

## WelTec/Whitireia Mathematics Series

### Division

Division is used in all trade jobs. For example, an electrician needs to know the numbers of rolls of cable to order for a job. A builder needs to know how many lengths of timber needed to complete a wall's construction.

Division is where you find how many times one number is in another number. It is a short method of subtraction. Dividing 30 by 6 is a way of finding the number of times 6 is contained in 30. The following subtractions show  $30 \div 6$ .

$$30 - 6 = 24$$

$$24 - 6 = 18$$

$$18 - 6 = 12$$

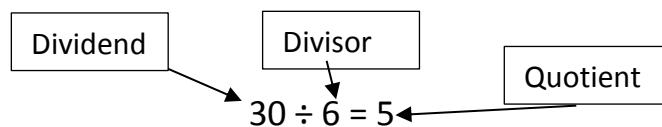
$$12 - 6 = 6$$

$$6 - 6 = 0$$

Six is subtracted 5 times from 24. So, there are 5 sixes contained in 30.

$$30 \div 6 = 5$$

Division is the opposite of multiplication. In division, the number to be divided is called the **dividend**. The number you are dividing by is called the **divisor**. The answer in a division is called the **quotient**.



The division  $30 \div 6$  can in fractional form as  $\frac{30}{6}$ , or using the long division symbol  $6 \overline{)30}$ .

## Method for Dividing Whole Numbers

### Example 1

Divide 4505 by 6. That is work out  $4505 \div 6$ , or  $6 \overline{)4505}$ .

### Solution

Write the problem as a long division calculation.

$$6 \overline{)4505}$$

You cannot divide 6 into 4, which is the number of thousands.

So, you will have to divide 6 into 45, which is the number of hundreds.

$$\begin{array}{r} 750 \\ 6 \overline{)4505} \end{array}$$

Write the answer 7, above the 5 in the 4505.

Multiply  $7 \times 6$ . This is 42. Subtract 42 hundreds from 45 hundreds.

$$\begin{array}{r} 750 \\ 6 \overline{)4505} \\ \underline{42} \\ 3 \end{array}$$

Write the three remainder in the hundreds column and bring down the 0 from the tens column.

$$\begin{array}{r} 750 \\ 6 \overline{)4505} \\ \underline{42} \\ 30 \end{array}$$

Divide 30 tens by 6. Write the 5 in the answer above the tens space.

$$\begin{array}{r} 750 \\ 6 \overline{)4505} \\ \underline{42} \\ 30 \\ \underline{30} \\ 5 \end{array}$$

Subtract 30 tens from 30 tens. This leaves 0. Bring down the 5, from the dividend, in the units column.

Divide 5 by 6. Since 6 is not contained in 5, write 0 in the answer above the units place.

$$\begin{array}{r} 750 \\ 6 \overline{)4505} \\ \underline{42} \phantom{0} \\ 30 \phantom{0} \\ \underline{30} \phantom{0} \\ 5 \phantom{0} \\ \underline{0} \\ 5 \end{array}$$

Subtract 0 from the 5. The remainder is 5.

The answer is 750 remainder 5, or 750 r 5.

### Question 1

Work out the following divisions.

a)  $3 \overline{)261}$

b)  $9 \overline{)408}$

c)  $8 \overline{)20376}$

d)  $7 \overline{)479997}$

e)  $9 \overline{)53043}$

f)  $9 \overline{)405}$

g)  $4 \overline{)26356}$

h)  $2 \overline{)3811}$

i)  $8 \overline{)98951}$

j)  $9 \overline{)1962}$

|   |   |   |   |
|---|---|---|---|
| $\begin{array}{r} 0 \\ 7 \\ \hline 07 \\ 49 \\ \hline 49 \\ 35 \\ \hline 39 \\ 56 \\ \hline 59 \\ 42 \\ \hline \end{array}$ | $\begin{array}{r} 0 \\ 56 \\ \hline 56 \\ 32 \\ \hline 37 \\ 40 \\ \hline 43 \\ 16 \\ \hline \end{array}$ | $\begin{array}{r} 0 \\ 48 \\ \hline 48 \\ 36 \\ \hline \end{array}$ | $\begin{array}{r} 0 \\ 21 \\ \hline 21 \\ 24 \\ \hline \end{array}$ |
| <p>d) <math>7 \overline{)479997}</math><br/>68571</p>   | <p>c) <math>8 \overline{)20376}</math><br/>2547</p>   | <p>b) <math>6 \overline{)408}</math><br/>68</p>                     | <p>a) <math>3 \overline{)261}</math><br/>87</p>                     |
| <p>Answers</p>  |   |   |   |

|   |   |   |   |
|---|---|---|---|
| $\begin{array}{r} 1 \\ \hline 10 \\ 11 \\ \hline 00 \\ 01 \\ \hline 18 \\ 18 \\ \hline 2 \\ \hline 2)3811 \\ \hline 1905 \end{array}$ | $\begin{array}{r} 0 \\ \hline 36 \\ 36 \\ \hline 32 \\ 35 \\ \hline 20 \\ 23 \\ \hline 24 \\ \hline 4)26356 \\ \hline 6589 \end{array}$ | $\begin{array}{r} 0 \\ \hline 45 \\ 45 \\ \hline 36 \\ \hline 9)405 \\ \hline 49 \end{array}$ | $\begin{array}{r} 6 \\ \hline 27 \\ 33 \\ \hline 81 \\ 84 \\ \hline 72 \\ 80 \\ \hline 45 \\ \hline 9)53043 \\ \hline 5893 \end{array}$ |
|   | h)  | g)  | f)  |
| <u>Answers</u>  |   |   |   |

|  |   |  |  |
|--|---|--|--|
| $\begin{array}{r} 7 \\ \hline 64 \\ 71 \\ \hline 48 \\ 55 \\ \hline 24 \\ 29 \\ \hline 16 \\ 18 \\ \hline 8 \\ \hline 8)98951 \\ \hline 12368 \end{array}$ | $\begin{array}{r} 0 \\ \hline 72 \\ 72 \\ \hline 9 \\ 16 \\ \hline 18 \\ \hline 9)1962 \\ \hline 218 \end{array}$ |  |  |
|  | i)  |  |  |
| <u>Answers</u>   |   |  |  |

## Trade Based Division Problems

### Question 1

A very small electromagnet is wound with 8 layers. The total number of turns for the magnet is 1896. What is the number of turns in each layer?

$$\begin{array}{r}
 0 \\
 \hline
 56 \\
 56 \\
 \hline
 24 \\
 29 \\
 \hline
 16 \\
 \hline
 8 \overline{)1896} \\
 \underline{237} \\
 \text{Answer}
 \end{array}$$

### Question 2

In estimating the time needed to complete a job, an electrical contractor determines that a total of 735 hours are needed. An electrician works 8 hours a day. How many days will she have to work to complete the job?

$$\begin{array}{r}
 7 \\
 \hline
 8 \\
 15 \\
 \hline
 72 \\
 \hline
 8 \overline{)735} \\
 \underline{91} \\
 \text{Answer}
 \end{array}$$

### Question 3

A 192 foot length of Romex cable needs to be stapled. The staples are evenly spaced with a staple at the beginning and another at the end of the cable. If 49 staples are used, how far apart should the staples be?

$$\begin{array}{r}
 0 \\
 \hline
 192 \\
 48 \overline{)192} \\
 \underline{4} \\
 \text{Answer} \\
 \text{Divide by 48,} \\
 \text{as there are} \\
 \text{48 spaces.}
 \end{array}$$

## Question 4

A certain wiring job requires 17,842 feet of Romex cable. Romex cable is packaged in 250 foot rolls. How many rolls should be ordered for this job?

$$\begin{array}{r}
 \text{Answer} \\
 71 \\
 \hline
 250 \overline{)17842} \\
 \underline{1750} \\
 342 \\
 \underline{250} \\
 92 \\
 \text{Therefore} \\
 \text{order 72 rolls}
 \end{array}$$

## Problems

The problems below are specific to the trades in the titles.

1. **Carpentry:** While working on a job a builder has to calculate how many rafters can be cut out of a piece of wood. How many rafters 32 inches long can be cut from a piece of wood 192 inches long?

$$\begin{array}{r}
 \text{Answer} \\
 6 \\
 \hline
 32 \overline{)192} \\
 \underline{192} \\
 0
 \end{array}$$

2. **Building Construction:** If subflooring is laid at the rate of 85 square feet per hour, how many hours will be needed to lay 1105 square feet.

$$\begin{array}{r}
 \text{Answer} \\
 13 \\
 \hline
 85 \overline{)1105} \\
 \underline{85} \\
 255 \\
 \underline{255} \\
 0
 \end{array}$$

3. **Manufacturing:** What is the average horsepower of six engines having the following HP ratings: 385, 426, 278, 434, 323, and 392? (Hint: To find the average, add the six numbers and divide by six).

$$\begin{array}{r}
 0 \\
 \hline
 18 \\
 18 \\
 \hline
 42 \\
 43 \\
 \hline
 18 \\
 6 \overline{)2238} \\
 \underline{373} \\
 385 + 426 + 278 + 434 + 323 + 392 = 2238
 \end{array}$$

Answer

4. **Plumbing:** Mr. Martinez, the owner of the Maya Restaurant, hired a plumber who worked for 18 hours installing some new equipment. The total bill for wages and supplies was \$859. If the cost of materials was \$175, calculate the plumber's hourly rate.

$$\begin{array}{r}
 0 \\
 \hline
 144 \\
 144 \\
 \hline
 54 \\
 18 \overline{)684} \\
 \underline{38} \\
 = \$684
 \end{array}$$

Answer

Cost of labour = \$859 - \$175 = \$684  
Cost per hour = \$38