Reduction of Decimals

Examples

Case I

To reduce Vulgar Fractions to decimals.

1st Reduce 5/6 to a decimal of the same value.

6)5.000
.833

2nd Reduce 1/2 to a decimal of the same value.

2)10
5

3rd Reduce 1/4 to a decimal of the same value.

4)1.00
25

4th Reduce 3/4 to a decimal of the same value.

4)3.00
75

Case II

To reduce numbers having different denominations to decimals.

1st

Reduce 12 pwt. 16 grs to the decimal of a pound Troy weight.

24 | 16.0000
20 | 12,6666
12 | 0,6333
.0527

2nd

Reduce 6 oz. 12 pwt. 15 grs. to the decimal of a pound Troy weight.

24 | 15.000
20 | 12,625 + 10.
12 | 6,631 2
.5526

3rd

Reduce 2 cwt. 3 qrs. 12 lb. 12 oz. 11 dr. to the decimal of a ton Avoirdupois wt.

16 | 11,000
16 | 12,687
28 | 12,792
4 | 3,456
20 | 2,864
14,32

4th

Reduce 3 qrs. 3 na. to the decimal of a yard cloth measure.

4 | 3,0000
4 | 3,7500
9375

5th

Reduce 2 miles 6 fur. 20 rods 12 ft. 6 in. 2 bar. to the decimal of a league League Long measure

3 | 2,0000
12 | 6,6666
16½ or 16.5 | 12,5555
40 | 20.7609
8 | 6.5190
3 | 2,8148
9382

16.2
33 | 125555
2
33)251110
7609

6th

Raeduce 3 roods 30 rods 29 yds to the decimal of an acre land measure

30¼ | 29,0000
40 | 30,9520
4 | 3,7738
.9434

117 2 105,61

Continued

Examples

7th Reduce 56 gals. 2 qts. 1 pt. to the decimal of a hhd. allowing 63 gal. to a hhd.

2 | 1.0000
4 | 3.5000
63 | 56.8750
.9027

8th Reduce 39 ft. 1727 in. to the decimal of a two round timber.

1728 | 1727.000
40 | 39.999
.9999

9th Reduce 1 pk. 2 qts. 1 pt. to the decimal of a chaldron.

2 | 1.0000
8 | 2.5000
144 | 1.3125

10th Reduce 12 mo. 3 wks. 6 dys. 23 hrs. 59 min 12 sec. to the decimal of a year.

60 | 12.0000
60 | 59.2000
24 | 23.9866
7 | 6.9994
4 | 3.9999
13 | 12.9999
.9999

11th Reduce 2 min. to the decimal of a month allowing 28 dys to a month.

40320 | 200000
.00004

12th Reduce 1 pt. to the decimal of a hhd. Wine measure.

2 | 1.00
4 | 0.500
63 | 0.125
0019

13th Reduce 1 week to the decimal of a year. allowing 13 months to a year.

4 | 1.00000
13 | 0.25000
01923

14th Reduce 1 minute to the decimal of a year allowing 360 days to a year.

60 | 1.00000
24 | 0.16666
365 | 0.00694
000001

15th Reduce 1 dram to the decimal of a ton Avoirdupois weight

16 | 1.000000
16 | 0062500
28 | 0003906
4 | 0000139
28 | 0000034
000001

Continued

Examples

1st Case III

Required the value of .0527 of a lb. Troy weight

lb. .0527
12
oz. .6324
20
pwts. 12,6480
24
grs. 15,5520

2nd

Required the value of 5526 of a lb. Troy weight

5526
12
6,6312
20
12,6240
24
24960
12480
2nd 14,9760

What is the value of .1432 of a ton

1432
20
2,8640
4
1,1560
28
96480
9120
12,7680
16
46080
7680
12,2880
16
17280
2880
4,6080

4th

What is the value of 9017 of a lb. Apothecaries, weight

9017
12
18034
9017
10,8204
8
6,5632
3
1,6896
20
5th 1,3 79 60

What is the value of 9376 of a yd. cloth measure.

9376
4
3,7504
4
6th 3,0016

What is the value of 9496 of a leag. Long measure

9496
3
2,8488
8
6,6464
40
25,8560
5½
42800
4280
47080
9
2,1240
12
1,4880

Continued

Examples

7th

What is the value of 9436 of an acre Land measure

9436
4
37744
40
8th 1509760

What is the value of 9999 of a ton of round timber

9999
40
399960
1728
799680
19920
69720
9960
9th 11521080

What is the value of 0099 of a chaldron

0099
36
0594
0297
03564
4
14256
8
10th 114048

What is the value of 0002 of a month allowing 28 days to a month

0002
28
0016
0004
000056
24
00224
00112
01344
60
806400
60
38460

Reduction Descending

Examples

1st

It is required to reduce 444 dolls 16 cts 5 mills into mills. 444,16,5

100
44416
10
444165

2nd

In 57 dolls. 99 cts 5 mills how many mills

57,99,5
100
5795
10
57955

3rd

In seven. 2 qrs. 20 lbs. how many pounds Avoirdupois weight

4, 2, 20
4
18
28
164
96
4th 524

In 20 acres 29 rods how many square rods

20, 29
40
800
1
5th 9229

How many inches from Exeter to London it being 18 miles

18
5
144
40
5760
12
69800
2880
91680
9
950400
12
11404800

Continued

Examples

6th

How many inches will reach round the world it being 360 degrees each degree containing 69½ miles.

360
69½
3240
2160
180
25020
5
125100
5
625500
40
25020000
5½
137610000
12096000
1209600
138915600
12
1666987200

7th How many solid feet in 20 cords of wood

20
128
160
10
8
2560

8th How many pints in 1 tun of wine

4
2
126
252
4
1008
2
2016

9th

How many hours in 33 years 2 months 12 days allowing 13 months to a year.

33, 2, 12
13
101
33
431
28
3460
12
41520
24
489720
2160
491880

10th

In 29 yards 2 quarters 3 nails how many nail.

29, 2, 3
4
118
4
475

11th

In £214. 18s. 6d. 2q. how many farthings

214, 18, 6, 2
20
4298
12
51578
4
206932

12th In 64 pounds 19 shillings 6 pence how many pence.

64, 19, 6
20
1299
12
15594

105, 6, 6

Continued Ascending

Examples

1st

Reduce 444,165 mills into dolls

10) 44416 5
10) 4441 6
10) 444 1
444 1, 5

2nd

In 5-7935 mills. how many dolls

10) 5-7935
10) 5-793
10) 5-79
5-7, 935

3rd

In 5-24 pounds Avirdupois how many hundred

2)5-24
4) 18, 26
4) 2, 20

4th

In 2229 rods how many acres Square measure.

4) 2229
4) 180, 2
20, 29

5th

In 114,480 inches how many miles Long measure

12) 114480
3) 9540
3) 3180
11) 1060
4) 5-76 0
5) 1 44
18

6th

In 15-25-9 6720 inches how many degrees each containing 69½ miles.

12) 15-25-96720
3) 1321056 00
11) 440352 00
4) 40032 00
8) 10008 00
125 1-0 0 0
360

7th

How many cords of wood are in 2-60 solid feet. 128 2-60 (20
256
00

8th

In 2016 pints of wine how many tons

2) 2016
2) 1008
252 2-2

9th

In 28-9920 hours how many years allowing 12 months to a year.

24) 28-9920
12) 1208 0
4) 1772-5
10) 443, 1
3 3, 2, 15

10th

In 475 nails how many yards.

4) 4, 75
4) 118, 3
29, 2 5

11th

In 206330 farthings how many pounds.

4) 206330
12) 5-15-82, 2
20) 429, 8, 6
214, 18, 6½

12th

In 15-5-94 pence how many pounds

12) 15-5-94
20) 1299 6
64, 19, 6

L.L.

Compound Multiplication

Examples

Case I

When the quantity is whole numbers.

1st How ~~many~~ much will 1000 lbs. of butter come to at 11 cts. 5 m. per pound.

1000
115
5000
1000
1000
115,000

2nd How much will 349 pounds of pork come to at 07 cents per pound

349
07
2443

3rd How much will an ox come to whose weight and prices are as follows viz: The quarters 205.5, 202, 207, 200 lbs. at .06 cents; the hide 70 lbs. a .07 cents; the tallow 66 lbs. at .09 cents a pound.

205.5	202	207	200	70	66
06	06	06	06	07	09
12330	1212	1242	1200	490	594

1212
1242
1200
490
594
59710

4th A drover sold 100 lambs in 5 separate lots 20 to each; the first lot was sold for $1.96 cents each; the second for $1.90 cents; the third for $2.05 cents; the fourth for $2.10 cents; and the fifth at $2.25 cents; I demand the price of the whole

196	190	205	210	225
20	20	20	20	20
3920	3800	4100	4200	4500

3800
4100
4200
4500
20520

Case II

When there are fractions in the quantity, such as $\frac{1}{5}$ $\frac{3}{4}$ $\frac{5}{6}$ &c

1st What will 102 $\frac{3}{4}$ yards of India cotton come to at 29 cents per yard.

4)300
75

102.75
29
92475
20550
297975

2nd What will 2 $\frac{1}{5}$ yards of velvet come to if 1 doll. 25 cents are paid for 1 yard.

$\frac{4|1}{5}$

215
125
1175
430
215
$26975

What will 6 $\frac{7}{8}$ of a yard of broad cloth come to at 6 dollars 75 cents per yard.

$\frac{14900}{75}$

675
675
3375
4725
4050
$455625

Case III

When there are several denominations in the quantity

1st How much will 3 cwt. 2 qr. 20 lb. of sugar come to at 12, 10 cts. per cwt.

28|20.000
4|2.714
* 3.678 X 12.10 = $44.50 cts. 3 m.

2nd How much will 179 cwt. 3 qr. 27 lb. of iron come to at $5.51 cts. per cwt.

28|27.000
4|3.964
179.991
5.51
179991
899955
899955
958,69,041

Note * 2 qr. 20 lb. reduced to the decimal of a cwt. is equal to 678 thousanths, which I anexed to the hundreds and multiplied by the price.

Continued.

Examples Case IV

3rd

How much will 356 acres 1 rood and 7 rods of land come to at $17.21 cts per acre.

40|7.00,0
4|1.175
356.2.99
17.21
356299
712598
2494051
356299

4th 6131,86,579

What will 64 tons 9 cwt. of potash come to at $84.50 cts per cwt.

20|9.00
6418
845.0
920750
256600
57920

5th 5520,6750

What will 98 cwt. 3 qr. 21 lb. of sugar come to at $11.52 cts per cwt.

28|21.000
4|3.750
98937
1152
77874
194685
98937
98937

6th 1139,75424

What will be the wages of a servant come to for 10 years 3 mo. 15 d. allowing 26 days to a year at $6.11 cts 5 m. per year.

26|15.000
12|3.576
10298
6115
257490
10298
192086
421788

472,051,070

1st

How much will 10751 feet of boards come to at $11.21 cents per thousand.

10,751
11.21
10751
21502
10751
10751

2nd 120,51,871

How much will 1100 feet of plank come to at 33 dollars per thousand.

1100
33
3300
3300

3rd 36,300

How much will 941 feet of clear boards come to at $25 per thousand

941
25
4705
1882

4th 23525

How much will 627 hoops come to at $1.27 cts. per hundred.

627
127
4389
1254
627
79629

1st

Case V

What is the value of 8/10 of a ship worth 1000 do.

1000
8
10)8000
800

Continued

Examples

2 rule

What is ¾ of a house worth which is valued at $ 9470.

9470
3
7113 5000
24 7 8571

1st Case VI

What is the weight of 9 casks of raisins each weighing 3 cwt. 2 qrs. 12 lb. 6 oz.

3, 2, 11, 0
9
2 rule 32, 1, 18, 6

What is the weight of 56 casks of raisins each weighing 1 cwt. 2 qrs. 12 lb.

1, 2, 12 × 28
9
14, 1, 24
6
87, 3, 4
3, 0, 24 *
2 rule 90, 3, 28

What is the weight of 105 casks of tobacco each weighing 3 cwt. 1 qr. 7 lb.

3, 1, 7 × 5*
10
33, 0, 14
10
331, 1, 0
16. 2, 7 *
347. 3. 7

4th

How much will 12 oxen come to at £16, 16 S. per ox. 10, 16
12
5th 129, 12

How much will 272 barrels of flour come to at £2, 10 S. 6 d. per barrel.

2, 10, 6
272
686, 16, 0

1st Rule 3

How much will 27 thousands of boards come to at £2, 10 S. 6½ d per thousand.

2, 10, 6½
20
50
12
606
4
2426
27
16982
4852
20) 65502
20) 16375 (1
20) 1364 (4
68, 4, 7½ d.

How much will 5 cwt. of iron come to at £2. 18. 6 per hundred.

2, 1, 6
28
41
12
498
4
1992
51
1992
9960
4) 101592
25398
2) 12699
105, 2, 6

Compound Division

Examples

1st Case I.

If 24 bushels of wheat cost $21 how much is one bushel of it worth.

```
24)21000(875
   192
    180
    168
     120
     120
```

2nd If 340 bushels of rye cost $456.25 cts. I demand the price of 1 bushel.

```
340)456.25(1,341 310/340
    340
    1162
    1020
     1425
     1360
      650
      340
      310
```

If 2020 lb of cheese cost $181,80 cts what did it cost per pound.

```
2020)181.80(.09
     181,80
```

Case II.

To find the price per hundred when there are parts in the quantity such as cwt. &

1st If 2 cwt. 3 qr. of sugar cost $45.26 cts I demand the price of 1 cwt.

```
4)300
  275)4526(16
      275
      1776
      1650
  275)126000(458 50/275
      1100
       1600
       1375
        2250
        2200
          50
         275
```

2nd If 15 cwt. 2 qr. of rice were sold for $54.25 cts. I demand the price of 1 cwt.

```
15,5)54,25(35
     465
      775
      775
```

3rd If 3 cwt. 2 qr. 14 lb. of iron cost $16,675 I demand the price per hundred.

```
3.55)16,67,5(46
     1420
      2475
      2130
       345
```

Case III.

When cwt. qrs. and lb. are given to find the price per lb.

1st If 3 cwt. 2 qr. 14 lb. of iron cost $16.67,5 I demand the price per pound.

```
28|14,000
 4|25-00
   3,625)16,6750(4.600 (.091 8/112
         14,5000  112
          21750   348
          21750   336
                  120
                  112
                    8
```

Continued

Examples

Case IV Lawful Money.

If 24 oxen cost £246,16s. 6d how much must be paid for one.

24)246,16,6 (10, 5, 8¼ and far.
24
6
20
24)136 (5
120
136
120
16
12
24)198 (8
192
6
4
24)24 (1
24

Case V. To divide by fractional parts.

What is the value of ¾ of an house which is worth $3000.

3600
3 num.
den. 4)9000
2250

Case VI. When the number of shares are unequal.

1st Divide $379,50 cts. among A. B. and C. in such a manner that B. may have twice as much as A. and C. thrice as much as A.

simple short 7)379,50
5-9,35 5/7 A's share
106,70 10/7 second more for
7 7
179,50 20/7 third more than 2nd
379,50 shares added

2nd Divide $1089,99 among 4 persons, and give the second three times as much as the first, the third four times as much as the second, and the fourth five times as much as the third.

76)108999 (1429 A's share
76
329
304
259
228
25
3
4299 B's share 3 times
4
17196 C's share 5 times
5
85980 D's share
25 remainder
108908 shares added

Case VII When the shares are not equal but increase by a certain ratio as 1 2 3 4 &c.

1st Divide $600 among 5 persons in such a manner that B. may have two more than A. and C. two more than B. &c.

$600 ÷ 5 =
116 A.
118 B.
120 C.
122 D.
124 E.
Proof 600

5)600
120
ratio 2 sub.
118
2
116 lst share.

120
ratio 2 add
122
2
124 great.

2nd Divide $640 among 7 persons in such a manner that the second shall have one more than the first the third one more than the second

7)64,000
91,42 6/7
ratio 1 sub.
90,42 6/7
1
89,42 6/7
1
88,42 6/7
ratio
91,42 6/7
1 ratio added
92,42 6/7
1
93,42 6/7
1
94,42 6/7

$640.00 ÷ 7 =
88,42 6/7 A. one remainder
89,42 6/7 B.
90,42 6/7 C.
91,42 6/7 D.
92,42 6/7 E.
93,42 6/7 F.
94,42 6/7 G.
64,000

3rd Divide $1600 among four persons in such a manner that the second may have one more than the first the third one more than the second.

40000
½ ratio! 50 +
40050
100 +
40150

4)160000
40000
50 -
40050
100 -
39950
100 -
39850

39850 A.
39950 B.
40000
40050 C.
40150 D.
1600,00

Average Judgment

Examples

1st

What is the value of a piece of land which is valued by A. at $10, by B. 11.50 by C. at 12, 90. by D. at 13,40 per acre.

A. 1 $10.00
B. 1 11,50
C. 1 12,30
D. 1 13,40
4 47,20

2nd

A. B. C. D. & E. were appointed appraisers of a certain estate. they appraised it as follows viz A. at $1,70. B. at 965.0 C. at 3,100. D. at 3500. C. at 1,400. E. at 3600. I demand the value of the estate.

1,70
965.0
3400
3500
1,00
3600

3rd 6)13326,000
3553,333

M. N. O. P. appraised the ship Lucy as follows. M. at $6700. A. at 9000. C. at 8750 and P. at 7880, what is the middle judgment

6700
9000
8750
7880
4)31330
7957.5

1st

Compound

A and B wishing to exchange horses and disagreeing as to the equivalents referred the matter to K. and L. by whos judgement they agreed to abide what were as follows K. said A should pay B $ & B said A pay $ 60 dollars But L. said B should pay A $ 5. What is the average judgment.

5
1
5
5715
91

2nd

C and D propose to swap watches agreed to referee to A. B and E. to say how they should exchange, A marked that C. should have $ B. said C. should have 5. C said C should have $. But D. said D should have 250 which receives the first and how much.

1.
5
2
11
3.50
4)1.50
187.5

Welches improved

Arithmetick

Single Rule of three Direct

Examples

1st
If ten sheep are worth $22,22 what are 19 of the kind worth.

10 : 22.22 : : 19
19
19998
2222
10)42218
42218
$ cts m.

The 1st same question by direct proportion. 10 : 222 : : 19
100
2222
19
19998
2222
10)42218
100)42218/10
42218/10

2nd
If 20 acres 1 rood 20 rods of land cost $189, 97 cts. 5 m. what will 97 acres of the same kind be worth.

120
40
60

160)16000 (975
480
1200
1120
80
80

20,975 : 189975 : : 97
97
1289625
540125
20975)668875 (999
61125
67497
61125
61125
61125

The same question by direct proportion

2nd
The same question by direct proportion

20,1,20   97
4   4
81   148
40   40
3260   5920

3260 : 189975000 : : 5920
5920
96175000000
1650975000
916885000
3260)108559000000 (333
978
1075
978
1079
978
101

3rd
If a 3 cwt. 3 qrs. of sugar is worth $261,25, I demand what must be given for 2 cwt. 1 qr. of the kind.

23.3
4
95
21
4
9

95 : 26125 : : 9
9
95)235125 (2475
190
451
380
712
665
475
475

Continued

Examples

4th

What will 4 hhd. of rum come to containing as follows the first 104 the second 96 3/4 the third 89 1/5 and the fourth 111 2/5 gallons if 6 1/2 gallons cost 6.89 cts.

104
96 3/4
89 1/5
111 3/5
399 1/5 399 1/5
4
1597
6 1/2 or 13/4
4
26

26 : 689 :: 1597
1597
4823
6201
3445
698
26)1100333(42326 5
104
60
52
83
78
53
52
130
130

5th

If 1000 feet of boards are worth $11,12, I demand the price of 17221 feet.

1000 : 11,12 :: 17221
17221
1112
2224
2224
7784
1112
1,000)19149752(
19149

6th

If 1/2 of 6 be three I demand the value of 1/4 of 20,

20 : 5 :: 3
3
2)15-00
7,5

7th

If 6 1/2 dozen pigeons are worth 65 cts I demand the price of 29 3/4 dozen.

6 1/2 or 13/4
4
26
29 3/4
4
119

26 : 65 :: 119
119
585
65
65
26)7735(297,5
52
253
234
195
181
130
130

8th

If 65 bushels and 1 peck of corn were spent in a family of 6 persons, I demand the quantity that would be sufficient to support a family of 22 persons the same time.

65,1
4
261

6 : 261 :: 22
22
522
522
6)5742
4)95700
23925

9th

How long will 94,261 lbs. of beef last an army of 600 men allowing them to draw 4 1/2 ounces each and that 3 times per day.

4 1/2
2
12
400
1800
3
8100

~~8100 : 1 :: 16~~
6

94261
16
205566
94261
8100 : 1 :: 548176
1
8100)548176(67 5476/8100
48600
62176
56700
5476

Continued

Examples

10th

How many times would a wheel that is 16 ft. 3 inches in circumference turn round in going round the world on the equator allowing a degree there to ~~turn~~ contain 69½ statute miles

16.3
12
195

69½
360
4140
207
1180
25020
8
200160
40
8006400
16½
48038400
40064
40032
528056000
12
15852672000

195)15852672000::1(81295743 15/195
1560
252
195
576
390
1867
1755
1122
975
1470
1365
1050
975
75

11th

How far are the inhabitants of the equator carried in a minute allowing the earth to make one revolution in 24 hours and allowing a degree to contain 69½ miles.

69½
360
4140
207
98
24
6
1440):25020::1(17,3
144
10620
10080
540
8
4320(3
4320

12th

A merchant failing in trade is owing $6420.20 his effects are worth $1142.75 what will a lose to whom he owed $960,73

642020
114275
642020):527745::96073
96073
1582225
2294215
1966467 66
2949705
642020)3114874535385(4904,5
2568080
5806645
5778180
2846535
2568080
2784555
2610100
174455

13th

A merchant failing is owing $7500, his effects amount $5640, what can he pay per cent.

7500:5640::100
100
7500)564000(75,2
525
390
375
150
150

14th

If the earth makes one revolution in one solar day, I demand the time that it is passing in one degree.

360:24::1
60
360)1440(4
144

Continued

Examples

15th

If the sun is 4 minutes in passing one degree I demand the difference of time of its coming to the meridian at two places which lie 20 degrees apart.

60 : 4 :: 20
20 hm
60) 80 (1, 20
60
20

16th

What is the insurance upon $9472 at 9½ per cent.

1 : 9½ :: 9472
9½
18416
1736
1) 12152

17th

If half an acre of land is worth $5920 I demand the price of 1½ acres

2 : 5920 :: 5
5
2) 29600
148

18th

I demand the value of $642 against an estate which can pay only 69 on the dollar.

1 : 642 :: 69
69
5778
3852
1) 44298

19th

There is a cistern having 4 cocks: the first empties it in 15 minutes, the second in 30 m the 3d in 45 m the 4th in 60 m in what time would it be emptied if they were all running together.

As 15 : 1 :: 120 : 8 ms
30 : 1 :: 120 : 4
45 : 1 :: 120 : 2⅔
60 : 1 :: 120

16⅔ 120
3 3
50 : 360 :: 1
1
50) 360 (7
350
10
60
50) 600
12'

20

If £21,12s be paid for building 6 rods of stone wall, how much must be paid for the building of 96 rods

60 : 2112 :: 96
20
432
96
2592
3888
60) 41472 (£34,11s
360
547
540
72
60
6|72|2|1
|60|10|5

21st

What must be given for 19½ yards of broadcloth if 9 yards of the like kind cost £17.11s 6d.

17, 11, 6
20
391
12
788
391
4698

9 : 4698 :: 19½
19½
42282
4698
2349
9) 91611
12) 90597
20) 2544, 9
127, 4, 9

Continued

22nd.

My horse and saddle are worth $40 but the horse is worth four times as much as the saddle; what is the value of each.

$$\begin{array}{r|l} 4 & 40 \\ \hline 5 & 160 \\ & 32 \end{array} \qquad \begin{array}{r|l} 4 & 40 \\ \hline 5 & 40 \\ & 8 \end{array}$$

23rd.

B. and C. depart for the same place and travel the same road; but B. goes 8 days before C at the rate of 30 miles per day; C follows at the rate of 40 miles per day in what time and distance will he overtake B.

$$\begin{array}{r|l} 40 & 30 \\ \hline 10 & 8 \\ & 6 \\ \hline 10 & 240 \\ & 24 \end{array} :: 30 : 40 :: \begin{array}{l} 30 \\ 8 \\ \hline 40 \\ \hline 1920 \\ 960 \end{array}$$

24th.

If in 4 months I spend 3 months gain how must one I lay up at the years end if I gain $150 every 6 months.

$$\begin{array}{r|l} 6 & 150 \\ \hline 6 & 450 \\ & 75 \end{array} : 9$$

25th.

Bought 126 gallons of rum for 110 dollars how much water must be added to reduce the first cost to 75 cents per gallon.

$$7 : 1 :: 110$$

$$\begin{array}{r|l} 75 & 110 \\ & 75 \\ \hline & 350 \\ & 300 \\ \hline & 500 \\ & 450 \\ \hline & 50 \\ 5 & 75 \\ & 15 \end{array} \qquad \begin{array}{l} 146 \\ 126 \\ \hline 20\frac{2}{3} \\ \\ \\ \\ \\ 10 \\ 3 \end{array}$$

26th.

If 60 gallons of water in one hour fall into a cistern containing 900 gallons and by a pipe in the cistern 35 gallons run out in 40 minutes in what time will it be filled

$$40 : 35 :: 60 \qquad \begin{array}{l} 60 \\ 52\frac{1}{2} \\ \hline 1\frac{1}{2} \\ 2 \end{array}$$

$$\begin{array}{r|l} 35 & 60 \\ & 35 \\ \hline & 300 \\ & 150 \\ \hline 40 & 2100 \\ & 52\frac{1}{2} \end{array} \qquad 15 : 1 :: 900$$

$$15 : 2 :: 900$$

$$\begin{array}{r|l} 15 & 1800 \\ & 60 \\ & 60 \end{array} \quad 40.$$

Method of making Taxes

1st

Required the rateable estate of A.B. who has

3 polls	at $1.10	=	$3.30
4 oxen 5 years old	" .30	=	1.20
2 do. 4 years old	" .20	=	.40
6 cows 3 years old	" .15	=	.90
8 cattle 2 years old	" .08	=	.64
7 do 2 years old	" .05	=	.40

1,10 / 3 / 3,30

1, 3,30 / 1,20

30 / 4 / ,40

4 / ,90

2, 7,20 / ,64

20 / 2 / ,40

3 40 / 6,84

15

6

4, 9 0

08

8

5, 64

05

8

4, 40

1st To find what 1 dollar pays

Suppose the estates named in the preceding inventory are liable to pay $181.30 for the building of a school house; each mans tax is required in proportion to his rateable estate.

1813 : 181,30 :: 1

1813 / 1813 0 / 10

1813

00

2nd To find what 1 cent pays

1813 : 181,30 :: 01

01

1813 / 1813 0 / 10

1813

0

To make the tax by the help of the tables.

1st Required A.B.s tax his rateable estate being $6.84.

6,00 / 80 / 04

10 / 10 / 10

6000 / 800 / 40

800

40

6840

Required C.D.s tax his rateable estate being 2,49.

$3,00 cents rateable estate pay 30,00

,40 " " " pay 4,00

,09 " " " pay ,90

A B	$6 8,40
C D	2,49,00
C F	4,16
E H	2,85 0
I J	11,00

J C.

Inman Preston

1st

If 8 men can build a tower in 12 days I demand how long it will take them if 4 more were added to their number.

8 : 12 :: 12
4
8
12)96(8

2nd

There is a piece of land 16.5 rods long. I demand the width to make an acre allowing 20 links to a rod.

16.5 : 160 :: 20
20 20
3300 (3200 (3696
297
290
198
290
198
92

3rd

A ship at sea is provided with bread and water sufficient to supply 20 men 9 months, 30 days to a month but finding a week in which were 7 men and 3 boys to whom they were willing to commmunicate relief I demand the time they all can draw their allowance allowing 2 boys equal to a man.

20
9
14
242

242 : 9 :: 20
2 2
484 40 40
3600 (3240
243
17
9
510
442
40

4th

There is a piece of land 10 rods 10 links in length I demand the length to make an acre.

10.10
20
160 : 160 :: 20
20
40) 3200 (80
21
110
105
50
42
180
60
120
160
2

5th

How much ice 5 rods wide will make an acre. 160 : 1 :: 5
1
5)160(32

6th

How much carpeting that is 1.5 yards wide will cover a floor that is 7.5 yards long and 5 yards wide

5 : 7.5 :: 1.5
5
15)37.5(2.5
30
7.5
7.5

7th

If 40 men can perform a piece of work in 20 days how many men can accomplish another piece of work five times as large in a fifth part of the time

4 : 40 :: 20
20
4)800(200 : 5
1
1)1000

8th

Continued

If in 12 months $100 principal gain $5 interest what principal will gain the same interest in 5 months. 12:100::5

12
5)1200
240

How much in length that is 9 inches wide will make a square foot.

3:144::1
1
3)144
12)48
4

Double Rule of Three

1st

If 200 dollars in 12 months will gain 12 dollars I demand how many 50 dollars will gain in six months

200:12::12
50: 6::

300
12
3600

200
12
2400)3600(150
2400
1200
1200
00

2nd

If 4 men spend 60 dollars going 300 miles I demand what is sufficient for the expense of 20 men and one boy 700 miles allowing the boy one half a mans expenses.

4:300::60
20½:700::

60
42000
20½

840000
21000
1200)861,0000(717,50
84
21
12
90
84
60
60
0

3rd

If 9 men can build 360 rods of wall in 24 days I demand how many rods 7 men would build in 27 days.

9:24::360
7:27::945
24
3780
1890
22680
9

360
27
2520
720
9720)68040(7
68040
0

4th

If 9 men in 24 days can build 360 rods of wall I demand the number of men necessary to build 945 rods in 27 days.

9:24::360
945
24
3780
1890
22680
9

360
27
2520
720
9720)68040(7
68040
0

Continued

5th

If 50 men can build a bridge in 144 days I demand the number of men necessary to build a like bridge in 120 days.

144 : 50 :: 120
50
120) 7200 / 60

6th

A man lent a friend 600 dollars for 6 months for which he received 9 dollars interest, I demand the sum which will gain the same interest in 2 months.

600 : 6 :: 9
2 :: 9
600
5400
6
18) 32400 (1800
18
144
144 00

7th

A received of B. 9 dollars for the loan of 600 dollars 6 months; now B wishes to hire of A 1800 dollars untill the loan should amount to the same sum; how long may he keep it.

600 : 6 :: 9
1800 : :: 9
600
5400
6
1800
9
16200) 32400 (2
324
0

8th

If 6 men build a wall 20 feet long 6 feet high and 4 feet wide in 16 days in what time will 24 men build one 200 feet long 8 feet high and 6 feet thick.

6 : 16 :: 480
9600
16
57600
9600
153600
6
1152) 921600 (800
9216
00

20 200 480
6 8 24
120 1600 1920
4 6 960
480 9600 11520

If the freight of 12 cwt. 2 qrs. 6 lb. 275 miles cost $27.78 how far may 60 cwt 3 qrs be shipped for $34.78.

12, 2, 6 60, 3
4 4
50 243
28 28
406 1944
100 486
1406 6804

1406 : 275 :: 2778
6804 : :: 3478
2778
54432
47628
47628
13608
18901512) 287987 00
275
17 3990
16 3946
46956
6456450
1406
38798 700
25825 800
6456450
18901512) 9077 68700 (480
75606048
15171 6390
15121 2096
5049030

If 20 dogs for 30 groats go 40 weeks to grass, How many hounds for 6 crowns can winter in that place.

20 : 40 :: 10
12 300
40
12000
20
12
10
120
120) 240000 (2000
2000

half a crown 2 shill

Continued

Case IX

To reduce the fractions of a higher to the fraction of a lower denomination retaining the same value.

1st

Reduce $\frac{3}{1000}$ of a dollar to the fraction of a mill.

3
10
30
10
300
10
3000
10000

2nd

Reduce $\frac{9}{1460}$ of a year fraction of a day.

365
9
1195
1460

Case X

To express the value of a fraction in the several denominations of the integer.

1st

What is the value of $\frac{9}{10}$ of a dollar. 1 doll. = 100 × 9 = 900 ÷ 10 = 90 cts.

100
9
10)900
90

2nd

What is the value of $\frac{7}{8}$ of an cwt. avoirdupois.

4
16
24
4
64
16
384
64
1024
28
8192
2048
28672
4
6)114688
4)19114.4
28)4778.2
16)170.18
10.10$\frac{4}{6}$

3rd

What is the value of $\frac{9}{16}$ of a cord of wood.

128
9
16)1152(36
108
72
72

What is the value of $\frac{9}{10}$ of a yard.

9
4
36
4
1,0)14.4
4)14
3.2$\frac{4}{10}$

Continued

Case XI

To reduce parts of an Integer which are expressed in several denominations to the fraction of a greater of the same kind.

1st

It is required to reduce 1 dime 6 cents and 9 mills to the fraction of an eagle.

1, 10, 10, 10, 100, 10, 1000, 10, 10000

1,6,9; 10, 16, 10, 169, 10000 ans.

2nd

Reduce 2 rods 12 feet to the fraction of a mile and to its lowest terms.

2,12 16½ 1/8 40 5280 45/5280 (117 ... 15/45 (3 45 ... 15)45 (9 ... 45/5280 (35

Reduce 10 feet 100 inches to the fraction of a cord wood measure.

10.100 1728 ... 1728 16 10368 1728 27648 8 221184

Addition of Vulgar Fractions

Case I

To add fractions having common denominators.

1st

Add $\frac{9}{15}, \frac{10}{15}, \frac{6}{15}, \frac{5}{15}, \frac{11}{15}, \frac{12}{15}, \frac{14}{15}$ together.

9, 10, 6, 5, 11, 12, 14 — 15)67(4 7/15; 60; 7

Case II

To add fractions having different denominators.

1st

Add $\frac{1}{2}, \frac{3}{5}, \frac{4}{6}, \frac{6}{8}, \frac{8}{10}, \frac{10}{12}, \frac{12}{14}$ together.

5) 2. 5. 6. 8. 10. 12. 14
6) 2. 1. 6. 8. 2. 12. 14
2) 2. 1. 1. 8. 2. 2. 14
1. 1. 1. 4. 1. 1. 7

7 × 28 × 5 = 140 × 6 = 840

2)840 = 420; 5)840 = 168 × 3 = 504; 6)840 = 140 × 4 = 560; 8)840 = 105 × 6 = 630; 10)840 = 84 × 8 = 672; 12)840 = 70 × 10 = 700; 14)840 = 60 × 12 = 720

420
504
560
630
672
700
720
4206
840

Continued

Case III.

To subtract fractions having different denominators. 1 ex.

What is the difference between $\frac{19}{20}$ and $\frac{22}{45}$.

5 | 20, 45
4, 9
4
9 5

9 | 11 5 0 | 45 | 18 0
18 | 4
19 | 90
171 | 88
180

What is the difference between $\frac{11}{15}$ and $\frac{9}{10}$.

5 | 15, 10
3, 2
2
6
5

15 | 30 | 15 | 30
9 | 2
11 | 7
22 | 22

Case IV.

To distinguish the largest of any two fractions.

What is the greatest fraction $\frac{9}{10}$ or $\frac{11}{12}$.

2 | 10, 12
5, 6
5
10

10 | 60 | 12 | 60
6 | 5
9 | 11
54 60 | 55 60

Which is the greatest fraction $\frac{22}{35}$ or $\frac{2}{7}$ and by how much.

7 | 35, 7
5, 1
7

35 | 7 | 5 | 1 | 35
2 | 2 | 7
2 35 | 1 35 | 1 35 or $\frac{1}{5}$

Case V

To subtract a mixed number from a mixed number when the fraction which is to be subtracted is greater than the one which it is to be taken from. 1 ex.

It is required to take $8\frac{12}{19}$ from $12\frac{9}{16}$.

9 | 19, 6
19, 2
2
38
3

19 | 11 4 | 6 | 114
6 | 14
12 | 3
7 9 | 5 | 114
114 | 72 subtracted from
2 2 | 7 added.
1 + 8 = 9 | 69
3 | 3 114

2nd

It is required $9\frac{16}{18}$ from $10\frac{1}{2}$.

2 | 18, 2
9, 1
2

18 | 2 | 18
16 | 1
16 | 9 18.
18 | 10
16 | 16
2 | 0
9
3rd 11 18

It is required to take $1\frac{2}{3}$ from $10\frac{9}{10}$.

2 | 10, 10
6, 5
5
30
9

10 | 60 | 10 | 60
6 | 5
5 | 9
95 | 18
60 | 60

60
95
95 | 10
18 | 2 13
49 | 8 11
60

Continued

Case VI

To subtract when the fractions are of different denominations; such as parts of unit, &c. &c.

It is required to take $\frac{3}{10}$ of a cwt. from $\frac{4}{5}$ of a ton

15. 0. 0. 0. 0
0. 3. 16. 12. 12 $\frac{4}{5}$
14. 0. 11. 3. 9 $\frac{2}{10}$

Required to take $\frac{1}{8}$ of a cwt from $12\frac{1}{4}$ cwt.

Multiplication of Vulgar fractions.

1st Case I

It is required to multiply $\frac{2}{5}$ by $\frac{2}{10}$ of $\frac{4}{5}$.

It is required to multiply $\frac{2}{3}$ of $\frac{3}{4}$ by $\frac{6}{7}$ of $\frac{5}{6}$.

It is required to multiply $\frac{12}{15}$ by $\frac{10}{12}$.

It is required to multiply $\frac{1}{2}$ by $\frac{2}{5}$.

Division of Vulgar Fractions.

It is required to divide $\frac{1}{2}$ by $\frac{1}{8}$.

It is required to divide $\frac{7}{10}$ by $\frac{1}{7}$.

It is required to divide 10 by $\frac{2}{3}$ of $\frac{5}{7}$.

It is required to divide $10\frac{1}{7}$ by $7\frac{2}{7}$.

Fractions

Miscellaneous Questions in Vulgar

1st

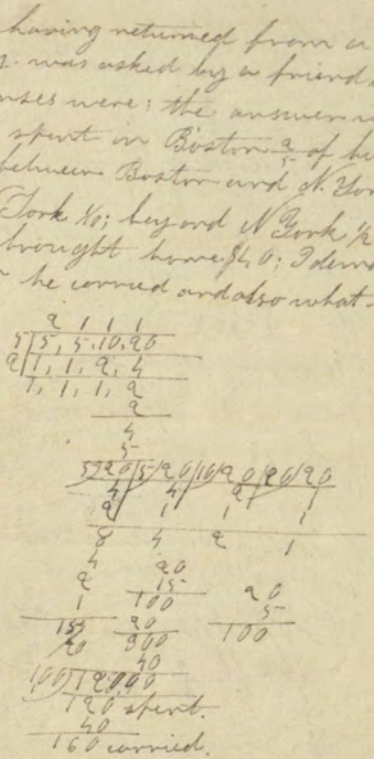
A school master being asked one day how many scholars he had, made answer that one fifth of them sat on one seat, one tenth on another, two fifths on another, two tenths on another. I demand the number his school consisted of.

$\frac{1}{5} + \frac{1}{10} + \frac{2}{5} + \frac{2}{10} = \frac{9}{10}$ $10 - 9 = 1 = \frac{1}{10}$ = of $\frac{2}{10}$ of $\frac{1}{5}$ =

$\frac{5}{10}$ $5 \times 4 + 6 = 60$ Ans.

Continued

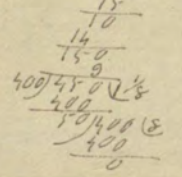
A man having returned from a journey was asked by a friend what his expenses were; the answer was that he spent in Boston $\frac{2}{5}$ of his money; between Boston and N York $\frac{1}{3}$; in N York $\frac{1}{10}$; beyond N York $\frac{1}{20}$ and he brought home £40; I demand the sum he carried and also what he spent.



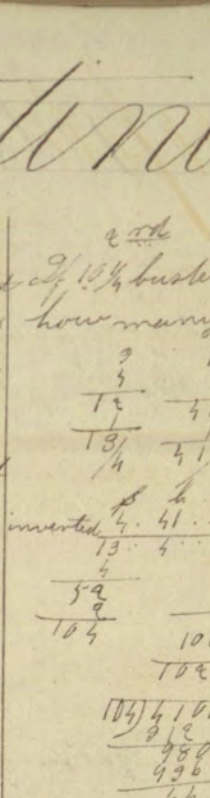
Rule of Three in Vulgar Fractions

If $\frac{3}{4}$ bushels of corn cost $\frac{75}{100}$ of a dollar what will $\frac{2}{4}$ of a bushel come to.

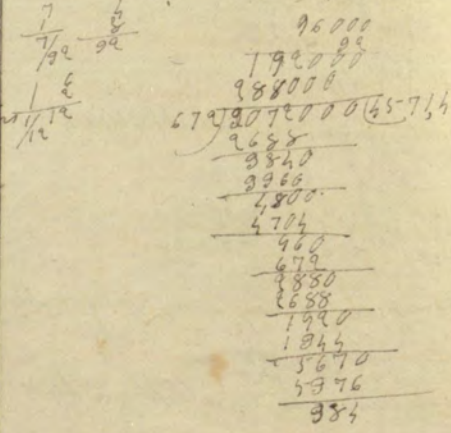
$$\frac{2 : 75 : 3}{1 : 100 : 4}$$



If 16¾ bushels potatoes cost $9¾ how many may be had for $1.50



If ¼ of ⅞ of a ship is worth ⅝ of 16000 dollars how much is ½ of ¼ of her worth



Simple Interest

1st Case I

What is the interest of $22.16 cents for one year at 6 per cent per annum.

```
  22,16
     06
 1,3296
 1,3296
```

2nd

What is the interest of 22,314 cts. for 5 years at 6 per cent.

```
  22,14
     06
 13,9884
       5
 66,9420
```

3rd

What is the interest of 123 dolls. 10 cts 1 m. for 7 years at 9 per cent.

```
  123,01
     .09
 1107909
       7
 7755363
```

1st Case II

When the amount is required.

What will $10.15 cts amount to in 12 years at 6 per cent per annum.

```
  10.15
     06
   6090
     12
  73080 interest.
  10,15 principal added.
 174580
```

2nd

What is the amount of 1.12 cts. for 2 years at 12 per cent per annum.

```
  1,12
    12
  1344
    12
 16128
  1,12
 2,7828
```

3rd

What is the amount of 242,17 cts. for 3 years at 9 per cent per annum.

```
  242,17
     .09
  217953
       3
  653859
  242,17
  307,5559
```

Case III

When there are years, months, and days in the time.

1st

What is the interest of $2.2 cents for 2 years. 6 mo. 10 days at 6 per cent.

```
 30/10,000
 12/ 6,333
     2,527
       628
      5054
      5054
     15162
   1571794
        06
   9430764
```

```
      6,22
 *1     06
  2)3732
         2
     7464.2 years inte.
 *1  1866.6 months inte.
     0109
     ,9439
```

The same question will check.

2nd

What is the interest of $10.10 cts. for 10 years 11 months at 9 per cent.

```
 12/11,000
    10,916
     1,010
    109160
    109160
  11025160
  99,22644
```

```
       10,10
          09
 6 mo = ½ yr. 2)9090  1 years interest
                 10
         9,0900. 10 years interest
 3 mo. = ¼ of 6 mo) 0,4545. 6 months interest
         0,2272.9  "      "
         0,1515.2  "      "
        $9,9232
```

Continued

Case VII

When the rate is any other than 6 per cent.

Find the interest a 6 per cent by case 5 or 6 and for the per cent above or below add or subtract.

1st

What is the interest of $34.24 for 10 months and 12 days at 7 per cent.

6/12
2
5/10
85

3424
5 2
6848
17120
6)1780,48 interest at 6 per cent.
29674 " " 1 per cent.
2,077,22 interest a 7 per cent.

2nd

What is the interest of $13.41 for 3 months and 16 days at 8 per cent

Ans. $0.31,4

2,1,16
90
6)106
4,1, or 8 of 6

13,41
17
9387
1341
447
447
3)23697
7899
315,88

3rd

What is the interest of 4,9,25 for 3 years and 3 months at 8 per cent

3, 3
12
7)39
19,1,3
6)33
5,5

44925
195
224625
44925
4425
24,62
3)1962897
481418
1444,255

4th

What is the amount of $5,98 for two years and 8 months at 3 per cent

Ans $6,45,8

5,98
16
3588
598
2)9568
4784
598 prin. added
6,45,84

5th

A note on interest for $45,45 was dated April 26, 1832: what was the amount May 28, 1833 at 4 per cent per annum

1833,5,28
1832,4,26
1,1,2

4545
65 1/3
22525
27270
1515
3)296940
9898
2
19796
4545 prin. added
4,4,296

6th

What is the interest of $19 for 22 months at 12 per cent per annum.

19
11
19
19
209
209
2,18

Case VII

An easy method of casting interest for any number of days allowing 360 days a year

1st

What is the interest of $72 for 90 at 6 per cent

6)360
6,0)6480
108 Ans. or 1,08

72
90

2nd

What is the interest of $1000 for 60 days at 6 per cent

6)360
6,0)60000
1000

1000
60

3rd

What is the interest of $555.50 for 60 days at 5 per cent

5)360
72)333000(46,25 or 46 1/4 cts
288
450
432
180
144
360
360

5550
60

Divide 360 by the rate per cent for a divisor. Multiply the principal by the given number of days for a dividend.

Continued

Case IX

To compute interest due on notes bonds &c. when partial payment is made.

1st Suppose A should have a bond against B. for $1166,66 cents and 6 mills dated May 1, 1796 upon which the following payments are made, viz.

	doll. M.	m.	days
December 25, 1796	166,666	7	24
July 10, 1797	16,666	6	15
September 1, 1798	50.000	13	21
June 14, 1799	333333	9	13
April 15, 1800	620,000	10	1

What will be due upon it Aug. 2nd 1801 - 15. 18 Ans. 287.76.

1796,5,1 / 1796,12,25 / 7,24
1797,7,10 / 1796,12,25 / 6,15
1798,9,1 / 1797,7,10 / 13,21

1799,6,14 / 1798,9,1 / 9,13
1800,4,15 / 1799,6,14 / 10,1
1801,8,9 / 1800,4,15 / 15,18

1166,666
99
1049999 4
3499998
4549997 4
66666
1116799 4 exps

prin 1166 666
prin 121,167
1045,499
32½
2090998
3136497
592749
3397871 7 int.
1161 6 int.
4991 2 int.
15490 6 int.

prin 1045499
68½
8363992
6272994
522749
71,616,681 int.
prin 1045,499
47½
7318493
4181996
174249
4931 2,702 int.

16,666
50000
333333 payments
399999
154906
245093 exps.

prin 1045,499
245093 exps.
prin 800406
1 50½
40020300
133401
int. 40153,701 sub from
620000
579847 prin
800406
220559 prin
78
1764472
1543913
int. 17203 542
220559
$ 237762 Ans

2nd Supposing a note of $867,33 dated Jan. 1794 upon which the following payments should be made, viz.

April 16, 1797 — $136,44 cts
April 16, 1799 — ..219 5
Jan. 1, 1800 — 518,68

What would be due July 11, 1801. ans 215,109

86733
31,6 2/3
520398
86733
260199
28911
28911
274659 1
86733
114988
45543
686,549
42½
1373086
2746172
343271
29178.077
686,549
715,721
518,68
197,041
91 ⅙
197041
1773378
65680
65680
18069181
197041
215109.

Continued

3rd

A note for $850 dated May 1, 1825 at 6 per cent has the following endorsements:—

June 1, 1826 — $150
Sept. 5, 1826 — 12
Jan. 1, 1827 — 215
July 16, 1827 — 10
Nov. 1, 1827 — 125
May 1, 1828 — 350

What remains due Sept. 1, 1828.

$850
6½
5100
425
$55.25
850.00
905.25
150.00
755.25 1st prin.
17⅓
5286.75
755.25
25.241
13091.66
75525 2d prin.
17⅓
528675
75525
25.241
25.241
$1334.407
13,091. Paid 215
12
227
26.495
755.25
781.685
227.000
$554.685 3d prin.
32½
1109.370
16640.55
277342
Int. 18027.262
$554.685 3d prin.
17½
388.2795
5546.85
277.352
$9706.987
18027.
27.734
$554.685
$447.519

Ans 113.055
y. m. da.
1. 1. 0
0. 9. 14
0. 9. 16
0. 6. 15
0. 3. 15
0. 6. 0
0. 4. 0

447.419 5th prin.
12
$1342.257
447.519
$460.841
50.000
110.841
2
221.682
110.841
$113.057

598 prin. added
6,155.84