Year 6
Ratio

Ratio language

Ratio and fractions

Scale factors

The relationship between 2 and 8 can be described as additive or multiplicative.

Additive
$+ 6$
2 8
$- 6$

8 is 6 greater than 2
2 is 6 less than 8

Multiplicative
$\times 4$
2 8
$\div 4$

8 is four times the size of 2
2 is a quarter the size of 8

For every 1 circle, there are 2 triangles.

For every 2 bananas, there are 3 apples.
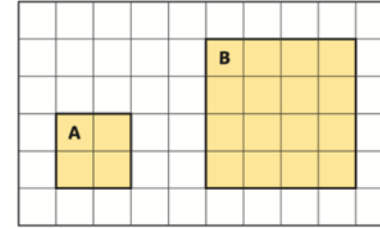
For every 1 football, there are 3 rugby balls.

What fraction of the bar is shaded? $\frac{2}{5}$

What fraction of the bar not shaded? $\frac{3}{5}$

Write the ratio of shaded to non-shaded parts. $2 : 3$

Write the ratio of non-shaded to shaded parts. $3 : 2$

Shape A has been enlarged by a scale factor of 2 to make Shape B.

Shape B is now two times as big as Shape A.

A sequence starts 3, 6, ...

Explain why the next number could be 9

Additive
$+ 3 \quad + 3$
3, 6, 9

Explain why the next number could be 12

Multiplicative
$\times 2 \quad \times 2$
3, 6, 12

The ratio of footballs to rugby balls: 1:4
The ratio of rugby balls to footballs: 4:1

Ratio symbol

The ratio of circles to triangles: 2:3
The ratio of triangles to circles: 3:2

The ratio of apples to bananas: 1:2
The ratio of bananas to oranges: 2:3
The ratio of apples to bananas to oranges: 1:2:3
The ratio of oranges to bananas to apples: 3:2:1

The bar model shows the ratio 1 : 2 : 4

For every 1 blue part, there are 2 yellow parts and 4 green parts.
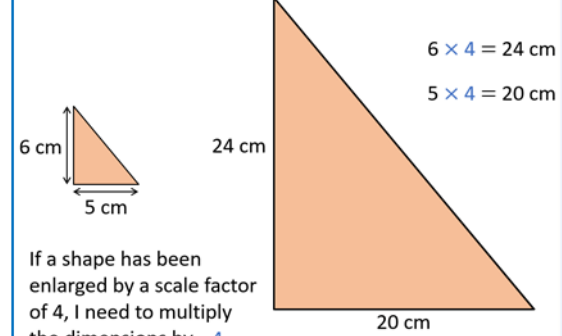
What fraction of the bar is shaded blue? $\frac{1}{7}$

What fraction of the bar is shaded yellow? $\frac{2}{7}$

What fraction of the bar is shaded green? $\frac{4}{7}$

Here is a triangle.
Enlarge the triangle by a **scale factor** of 4

$6 \times 4 = 24$ cm
$5 \times 4 = 20$ cm

6 cm
5 cm
24 cm
20 cm

If a shape has been enlarged by a scale factor of 4, I need to multiply the dimensions by __4__

Ratio represents a multiplicative relationship between a set of values.

For every 4 apples, there are 2 pears.
For every 2 pears, there are 4 apples.

Ratio and proportion problem solving

To use the ingredients for 1 person, you divide all the quantities by 10 (÷ 10).

To use the ingredients for 5 people, you halve all the quantities (÷ 2).

Ingredients for Fruit Smoothie (serves 10 people)

800g of bananas
500g of strawberries
200g of raspberries
700ml of milk
300ml of natural yogurt

To use the ingredients for 20 people, you double all the quantities (× 2).

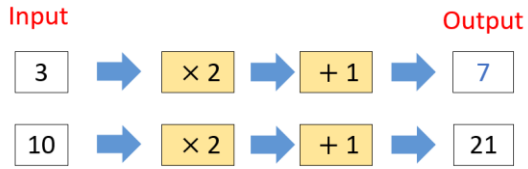In a bag of 15 sweets, there is 1 smiley face sweet for every 4 love heart sweets.

Therefore, there will be 3 smiley face sweets and 12 love heart sweets in the bag.
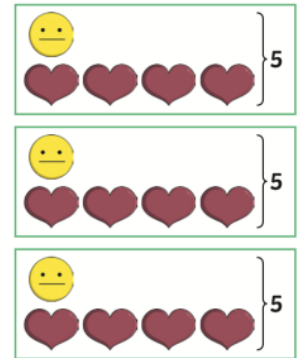
Year 6
Algebra

A function machine is a way of writing rules.

Input → Output

3 → $\times 2$ → $+1$ → 7

10 → $\times 2$ → $+1$ → 21

Substitution

⬤ $= 10$ ▲ $= 5$

What would be the totals of these calculations?

$10 + 5 + 5 = 20$

$10 + 10 + 10 + 5 = 35$

Forming expressions

We can represent these expressions.

$3x + 3$

$4 + x$
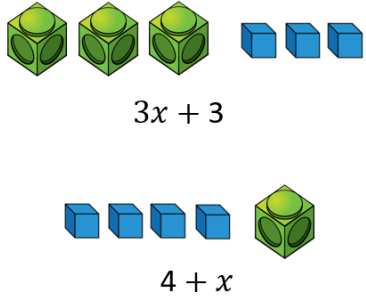
We can write an algebraic **expression** to represent the perimeter of the rectangle.

a
$b \quad b$
a

$2a + 2b$
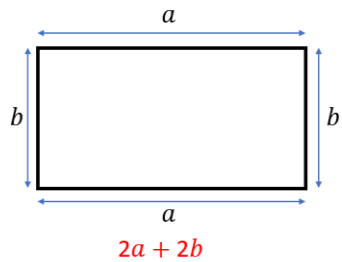
Substitution

If $m = \frac{1}{4}$ and $n = 0.2$

work out the value of $m + 3n$

$\frac{1}{4} + 3(0.2)$

$\frac{1}{4} + 0.6$

$0.25 + 0.6 \quad = 0.85$

Equation

$x + 5 = 11$

x is a specific unknown value

Forming equations

Solving equations

Alex and Tommy have the same number of sweets.

Sweets Sweets

Form an equation to represent this.

$2s + 2 = 10$

A **formula** is a rule or relationship that uses **letters** to **represent amounts** which can be changed.

Formula

| (s) Number of squares	1	2	3	4	80
(c) Number of circles	2	4	6	8	160

$\times 2$

$c = 2s$

$c = 2 \times 80$

A babysitter charges (c) £9 per hour (h) and £3 for travel.

$c = 9h + 3$

A bar model to represent each **equation.**

$3c = 18$

	18	
c	c	c

$8 + 4 = x$

x	
8	4

$2s + 2 = 10$
$-2 \quad -2$
$2s = 8$

$2s + 2 = 10$
$-2 \quad -2$
$2s = 8$
$\div 2 \quad \div 2$
$s = 4$

8		2
s	s	2

$2s + 2 = 10$
$-2 \quad -2$
$2s = 8$
$\div 2 \quad \div 2$
$s = 4$


Vocabulary
algebra
function machine
inverse
input   output
rule
expression
represent
substitution
worth
value
formula
formulae
equation
solution

Year 6 Decimals

Partitioning Numbers

T	O	Tth	Hth	Thth

There are _2_ tens, _4_ ones, _4_ tenths, _3_ hundredths and _1_ thousandth.

The number is __24.431__

Rounding 4.8 to the nearest integer.

$$4 \quad\quad\quad\quad\quad 4.8 \quad\quad 5$$

The previous integer is ___4___
The next integer is ___5___
___4.8___ is closer to ___5___ than ___4___
4.8 rounded to the nearest integer is ___5___

Gattegno Chart

100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

The red counter is 10 times greater than the blue counter.
The **black** counter is 100 times smaller than the green counter.

Vocabulary

decimal
decimal places
represent
tenth
hundredth
thousandths
digit
greater / less
10 times the size of
one tenth the size of
integers
value
rounding   multiple

Part-whole model.

3
0.6
0.02
3.627
0.007
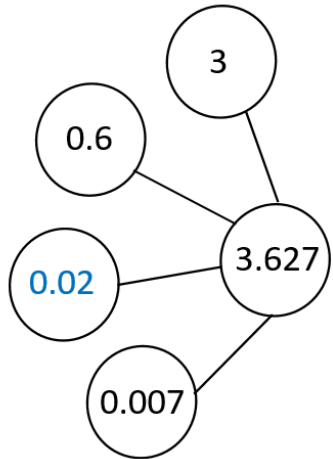
$3 + 0.6 + \underline{0.02} + 0.007$

Add and subtract decimals

$15.027 + 9.58 = 24.607$

$0.468 - 0.28 = 0.188$

T	O	.	Tth	Hth	Thth
1	5	.	0	2	7
+ 0	9	.	5	8	0
2	4	.	6	0	7
1			1		

O	.	Tth	Hth	Thth
0	.	³4̸	¹6	8
− 0	.	2	8	0
0	.	1	8	8

I can exchange 1 tenth for 10 hundredths

Multiplying decimals by integers

$3.21 \times 3 = 9.63$

	3	.	4	5
×				3
1	0	.	3	5
	1		1	

Multiplying by 10, 100 and 1000

1) To multiply a number by 10 each digit moves __1__ to the left on a place value grid.

2) To multiply a number by 100 each digit moves __2__ to the left on a place value grid.

3) To multiply a number by 1,000 each digit moves __3__ to the left on a place value grid.

Th	H	T	O
		7	8
	7	8	0
7	8	0	0
7	8	0	0

$78 \times 10 = 780$
$78 \times 100 = 7,800$
$78 \times 1,000 = 78,000$

Dividing by 10, 100 and 1000

1) To divide a number by 10 each digit moves __1__ to the right on a place value grid.

2) To divide a number by 100 each digit moves __2__ to the right on a place value grid.

3) To divide a number by 1,000 each digit moves __3__ to the right on a place value grid.

TTh	Th	H	T	O
4	7	0	0	0
	4	7	0	0
		4	7	0
			4	7

$47,000 \div 10 = 4,700$
$47,000 \div 100 = 470$
$47,000 \div 1,000 = 47$

Year 6
Fractions decimals and percentages

Percentages

The hundred square is worth 1

The whole has been divided into _100_ equal parts.
Each part is worth _0.01_
_11_ parts out of _100_ are shaded.   0.11 $\frac{11}{100}$

Fractions can be expressed as divisions.

$$\frac{1}{6} = 1 \div 6$$

$\frac{1}{5}$ $\qquad$ $\frac{7}{9}$ $\qquad$ $\frac{112}{137}$

$1 \div 5$ $\qquad$ $7 \div 9$ $\qquad$ $112 \div 137$

$$\frac{1}{20} = 1 \div 20$$

$$0.05$$
$$20 \overline{) 1.^{1}0^{10}0}$$

$$\frac{1}{20} = 0.05$$

Percent means parts out of 100

There are _37_ parts out of a hundred shaded.
This is _37_ %

Converting $\frac{2}{5}$ to a decimal.

$\times 20$

$$\frac{2}{5} = \frac{40}{100}$$

$\times 20$

To find an equivalent fraction, whatever you do to the numerator, do to the denominator.

$$\frac{40}{100} = 0.40 \qquad 0.4$$

Fractions, decimals and percentages

= 1	= 1	= 100%
= ½	= 0.5	= 50%
= ⅓	= 0.33	= 33.3%
= ¼	= 0.25	= 25%
= ⅕	= 0.2	= 20%
= ⅛	= 0.125	= 12.5%
= ⅒	= 0.1	= 10%
= 1/100	= 0.01	= 1%

Everything $\qquad$ $\frac{100}{100}$

100%

All $\qquad$ The whole

Find four different ways of making 45%

$45\% = 40\% + 5\%$

$45\% = 20\% + 20\% + 5\%$

$45\% = 50\% - 5\%$

$45\% = 4 \times 10\% + 5\%$

Find a percentage of an amount

120

12

10% of 120 = 12

120 ÷ 10 = 12

To find 10% of a number, I need to divide by _10_

Find 1% of 200

The whole is worth 200

$200 \div 100 = 2$
1% of $200 = 2$

To find 1% of a number, I need to divide by _100_

How could we calculate 15% of 80?

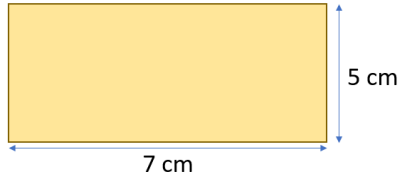15% of $80 = 8 + 4$ 10%   5%
15% of $80 = 12$

80

| 8 | 4 | 4 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

10% 5%

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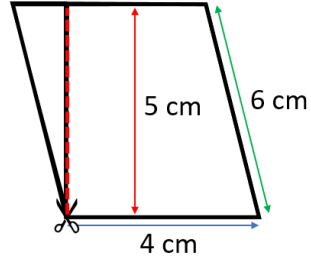
Year 6
Area and Perimeter and Volume

Find the perimeter and area of this rectangle.

5 cm

7 cm

The formula to find the perimeter of a rectangle is: $2l + 2w$

$2 \times 7 + 2 \times 5 = 24$ cm

The formula to find the area of a rectangle is: $l \times w$

$7 \times 5 = 35$ cm²

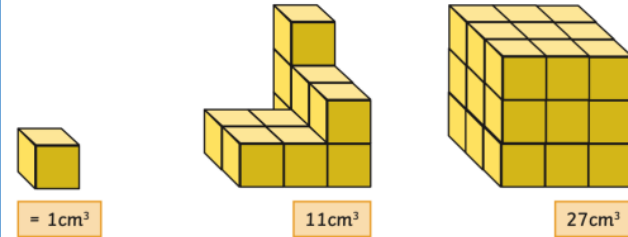Area of a **rectilinear** shape.

2 cm

2 cm   4 cm²

6 cm

3 cm   24 cm²   5 cm

8 cm

6×4
24 cm²

3×2
6 cm²
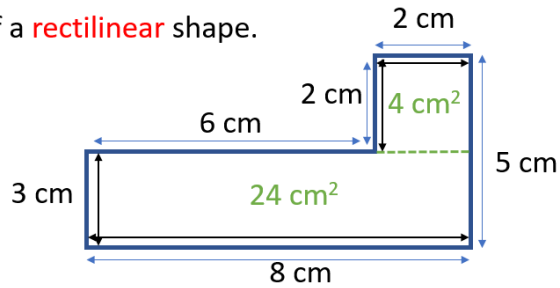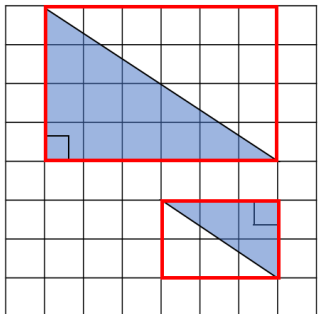
Area of triangles

12

3 cm²

The area of the right-angled triangle is half the area of the rectangle.

Area of parallelograms

5 cm   6 cm

4 cm

Area of a parallelogram = **Base** × **Perpendicular height**
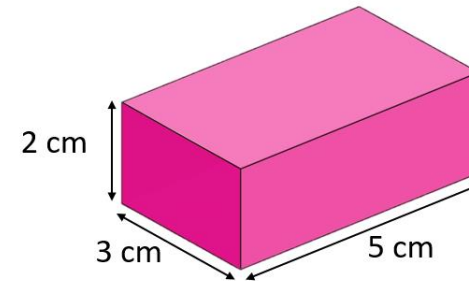
20 cm² = **4 cm** × **5 cm**

---

9 cm   7 cm

4 cm
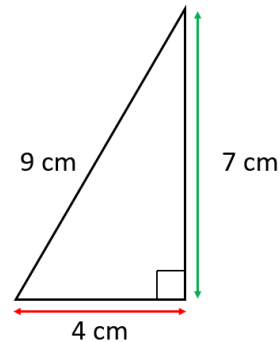
14 cm²

Area of a triangle = $\dfrac{\text{Base} \times \text{Perpendicular height}}{2}$

Area of a triangle = $\dfrac{1}{2} \times$ **Base** × **Perpendicular height**

$= \dfrac{1}{2} \times 4 \times 7$

Volume of cuboids

Volume – counting cubes

= 1cm³   11cm³   27cm³

Volume of a cuboid.

2 cm

3 cm   5 cm

Volume of a cuboid = **Length** × **Width** × **Height**

$= 5$ cm $\times 3$ cm $\times 2$ cm

$= 30$ cm³

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Year 6 Statistics

Line graphs

Line graphs are used to show changes to a measurement over time.

Data shown in a line graph is continuous. Sets of points are joined together to make the line.

Distance a car travelled
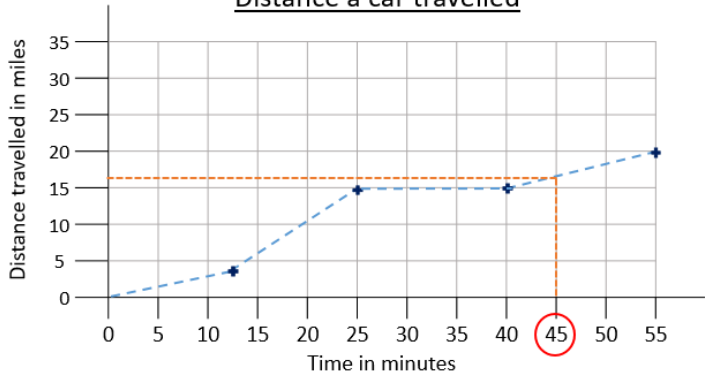
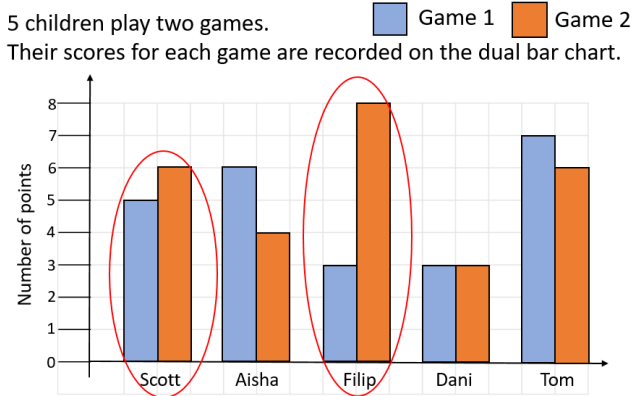Estimate the distance travelled in 45 minutes.   **16 miles**

Pie charts represent discrete data.

A circle is divided into segments, where each segment represents a data category. The size of each segment matches its proportion of the total amount.
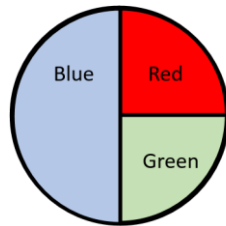

Dual bar charts

5 children play two games. Their scores for each game are recorded on the dual bar chart.

Game 1   Game 2

How many children got a higher score on their second game?

2 children

Pie charts

Favourite colours

What fraction is red? $\frac{1}{4}$

What fraction is green? $\frac{1}{4}$

What fraction is blue? $\frac{2}{4}$ or $\frac{1}{2}$

__Two__ times as many prefer blue compared to red.

__Half__ as many prefer green as they do blue.
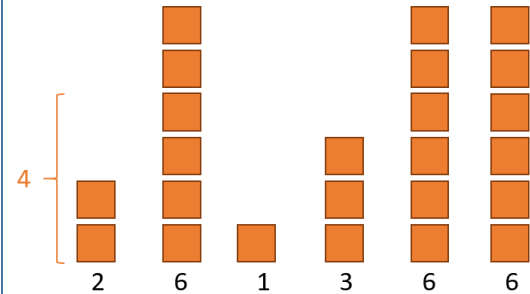
Mean average

The mean is the average of a set of data.

Mean = Total ÷ number of items
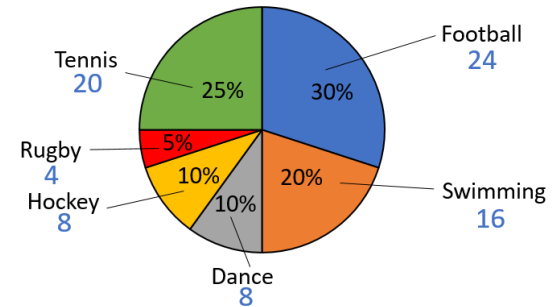
2 6 1 3 6 6   = 24

$24 \div 6 = 4$

The mean of this set of numbers is 4

2   6   1   3   6   6

Mean = 4

80 children were asked to choose their favourite sport from six options.

Tennis 20   Football 24
Rugby 4   Swimming 16
Hockey 8   Dance 8

Work out the number of children who chose each sport.

20% of 80 = 16   30% of 80 = 24   25% of 80 = 20

10% of 80 = 8   5% of 80 = 4

A full turn is equal to 360°

360° represents 100% of the data within a pie chart.

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