

Ordering whole numbers



ascending



descending

7 0, 1 7 7

7, 1 7 0

7 0, 7 1 7

7 0, 1 7 7

7, 1 7 0

7 0, 7 1 7

1) Put all the numbers in a column, making sure the digits in each column are aligned.

2) Check whether you are putting the numbers in ascending or descending order

3) Compare the digits in each column, starting from the left. If two digits are the same, move along to the next column.

Ascending

7, 1 7 0

7 0, 1 7 7

7 0, 7 1 7

Read through each number to check the order.

Ordering decimal numbers



ascending



descending

1 . 2 3

0 . 1 2 3

2 1 . 3

1 . 2 3 3

0 1 . 2 3 0

0 0 . 1 2 3

2 1 . 3 0 0

0 1 . 2 3 3

1) Put all the numbers in a column, making sure the decimal points are aligned.

2) Check whether you are putting the numbers in ascending or descending order

3) Add in zeroes as placeholders

4) Compare the digits in each column, starting from the left. If two digits are the same, move along to the next column.

Ascending

0 . 1 2 3

1 . 2 3

1 . 2 3 3

2 1 . 3

Read through each number to check the order.

Read and write whole numbers

M	HTh	TTh	Th	H	T	O
Millions	Ten Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
8	2	1	7	5	4	3

						3
					4	0
				5	0	0
			7	0	0	0
		1	0	0	0	0
	2	0	0	0	0	0
8	0	0	0	0	0	0

Eight million, two hundred and seventeen thousand,
five hundred and forty-three.

Read and write decimal numbers

0	.	t	h	th
Ones		Tenths	Hundredths	Thousandths
3	.	4	7	6

3

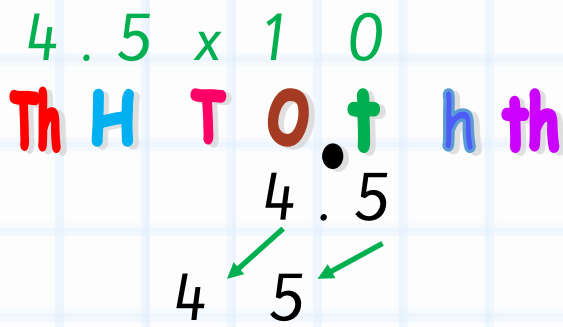
0 . 4

0 . 0 7

0 . 0 0 6

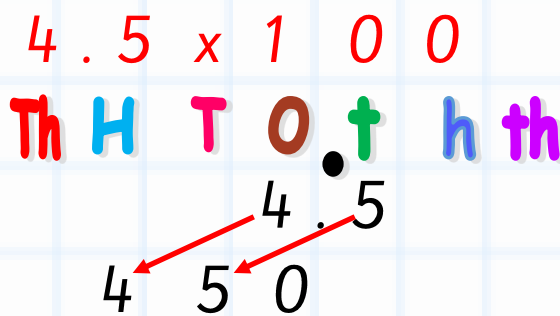
Three point four seven six

Multiply by 10, 100 and 1000



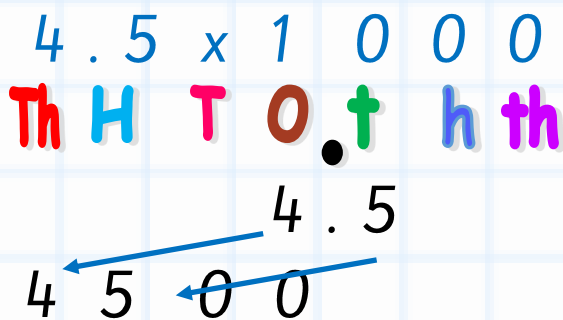
Makes the number 10 times bigger.

Move each digit one place to the left.



Makes the number 100 times bigger.

Move each digit two places to the left.

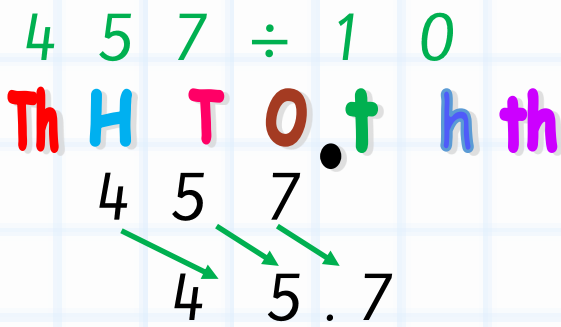


Makes the number 1000 times bigger.

Move each digit three places to the left.

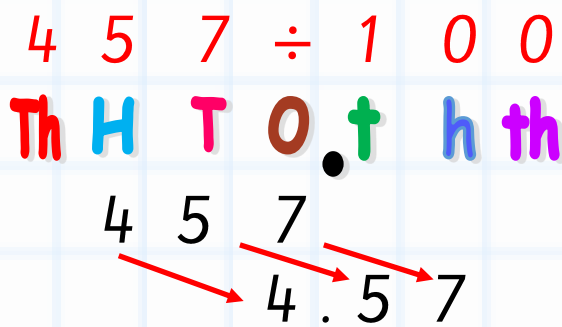
- 1) Lay out the number
- 2) Work out the number of places the digits need to move.
- 3) Move each digit, adding in zeroes as placeholders.

Divide by 10, 100 and 1000



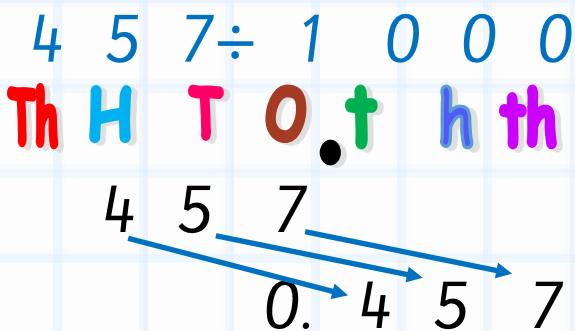
Makes the number 10 times smaller.

Move each digit one place to the right.



Makes the number 100 times smaller.

Move each digit two places to the right.



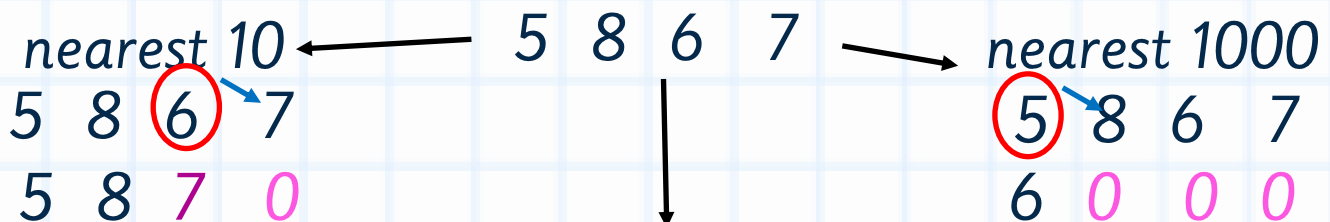
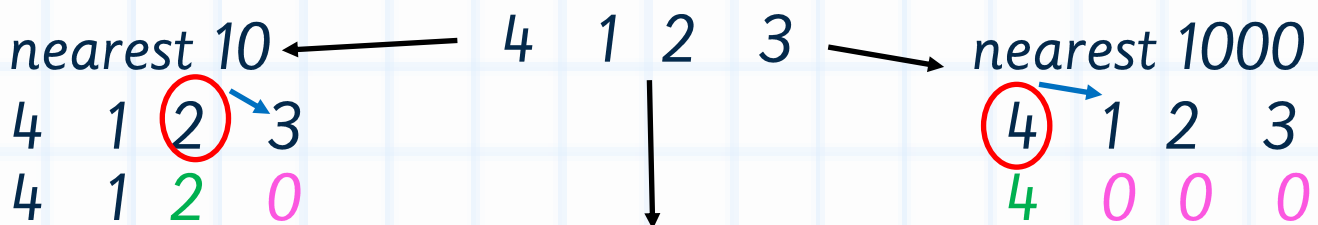
Makes the number 1000 times smaller.

Move each digit three places to the right.

- 1) Lay out the number
- 2) Work out the number of places the digits need to move.
- 3) Move each digit, adding in zeroes as placeholders.

Round whole numbers

- 1) Find your number and circle it
- 2) Look next door
- 3) Less than 4, just ignore
- 4) 5 or more, add one more to the circled number
- 5) Replace the rest with zeroes



Round decimal numbers

1) Find your number and circle it

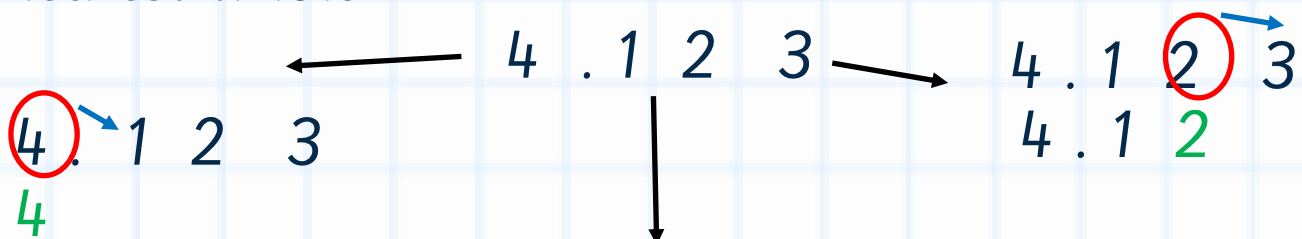
2) Look next door

3) Less than 4, just ignore

4) 5 or more, add one more to the circled number

nearest hundredth (2dp)

nearest whole

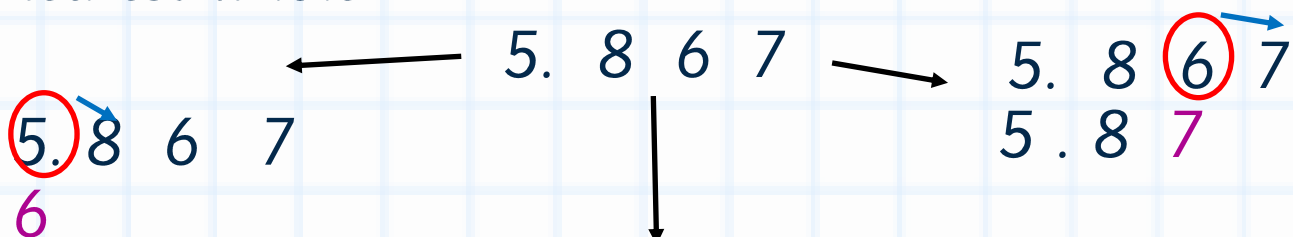


nearest tenth (1dp)



nearest hundredth (2dp)

nearest whole



nearest tenth (1dp)



Use column addition

$$32.7 + 4.37$$

$$\begin{array}{r} \text{T O t h} \\ 32.70 \\ + 04.37 \\ \hline \end{array}$$

1) Align digits and decimal points.

2) Add zeroes as placeholders if needed.

3) Starting from the right, add each column in turn. Carry digits to the next column if the total adds to more than 9.

$$\begin{array}{r} 32.70 \\ + 04.37 \\ \hline 7 \\ \hline \end{array}$$

$$\begin{array}{r} 32.70 \\ + 04.37 \\ \hline 07 \\ \hline \end{array}$$

1
Carry the 1 to the next column

$$\begin{array}{r} 32.70 \\ + 04.37 \\ \hline 7.07 \\ \hline \end{array}$$

1
Include the 1 in your next addition

$$\begin{array}{r} 32.70 \\ + 04.37 \\ \hline 37.07 \\ \hline \end{array}$$

Use column addition

$$34,453 + 4,527$$

TTH	TH,	H	T	O
3	4,	4	5	3
+				
		4,	5	2
			7	

1) Align digits in the correct place value columns.

3) Starting from the right, add each column in turn. Carry digits to the next column if the total adds to more than 9.

TTH	TH,	H	T	O
3	4,	4	5	3
+				
		4,	5	2
			7	

0

1
Carry the 1 to the next column

TTH	TH,	H	T	O
3	4,	4	5	3
+				
		4,	5	2
			7	

8 0

1
Include the 1 in your next addition

TTH	TH,	H	T	O
3	4,	4	5	3
+				
		4,	5	2
			7	

3 8 9 8 0

1

Use column subtraction

$$18.9 - 2.82$$

$$\begin{array}{r} 18.90 \\ + 02.82 \\ \hline \end{array}$$

1) Align digits and decimal points.

2) Add zeroes as placeholders if needed.

3) Starting from the right, subtract each column in turn. If the top digit is smaller than the bottom, borrow from the next column.

$$\begin{array}{r} 18.90 \\ - 02.82 \\ \hline \end{array}$$

Borrow from the tenths digit

$$\begin{array}{r} 18.90 \\ - 02.82 \\ \hline 08 \end{array}$$

$$\begin{array}{r} 18.90 \\ - 02.82 \\ \hline 6.08 \end{array}$$

$$\begin{array}{r} 18.80 \\ - 02.82 \\ \hline 16.08 \end{array}$$

Use column subtraction

$$34,653 - 4,527$$

TTH	TH	H	T	O
3	4	6	5	3
-				
	4	5	2	7

1) Align digits in the correct place value columns.

3) Starting from the right, subtract each column in turn.

			4	1
3	4	6	~~5~~	3
-				
		4	5	2
			7	
				6

3 subtract 7 would give us a negative number, so we regroup

Exchange one lot of 10, so we now have 13—7.

			4	1
3	4	6	~~5~~	3
-				
	4	5	2	7
3	0	1	2	6

Use short multiplication

$$8 \ 5 \ 3 \times 6$$

$$\begin{array}{r} \times \quad 8 \ 5 \ 3 \\ \quad \quad \quad 6 \\ \hline \quad \quad \quad 8 \\ \hline \quad \quad 1 \end{array}$$

1) Multiply the top ones digit by the multiplier. Carry the extra digit if needed.

$$\begin{array}{r} \times \quad 8 \ 5 \ 3 \\ \quad \quad \quad 6 \\ \hline \quad \quad 1 \ 8 \\ \hline \quad 3 \ 1 \end{array}$$

2) Multiply the top tens digit by the multiplier. Add any carried digits. Carry the extra digit if needed.

$$\begin{array}{r} \times \quad 8 \ 5 \ 3 \\ \quad \quad \quad 6 \\ \hline 5 \ 1 \ 1 \ 8 \\ \hline \quad 3 \ 1 \end{array}$$

3) Multiply the top hundreds digit by the multiplier. Add any carried digits.

$$8 \ 5 \ 3 \times 6 = 5 \ 1 \ 1 \ 8$$

Use long multiplication

$$32 \times 45$$

1) Multiply the top ones digit by the bottom ones.

$$\begin{array}{r} \times 32 \\ 45 \\ \hline \end{array}$$

$$2 \times 5 = 10$$

Carry the one.

2) Multiply the top tens digit by the bottom ones.

$$\begin{array}{r} \times 32 \\ 45 \\ \hline 160 \\ \hline \end{array}$$

3) Add a zero below the ones digits.

$$\begin{array}{r} \times 32 \\ 45 \\ \hline 160 \\ 0 \\ \hline \end{array}$$

This shows that you are multiplying by 40 rather than 4

4) Multiply the top ones digit by the bottom tens.

$$\begin{array}{r} \times 32 \\ 45 \\ \hline 160 \\ 80 \\ \hline \end{array}$$

$$4 \times 2 = 8$$

5) Multiply the top tens digit by the bottom tens.

$$\begin{array}{r} \times 32 \\ 45 \\ \hline 160 \\ 1280 \\ \hline \end{array}$$

$$4 \times 3 = 12$$

6) Add the two answers together.

$$\begin{array}{r} \times 32 \\ 45 \\ \hline 160 \\ 1280 \\ \hline 1440 \\ \hline \end{array}$$

Use short division with decimal remainders

$$24 \div 4 = 6$$

divisor

quotient

dividend

$$625 \div 4 =$$

$$\begin{array}{r} 156 \\ 4 \overline{) 625} \\ \underline{4} \\ 22 \\ \underline{20} \\ 25 \end{array}$$

1) Starting from the left, see how many times the divisor will go into each digit of the dividend

$$\begin{array}{r} 156. \\ 4 \overline{) 625.} \\ \underline{4} \\ 22 \\ \underline{20} \\ 25 \end{array}$$

2) When you reach the last digit, add a decimal point to the dividend and a decimal point to the quotient.

$$\begin{array}{r} 156.25 \\ 4 \overline{) 625.00} \\ \underline{4} \\ 22 \\ \underline{20} \\ 25 \\ \underline{20} \\ 50 \\ \underline{40} \\ 10 \end{array}$$

3) Continue the division, adding more zeroes to the dividend if needed.

You can check by doing short multiplication.

$$156.25 \times 4 = 625 \checkmark$$

Use long division

$$24 \div 4 = 6$$

divisor (points to 4)
quotient (points to 6)
dividend (points to 24)

$$1472 \div 23 =$$

1) Lay out the calculation

$$\begin{array}{r}
 23 \overline{) 1472} \\
 \underline{1150} \\
 0322 \\
 \underline{230} \\
 092 \\
 \underline{92} \\
 00
 \end{array}$$

x 50

2) Subtract a "chunk" (a multiple of the dividend)

$$23 \times 50 = 1150$$

x 10

3) Subtract a further "chunk"

$$23 \times 10 = 230$$

4) Subtract a further "chunk"

$$23 \times 4 = 92$$

5) Add up how many "chunks" you have subtracted. $50 + 10 + 4$

$$1472 \div 23 = 64$$

Finding multiples and common multiples

A multiple is a number which can be divided by another number without a remainder.

Multiples of 5 = 5, 10, 15, 20, 25, 30

Common multiples

- 1) Write out multiples of the first number.
- 2) Write out multiples of the next number.
- 3) Look for the numbers that appear in both. These will be the common multiples.

Multiples of 3: 3, 6, 9, 12, 18, 21, 24

Multiples of 4: 4, 8, 12, 16, 20, 24, 28, 32

12 and 24 appear in both sets so are common multiples of 3 and 4.

Finding factors and common factors

Factors are whole numbers that can multiply by other whole numbers to make the product.

$$\begin{array}{r} 3 \ 6 \\ 1 \times 3 \ 6 \\ 2 \times 1 \ 8 \\ 3 \times 1 \ 2 \\ 4 \times 9 \\ 6 \times 6 \end{array}$$

product

1) Starting with '1 x ____', find pairs of numbers which multiply to make the product.

2) List your factors in ascending order, ignoring any duplicates.

1, 2, 3, 5, 6, 9, 12, 18, 36

Common factors

1) Find the factor pairs of both numbers.

$\begin{array}{r} 4 \ 8 \\ (1) \times 4 \ 8 \\ (2) \times 2 \ 4 \\ (3) \times 1 \ 6 \\ (4) \times (1 \ 2) \\ (6) \times 8 \end{array}$	$\begin{array}{r} 3 \ 6 \\ (1) \times 3 \ 6 \\ (2) \times 1 \ 8 \\ (3) \times (1 \ 2) \\ (4) \times 9 \\ (6) \times 6 \end{array}$
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2) Circle the numbers that appear in both lists.

Common factors of 2 4 and 3 6

1, 2, 3, 4, 6, 12

Calculate percentages

Remember: 'per cent' means 'out of 100'

Easy ones to remember:

50% = divide by 2

25% = divide by 4

75% = divide by 4, then multiply by 3

10% = divide by 10

5% = divide by 10, then divide by 2

1% = divide by 100

For all other multiples of 10%, divide by 10 to find 10%, then multiply by the first digit.

30% = divide by 10, then multiply by 3

40% = divide by 10, then multiply by 4

70% = divide by 10, then multiply by 7

For all other percentages, divide by 100 to find 1%, then multiply by the percentage.

35% = divide by 100, then multiply by 35

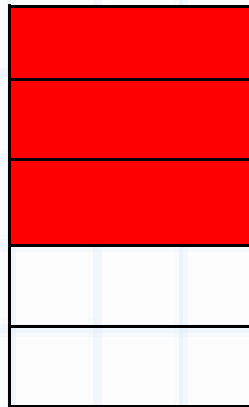
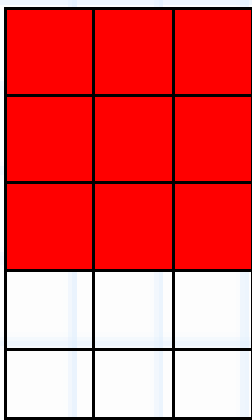
48% = divide by 100, then multiply by 48

79% = divide by 100, then multiply by 79

Simplifying fractions

1) Find a number that both the numerator and the denominator can be divided by.

2) Divide both the numerator and denominator by that number.



$$\frac{9}{15}$$

$$\div 3$$

$$\div 3$$

$$\frac{3}{5}$$

Use multiples to express fractions in the same denominator

$$\frac{2}{3}$$

$$\frac{3}{4}$$

1) Find a number that is a common multiple of both denominators.

$$\frac{1}{2}$$

$$\frac{1}{2}$$

2) Multiply both fractions by the relevant multiple to reach the new denominator

$$\frac{2}{3} \quad \begin{array}{l} \times 4 \\ \times 4 \end{array}$$

$$\frac{3}{4} \quad \begin{array}{l} \times 3 \\ \times 3 \end{array}$$

$$\frac{8}{1 \ 2}$$

$$\frac{9}{1 \ 2}$$

Convert mixed numbers to improper fractions

add

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

multiply

1) Multiply the denominator by the whole number. ($4 \times 1 = 4$)

2) Add the numerator ($4 + 3 = 7$)

3) Write the answer as a numerator over the existing denominator (4)

$$1\frac{3}{4} = \frac{7}{4}$$

$\frac{4}{4}$ (one whole)

$\frac{3}{4}$

Convert improper fractions to mixed numbers

$$\frac{7}{4}$$

1) See how many times the denominator will go into the numerator (once, with a remainder of 3)

2) Write the answer (1) as the whole

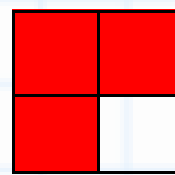
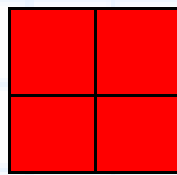
3) Write the remainder (3) as the numerator over the existing denominator.

$$\frac{7}{4}$$

=

1

$$\frac{3}{4}$$



$$\frac{4}{4}$$

(one whole)

$$\frac{3}{4}$$

Compare fractions

$>$
more than

$$\frac{2}{3}$$

$<$
less than

$$\frac{3}{4}$$

$=$
equal to

1) Decide on a common multiple of the two denominators to become the new denominator.

2) Convert both fractions to have the same denominator.

$$\begin{array}{rcl} \frac{2}{3} & \begin{array}{l} \times 4 \\ \times 4 \end{array} & \frac{3}{4} \begin{array}{l} \times 3 \\ \times 3 \end{array} \\ \hline \frac{8}{12} & < & \frac{9}{12} \end{array}$$

3) Decide which symbol to use— which fraction is larger?

Order fractions



ascending



descending

Put these fractions in ascending order:

$$\frac{3}{4}$$

$$\frac{4}{5}$$

$$\frac{9}{10}$$

$$\frac{14}{20}$$

1) Decide on a common multiple of the denominators to become the new denominator.

2) Convert the fractions to have the same denominator.

$$\frac{3}{4} \begin{matrix} \times 5 \\ \times 5 \end{matrix}$$

$$\frac{4}{5} \begin{matrix} \times 4 \\ \times 4 \end{matrix}$$

$$\frac{9}{10} \begin{matrix} \times 2 \\ \times 2 \end{matrix}$$

$$\frac{14}{20} \begin{matrix} \times 5 \\ \times 5 \end{matrix}$$

$$\frac{15}{20}$$

$$\frac{16}{20}$$

$$\frac{18}{20}$$

$$\frac{14}{20}$$

3) Re-order the fractions in their original form.

$$\frac{14}{20}$$

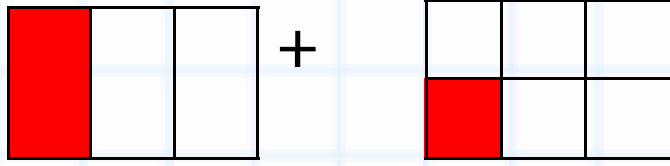
$$\frac{3}{4}$$

$$\frac{4}{5}$$

$$\frac{9}{10}$$

Add fractions

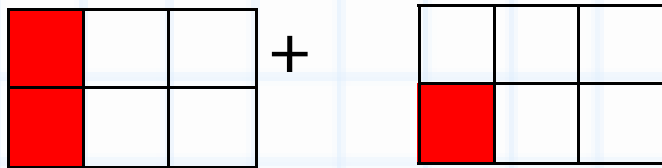
$$\frac{1}{3} + \frac{1}{6}$$



1) Convert both fractions to have the same denominator.

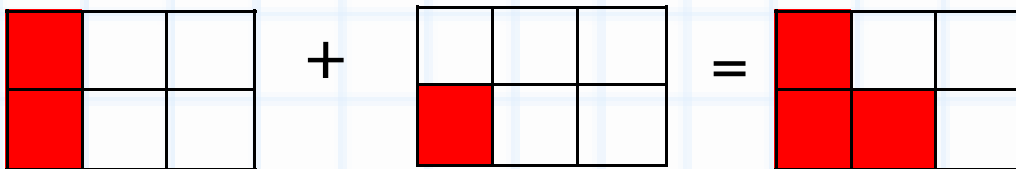
$$\frac{1}{3} \times 2 + \frac{1}{6}$$

$$\frac{2}{6} + \frac{1}{6}$$



2) Add the numerators, but not the denominators.

$$\frac{2}{6} + \frac{1}{6} = \frac{3}{6}$$



3) Simplify the answer if you can.

$$\begin{array}{c} \div 3 \\ \frac{3}{6} = \frac{1}{2} \\ \div 3 \end{array}$$

Add mixed numbers– method 1

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

1) Change any mixed numbers to improper fractions.

$$\frac{7}{4} + \frac{11}{8}$$

2) Convert both fractions to have the same denominator.

$$\frac{7}{4} \begin{matrix} \times 2 \\ \\ \times 2 \end{matrix} + \frac{11}{8}$$

3) Add the numerators together.

$$\frac{14}{8} + \frac{11}{8} = \frac{25}{8}$$

4) Change any improper fractions back to mixed numbers.

$$\frac{25}{8} = 3\frac{1}{8}$$

5) Simplify the answer if you can.

Add mixed numbers– method 2

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

1) Add the two whole numbers together.

$$1 + 1 = 2$$

2) Convert both fractions to have the same denominator.

$$\frac{3}{4} \overset{\times 2}{+} \frac{3}{8}$$

3) Add the numerators together.

$$\frac{6}{8} + \frac{3}{8} = \frac{9}{8}$$

4) Change any improper fractions back to mixed numbers.

$$\frac{9}{8} = 1\frac{1}{8}$$

5) Add together your two answers.

$$2 + 1\frac{1}{8} = 3\frac{1}{8}$$

6) Simplify the answer if you can.

Subtracting mixed numbers

$$2\frac{3}{4} - 1\frac{1}{8}$$

1) Change any mixed numbers to improper fractions.

$$\frac{1}{4} - \frac{9}{8}$$

2) Convert both fractions to have the same denominator.

$$\frac{1}{4} \xrightarrow{\times 2} \frac{2}{8} - \frac{9}{8}$$

3) Subtract the second numerator from the first.

$$2\frac{2}{8} - \frac{9}{8} = \frac{1}{8}$$

4) Change any improper fractions back to mixed numbers.

$$\frac{1}{8} = 1\frac{5}{8}$$

5) Simplify the answer if you can.

Multiplying pairs of fractions

$$2\frac{3}{4} \times 2\frac{2}{3}$$

1) Change any mixed numbers to improper fractions.

$$\frac{1 \ 1}{4} \times \frac{8}{3}$$

2) Multiply the numerators

$$\frac{1 \ 1}{4} \times \frac{8}{3} = \frac{8 \ 8}{1 \ 2}$$

3) Multiply the denominators

$$\frac{8 \ 8}{1 \ 2}$$

4) Change any improper fractions back to mixed numbers.

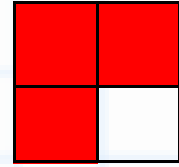
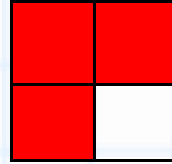
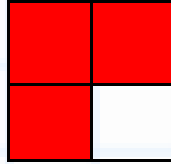
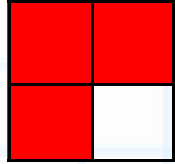
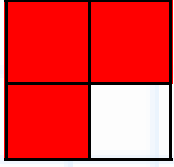
$$\frac{8 \ 8}{1 \ 2} = 7\frac{4}{1 \ 2}$$

5) Simplify the answer if you can.

$$7\frac{4}{1 \ 2} = 7\frac{1}{3}$$

Multiplying fractions by whole numbers

$$\frac{3}{4} \times 5$$



1) Write the whole number as a fraction over 1.

$$\frac{3}{4} \times \frac{5}{1}$$

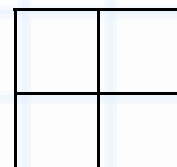
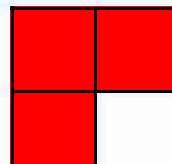
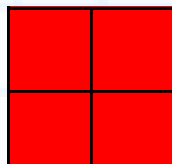
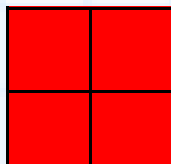
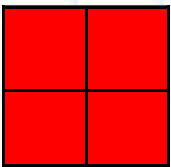
2) Multiply the numerators

$$\frac{3}{4} \times \frac{5}{1} = \frac{15}{4}$$

3) Multiply the denominators

4) Change any improper fractions back to mixed numbers.

$$\frac{15}{4} = 3\frac{3}{4}$$



5) Simplify the answer if you can.

Multiplying mixed numbers by whole numbers– 1

$$3\frac{3}{4} \times 5$$

1) Change any mixed numbers to improper fractions.

$$\frac{13}{4} \times 5$$

2) Write the whole number as a fraction over 1.

$$\frac{13}{4} \times \frac{5}{1}$$

3) Multiply the numerators

$$\frac{13}{4} \times \frac{5}{1} = \frac{65}{4}$$

4) Multiply the denominators

5) Change any improper fractions back to mixed numbers.

$$\frac{65}{4} = 16\frac{1}{4}$$

6) Simplify the answer if you can.

Multiplying mixed numbers by whole numbers– 2

$$3\frac{3}{4} \times 5$$

1) Multiply the two whole numbers together.

$$3 \times 5 = 15$$

2) Multiply the fraction by the whole number.

$$\frac{3}{4} \times 5$$

$$\frac{3}{4} \times \frac{5}{1} = \frac{15}{4}$$

3) Change any improper fractions back to mixed numbers.

$$\frac{15}{4} = 3\frac{3}{4}$$

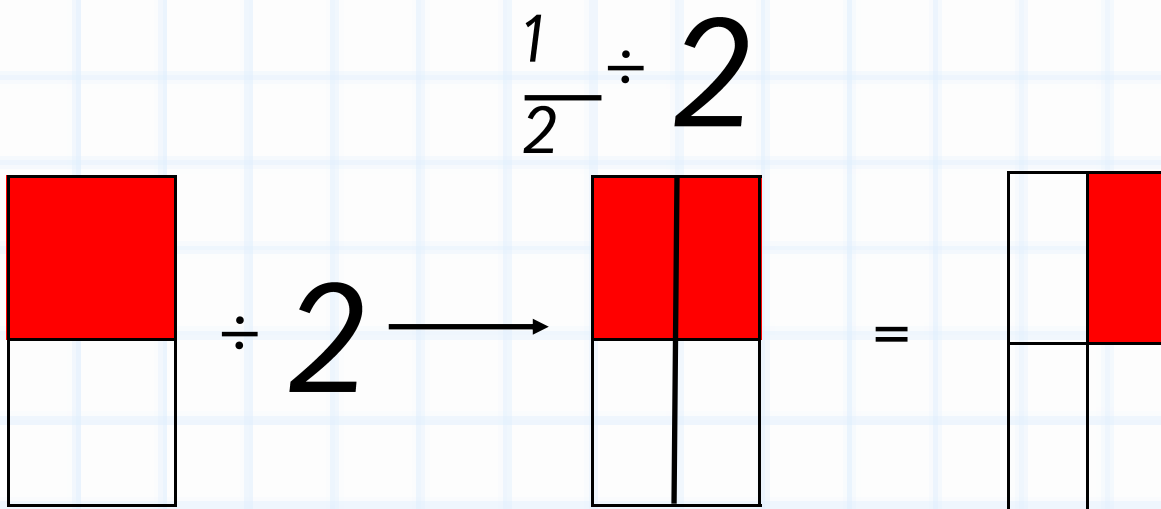
4) Add your two answers together.

$$15 + 3\frac{3}{4}$$

5) Simplify the answer if you can.

$$= 18\frac{3}{4}$$

Divide fractions by whole numbers



1) Multiply the denominator by the whole number and write the answer as the new denominator.

$$\frac{1}{2} \div 2 = \frac{1}{\underline{\quad}}$$

2) Simplify the answer if you can.

Divide fractions by whole numbers

$$5\frac{3}{4} \div 3$$

1) Change any mixed numbers to improper fractions.

$$\frac{2\frac{3}{4}}{4} \div 3$$

2) Multiply the denominator by the whole number and write the answer as the new denominator.

$$\frac{2\frac{3}{4}}{4} \div 3$$

3) Change any improper fractions back to mixed numbers.

$$\frac{2\frac{3}{4}}{12} = 1\frac{11}{12}$$

4) Simplify the answer if you can.

Convert between fractions and decimals

Fractions to decimals:

1) Divide the numerator by the denominator.

$$\begin{array}{r} 3 \\ \hline 4 \end{array} \quad \begin{array}{r} 0.75 \\ 4 \overline{) 3.00} \\ \underline{3} \\ 0 \\ \underline{0} \\ 0 \end{array}$$

Decimals to fractions:

1) Create the numerator. $0.15 \longrightarrow \frac{15}{100}$

2) Create the denominator.

2 digits after the decimal point

2 zeroes in the denominator

5) Simplify the fraction if needed $\frac{15}{100} = \frac{3}{20}$

Examples:

$$0.\underline{5} = \frac{5}{10}$$

one zero

$$0.\underline{72} = \frac{72}{100}$$

two zeroes

$$0.\underline{638} = \frac{638}{1000}$$

three zeroes

Use equivalence between fractions, decimals and percentages

$$\frac{5}{8}$$

Decimal– divide the numerator by the denominator. 0.625

Percentage– multiply by 10 and add the percent symbol. 62.5%

Fraction	Decimal	Percentage
$\frac{1}{8}$	0.125	12.5%
$\frac{2}{8}$	0.25	25%
$\frac{3}{8}$	0.375	37.5%
$\frac{4}{8}$	0.5	50%
$\frac{5}{8}$	0.625	62.5%
$\frac{6}{8}$	0.75	75%
$\frac{7}{8}$	0.875	87.5%
$\frac{8}{8}$	1	100%

Use the order of operations

B rackets

O rder (square/ cubes)

D ivision

M ultiplication

A ddition

S ubtraction

$$3^3 - 3 \times (3 + 2)$$

$$3^3 - 3 \times 5$$

1) Complete any calculations in brackets.

$$27 - 3 \times 5$$

2) Complete any square or cube number calculations

$$27 - 15$$

3) Complete any multiplication or division (going from left to right)

$$27 - 15 = 12$$

4) Complete any addition or subtraction (going from left to right)

Solve multi-step word problems

2)

One drink costs £1.67 and I buy 4. If I pay with a £20 note, how much change will I get?

1) Read the question and break it down into parts.

2) Work out the calculation £20- (4 x £1.67)

3) Solve each part.

$$£1.67 \times 4 = £6.68$$

$$£20 - £6.68 = £13.32$$

$$\begin{array}{r}
 1.67 \\
 \times 4 \\
 \hline
 6.68
 \end{array}$$

$$\begin{array}{r}
 1.991 \\
 \times 200 \\
 \hline
 398.2
 \end{array}$$

4) Check your answer fits the question.

$$£1.67 + £1.67 + £1.67 + £1.67 + £13.32 = £20$$

Use rounding to estimate

- 1) Choose what to round each number to.
- 2) Complete the rounded calculation.
- 3) Complete the original calculation.
- 4) If your answers are very different, work it out again!

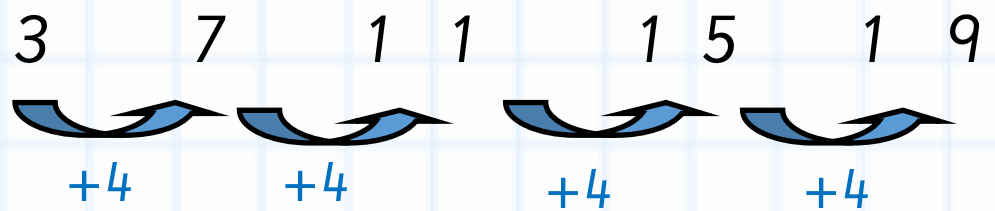
$$\begin{array}{r} 38.7 + 20.8 \\ 40 + 20 = 60 \\ 38.7 + 20.8 = 59.5 \end{array}$$



$$\begin{array}{r} 30,127 + 2,953 \\ 30,000 + 3,000 = 33,000 \\ 30,127 + 2,953 = 33,080 \end{array}$$

Generate and describe linear number sequences

Finding the
rule:



1) Find the difference between
each number in the sequence.

4 n

This is your 'n'

2) Work out how to get from
your 'n' to the first number in
the sequence. In this case, -1

4 $n - 1$

3) Check your rule.

$$4 \times 1 - 1 = 3$$

$$4 \times 2 - 1 = 7$$

$$4 \times 3 - 1 = 11$$

$$4 \times 4 - 1 = 15$$

$$4 \times 5 - 1 = 19$$



Generate and describe linear number sequences

Calculating the sequence.

Rule: $5n - 4$

1) Multiply the 'n' number by the each term in the term in the sequence.

2) Add or subtract the number which comes after 'n'

1st term: $5 \times 1 - 4 = 1$

2nd term: $5 \times 2 - 4 = 6$

3rd term: $5 \times 3 - 4 = 11$

4th term: $5 \times 4 - 4 = 16$

5th term: $5 \times 5 - 4 = 21$

20th term: $5 \times 20 - 4 = 96$

10th term: $5 \times 20 - 4 = 96$

Use ratio

Simplifying ratios:



1) Work out how many of each item there are.

2) Write out as a ratio.

red : blue : green

2 : 4 : 6

3) Work out if there is a number that you can divide each of the shares by, and if so divide them.

red : blue : green $\div 2$

2 : 4 : 6

1 : 2 : 3



Use ratio

Using knowledge of one share to find out how big the others are.

A prize is shared in a ratio of $3 : 4$ between Jamie and Dan. If Jamie gets £21, how much will Dan get?


$$\begin{array}{rcccl} & \text{Jamie} & : & \text{Dan} & \\ & 3 & : & 4 & \\ & 21 & : & 28 & \\ & 2 & : & 8 & \end{array}$$

1) Work out how to get from the share you know to the value. In this case, multiply by 7.

2) Do the same with the other shares.

Jamie will get £21 and Dan will get £28.

Use ratio

Using knowledge of the total to find out how big the different parts are.

A prize of £200 is shared in a ration of 3:2 between Diane and Dave. How much should they get each?

Diane : Dave

$$3 : 2 = 5$$

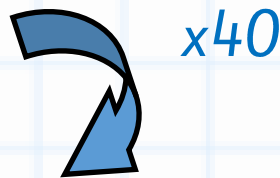
1) Add together the total shares ($3 + 2 = 5$)

2) Work out how to get from the total shares to the overall amount.

Diane : Dave

$$3 : 2 = 5$$

$$= £200$$



x40

3) Multiply each of the shares by that amount.

Diane : Dave

$$3 : 2 = 5$$



x40

$$£120 : £80 = £200$$

Use scale factor– recipes
Recipe for fairy cakes– 2 people.

Complete the recipe for 8 people.

- 1) Work out the relationship between 2 and 8 ($\times 4$)
- 2) Using your scale factor, convert each value ($\times 4$)

6 eggs	($\times 4$)	24 eggs
100g flour	$\longrightarrow$	400g flour
50g butter		200g butter
80 ml milk		320 ml milk

For measurements where there is not a clear scale factor, first find the amount for one serving.

2 people	1 person	5 people
6 eggs	$6 \div 2 = 3$ eggs	$3 \times 5 = 15$ eggs
100g flour	$100 \div 2 = 50$ g	$50 \times 5 = 250$ g
50g butter	$50 \div 2 = 25$ g	$25 \times 5 = 125$ g
80ml milk	$80 \div 2 = 40$ ml	$40 \times 5 = 200$ ml

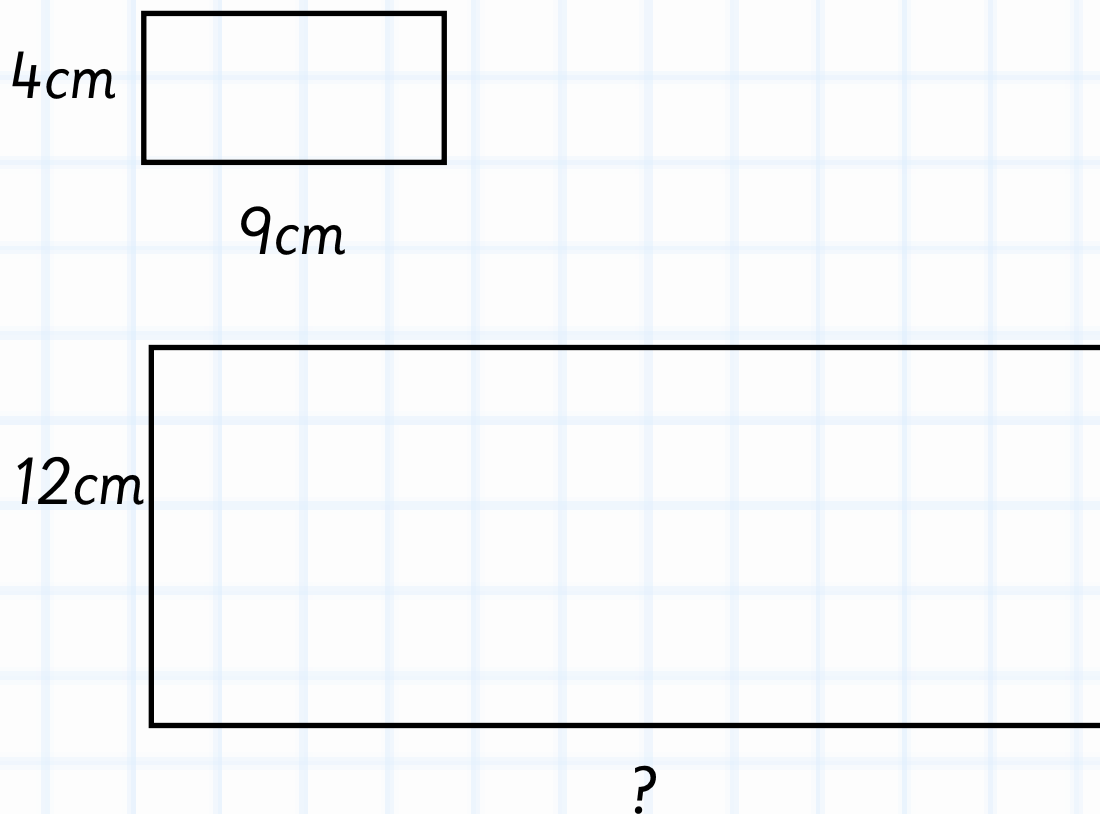


Find the amount for
one serving($\div 2$)



Multiply by the amount of serv-
ings there are ($\times 5$)

Use scale factor–shape



1) find the corresponding known lengths on each shape (in this case, the vertical sides)

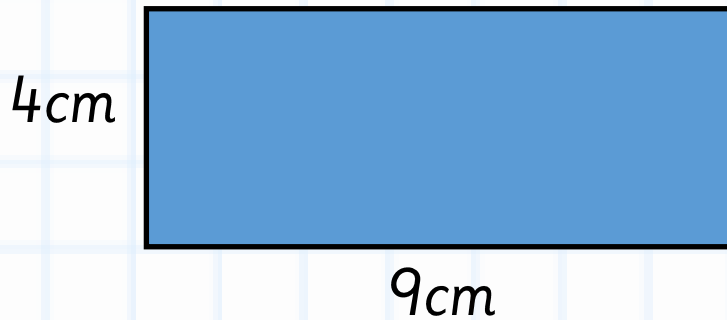
2) Find the scale factor by working out the relationships between the two lengths.

4cm $\rightarrow$ 12cm = multiply by 3 scale factor is 3

3) Use this scale factor to work out the unknown line, using the corresponding known line.

$$9\text{cm} \times 3 = 27\text{cm}.$$

Calculate area of rectangles



The area tells you the space that the rectangle takes up.

1) Multiply the base of the rectangle by the height.

$$9 \times 4 = 36$$

2) After the answer, put the correct unit of measure (in this case, cm) and then a ² symbol.

$$36 \text{ cm}^2$$

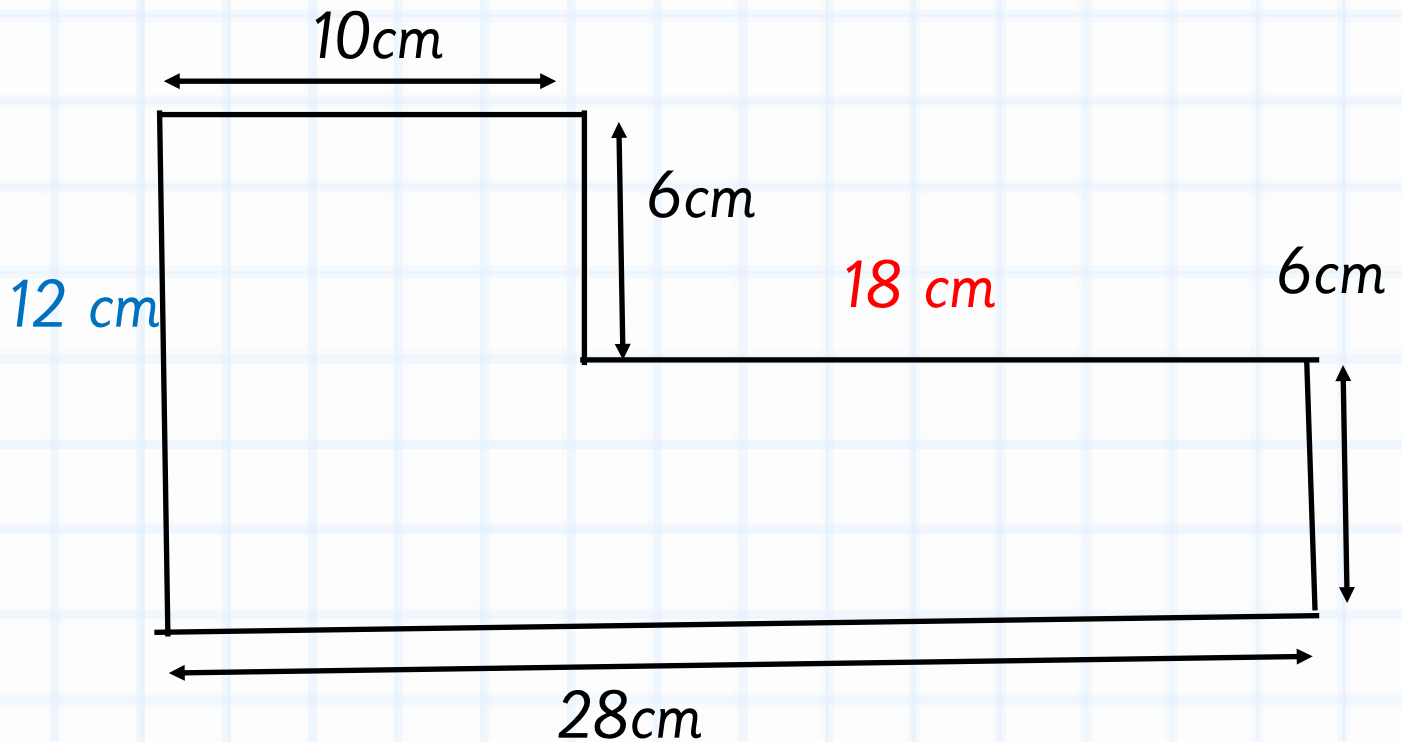
Calculate area of rectangles



The perimeter tells you the distance around the outside of the rectangle.

- 1) Add in the missing sides.
 - 2) Add together all 4 sides.
- $$4 + 4 + 9 + 9 = 26 \text{ cm}$$

Perimeter of compound shapes

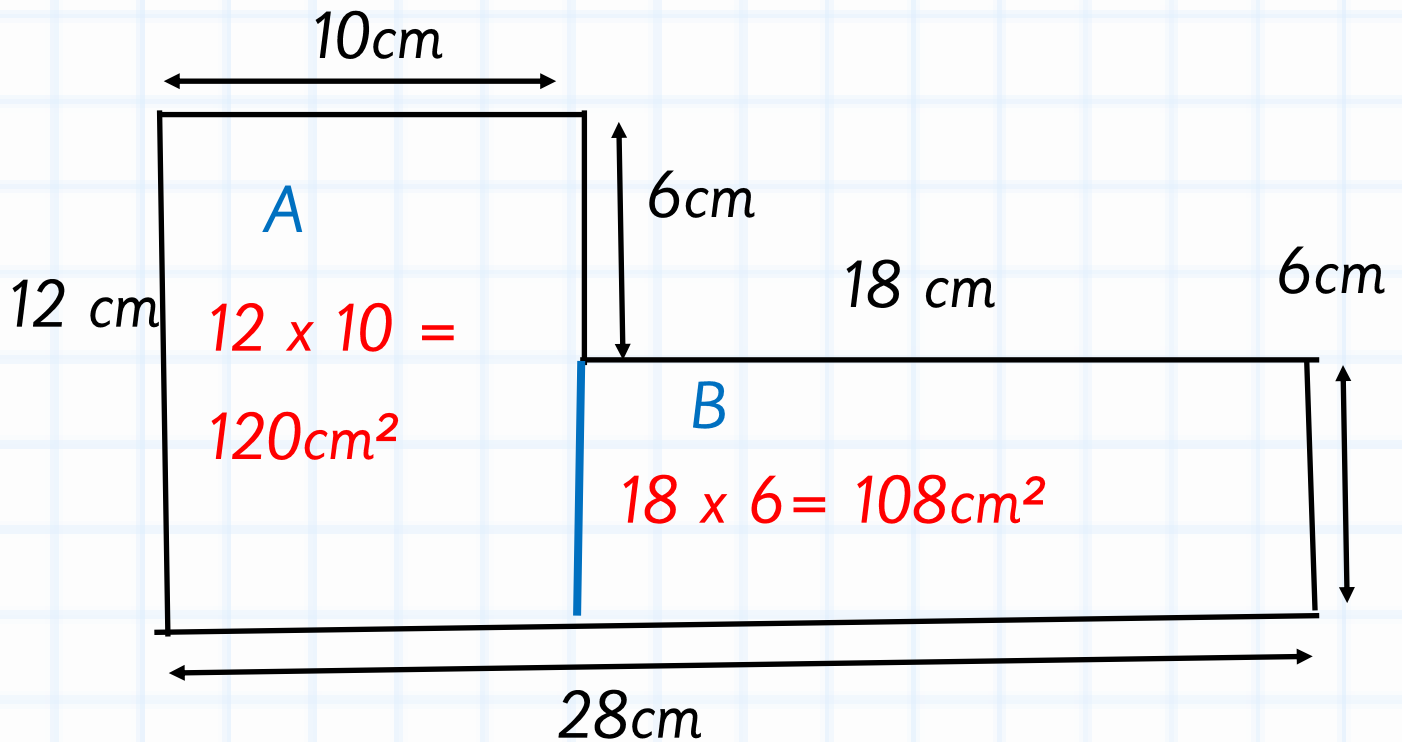


1) When you know the two shorter sides, add to find the longer side opposite ($6 + 6 = 12 \text{ cm}$)

2) If you know the long side opposite one shorter side, subtract the short side from the long ($28 - 10 = 18 \text{ cm}$)

3) Add all the lengths of the sides together.
= 80cm

Area of compound shapes



1) Divide the shape into 2 rectangles and label.

2) For each rectangle, multiply the length by the width to find the area.

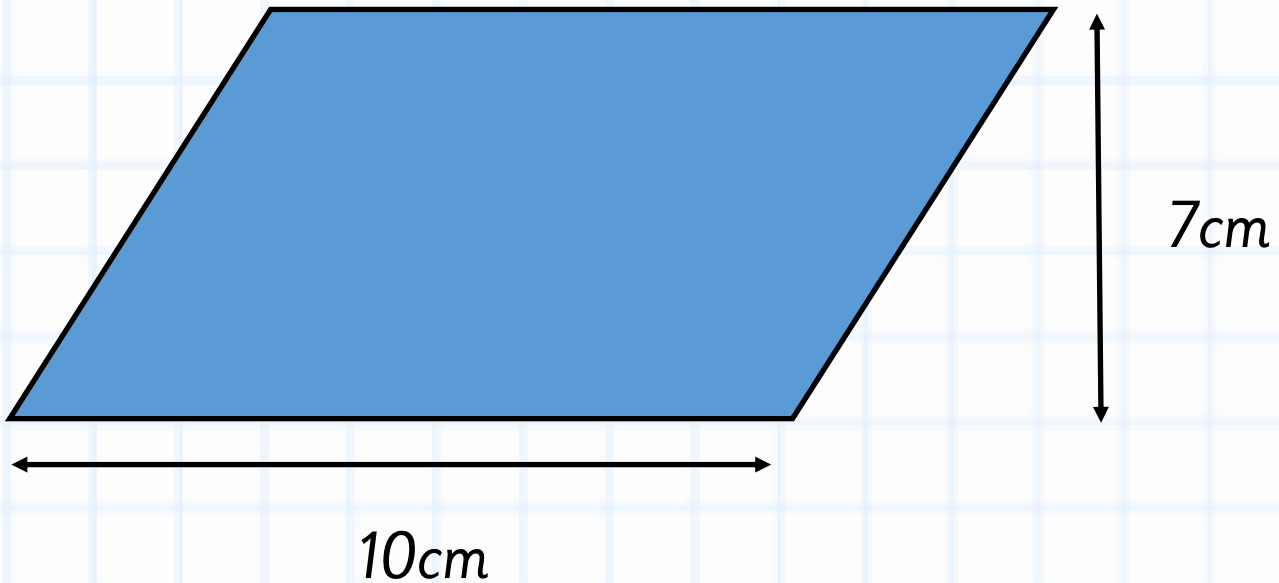
3) Add the two areas together.

$$120\text{cm}^2 + 108\text{cm}^2 = 228\text{cm}^2$$

Area of parallelograms

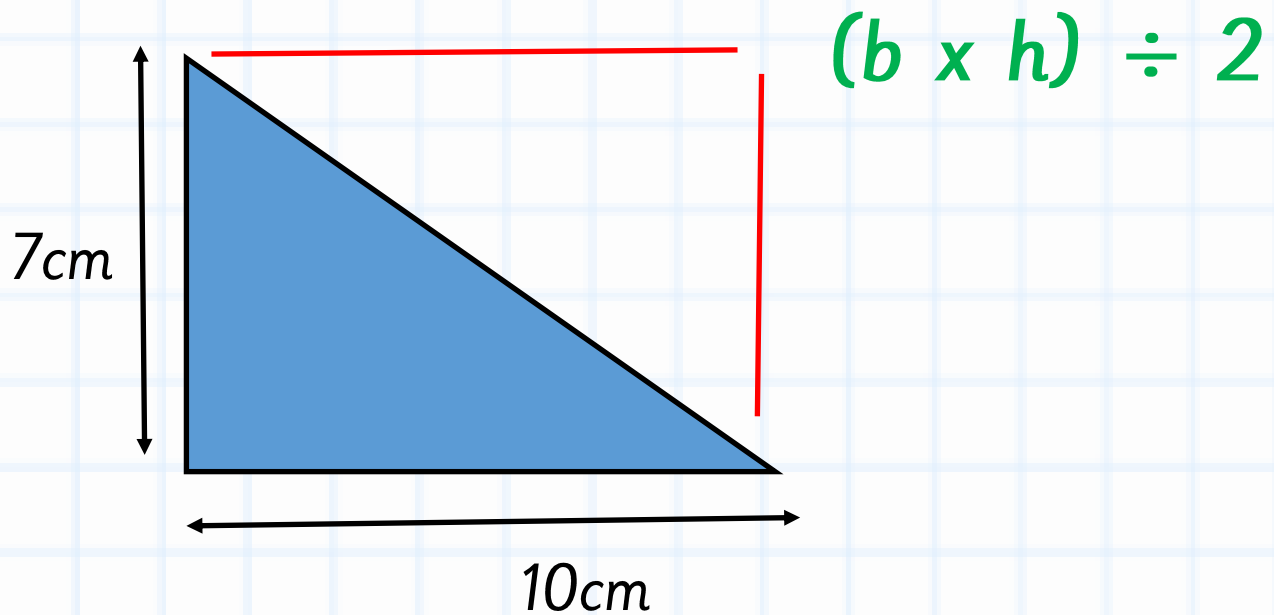
Finding the area of a parallelogram is the same as finding the area of a rectangle.

$$b \times h$$



1) Multiply the base by the height. $10 \times 7 = 70\text{cm}^2$

Area of triangles

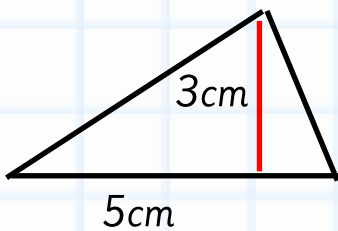


The area of a triangle will always be half the area of a rectangle.

1) Find the area of the rectangle by multiplying the base by the height. $9 \times 6 = 54$

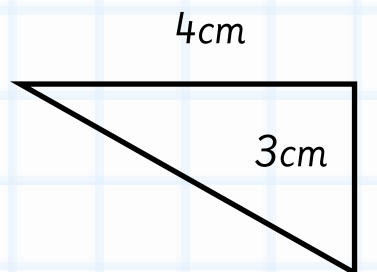
2) Divide the answer by 2

$$54 \div 2 = 27 \text{ cm}^2$$



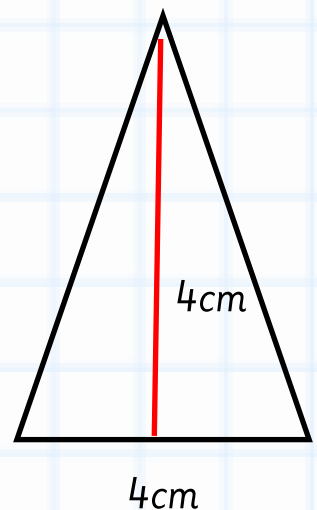
$$5 \times 3 = 15$$

$$15 \div 2 = 7.5 \text{ cm}^2$$



$$4 \times 3 = 12$$

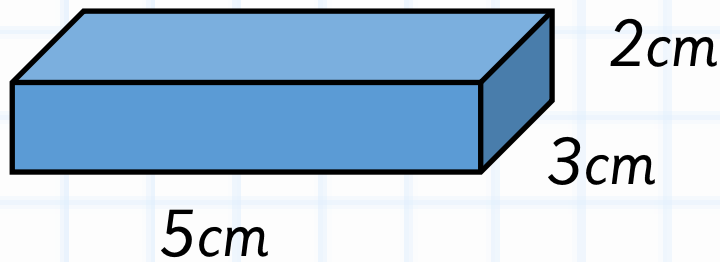
$$12 \div 2 = 6 \text{ cm}^2$$



$$4 \times 4 = 16$$

$$16 \div 2 = 8 \text{ cm}^2$$

Calculating volume

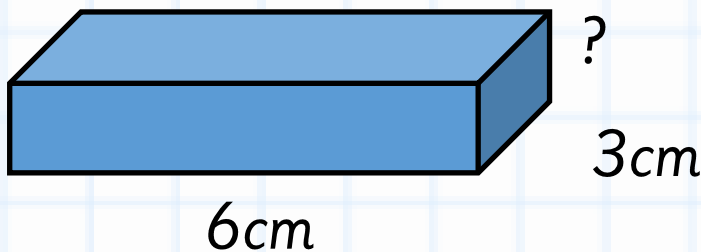


1) Multiply the length by the width to find the area of one face. $5 \times 3 = 15$

2) Multiply the answer by the height.

$$15 \times 2 = 30 \text{ cm}^3$$

Finding a missing value



Total: 36 cm^3

1) Divide the volume by one of the values.

$$36 \div 6 = 6$$

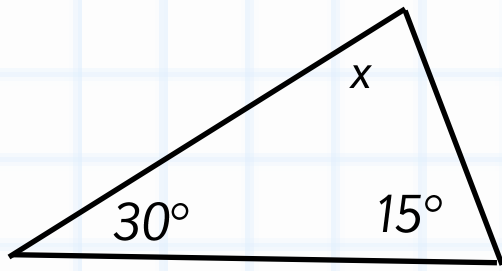
2) Divide the answer by the other value.

$$6 \div 3 = 2$$

3) Check by multiplying

$$6 \times 3 \times 2 = 36 \text{ cm}^3$$

Missing angles in triangles



Angles in a triangle
add to 180°

1) Add the two known values.

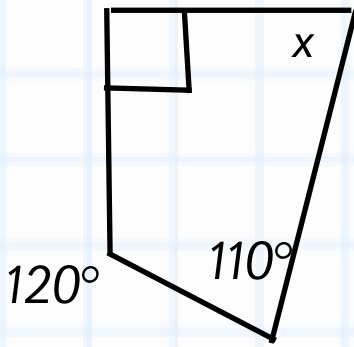
$$30^\circ + 15^\circ = 45^\circ$$

2) Subtract from 180°

$$180^\circ - 45^\circ = 135^\circ$$

3) Check by adding the values together to make sure they reach 180°

Missing angles in quadrilateral



Angles in a
quadrilateral add to
 360°

1) Add the three known values.

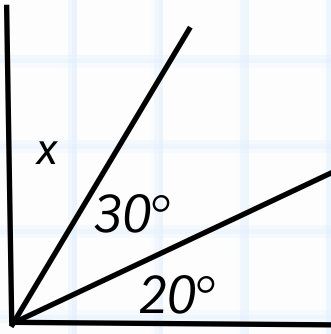
$$120^\circ + 110^\circ + 90 = 320^\circ$$

2) Subtract from 360°

$$360^\circ - 320^\circ = 40^\circ$$

3) Check by adding the values together to make sure they reach 360°

Missing angles



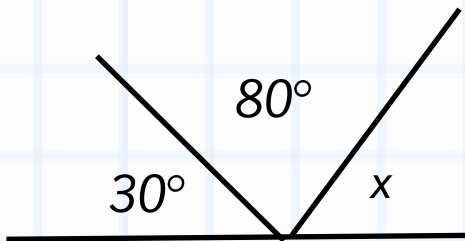
1) Add the known values.

$$20^\circ + 30^\circ = 50^\circ$$

2) Subtract from 90° .

$$90^\circ - 50^\circ = 40^\circ$$

3) Check that the values add to 90° .



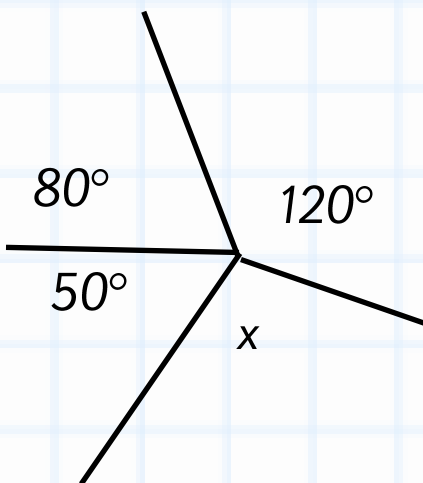
1) Add the known values.

$$30^\circ + 80^\circ = 110^\circ$$

2) Subtract from 180° .

$$180^\circ - 110^\circ = 70^\circ$$

3) Check that the values add to 180° .



1) Add the known values.

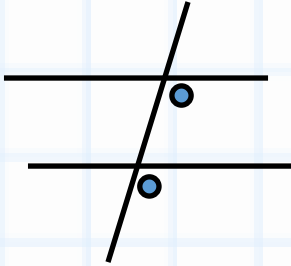
$$120^\circ + 80^\circ + 50^\circ = 250^\circ$$

2) Subtract from 360° .

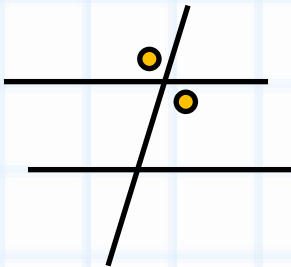
$$360^\circ - 250^\circ = 110^\circ$$

3) Check that the values add to 360° .

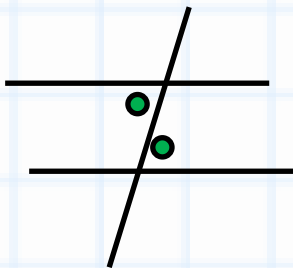
Corresponding, alternate and opposite angles



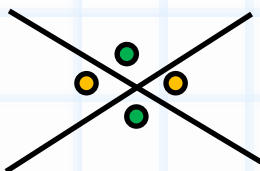
Corresponding angles are equal.



Opposite angles are equal.



Alternate angles are equal.

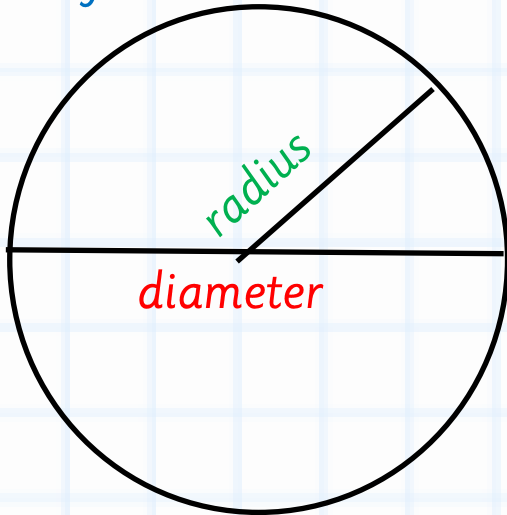


Opposite angles are equal.

Parts of a circle

Hint: the diameter is twice the radius.

circumference

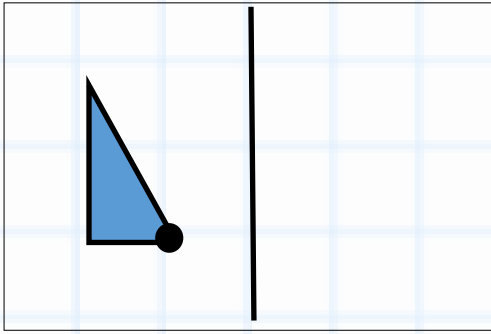


Circumference: Distance around the edge of the circle.

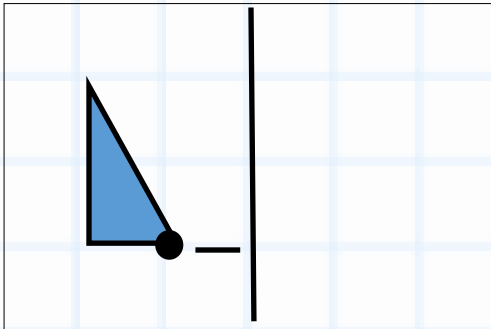
Diameter: Length of a line through the middle from one edge to the other.

Radius: Distance from the middle of the circle to the outer edge.

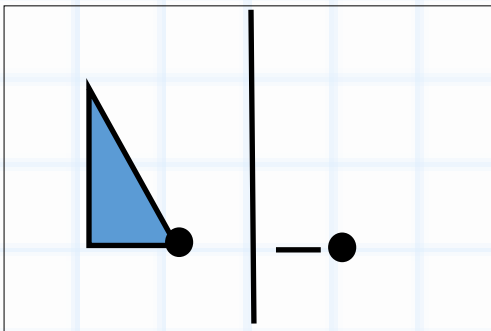
Reflect shapes



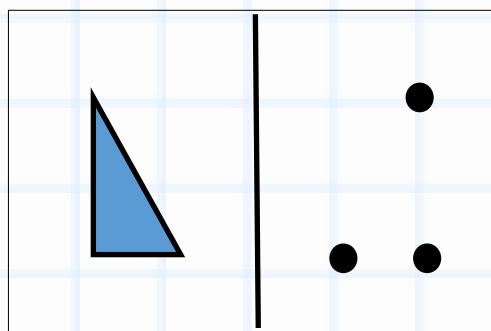
1) Choose a point



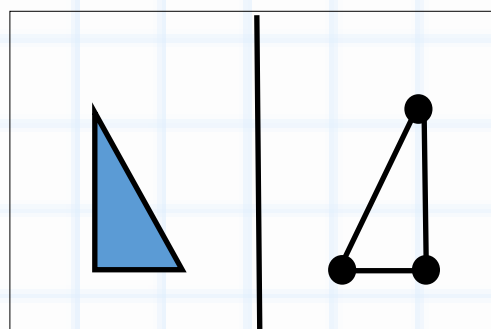
2) Count the units from the point to the mirror line



3) Count the same number out the other side and draw a dot.



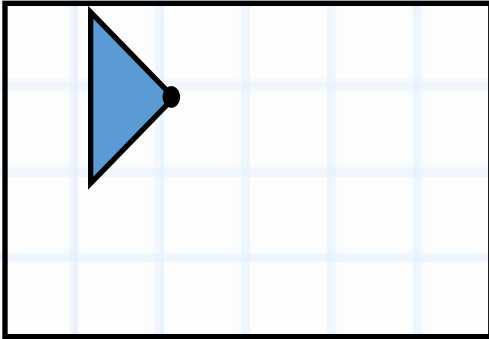
4) Repeat with the other points.



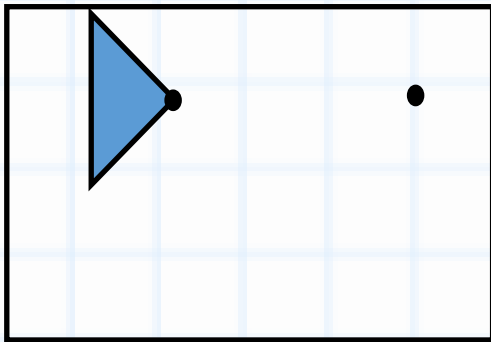
5) Join the points using a ruler

Translate shapes

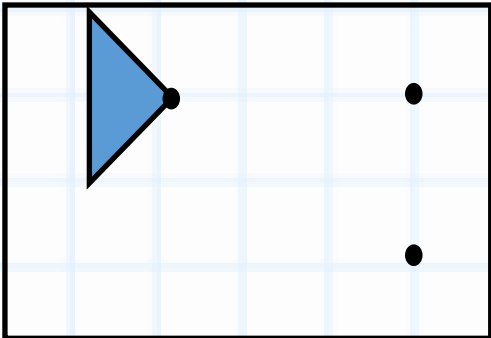
Translate 3 right and 2 down



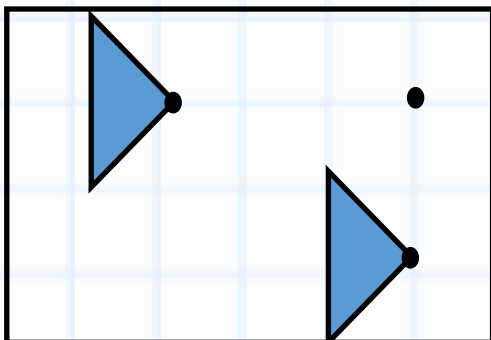
1) Choose a point (or use the one marked for you)



2) Count the correct amount of units along and draw a dot.



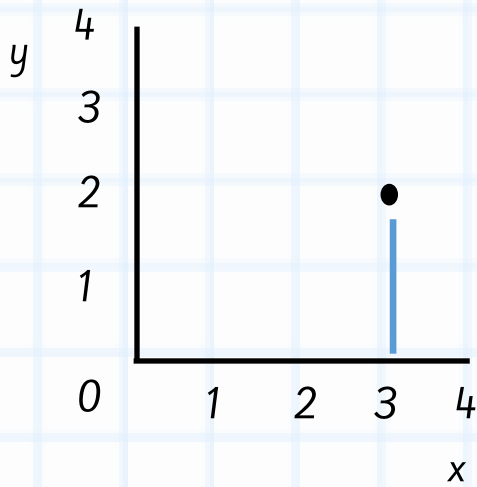
3) Count the correct amount of units up/down and draw a dot.



4) Draw the shape in the new position, starting from the dot.

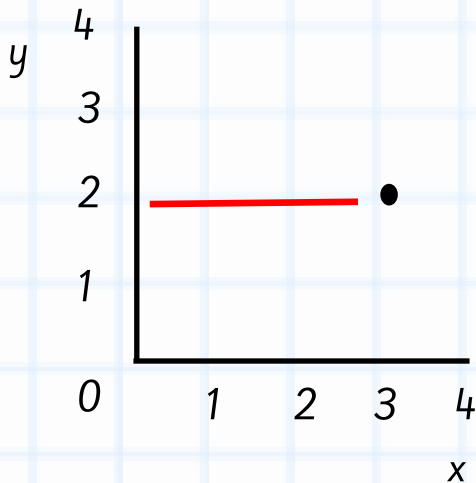
Read co-ordinates

Remember: Along the corridor and up the stairs



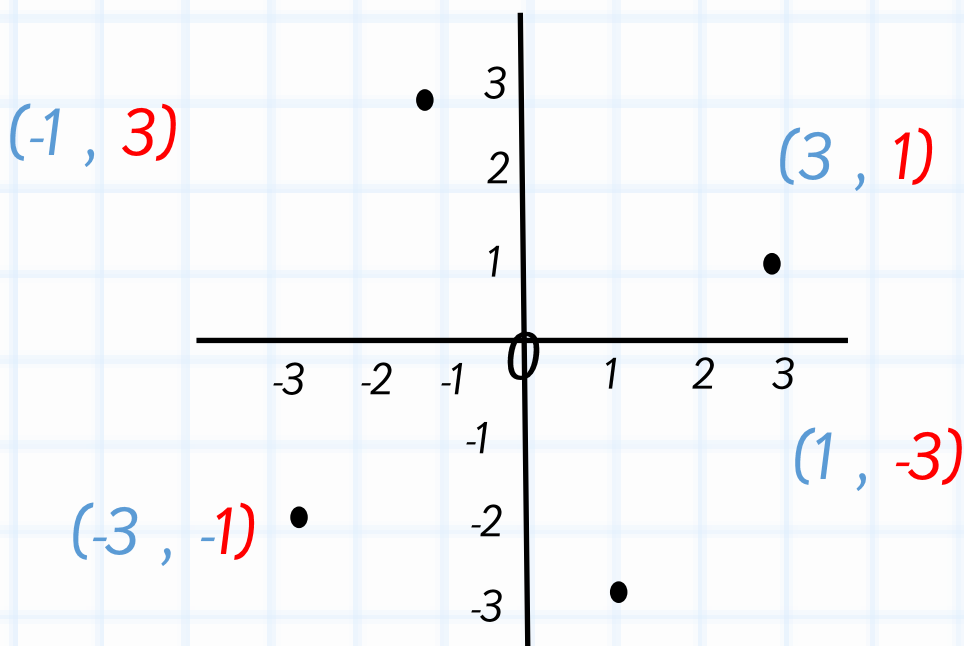
1) Imagine a line going down to the x-axis. This is the x coordinate and the first number inside the brackets.

(3 ,



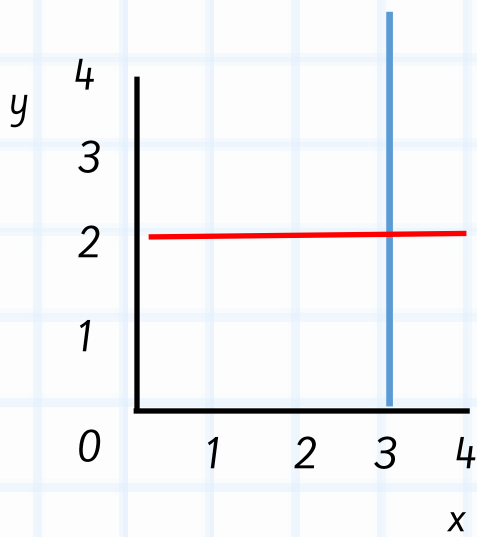
2) Imagine a line going across to the y-axis. This is the y coordinate and the second number inside the brackets.

(3 , 2)



Read and plot co-ordinates

Remember: Along the corridor and up the stairs



Plot the co-ordinate (3, 2)

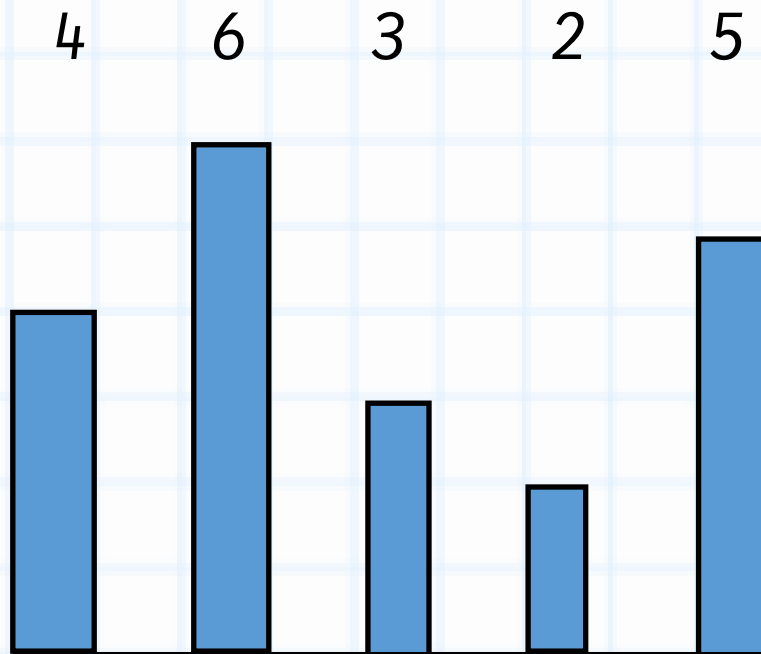
1) Go along the x axis to get to the co-ordinate you .want.

2) Go up or down the y axis to get to the co-ordinate you .want.

3) Put a cross where the two imaginary lines meet.

Calculate the mean

The mean is a way of finding the average of a set of data.



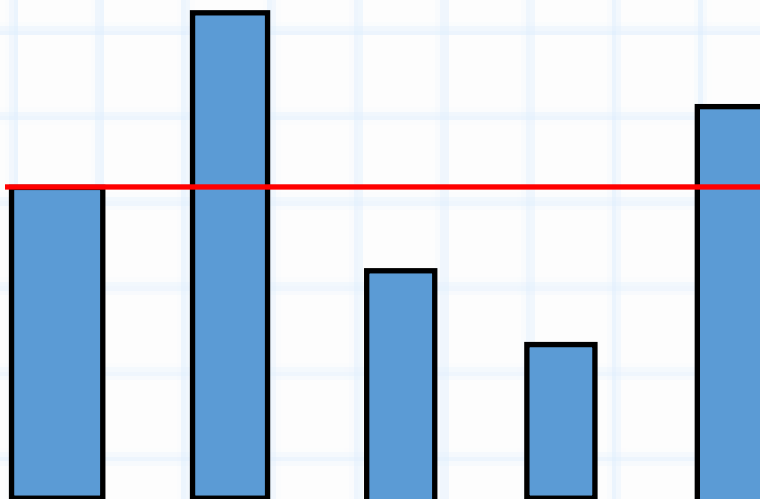
$$4 + 6 + 3 + 2 + 5 = 20$$

1) Add the values together

$$20 \div 5 = 4$$

2) Divide by the amount of

The mean of this set of data is 4.



Find fractions of numbers

$$\frac{3}{4} \text{ of } 48$$

1) Divide the whole number by the denominator.

$$(48 \div 4 = 12)$$

2) Multiply the answer by the numerator

$$(12 \times 3 = 36)$$

12	12	12	12
----	----	----	----

$$48 \div 4 = 12$$

dividing by 4 finds one quarter.

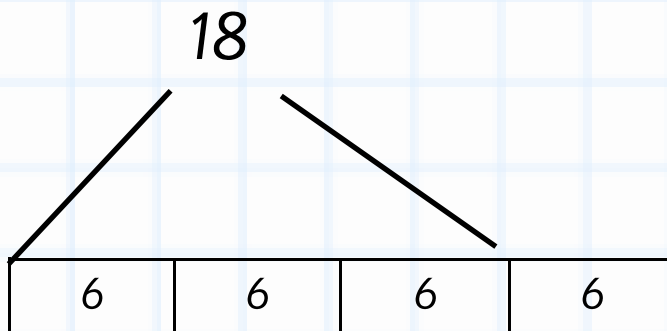
$$12 \times 3 = 36$$

multiplying by 3 finds 3 quarters

Find the whole from a fraction

18 is $\frac{3}{4}$ of what number?

1) Divide the number by the numerator ($18 \div 3 = 6$)

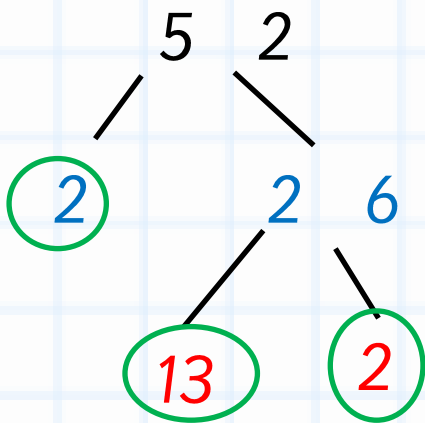


2) Multiply the answer by the denominator ($6 \times 4 = 24$)

$$18 \div 3 = 6$$

$$6 \times 4 = 24$$

Prime factors



Prime factors:

$$2 \times 2 \times 13 =$$

52

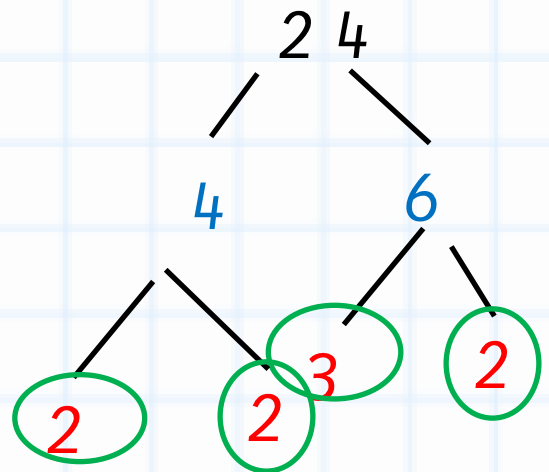
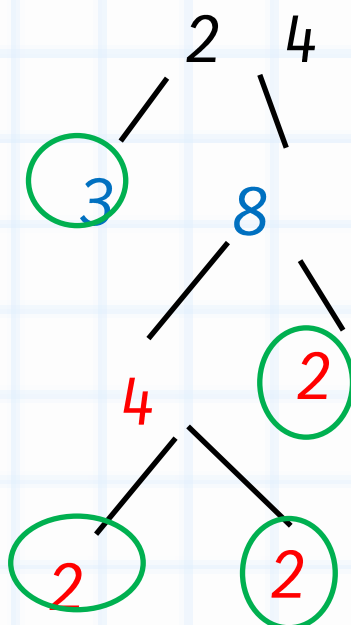
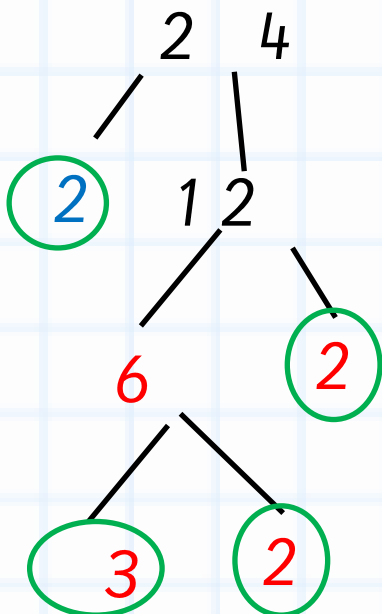
1) Place your number at the top.

2) Choose a pair of numbers that multiply to make your target.

3) If there are any prime numbers, circle them.

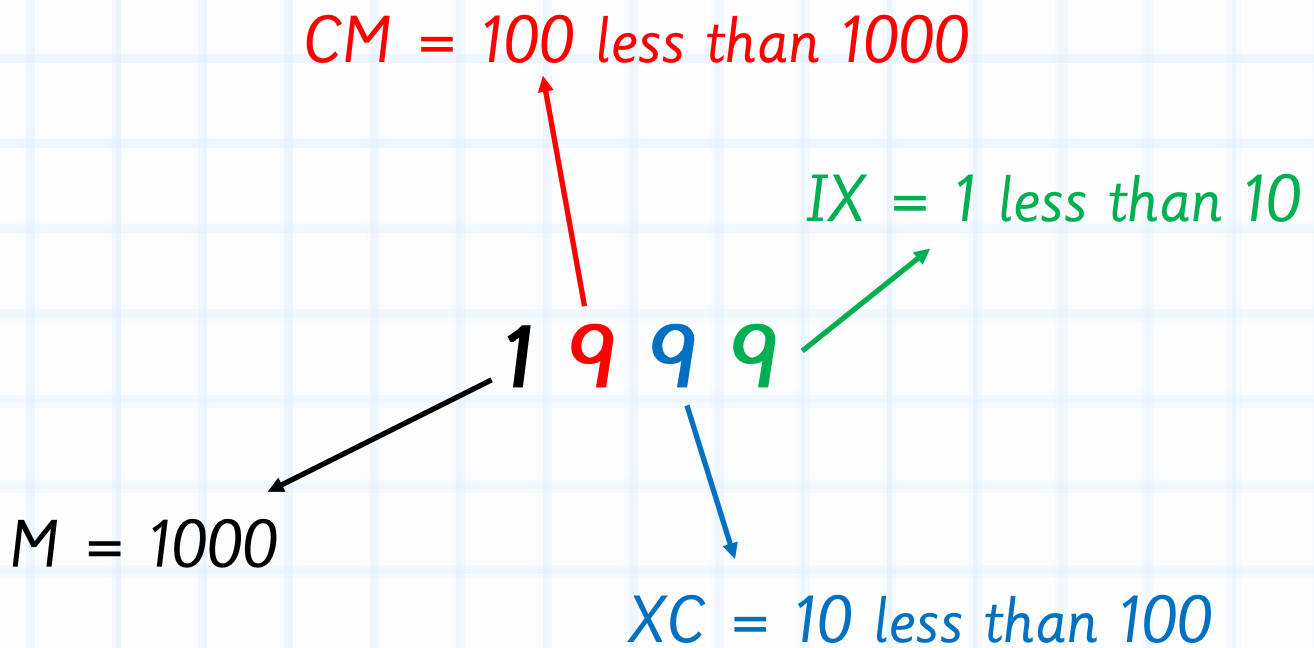
4) Continue by finding a pair of numbers that make your new target.

Sometimes there will be more than one way to get the answer, e.g.



Roman numerals

1 = I 5 = V 10 = X 50 = L
100 = C 500 = D 1000 = M



M CM XC IX

Ones to remember:

IV = 4 IX = 9 XL = 50
XC = 90 CD = 400 CM = 900

Prime numbers

A prime number is a whole number greater than 1 with no divisors except 1 and itself.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Top tips:

2 is the only even prime number.

There are no prime numbers that end in 5, except for 5.

The digits can't add up to 3, except 3.

Times table grid

x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

Square numbers

A square number is a number multiplied by itself.

$$1^2 = 1 \times 1 = 1$$

$$7^2 = 7 \times 7 = 49$$

$$2^2 = 2 \times 2 = 4$$

$$8^2 = 8 \times 8 = 64$$

$$3^2 = 3 \times 3 = 9$$

$$9^2 = 9 \times 9 = 81$$

$$4^2 = 4 \times 4 = 16$$

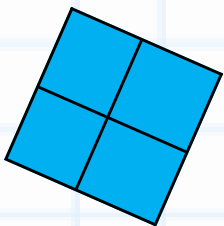
$$10^2 = 10 \times 10 = 100$$

$$5^2 = 5 \times 5 = 25$$

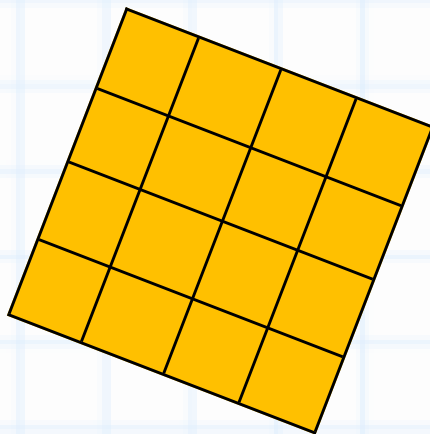
$$11^2 = 11 \times 11 = 121$$

$$6^2 = 6 \times 6 = 36$$

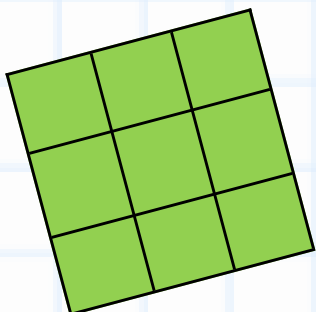
$$12^2 = 12 \times 12 = 144$$



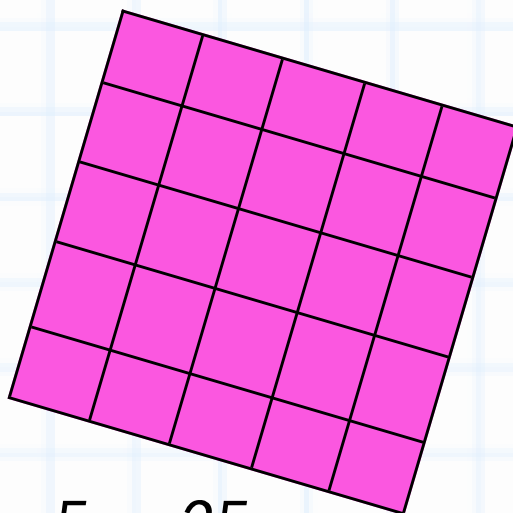
$$2^2 = 2 \times 2 = 4$$



$$4^2 = 4 \times 4 = 16$$



$$3^2 = 3 \times 3 = 9$$



$$5^2 = 5 \times 5 = 25$$

Cube numbers

A square number is a number multiplied by itself, then by itself again.

$$1^3 = 1 \times 1 \times 1 = 1$$

$$2^3 = 2 \times 2 \times 2 = 8$$

$$3^3 = 3 \times 3 \times 3 = 27$$

$$4^3 = 4 \times 4 \times 4 = 64$$

$$5^3 = 5 \times 5 \times 5 = 125$$

$$6^3 = 6 \times 6 \times 6 = 216$$

$$7^3 = 7 \times 7 \times 7 = 343$$

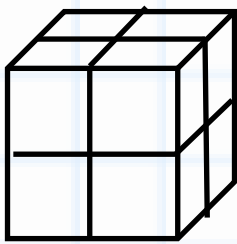
$$8^3 = 8 \times 8 \times 8 = 512$$

$$9^3 = 9 \times 9 \times 9 = 729$$

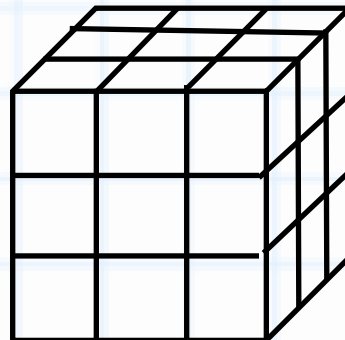
$$10^3 = 10 \times 10 \times 10 = 1000$$

$$11^3 = 11 \times 11 \times 11 = 1331$$

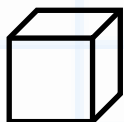
$$12^3 = 12 \times 12 \times 12 = 1728$$



$$2^3 = 2 \times 2 \times 2 = 8$$

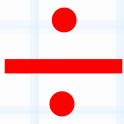


$$3^3 = 3 \times 3 \times 3 = 27$$



$$1^3 = 1 \times 1 \times 1 = 1$$

Key maths vocabulary



divide
divided by
divided into
share

equal groups of...
share equally



add
plus
more
sum
altogether
make



subtract
difference between
take away
leave
minus



multiply
lots of
product
times
multiplied by



equal to	total
equivalent	same as
makes	balances

Convert metric units of length

$$10 \text{ mm} = 1\text{cm}$$

$$100 \text{ cm} = 1\text{m}$$

$$1000\text{m} = 1\text{km}$$

What is 1.37 km in m?

1) Write out the fact that you need. $1000\text{m} = 1\text{km}$

$\div 1000$

2) Add in the arrows to show how to get from one value to the other.

$$1000\text{m} = 1\text{km}$$

$\times 1000$

What is 1.37 km in m? 1370m

$\div 10$



$$10\text{mm} = 1\text{cm}$$



$\times 10$

$\div 100$



$$100\text{cm} = 1\text{m}$$



$\times 100$

$\div 1000$



$$1000\text{m} = 1\text{km}$$



$\times 1000$

Convert metric units of mass

$$1000g = 1kg$$

What is 0.36 kg in g?

1) Write out the fact that you need. $1000g = 1kg$

$\div 1000$

2) Add in the arrows to show how to get from one value to the other.

$$1000g = 1kg$$



$\times 1000$

What is 0.36kg in g? 360m

$\div 1000$



$$1000g = 1kg$$



$\times 1000$

Convert metric units of capacity

$$1000\text{ml} = 1\text{l}$$

What is 3.26 l in ml?

1) Write out the fact that you need. $1000\text{ml} = 1\text{l}$

$\div 1000$

2) Add in the arrows to show how to get from one value to the other.

$$1000\text{ml} = 1\text{l}$$

$\times 1000$

What is 3.26l in ml? 3260m

$\div 1000$

$$1000\text{ml} = 1\text{l}$$

$\times 1000$

Convert metric units

length

$\div 10$



$$10\text{mm} = 1\text{cm}$$



$\times 10$

$\div 100$



$$100\text{cm} = 1\text{m}$$



$\times 100$

$\div 1000$



$$1000\text{m} = 1\text{km}$$



$\times 1000$

mass

$\div 1000$



$$1000\text{g} = 1\text{kg}$$



$\times 1000$

capacity

$\div 1000$



$$1000\text{ml} = 1\text{l}$$



$\times 1000$

Convert units of time

60 seconds = 1 minute

60 minutes = 1 hour

24 hours = 1 day

7 days = 1 week

12 months = 1 year

365 days = 1 year

÷ 60



60 s = 1m



x 60

÷ 60



60m = 1h



x 60

÷ 24



24 h = 1d



x 24

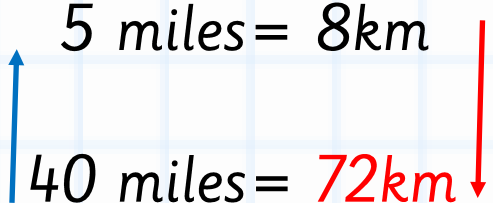
Convert between miles and kilometres

Facts to remember:

$$1 \text{ mile} = 1.6 \text{ km}$$

$$5 \text{ miles} = 8 \text{ km}$$

To convert miles to km:



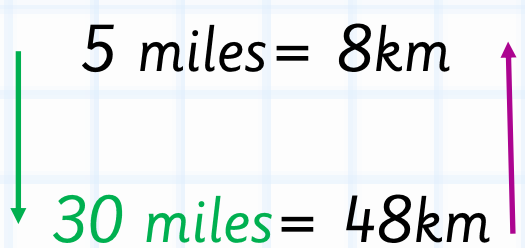
5 miles = 8 km

40 miles = 72 km

1) Divide by 5 ($45 \div 5 = 9$)

2) Multiply by 8 ($9 \times 8 = 72$)

To convert km to miles: 1) Divide by 8 ($48 \div 8 = 6$)



5 miles = 8 km

30 miles = 48 km

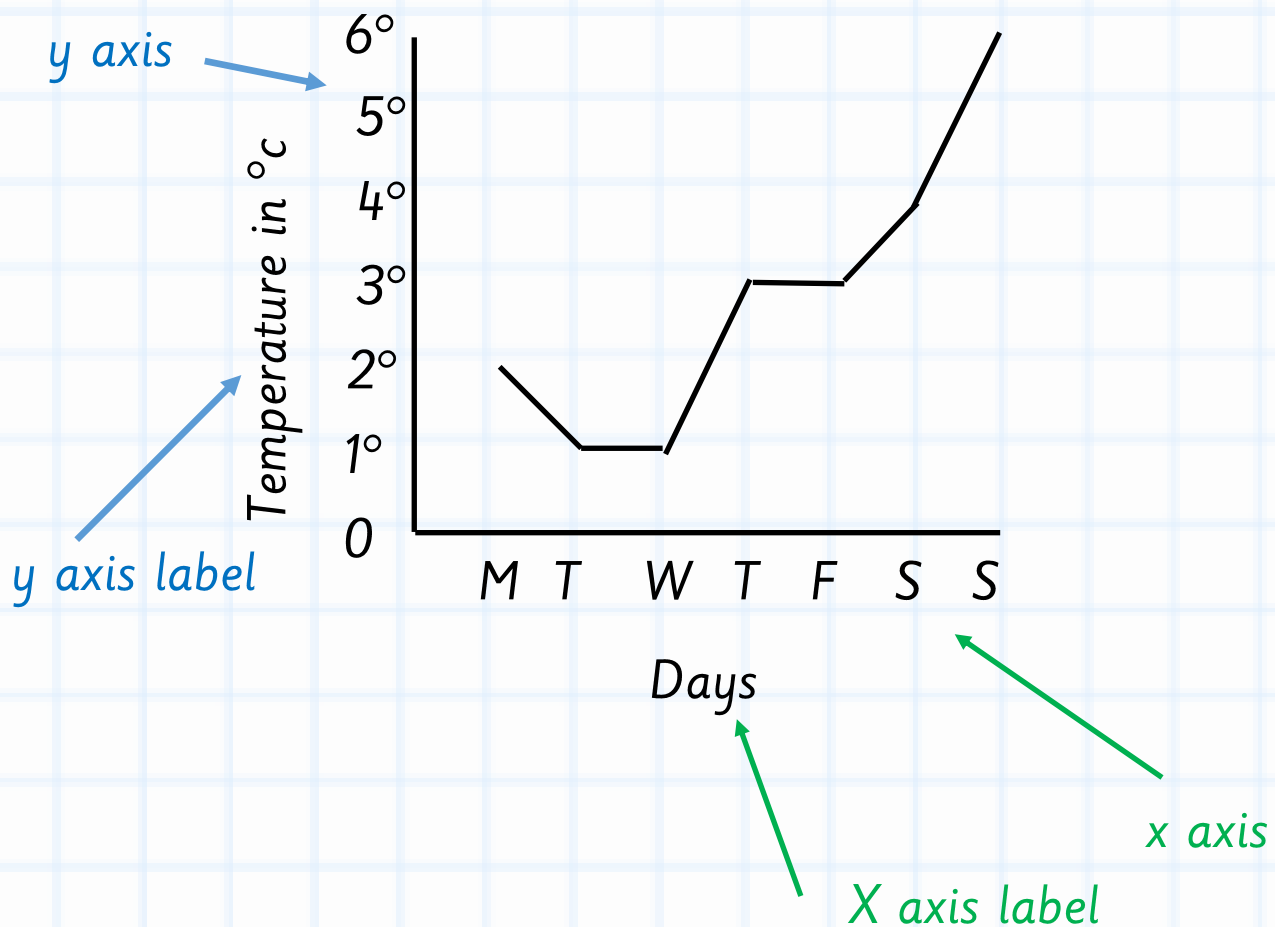
2) Multiply by 5
($6 \times 5 = 30$)

Read and interpret line graphs

Graph title

Line graphs show a change over time.

Graph showing the temperature change over a week



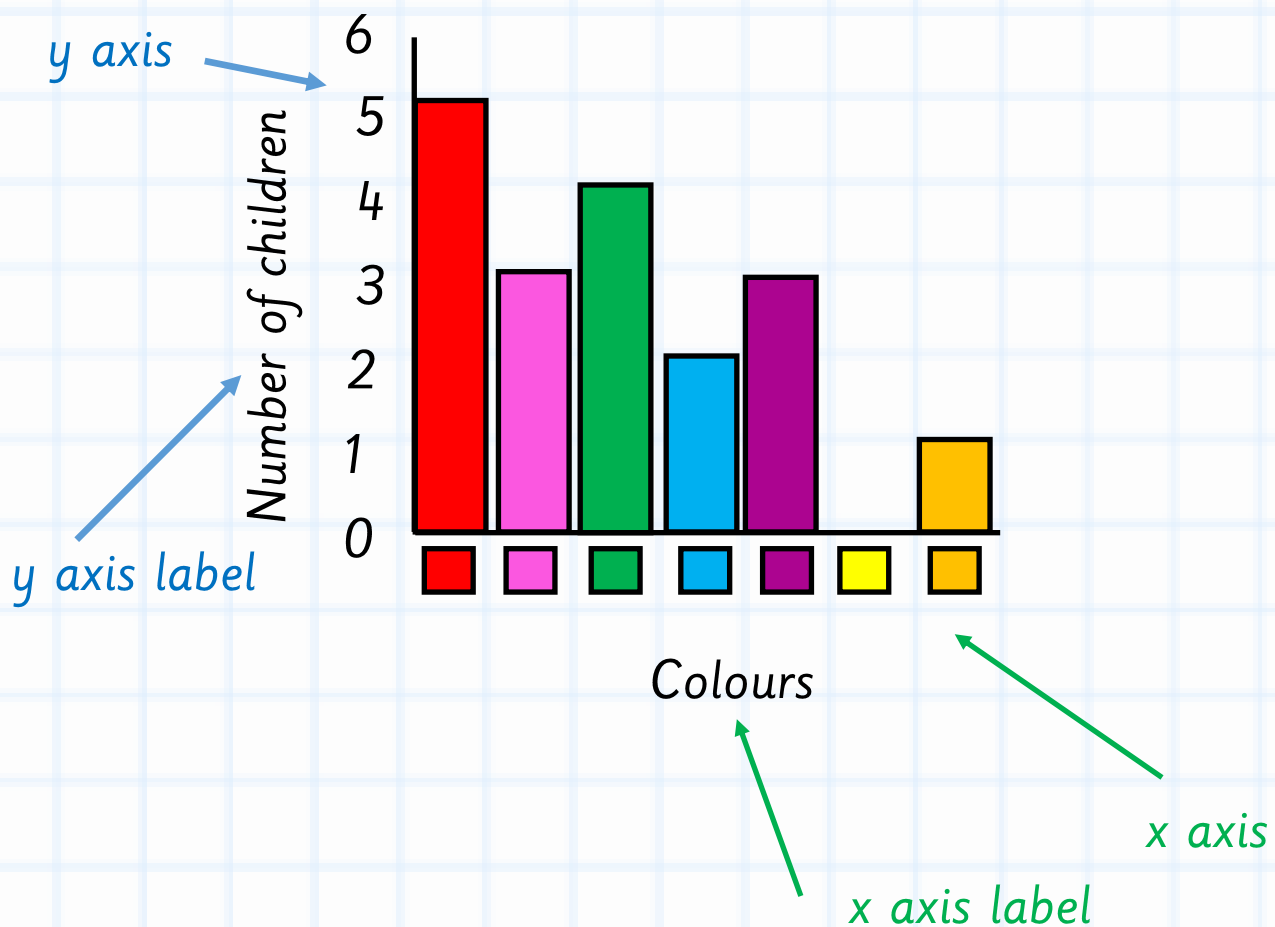
- 1) Read the title and the axes
- 2) Check what the graph is telling you
- 3) Look at the general trends.

Read and interpret bar graphs

Graph title

Bar graphs show a snapshot in time

Graph showing the favourite colours in year 6



- 1) Read the title and the axes
- 2) Check what the graph is telling you
- 3) Look at the general trends.