	3		
2	6			
59	4	6		
14	10	1	6″	
74	2	7	6	

A CARPENTER'S ACCOUNT.

733 yds. 3 ft. 8 in. flooring,	£131,	16s.	11d.
151 yds. 9 in. painting,	4	14	5
158 yds. 1 ft. 3 in. plastering,	2	19	3½
1737 ft. timber,	133	17	10½
6 ro. 6 yds. 6 ft. slating,	4	9	8
196 ft. 10 in. 6″ sawing,	0	8	2¼
154 ft. deals,	1	12	1
83 ft. 4 in. 11″ 5‴ 3‴ Memel logs,	6	19	0
	£286	17	5¼

66. $\frac{34+20}{2} = 27$ in. = 2 ft. 3 in. and $\frac{17+10}{2} =$

13¾ in. = 1ft. 1 in. 6″, then 1 ft. 1 in. 6″ × 2 ft. 3 in. × 24 ft. 9 in. = 2 ft. 6 in. 4″ 6‴ × 24 ft. 9 in. = 62 ft. 7 in. 9″ 4″ 6‴.

67. 50 + 50 + 18 + 18 = 136 ft. circumference of the house, and 136 ft. × 15 ft. = 2040 ft. = walls, then 50 × 18 = 900 ft. = floor or roof. Therefore 2040 + 900 + 900 = 3840 ft.

68. 24¼ × 2 × 1¼ = 61¼ ft. content of the plank, and 61¼ × 25 lb. = 1531¼ lb.

69. 1 ft. : 61¼ ft. : : 1s. 2d. : £3, 11s. 5¼d. and 1 lb. : 1531¼ lb. : : ½d. : £3, 3s. 9¼d. ¼.

70. 68 ft. 4 in. × 60 ft. 6 in. = 4134 ft. 2 in., and 9 ft. : 4134 ft. 2 in. : : 3¼d. : £6, 4s. 4¾d. ¾.

71. 5 ft. 6 in. + 5 ft. 3 in. + 4 ft. 9 in. = 15 ft. 6 in. and 15 ft. 6 in. × 2 ft. 6 in. × 5 = 38 ft. 9 in. × 5 = 193 ft. 9 in., then 1 ft. : 193 ft. 9 in. : : 9¼d. : £7, 13s. 4¼d. ¼.

72. 60 × 30 × 4 = 1800 × 4 = 7200 content of the 4 floors, and 12 ft. 4 in. × 8 ft. 6 in. × 4 = 104 ft. 10 in. × 4 = 419 ft. 4 in. content of the whole staircase, then 7200 ft. — 419 ft. 4 in. = 6780 ft. 8 in. — 753 cube. 3 ft. 8 in. Lastly, 9 ft. : 6780 ft. 8 in. : : 3s. 6d. = 180 in. : 81368 in. : : 42d. : 31643d. = £131, 16s. 11¼d.

73. (40 ft. 6 in. + 24 ft. 3 in.) × 2 × 10 ft. 6 in. = 64 ft. 9 in. × 2 × 10 ft. 6 in. = 129 ft. 6 in. × 10 ft. 6 in. = 1359 ft. 9 in. = 151 yds. 9 in., then 9 ft. : 1359 ft. 9 in. : : 7¼d. : £4, 14s. 5⅝d. ⅛.

74. (32 ft. 6 in. + 16 ft. 6 in.) × 2 × 9 ft. 3 in. = 98 ft. × 9 ft. 3 in. = 906 ft. 6 in., then 6 ft. 6 in. × 3 ft. = 19 ft. 6 in. door, multiply 906 ft. 6 in. — 19 ft. 6 in. = 887 ft. walls, again 32 ft. 6 in. × 16 ft. 6 in. = 536 ft. 3 in. roof. Therefore 887 ft. + 536 ft. 3 in. = 1423 ft. 3 in. = 158 yds. 1 ft. 3 in. content of the whole, and 1 yd. : 158 yds. 1 ft. 3 in. : : 4¼d. : £2, 19s. 3¼d. ¼.

75. 12 ft. 6 in. × 1 ft. 9 in. × 9 = 21 ft. 10 in. 6″ × 9
= 196 ft. 10 in. 6″, and 1 ft. : 196 ft. 10 in. 6″ :: ¼d.
: 8s. 2¼d. ¾.

76. 12 ft. 6 in. × 8½ in. = 8 ft. 10 in. 3″ = 1275″ and
50 ft. × 16 ft. = 800 ft. = 115200″, then 115200÷1275
= 90¼⁷⁄₅₁ deals.

77. 50 ft. 6 in. × 2¼ ft. 3 in. = 1224 ft. 7 = 136
yds. 7 in. 6″ = 3 ro. 28 yds. 7½ in., then 324 sq. ft. (1
rood) : 1224 ft. 7½ in. :: £2 : £7, 11s. 2¼d. ₅⁄₁₇.

78. 64 ft. × 20 ft. = 1280 ft. to reduce which to stand-
ard measure, multiply by 3, and divide by 2, or add ½ of
it to itself, the result is 1920 ft., therefore 324 ft. :
1920 ft. :: £2 : £11, 17s. 0½d. ⅞.

79. 48 ft. × 28 ft. = 1344 ft. which reduced to stand-
ard measure by × 5, and ÷ 3 is = 2240 ft. = 248 yds.
8 ft.

80.

	ft.	in.	″	‴
Side-walls, 41 ft. × 19 ft. 9 in. × 2 =	1619	6	0	0
End-walls, 20 ft. 9 in. × 18 ft. 9 in. × 2 = 778 ft. 1 in. 6″ to which add ¼ of itself for the thickness, the result is	972	7	10	6
Gables above end-walls, $\frac{20\text{ ft. 9 in.}+4\text{ ft.}}{2}$ = 12 ft. 4 in. 6″, and 12 ft. 4 in. 6″ × 8 ft. 6 in. × 2 = 210 ft. 4 in. 6″ to which add ¼ itself for thickness =	262	11	7	6
Chimney-stacks, 4 feet + 2 feet 6 in. = 6 ft. 6 in. × 5 ft 1 in. × 2 =	66	1		
	9)2921	2	6	
	36)324	5	2	6
Content of the building =	9 r. 5ft.2¼in.			

Now, 1 rood : 9 ro. 5 ft. 2¼ in. :: 30s. : £13, 10s.
5¾d. ₄⁷⁄₇₇ expense of building.

BROACHED HEWN WORK.

	ft.	in.
Skews, 11 ft. 6 in. × 1 ft. 7 in. × 4	72	10
Corners, 18 ft. 9 in. × 1 ft. 0 in. × 4	187	6
Chimney-stacks, 13 ft. × 5 ft. 3 in. × 2	136	6
	396	10 in.

Then 1 ft. : 396 ft. 10 in. : : 4d. : £6, 12s. 3¼d. ⅛

DROVED HEWN WORK.

	ft.	in.	''
13 ft. 11 in. × 1 ft. 3 in. × 6 =	104	4	6''
3 ft. 11 in. × 1 ft. 7 in. × 6	37	2	6
9 ft. 3 in. × 1 ft. 3 in. × 6	11	6	9
3 ft. 3 in. × 1 ft. 7 in. · ·	5	1	9
19 ft. 3 in. × 1 ft. 3 in. ·	24	0	9
4 ft. 3 in. × 1 ft. 7 in. · ·	6	8	9
6 ft. × 2 ft. × 3	36	0	0
4 ft. 5 in. × 1 ft. 3 in. × 3	16	6	9
3 ft. 1 in. × 1 ft. 6 in. × 3	13	10	6
3 ft. 8 in. × 1 ft. 3 in. × 3	13	4	0
8 ft. 8 in. × 2 ft. 3 in. ·	19	6	0
5 ft. 8 in. × 1 ft. 3 in. · ·	7	1	0
4 ft. × 1 ft. 9 in. · ·	7	0	0
	307	5 in.	3''

Then 1 ft. : 307 ft. 5 in. 3'' : : 5d. : £6, 8s. 1¼d. ⅞,
and 1 ft. : 106½ ft. : : 6d. : £2, 13s. 3d. vents.

Now expenses for bulding, &c., = £13, 12s. 8¼d. ₇⁄₁₆
Broached work,	=	6	12	3¼	⅛
Droved work,	=	6	8	1¼	⅞
Vents,	=	2	13	3	
Whole price	£29	4	1½	₇⁄₁₆	

81. 46 ft. 6 in. + 1 ft. 6 in. (the two eaves) = 48 ft.
and 48 ft. × 41 ft. 9 in. = 2004 ft. = 222 yds. 6 ft. = 6
ro. 6 yds. 6 ft. Now 324 ft. : 2004 ft. : : 14s. 6d. : £4,
9s. 8¾d.

I 2

MISCELLANEOUS QUESTIONS.

1. £2573, 3s. 11¾d. — £689, 18s. 2¼d. = £1883, 5s 9½d. net estate.

2. £2851, 4s. ÷ 16 = £178, 3s. captain's share. Then £2851, 4s. — £178, 4s. = £2673 and £2673 ÷ 32 = £83, 10s. 7⅛d. each officer's share, which × 6 = £501, 3s. 9d. sum of the officers' shares. Again £2673 — £501, 3s. 9d. = £2171, 16s. 3d. and £2171, 16s. 3d. ÷ 45 = £48, 5s. 3d. each private man's share.

3. Captain 1½ + men 4 + boy ½ = 5½ shares. Wherefore £212, 14s. 7d. ÷ 5½ = £38, 9s. 4½d. ½ one share, consequently a man's share, which multiplied by 1½ = £54, 14s. 0½d. ⅓ captain's share, and ÷ 3 = £12, 3s. 1½d. ⅔ the boy's share.

4. 60⅘ ft. × 33¼ ft. = 2026⅚ ft., and 15 ft. × 1¼ ft. = 18⅞ ft. Whence 2026⅚ ÷ 18⅞ = 8107 ÷ 75 = 108 ₇⁄₇₅ planks.

5. First 1603 — 70 = 1533, year in which she was born. Again 1602 — 1558 = 44 yrs. and from Nov. 17 to March 24 (both days included) is ` 28 days. Then 44 yrs. × 365 = 16071 days, to which add 128, the sum is 16199 days = 2314 w. 1 da. = 578 m. 2 w. 1 da. reigned.

6. First ⅔ of 11s. = 4s. 1½d. gain by the first price, which taken from 11s. leaves 6s. 10½d. prime cost. Then 13s. 6d. — 6s. 10½d. = 6s. 7½d. gain by the second price. Whence 6s. 10½d. : 6s. 7½d. :: 100 : £96, 7s. 3⅜d. ₉⁄₇₅

7. 1 cwt. : 17 cwt. 3 qrs. 14 lb. :: £2, 6s. 8d. : £41, 14s. 2d. and 1 lb. : 18 cwt. 1 qr. 21 lb. :: 4½d. : £38, 14s. 4⅛d. Then 17 cwt. 3 qrs. 14 lb. + 18 cwt. 1 qr. 21 lb. = 36 cwt. 1 qr. 7 lb. and £41, 14s. 2d. + £38, 14s. 4⅛d. = £80, 8s. 6⅛d. : £2, 4s. 3¼d. ±⅔₄₂. Therefore 36 cwt. 1 qr. 7 lb. : 1 cwt. :: £80, 8s. 6⅛d. : £2, 4s. 3¼d. ±⅔₄₂.

8. Stockings, £316, 5s. + stuff, £26, 16s. 8d. = £343, 1s. 8d. and sugar, £57, 5s. 4½d. + indigo, £183, 3s. 4d. = £240, 8s. 8½d. Then £343, 1s. 8d. — £240, 8s. 8½d. = £102, 12s. 11½d.

9. £100 : £560, 10s. :: £2, 10s. : £14, 0s. 3d.

10. 1s. 2d. + 7¼d. + 3⅓d. + 3d. = ?s. 4d. = 28d. and
£14 = 3360d. Then 3360 ÷ 28 = 120.

11. 3s. 6d. + 2s. 6d. + 1s. 6d. + 1s. = 8s. 6d., and the
fourth part of the seats, 600 at 8s. 6d. = £255. Then
£255 − £120 = £135 annual surplus. Whence if £1600
: £100 :: £135 : £8⁷/₁₆ per cent.

12. From 5th March to 4th Nov. are 244 days, from
which take 34 Sundays, there remain 210 work days.
Then 1 da. : 210 da. :: 14d. : £12, 5s. Again, from
4th Nov. to 5th March, are 104 work days. Wherefore
1 da. : 104 da. :: 14d. : £4, 19s. 8d. Lastly, £12, 5s.
+ £4, 19s. 8d. = £17, 4s. 8d.

$$\begin{array}{ll} 13. \quad 6 \times 40 \times \quad 4 = 240 \times' \quad 4 = \quad 960 \\ \quad\quad 6 \times 30 \times \ 12 = 180 \times \ 12 = \ 2160 \\ \quad\quad 3 \times 22 \times 110 = 66 \times 110 = 7260 \end{array}$$

Then 960 + 2160 + 7260 = 10380, whence

10380 : 240 :: £1000 : £23, 2s. 5d. ⁷/₂₃ Officer's.
10380 : 180 :: 1000 : 17 6 9½ ¹⁵⁷/₁₇₃ Midshipman's.
10380 : 66 :: 1000 : 6 7 2 ¹²⁶/₁₇₃ Sailor's.

14. 73126 yds. × 3 × 60 × 10 = 132706800 yds. in a
day, and 132706800 × (365 − 63) = 40077453600 yds.
in a year.

15. 1300 × 47 × 15½s. = 947050s. price of the cloth ;
the half of which is 473525. Then £65 : 473525s. ::
1 t. : 364 t. 1 hhd. of wine ; and 70s. : 473525s. :: 1
chest : 6764¹⁵/₁₄ chests of oranges.

16. 608 + 1200 + 1500 = 3308, then
3308 : 608 :: £12, 10s. : £2, 5s. 11½d. ⁴⁸⁴/₈₂₇ A pays.
3308 : 1200 :: 12 10 : 4 10 8½ ³⁹⁶/₈₂₇ B pays.
3308 : 1500 :: 12 10 : 5 13 4½ ⁶⁶³/₈₂₇ C pays.

17. £3, 10s. × 14⅞ = £51, 12s. 6d. = 12390d. price
of the sugar, and 12390d. ÷ 66d. = 187 yd. 2 qr. 3¹¹/₁₃
nails.

18. 144 ells × 5760 ells (an acre) ÷ 1 lip. = 40 lip.
= 10 pks., and 1 lip. : 40 : : 1s. 5¼d. : £2, 18s. 4d.

19. 5760 ells ÷ 100 = 57 pks. 2⅘ lip. = 14 fir. 1 pk.
2⅘ lip. = 3 bo. 2 fir. 1 pk. 2⅘ lip.

20. ⅓ mark = 6s. 8d. = 80d. : 60d. (5s.) : : 4 oz. (¼ lb.) : 3 ounces.

21. $\left\{\begin{array}{l}1 \text{ sol. : } 750 \text{ sol.}\\ 8 \text{ da. : } 365 \text{ da.}\end{array}\right\}$: : 12 lb. : $\dfrac{12 \times 750 \times 365}{8}$

= 3 × 375 × 365 = 410625 lb. = 183 tons, 6 cwt. 1 qr. 5 lb.

22. First ¼ + ⅗ + ⅓ = 23/20 and 1 − 23/20 = 37/20 = ¼ W's share; then (£120, 14s. ÷ 1 = £362, 2s. 6d. S or W; £120, 14s. × 3 ÷ 8 = £362, 2s. ÷ 8 = £45, 5s. 3d. T; and £120, 14s. ÷ 8 = £15, 1s. 9d. V.

23.
	2oz.	5dr.	0sc.	0gr.
3	4	0	0	
0	5	2	15	
4	3	1	8	
11	2	1	3	

24. 1 po. : 12000⅛ ac. : : 15 £. : £30001, 5s. yearly income. And £30001, 5s. ÷ 365 = £82, 3s. 10¾d. 33/73 daily income.

25. 390 ft. 9 in. (sum of the 5 circumferences) × 10 ft. 8 in. = 4166 11/12 half-inches, and 100032 h. in. ÷ 65 (32½ in.) = 1538 ft. 11 11/12 inches = 512 yards, 35½ 3/12 inches.

26. 17 lb. 10½ oz. × 73 = 4520 drs. × 73 = 329960 drs. in the whole, and 329960 ÷ 126 drs. (7 oz. 14 drs.) = 2618 23/63.

27. 110 : 100 : : £350 : £318, 3s. 7⅙d. ⅙ principal. And 110 : 10 : : £350 : £31, 16s. 4¼d. 7/11 gain; or £350 − £318, 3s. 7⅙d. 7/11 = £31, 16s. 4¼d. 7/11 gain.

28. 13 = (8 + 5) ∴ £154 : : (8 − 5) = £35, 10s.
9¾d. 1 3/13.

29. 10½d. + 8s. 9d. + 1s. 8¼d. = 8s. 4d. = 25 four-
pences, and £704, 3s 4d. = 42250 fourpences; therefore
42250 ÷ 25 = 1690 lb. of each sort.

30. 650 × 10 × 3¾d. = 6500 lb. × 3¾d. = 22750d. =
£94, 15s. 10d. selling price of the whole, from which take
80 guineas or £84, there remains £10, 15s. 10d. gain.

31. 11 cwt. 3 qrs. × 20 = 235 cwt. and 235 cwt. ×
£7¼ = £1762, 10s. selling price of the whole, from which
subtract 1500qs. or £1575, the balance is £187, 10s.

32. £519, 10s. 6d. + £33, 12s. + £61, 1s. + £17, 6s.
6d. = £661, 10s. Then 126 × 18 = 2268 gal. : 1 gal.
: : £661, 10s. = 5s. 10d. per gallon.

33. 70 bars of steel × 8 lb. = 560 lb. = 5 cwt. and 560
× 5d. = £800. = £11, 13s. 4d. price of the steel, which
taken from £29, 3s. 4d. leaves £17, 10s. price of the iron.
Then 70 bars (a ton) − 560 lb. = 1580 lb. in 15 cwt. of
iron. Now £17, 10s. ÷ 1680 = 2¼d. price of the iron
per lb. Lastly, 130 bars − 70 = 60 bars of iron and
1680 ÷ 60 = 28 lb. weight of each bar of iron.

34. 1000 Flem. ells × 5 qrs. (an Eng ell) : : £100 =
(90 + 10) : 9s. 4d. per English ell.

35. 34 pks. (a qr.) : 24 pks. : : 18s. : 13s. 6d. price of
the oats, which 1s. 1d × 20 = £1, 6s. 8d. price of the hay.
Therefore £10, 16s. + 13s. 6d. + £1, 6s. 8d. = £12,
16s. 2d. whole cost of the ox. Now 36 st. × 14 = 504 lb.
× 5½d. = 2772d. = £11, 11s. price of the beef, and 6 st.
× 14 = 84 lb. × 7d. = 588d. = £2, 9s. price of the tal-
low. Then £11, 11s. + £2, 9s. + £1, 5s. = £15, 15s.
whole sum received for the ox, from which deduct the
prime cost, £12, 16s. 2d., and there remains £2, 8s. 10d.
gain.

36. 5 × 365 × 8d. = 14600d. = £60, 16s. 8d expense
of maintenance. £3 × 3 years = 9 and 9 + 5 + 8 =
£22 allowed for clothes. Then £60, 16s. 8d. + £22 =

£82, 16s. 8d. whole expense. Now £6 + 12 + 18 + 24 = £60 value of his work, to which add £25 apprentice = £85; therefore £85 — £82, 16s. 8d. = £2, 3s. 4d. gain.

37. 100 ∶ 91⅞ = (100 — 8⅛) ∶∶ 5s. 6d. ∶ 5s. 0⅛d. money remitted here, from which take 3s. 11⅜d. (cost price including freight, &c.), there remains 1s. 1d. gain. Then 3s. 11⅜d. ∶ 1s. 1d. ∶∶ £100 ∶ £27, 7s. 4⅛d. $\frac{1}{1}\frac{9}{9}$ gain per cent.

38. 7 men × 5 ÷ 3 = 11⅔ women and 11⅔ ÷ 7 = 20⅚; then 20⅚ × 7 ÷ 6 = 24⅙ boys, and 24⅙ ÷ 3 = 27¼; wherefore £43, 12s. 9d. ÷ 27¼ = £1, 12s. 2½d. $\frac{1}{1}\frac{9}{9}$ a boy's share: which × 7 ÷ 6 = 1s. 1s. 6¼d. $\frac{8}{109}$ a woman's share: and this × 5 and ÷ 3 = £3, 2s. 7d. $\frac{1}{1}\frac{1}{9}$ a man's share.

Otherwise, if a boy get 18 shares, it is obvious that a woman will get 21, and a man 35; therefore 35 × 7 = 245, 21 × 9 = 189, and 18 × 5 = 54; now 245 + 189 + 54 = 488; hence 488 ∶ 35 ∶∶ £43, 12s. 9d. ∶ £3, 2s. 7d. $\frac{1}{1}\frac{1}{9}$, a man's share: 488 ∶ 21 ∶∶ £43, 12s. 9d. ∶ £1, 17s. 6¼d. $\frac{8}{109}$, a woman's: and 488 ∶ 18 ∶∶ £43, 12s. 9d. ∶ £1, 12s. 2½d. $\frac{1}{1}\frac{9}{9}$ a boy's.

39. Find the value of the whole court at 3s. per yard, and the footpath at 6d.; the sum of these values will be the whole cost. Thus, 68 ft. 6 in. × 42 ft. 9 in. = 2928 ft. 4 in. 6″ = area of the whole court; 68 ft. 6 in. × 5 ft. 6 in. = 376 ft. 9 in. = area of the footpath. Then 3 ∶ 2928 ft. 4 in. 6″ ∶∶ 3s. ∶ £48, 16s. 1¼d = price of the whole court at 3s.; and 9 ft. ∶ 376 ft. 9 in. ∶∶ 6d. ∶ £1, 0s. 11¼d. $\frac{2}{3}$ = price of the footpath at 6d. Lastly, £48, 16s. 1¼d. — £1, 0s. 11¼d. $\frac{2}{3}$ = £49, 17s. 0½d. $\frac{1}{3}$ whole cost.

40. £2 + $\frac{4}{5}$ of $\frac{4}{9}$ ÷ $\frac{2}{3}$ ÷ $\frac{1}{1}$ + $\frac{2}{8}$ = $\frac{16+1}{8}$ = £$\frac{17}{8}$, and 3 yds.

+ $\frac{2}{3}$ of $\frac{3}{5}$ = $\frac{3}{1}$ + $\frac{2}{5}$ = $\frac{15+2}{5}$ = $\frac{17}{5}$ yds.   Then $\frac{17}{5}$ yds.

∶ $\frac{3}{4}$ yd. ∶∶ £$\frac{17}{8}$ ∶ $\frac{5 × 17 × 3}{17 × 8 × 4}$ = $\frac{5 × 3}{8 × 4}$ = £$\frac{15}{32}$ = 9s. 4⅝d.

41. First $\sqrt{(40^2 - 33^2)} = \sqrt{(1600 - 1089)} = \sqrt{511} = 22·605$. Then $\sqrt{(40^2 - 21^2)} = \sqrt{(1600 - 441)} = \sqrt{1159} = 34·044$. Consequently $22·605 + 34·044 = 56·649$ ft. $= 56$ ft. $7·788$ inches the breadth of the street.

42. 36 ox. : 21 ox. } : : 10 : $13\frac{1}{2}$, hence $13\frac{1}{2} - 10$
    4 we. : 9 we. } $= 3\frac{1}{2}$ ac. the increase of the
grass upon 10 ac. for 5 weeks, now 5 weeks : 14 weeks
:: $3\frac{1}{2}$ ac. : $8\frac{3}{5}$ ac. the increase in 14 weeks, consequently
10 ac. : $18\frac{3}{5}$ ac. }
18 we. : 4 we. } : : 36 oxen : 15 oxen, the number
required.

43. £3179, 11s. 8d. + £100 ÷ 4 = £3204, 11s. 8d. and £5204, 11s. 8d. − $\frac{1}{16}$ of it = £2938, 1s. $6\frac{1}{2}$d. his worth at the end of 3 years, then £2938, 1s. $6\frac{1}{2}$d. + £100 = £3038, 1s. $6\frac{1}{2}$d. and £3038, 1s. $6\frac{1}{2}$d. − $\frac{1}{16}$ of it = £2893, 11s. 2d. worth at the end of 2 years ; again, £2293, 11s. 2d. + £100 = £2393, 11s. 2d., and this − $\frac{1}{16}$ of itself is = £1795, 3s. $4\frac{1}{2}$d. worth at the end of 1 year ; now £1795, 3s. $4\frac{1}{2}$d. + 100 = £1895, 3s. $4\frac{1}{2}$d. and this − $\frac{1}{16}$ of itself is = £1421, 7s. $6\frac{1}{2}$d. what he had at the beginning.

44. $\frac{11}{18} - \frac{5}{11} = \frac{9}{198}$ = £540, 10s. the difference of the legacies ; hence 411 : 1170 : : £540, 10s. : £1538, 12s. $11\frac{3}{41}$d. $\frac{77}{137}$, the sum left.

45. As the minute-hand goes round the whole circumference, while the hour-hand only goes over the $\frac{1}{12}$ part of it, therefore the minute-hand gains $\frac{11}{12}$ upon the other in one hour ; and when the minute-hand is at 12, the other is at 4 : now since the next time the former over-takes the latter, it must have gone over 4 parts of the 12 more than the other ; hence 11 : 4 : : 60 : $21\frac{9}{11}$ min. past 4, the time required.

46. Here 3 : 4 : : 4 : $5\frac{1}{3}$, and $5\frac{1}{3} - 5 = \frac{1}{3}$ of a leap gained upon every 4 leaps of the hare, whence $\frac{1}{3}$: 100 : : 4 : 1200 leaps.

47. Here A and B perform $\frac{1}{6}$ of the work in a day, A and C $\frac{1}{6}$ of it, and B and C $\frac{1}{10}$ of it, hence $\frac{1}{6} + \frac{1}{6} + \frac{1}{10} = \frac{9}{15}$ of it done by the 3 together in 2 days, since each has been taken twice, and $\frac{7}{15}$ the part done by them in 1 day. Now $\frac{8}{15} - \frac{1}{10} = \frac{5}{30} = \frac{1}{6}$ of it done by A in 1 day, and $\frac{7}{15} : 1$: : 1d. : $9\frac{3}{7}$ days A takes. $\frac{7}{15} - \frac{1}{6} = \frac{2}{15} = \frac{1}{16}$ of it done by B in 1 day, and $\frac{1}{16} : 1$: : 1d. : 16 days B takes. $\frac{7}{15} - \frac{1}{6} = \frac{1}{48}$ of it done by C in 1 day, and $\frac{1}{48} : 1$: : 1d. : 48 days C takes.

48. $\sqrt{(86^2 - 76^2)} = \sqrt{(7396 - 5776)} = \sqrt{1620} = 40.2492$, and $50 - 40.2492 = 9.7508$ height of the statue; then $64 - 9.7508 = 54.2492$ height of the higher column above the top of the statue; again, $\sqrt{(97^2 - 54.2492^2)} = \sqrt{(9409 - 2942.9757004\frac{5}{5})} = \sqrt{6466.02429936} = 80.4116$ distance between the statue and the higher column, then $80.4116 + 76 = 156.4116$ distance between the columns; whence $\sqrt{156.4116^2 + (64 - 50)^2} = \sqrt{(24464.58861456 + 196)} = \sqrt{24660.58861456} = 157.0369$ feet, the distance between the tops of the columns.

49. $19 \times 4 \div 5 = 15\frac{1}{5}$. prime cost per yard; then $100 : 102.5$: : $15.2 : 15.58$; also, $100 : 105$: : $15.58 : 16.359$; lastly, $100 : 125$: : $16.359 : 20.14875s. = £1$, 0s. 5$\frac{1}{4}$d. $\frac{3}{4}\frac{3}{4}$ selling price per yard.

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