

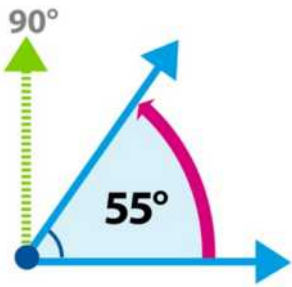
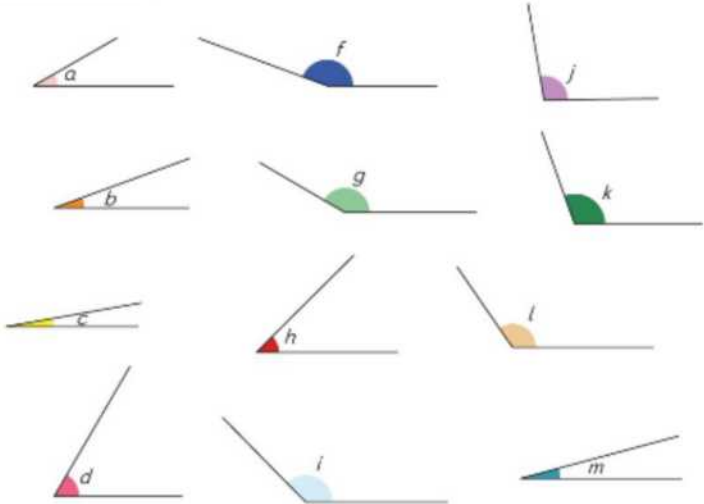

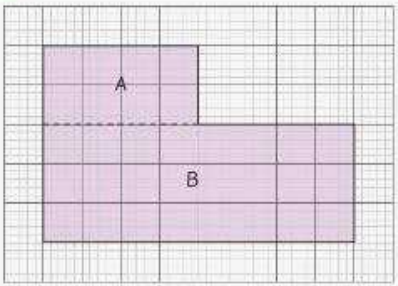

# *Riversdale Primary School*



# *Mathematics Dictionary*

*(Images sourced from Maths! No Problem Website and Leo Academy Trust)*



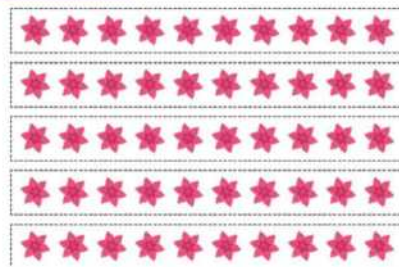
<p><b>Acute angles</b></p>	<p>An acute angle is any angle smaller than a right angle (<math>90^\circ</math>).</p> 
<p><b>Algebra</b></p>	<p>Algebra is about seeing mathematical patterns, understanding the patterns and describing them using words and symbols. Patterns that are true in lots of different situations are called generalisations.</p> <div style="background-color: #e0f0e0; padding: 10px; border: 1px solid #ccc; margin: 10px auto; width: fit-content;"> <math display="block">x - 2 = 2</math> <math display="block">x = 2 + 2</math> <math display="block">x = 4</math> </div>
<p><b>Angles</b></p>	<p>An angle is the amount of turn between two lines joined at a vertex. The measure of an angle is the amount that you would need to turn one line to sit exactly on top of the other one. The lines on either side of an angle are called arms. Angles are measured in degrees (<math>^\circ</math>).</p> 
<p><b>Approximation (<math>\approx</math>)</b></p>	<p>Approximating means to make a rough guess when estimating. The approximation sign means “approximately equal to”.</p> <p>For example, <math>13 \div 3 \approx 4</math></p> 
<p><b>Area</b></p>	<p>Area is the amount of space a shape covers. You measure area in square units, for example, square millimetres (<math>\text{mm}^2</math>), square centimetres (<math>\text{cm}^2</math>) or square meters (<math>\text{m}^2</math>).</p>  <div style="margin-left: 20px;"> <p>Area of A = <math>2 \times 4 \text{ cm}^2</math> = <math>8 \text{ cm}^2</math></p> <p>Area of B = <math>3 \times 8 \text{ cm}^2</math> = <math>24 \text{ cm}^2</math></p> <p>Area of  = <math>8 \text{ cm}^2 + 24 \text{ cm}^2</math> = <math>32 \text{ cm}^2</math></p> </div>

## Array

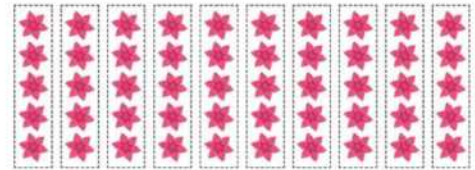
An array is either a picture or items (such as objects, numbers, etc.) arranged in rows and columns. These are used to represent multiplication equations.

How many flowers are there?

Let's Learn



5 groups of 10  
 $5 \times 10$



$5 \times 10 = 50$   
 $10 \times 5 = 50$   
They are equal.

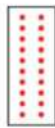
There are 50 flowers.



10 groups of 5  
 $10 \times 5$

Multiply.

(a)



$$10 \times 2 = 20$$

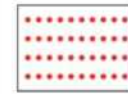


$$2 \times 10 = 20$$

(b)



$$10 \times 4 = 40$$



$$4 \times 10 = 40$$

## Ascending

Ascending order is a list of numbers that goes up, or increases, in value.



## Associative law/property of addition

Brackets around numbers tell you which part of a calculation to work out first. But if the calculation only contains adding, the grouping doesn't affect the answer. This is called the associative law of addition, written as  $(a + b) + c = a + (b + c)$ .

(Associative Property of Addition)

$$(2+3)+4 = 2+(3+4)$$

Do first! Do first!

$$5+4=9 \quad \text{is the same as} \quad 2+7=9$$

## Associative law/property of multiplication

Brackets around numbers tell you which part of a calculation to work out first. But if the calculation only contains multiplication, the grouping doesn't affect the answer. This is called the associative law of multiplication, written as  $(a \times b) \times c = a \times (b \times c)$ .

### Associative Property of Multiplication

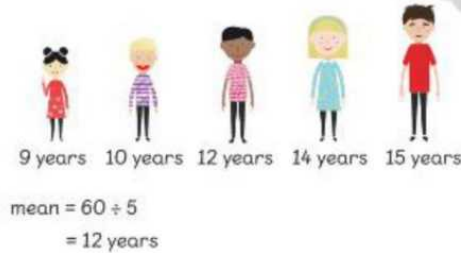
$$(a \times b) \times c = a \times (b \times c)$$

$$(5 \times 2) \times 4 = 5 \times (2 \times 4)$$

## Average

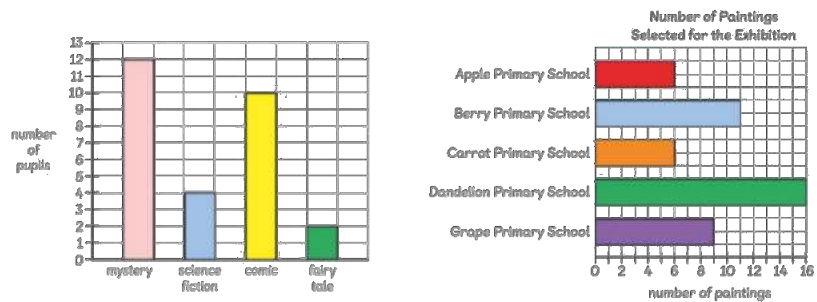
An average is a piece of information that you use to represent a whole set of data. There are three different kinds of average: mode, mean, median and range. We generally work out the mean.

Find the mean age.

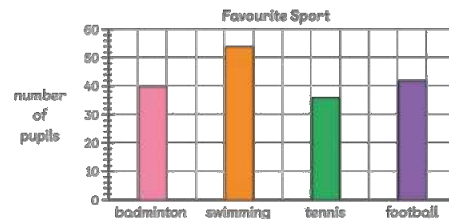


## Bar graph

A bar chart/graph uses bars to show frequency. The bars are the same width, but their heights vary with the frequency they're showing.

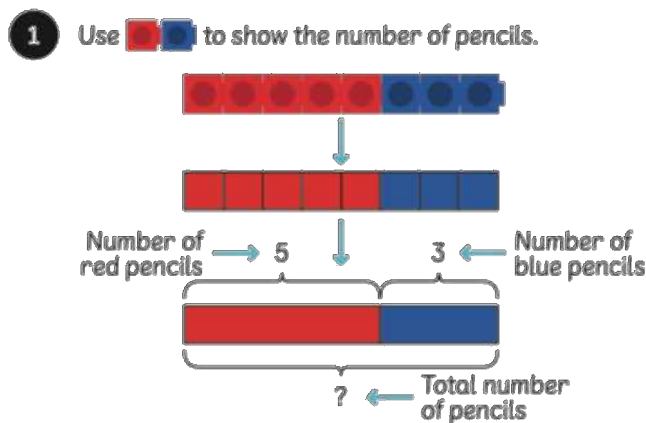


The bar graph shows the number of pupils who like different sports.



## Bar Model

A bar model is a model that represents a mathematical problem. It is just one of the heuristics (strategies we can adopt to solve mathematical problems) we can use to understand a problem. There are a number of different types of bar models.



There are 8 pencils altogether.

Draw bars to show each number.



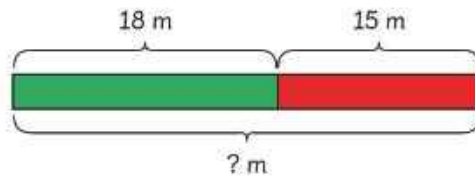
**Bar Model:**

**Addition & Subtraction**

**Part-Whole Model:**

**Part + Part = Whole**

Emma buys 18 m of red cloth and 15 m of blue cloth.  
What is the total length of cloth that she buys?



Should we add or subtract?

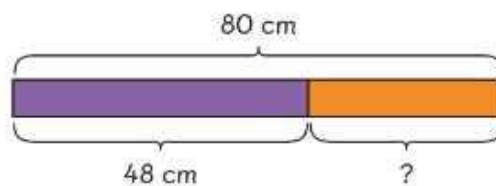


$$18 + 15 = 23$$

Emma buys **25** of cloth altogether.

**Whole – Part = Part**

Ruby has a ribbon that is 80 cm long.  
She cuts a piece that is 48 cm long to make a bow.  
What is the length of ribbon left?



What equation can we write?

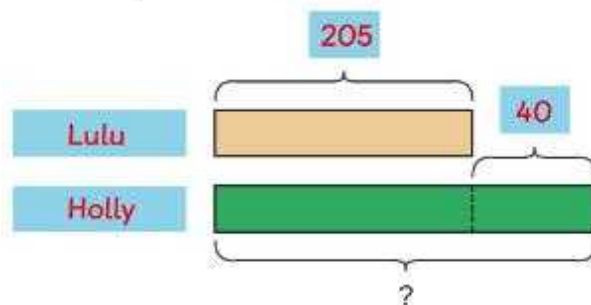


$$80 - 48 = 32$$

**Comparison Model:**

**Smaller quantity + difference = larger quantity**

Lulu has 205 beads.  
Holly has 40 more beads than Lulu.  
How many beads does Holly have?



Who has more beads?



$$205 + 40 = 245$$

Holly has **245** beads.

Should we add or subtract?

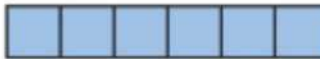


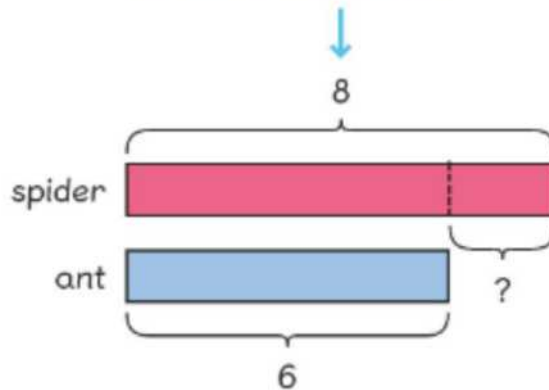
Larger quantity – smaller quantity = difference

A spider has 8 legs.

An ant has 6 legs.

spider 

ant 



A spider has 2 more legs than an ant.

Bar Model:

Multiplication & Division

Part-Whole Model:

One part  $\times$  number of parts = whole

Elliott bought 4 bags of rice.  
Each bag has a mass of 3 kg.



$$4 \times 3 = 12$$

The total mass of the 4 bags of rice is 12 kg.

$$3 + 3 + 3 + 3 = 12$$

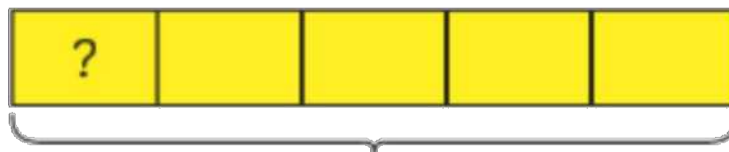


Whole  $\div$  number of parts = one part

The total mass of 5 bags of flour is 40 kg.

Each bag of flour has the same mass.

What is the mass of each bag of flour?



40 kg

$$40 \div 5 = 8$$

The mass of each bag of flour is 8 kg.

Other: Whole  $\div$  one part = number of parts

**Comparison Model:**

**Larger quantity  $\div$  multiple = smaller quantity**  
**Smaller quantity  $\times$  multiple = larger quantity**

**In Focus**

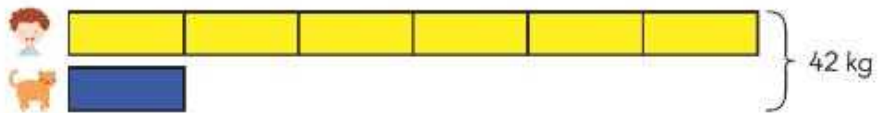
Elliott is 6 times as heavy as his cat.  
This is what the weighing scale reads.



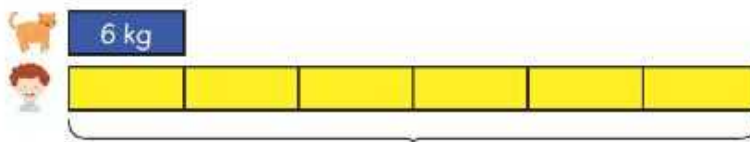
Is it possible to find out Elliott's mass?

**Let's Learn**

- 1 This is Sam's method.  
Their total mass is 42 kg.



$$42 \text{ kg} \div 7 = 6 \text{ kg}$$



Elliott is 36 kg.

**Other: Larger quantity  $\div$  smaller quantity = multiple**

**Bar Model:**

**Fractions**

**Part-Whole Model:**

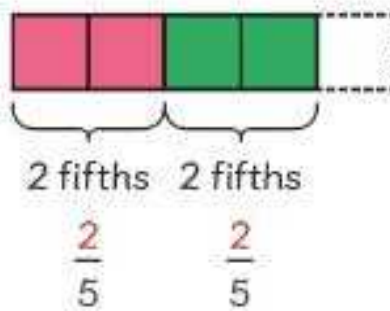
**Identifying Fractions**

Show  $\frac{3}{4}$  of a rectangle.

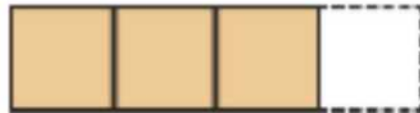


## Adding Fractions

Add  $\frac{2}{5}$  and  $\frac{2}{5}$ .



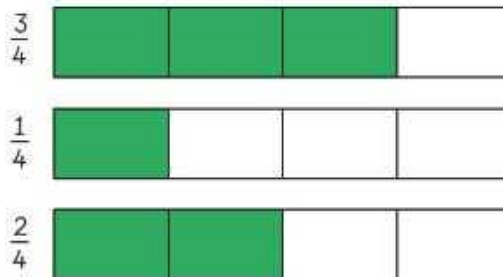
## Subtracting Fractions



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

## Comparison Model:

### Comparing Fractions



## Finding Equivalent Fractions

Is it possible to write  $\frac{2}{3}$  as  $\frac{8}{12}$  ?



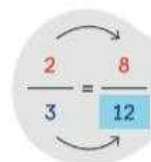
### Let's Learn



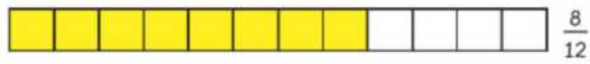
Let's put these 2 parts into 8 equal parts.

The 2 parts become 8 equal parts.  
Each part is a twelfth.

$$\frac{2}{3} = \frac{8}{12}$$



## Simplifying Fractions



$$\frac{8}{12} = \frac{4}{6} = \frac{2}{3}$$

We say  $\frac{2}{3}$  is the simplest form of  $\frac{8}{12}$ .

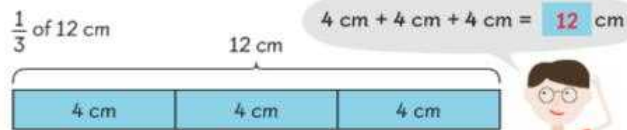
What do you notice?



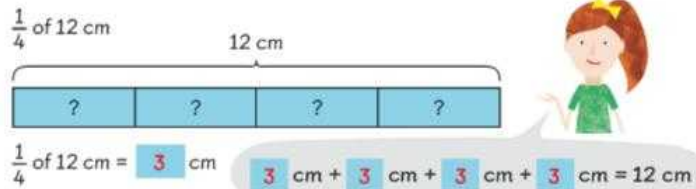
## Finding Fractions of Quantities



$\frac{1}{2}$  of 12 cm = 6 cm



$\frac{1}{3}$  of 12 cm = 4 cm

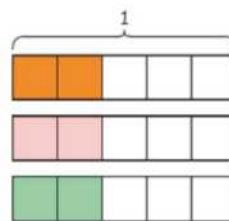
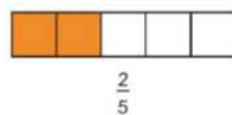


$\frac{1}{4}$  of 12 cm = 3 cm

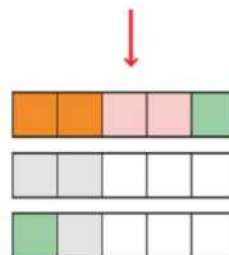
$3 \text{ cm} + 3 \text{ cm} + 3 \text{ cm} + 3 \text{ cm} = 12 \text{ cm}$

## Multiplying Fractions by Whole Numbers

Find the value of  $3 \times \frac{2}{5}$ .



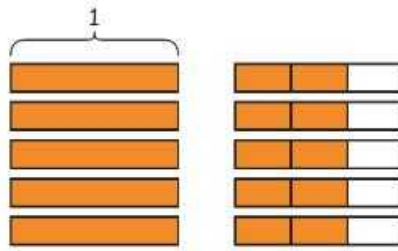
$3 \times 2$  fifths  
= 6 fifths



$3 \times \frac{2}{5} = \frac{6}{5} = 1\frac{1}{5}$



## Multiplying Mixed Numbers



$$\begin{aligned} 5 \times 1\frac{2}{3} &= 5 + \frac{10}{3} \\ &= 5 + 3\frac{1}{3} \\ &= 8\frac{1}{3} \end{aligned}$$



$$5 \times 1 = 5$$



$$5 \times 2 \text{ thirds} = 10 \text{ thirds}$$

They had  $8\frac{1}{3}$  mini cake rolls.

## Multiplying Fractions

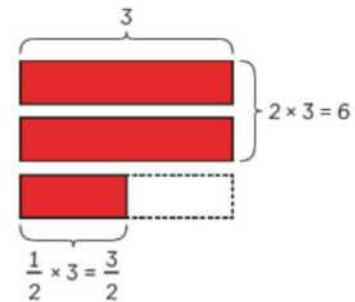


The gift box costs  $2\frac{1}{2}$  times as much as the crayons.

How much does the gift box cost?

### Let's Learn

$$\begin{aligned} 1 \quad 2\frac{1}{2} \times 3 &= 6 + \frac{3}{2} \\ &= 6 + 1\frac{1}{2} \\ &= 7\frac{1}{2} \end{aligned}$$



The gift box costs £7.50.

## Dividing Fractions by Whole Numbers

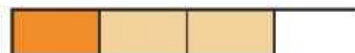
$$1 \quad \frac{3}{4} \div 3 = \frac{1}{4}$$



Each person gets  $\frac{1}{4}$  of the bar of chocolate.

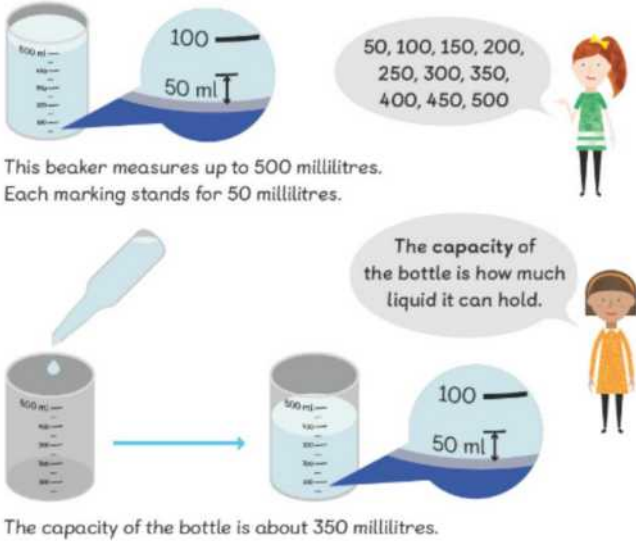
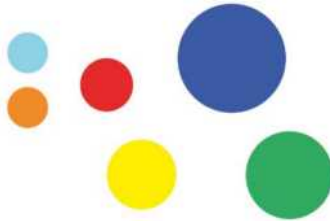
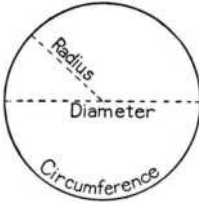
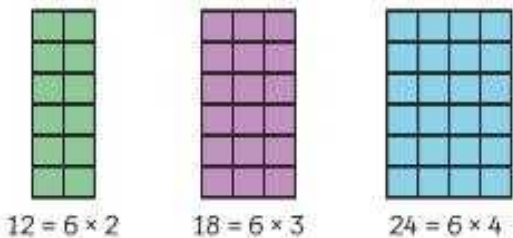
$$\frac{3}{4} \div 3 = \frac{1}{4}$$

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



I receive a fraction of  $\frac{3}{4}$  of the bar.

$$\frac{3}{4} \div 3 = \frac{1}{3} \times \frac{3}{4} = \frac{1}{4}$$

<p><b>Capacity</b></p>	<p>Capacity is the amount a container can hold. For example, this might be the amount of milk in a carton or the amount of air in a balloon. The metric units for measuring capacity are millilitres (ml), centilitres (cl), cubic centimetres (cm<sup>3</sup>) and litres.</p> 
<p><b>Century</b></p>	<p>A century in time is 100 years.</p>
<p><b>Circles</b></p>	<p>A circle is a flat round shape made by a single curved line. Every point on the edge of a circle is exactly the same distance from the middle. Several parts of a circle have their own names.</p> 
<p><b>Circumference</b></p>	<p>A circle's circumference is the total distance around the edge.</p> 
<p><b>Common Factors</b></p>	<p>Common factors are numbers that divide exactly into two or more numbers to give a whole number. For example, the common, or same, factors of 12, 18 and 24 are 3 and 6. These can also be used to simplify fractions</p>  <p>6 is also a common factor of 12, 18 and 24.</p>

$\frac{8}{12} = \frac{2}{3}$   
 Cut the roll into 3 equal pieces.  
 I will take 2 pieces.  
 $\frac{8}{12} = \frac{2}{3}$   
 4 is a common factor of 8 and 12.  
 $\frac{2}{3}$  is a fraction in the simplest form.

**Common Multiples**

A number that's a multiple of two or more numbers is a common multiple. For example, 12 is a common multiple of 4 and 6. The lowest common multiple of two or more numbers is the smallest number that is a multiple of both.

Find common multiples of 20 and 15.

$1 \times 20 = 20$	$1 \times 15 = 15$
$2 \times 20 = 40$	$2 \times 15 = 30$
$3 \times 20 = 60$	$3 \times 15 = 45$
$4 \times 20 = 80$	$4 \times 15 = 60$
$5 \times 20 = 100$	$5 \times 15 = 75$

60 is a common multiple of 20 and 15.

**Commutative Law of Addition**

The commutative law of addition means it doesn't matter what order you add numbers in: the answer is always the same. For example:

6 blue chairs      12 red chairs

How many chairs are there altogether?

**Let's Learn**

$6 + 12 = 18$  or  $12 + 6 = 18$

There are 18 chairs altogether.

When do we add or subtract?

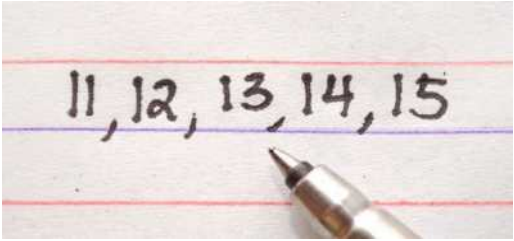
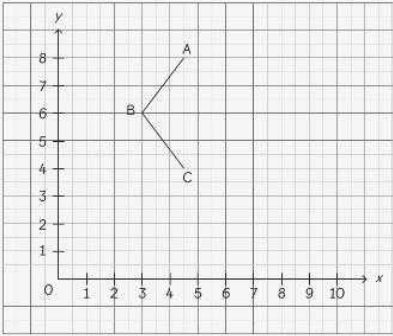
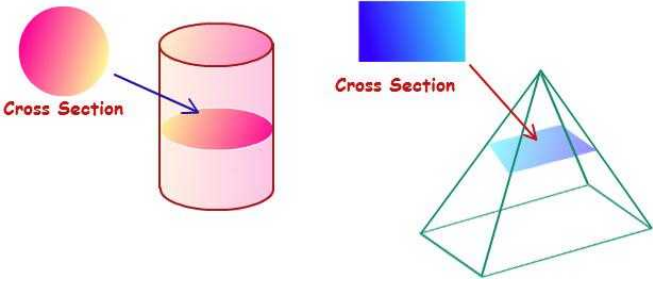
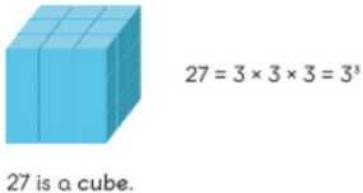
**Commutative Law of Multiplication**

The commutative law of multiplication means you can multiply numbers in order: the answer stays the same. For example:

4 rows of 8  
 $4 \times 8 = 32$

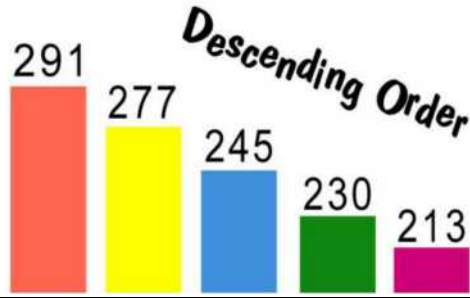
$4 \times 8 = 8 \times 4$

8 rows of 4  
 $8 \times 4 = 32$

<p><b>Composite Number</b></p>	<p>A composite number has three or more factors. For example, 10 have four factors: 1, 2, 5 and 10, so it is composite. Except for 2 all even numbers are composite. Every number greater than 1 is either a prime number or a composite number.</p>
<p><b>Consecutive Number</b></p>	<p>Consecutive numbers are whole numbers which follow each other in order, without gaps, from smallest (lowest value) to largest (greatest value).</p> 
<p><b>Coordinates</b></p>	<p>Coordinates are a pair of numbers that describes the position of a point on a grid. To find a point's coordinates, you need to look at the numbers of the lines it sits on.</p> <p>First look at the number of the line along the x-axis (horizontal), and next the number of the line up the y-axis (vertical). Then write the coordinates in brackets with a comma between the numbers, like this: (x, y).</p> 
<p><b>Cross Section</b></p>	<p>A cross section is a flat surface you make by cutting straight across through a solid.</p> 
<p><b>Cube Numbers</b></p>	<p>When you multiple a number by itself and then by itself again, you get a cube number. For example, multiplying <math>2 \times 2 \times 2</math> gives the cube number 8. This is written as <math>2^3</math>.</p>  <p>27 is a cube.</p>
<p><b>Decade</b></p>	<p>A decade is ten years.</p>

**Descending**

A list of numbers that decreases (goes down) in value are in descending order.



**Decimal**

A decimal is made up of whole numbers and parts of whole numbers, separated by a dot called a decimal point.

tens	ones	tenths	hundredths
1	8	3	0

**Decimal Fraction**

A decimal fraction is a decimal number that is less than 1. For example, 0.25 is a decimal fraction. 0.25 stands for  $0 + 2/10 + 5/100$ .

Write each number shown by the shaded part as a decimal.

(a)   
0.1

(b)   
0.7

(c)   
0.4

**Decimal Places**

A digit's position after the decimal point is its decimal place. You usually see decimals written with 1, 2 or 3 digits after the decimal point. They are written to 1, 2 or 3 decimal places.

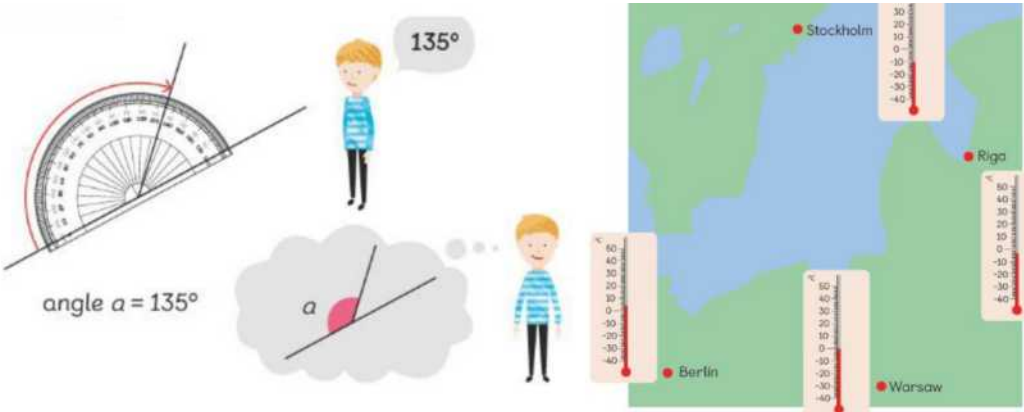
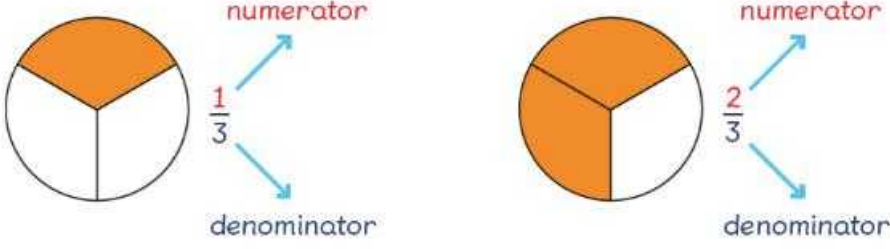
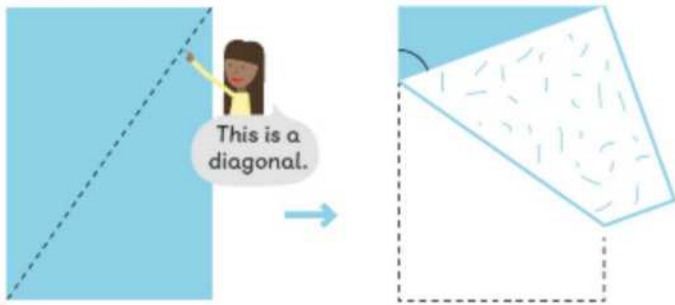
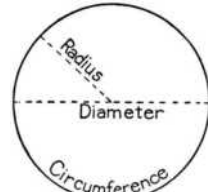
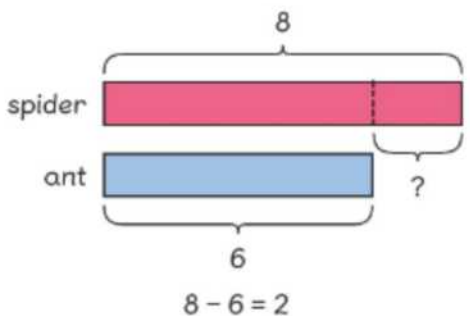
1 makes 1 1 1 0.1 0.1

ones	tenths
3	2

tens	ones	tenths	hundredths
1	8	3	0

9 . 0 1 2

ones	hundredths	thousandths
5	4	2

<p><b>Degree (°)</b></p>	<p>The unit of measurement we use for measuring angles and temperatures.</p> 
<p><b>Denominator</b></p>	<p>The bottom part of a fraction is called the denominator. It shows how many equal parts are in the whole/the size of the parts and the numerator shows how many of them you are talking about.</p>  <p>The numerator tells us the number of pieces. The denominator tells us the size of the pieces.</p>
<p><b>Diagonal</b></p>	<p>A diagonal is a line that joins two vertices that are not next to each other.</p> 
<p><b>Diameter</b></p>	<p>A diameter is a straight line through the middle of a circle that joins two points on its edge. A diameter is twice as long as a radius.</p> 
<p><b>Difference</b></p>	<p>To find the difference between 2 numbers, you need to take the smaller number away from the larger one. E.g. the difference between 8 and 6 is 2.</p>  <p><math>8 - 6 = 2</math></p> <p>A spider has 2 more legs than an ant</p>

## Digit

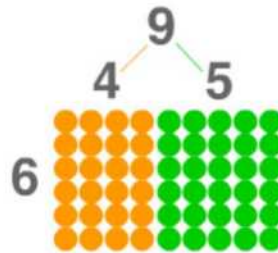
A digit is any of the ten symbols 0-9. You can use digits to make larger numbers. This number is made up of the digits 1, 8, 3 and 0.

tens	ones	tenths	hundredths
1	8	3	0

## Distributive Law of Multiplication

Sometimes it is easier to multiply a number if you split it up. This is called the distributive law of multiplication:  $(a + b) \times c = (a \times c) + (b \times c)$ .

distributive law, rule or property



$6 \times 9$ is the same as $6 \times (4 + 5)$ which equals $(6 \times 4) + (6 \times 5)$ which equals $24 + 30$ which equals $54$	or	$6 \times 9$ $6 \times (4 + 5) = (6 \times 4) + (6 \times 5)$ $6 \times 9 = 24 + 30$ $54 = 54$
--	----	---

other examples

$$2 \times (4 + 5) = (2 \times 4) + (2 \times 5)$$
$$3 \times 12 = (3 \times 10) + (3 \times 2)$$
$$4 \times 9 = (4 \times 6) + (4 \times 3)$$

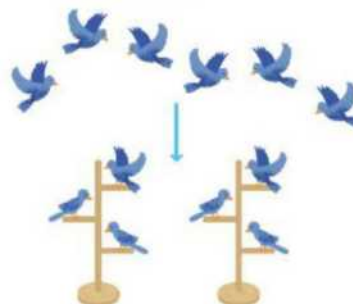
multiplying a number is the same as multiplying its addends by the number, then adding the products

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## Dividing

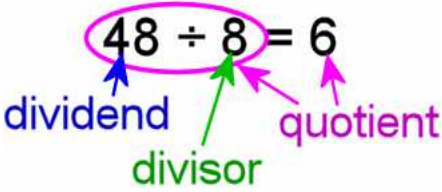


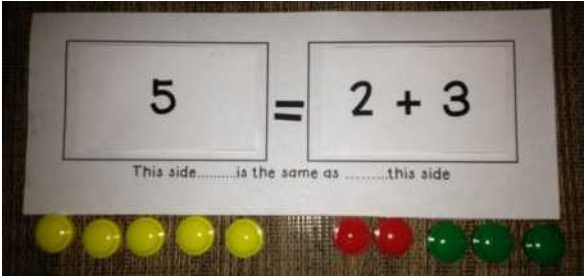
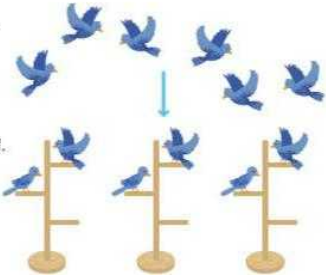
Dividing is a quick way of subtracting several lots of the same number or quantity or splitting it up into equal groups. Multiplication and division are the opposite, inverse, of each other. You can divide by sharing or grouping. Other words linked to division: share, group, divide, divide into, divided by, divisible by.

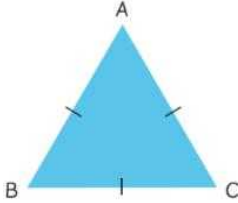
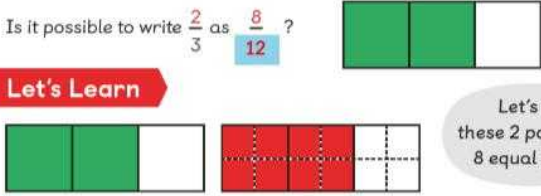
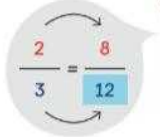
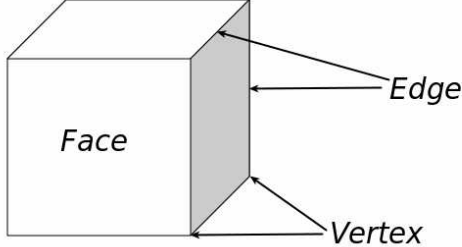
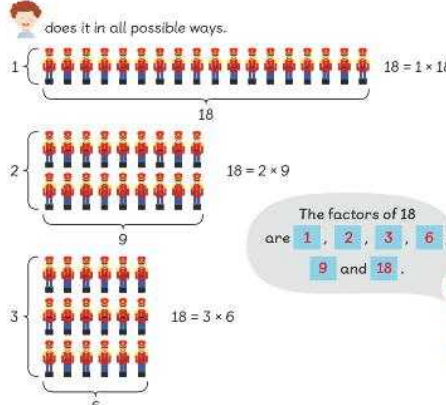
Put the birds in groups of 3.


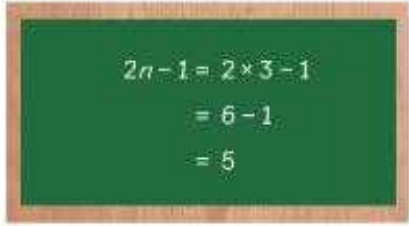
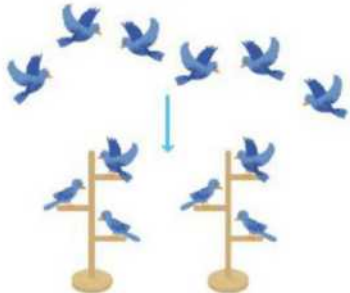
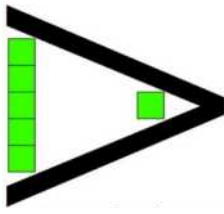
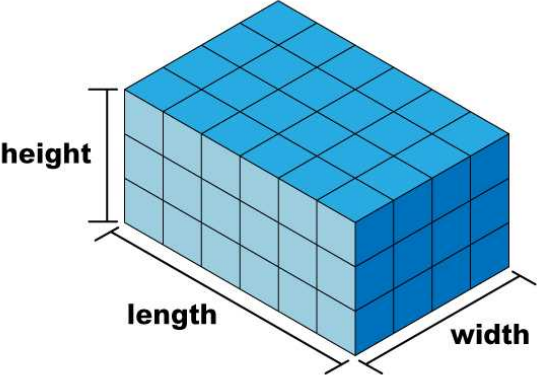



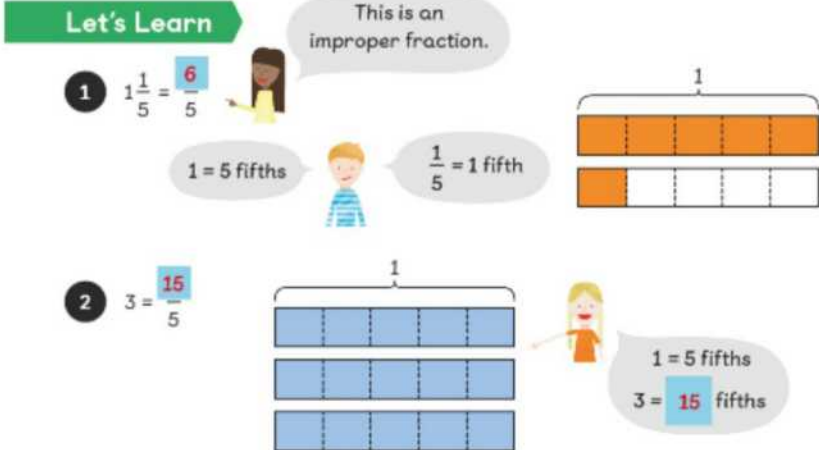


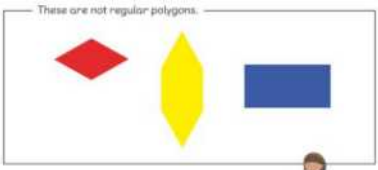
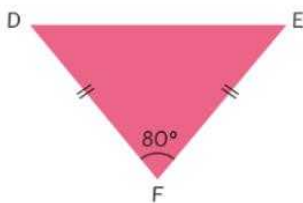
$$6 \div 3 = 2$$

At least 2 stands are needed.

<p><b>Dividend</b></p>	<p>The dividend is the number which is being divided. For example, in <math>8 \div 2</math> the dividend is 8.</p> <div style="text-align: center;">  </div>
<p><b>Divisor</b></p>	<p>The divisor is the number you divide by. For example, in <math>8 \div 2</math> the divisor is 2.</p>
<p><b>Edges</b></p>	<p>The edge is the line where two faces of a 3D shape meet.</p> <p style="text-align: center;">How many edges does a cuboid have?</p> <div style="text-align: center;">  </div> <p style="text-align: center;">A cuboid has 12 edges.</p>
<p><b>Estimate</b></p>	<p>Estimating means using the information you have to make a rough or approximate guess.</p>
<p><b>Even Numbers</b></p>	<p>An even number is any multiple of 2. So, all whole numbers that you can divide by 2 to give a whole number are even. An easy way to spot even numbers is to remember they all end in 0, 2, 4, 6 or 8. Zero itself is considered to be an even number. For example, 2, 48 and 556 are even numbers. This works for negative numbers as well, so -2, -48 and -556 are all even numbers too.</p> <div style="text-align: center;"> <p>Even and Odd Numbers</p>  </div>
<p><b>Equal to (=)</b></p>	<p>= means "equal to". For example, <math>2 + 3 = 5</math> means 2 + 3 is equal to 5.</p> <div style="text-align: center;">  </div>
<p><b>Equal Groups</b></p>	<p>One aspect of division is sharing into equal groups. By sharing the birds into three equal groups we can see that they are 2 birds on each stand/in each group.</p> <div style="text-align: center;"> <p>Put 6 birds into 3 equal groups.</p> <p><math>6 \div 3 = 2</math></p> <p>There are 2 birds on each stand.</p>  </div>

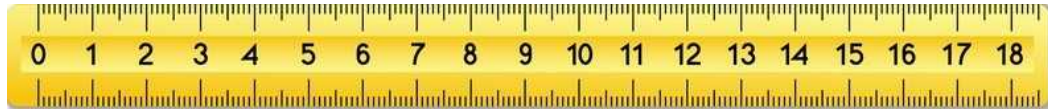
<p><b>Equations</b></p>	<p>An equation says that two things are equal. It will have an equal sign "=" like this:</p> <p style="text-align: center;"><b>7 + 2 = 10 - 1</b></p> <p>That equation says: what is on the left (7 + 2) is equal to what is on the right (10 - 1). So, an equation is like a statement "this equals that"</p>
<p><b>Equilateral Triangle</b></p>	<p>An equilateral triangle has three equal angles and three equal length sides. It is sometimes called a regular triangle. Each angle is 60°.</p> <p>ABC is an equilateral triangle.</p>  <p>We name vertices using letters like A, B, C.</p> <p>We name lines using a pair of letters like AB.</p> <p>∠ABC means the angle between the lines AB and BC.</p> <p>Find ∠ABC.  <math>180^\circ \div 3 = 60^\circ</math></p>
<p><b>Equivalent Fractions</b></p>	<p>Equivalent fractions are worth the same as each other, even though they look different.</p> <p>Is it possible to write <math>\frac{2}{3}</math> as <math>\frac{8}{12}</math>?</p> <p><b>Let's Learn</b></p>  <p>Let's put these 2 parts into 8 equal parts.</p> <p>The 2 parts become 8 equal parts. Each part is a twelfth.</p> <p><math>\frac{2}{3} = \frac{8}{12}</math></p> 
<p><b>Faces</b></p>	<p>A surface of a 3D shape is called a face. The face a shape sits on is its base. Faces can be flat or curved.</p> 
<p><b>Factors</b></p>	<p>A factor is a whole number which will divide exactly into another whole number. For example, you can divide 12 exactly into 3 (to get 4), so 3 is a factor of 12.</p> <p>does it in all possible ways.</p> <p>1 <math>18 = 1 \times 18</math></p> <p>2 <math>18 = 2 \times 9</math></p> <p>3 <math>18 = 3 \times 6</math></p> <p>The factors of 18 are 1, 2, 3, 6, 9 and 18.</p> 

<p><b>Formulas</b></p>	<p>You can use a formula to describe a rule that connects two numbers.</p> <p>Evaluate <math>2n - 1</math> when <math>n = 3</math>.</p> <p>To <b>evaluate</b> means to find the value of.</p>  
<p><b>Fraction</b></p>	<p>A fraction is a "part" of a "whole" where it has been split into <u>equal</u> parts.</p> <p>It is also a ratio between two integers separated by a solidus (/) or a vinculum (—). The upper part of a fraction is called a numerator and the lower part is called a denominator.</p>
<p><b>Groups Of</b></p>	<p>One aspect of dividing is grouping. Dividing the below birds in to groups of 3 will tell you how many will be on each stand. This is the same as repeated subtraction.</p> <p>Put the birds in groups of 3.</p>  <p><math>6 \div 3 = 2</math></p> <p>At least 2 stands are needed.</p>
<p><b>Greater Than (&gt;)</b></p>	<p>This is used to compare values. For example, <math>5 &gt; 1</math> means 5 is greater than 1.</p> 
<p><b>Height</b></p>	<p>Height is measured upwards, often from the ground, for example, the height of a person. Height is another word for length. It can be measured in millimetres, centimetres or meters. It can also be measured in feet and inches.</p> 

<p><b>Horizontal</b></p>	<p>The horizontal is the line where the earth and sky meet, and something horizontal lies level with the horizon.</p> <p>The box sits on a table. Are there horizontal lines?</p> 
<p><b>Improper Fraction</b></p>	<p>An improper fraction is a fraction greater than one. In an improper fraction the numerator is bigger than its denominator.</p> <p><b>Let's Learn</b></p> <p>1 <math>1\frac{1}{5} = \frac{6}{5}</math></p> <p>This is an improper fraction.</p> <p>1 = 5 fifths</p> <p><math>\frac{1}{5} = 1</math> fifth</p> <p>2 <math>3 = \frac{15}{5}</math></p> <p>1 = 5 fifths</p> <p>3 = 15 fifths</p> 
<p><b>Inverse Operation</b></p>	<p>Inverse means opposite. Addition and subtraction are inverse operations. Multiplication and division are inverse operations.</p> <p>We can write a family of addition and subtraction facts.</p> <p><math>6 + 12 = 18</math>      <math>18 - 12 = 6</math>  <math>12 + 6 = 18</math>      <math>18 - 6 = 12</math></p>  <p><math>20 \div 4 = 5</math> <math>5 \times 4 = 20</math></p>  <p><math>20 \div 5 = 4</math> <math>4 \times 5 = 20</math></p> <p>We can make a family of multiplication and division equations.</p>
<p><b>Irregular Polygon</b></p>	<p>In an irregular polygon, the sides and angles are not all the same.</p> <p>These are not regular polygons.</p>  <p>What is a regular polygon?</p>
<p><b>Isosceles Triangle</b></p>	<p>An isosceles triangle has two equal angles and two equal sides. 'Isosceles' is the Greek word which means 'equal legs.'</p> <p>DEF is an isosceles triangle. Find <math>\angle DEF</math>. <math>50^\circ</math></p> 

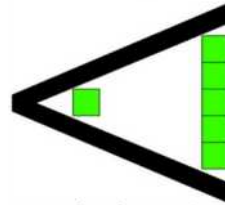
## Length

Length is the distance between two points. There are lots of units for measuring length. The ones you'll use most often are metric – millimetres (mm), centimetres (cm), meters (m) and kilometres (km).



## Less Than (<)

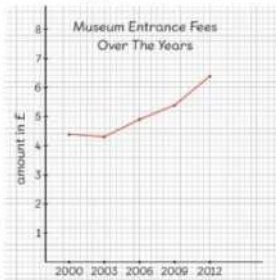
This means "less than". For example,  $1 < 5$  means 1 is less than 5.



## Line Graph

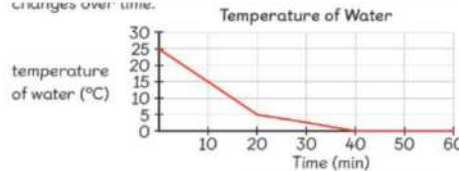
A line graph shows information using straight lines to join together a set of points on a grid.

This is a line graph.



A line graph shows how a quantity changes over time. We can say that the museum entrance fee has been increasing since 2003.

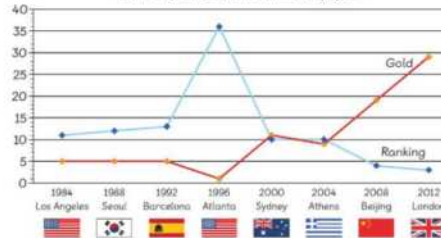
Changes over time.



Did the temperature increase, decrease or remain the same?



UK Performance at the Summer Olympics



This graph shows how the British pound is related to the Singapore dollar (SGD) and the US dollar (USD).



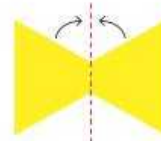
## Lines of Symmetry

A shape can be folded to see if it has a line of symmetry. A shape has a line of symmetry when the folded part sits perfectly on top, with all edges matching.

### Drawing Lines of Symmetry

Lesson  
6

#### In Focus



Does this figure have lines of symmetry?

How many?



#### Let's Learn

1 drew this line.



The two halves match up exactly.



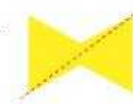
2 drew this line.




The top half is a reflection of the bottom half. The two halves are reflections of each other along the line of symmetry.



3 drew this line.



How many lines of symmetry does  have?



Why is this not a line of symmetry?

When folded, the shapes do not match.

## Mass

Mass is the amount of "stuff" there is in an object. The metric units for measuring mass are milligrams (mg), grams (g), kilograms (kg) and tonnes (t). People often confuse mass and weight. Remember that weight is a force and is measured in newtons.

### In Focus

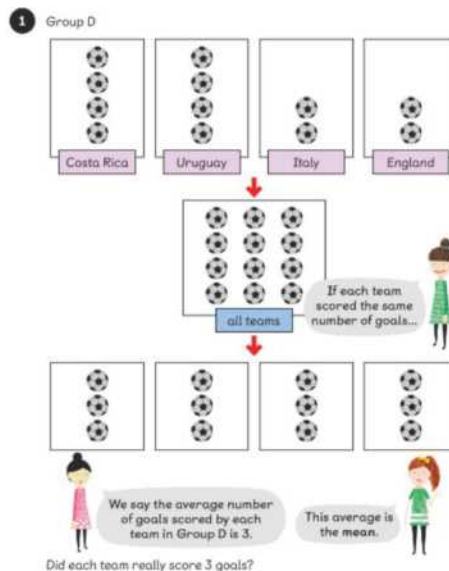
The bag of crisps weighs more than 300 g.  
It weighs less than 400 g.

What is the mass of the bag of crisps?



## Mean

The mean is a typical value of a set of data. To find the mean of a list of values, add them up and divide them by the number of values there are.



### Mixed Number

A mixed number is made up of a whole number and a fraction. For example,  $2\frac{5}{6}$ .



There are 2 whole cakes and 5 sixths of a cake.

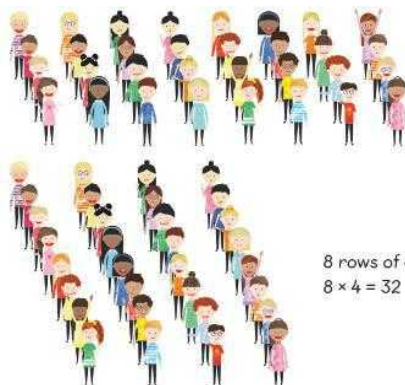
$$2 + \frac{5}{6} = 2\frac{5}{6}$$

$2\frac{5}{6}$  is a mixed number.



### Multiplying

Multiplying is a quick way of adding several lots of the same number or quantity. Other words linked to multiplication: multiply, times, lots of, multiplied by, times tables, groups of.



4 rows of 8  
 $4 \times 8 = 32$

$4 \times 8 = 8 \times 4$

8 rows of 4  
 $8 \times 4 = 32$



### Multiples

Multiples are whole numbers that a larger number can be made of by adding lots of the smaller numbers together. E.g. 12 is a multiple of 3.

Find the first 12 multiples of 6.

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



The first multiple of 6 is 6.  
The second multiple of 6 is 12.  
The tenth multiple of 6 is 60.

$1 \times 6 = 6$   
 $2 \times 6 = 12$   
 $10 \times 6 = 60$

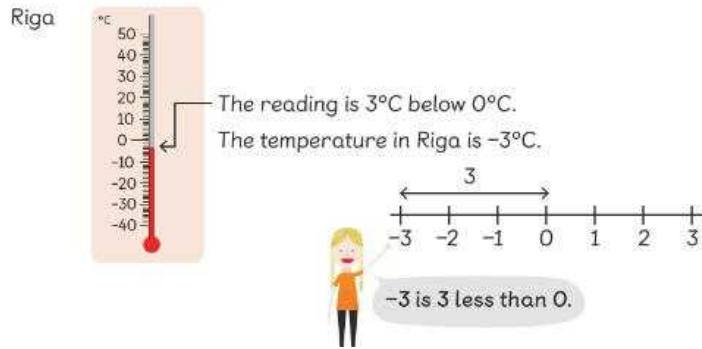


### Negative Numbers

All numbers less than zero are negative numbers. A minus sign (-) in front tells you that a number is negative, for example, -1. You say, "negative one" or "minus one", and so on.

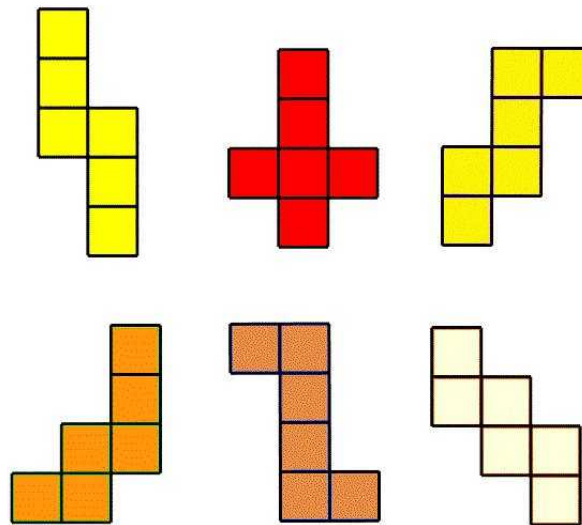
These are examples of -0.5, -1, -24, -356.

The minus sign shows how many less than zero the number is. For example, -1 is 1 less than 0, and -24 is 24 less than 0. So, -24 is smaller than -1.



**Nets**

A net is a 2D shape that you can fold to make a 3D solid. Some solids can have more than one net. These nets make a cube:

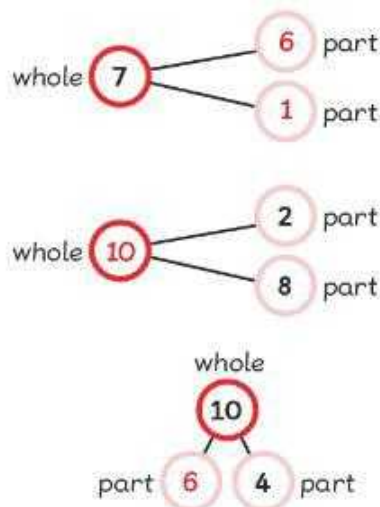


**Numbers**

Numbers help you count and describe all sorts of things. For example, you can use numbers to say how old you are, what time it is, how much things cost and how many muffins are on a plate.

**Number Bonds**


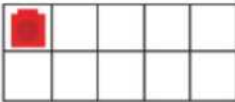

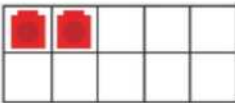

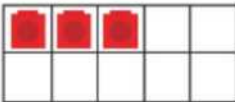


Number bonds are pairs of numbers that add up to another number. For example,  $7 = 6+1$ ,  $70 = 60+10$ ,  $700 = 600+100$ . This is a number bond diagram:

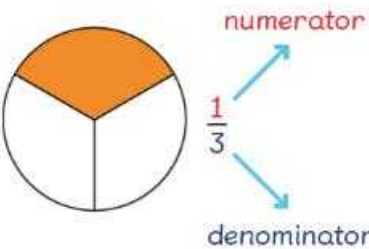
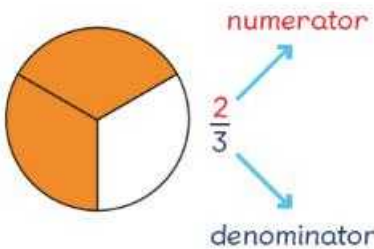


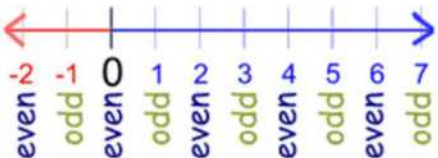
**Numerals**

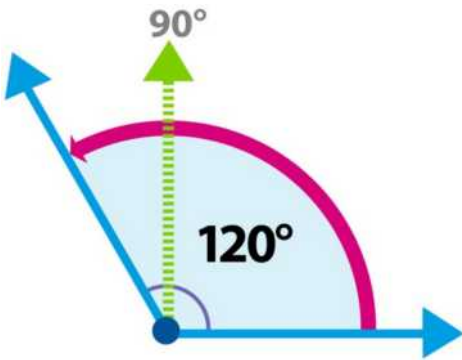
A numeral is a symbol or group of symbols you use to show a number.

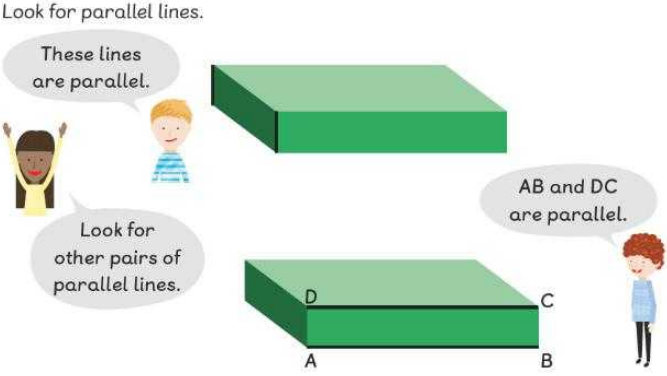
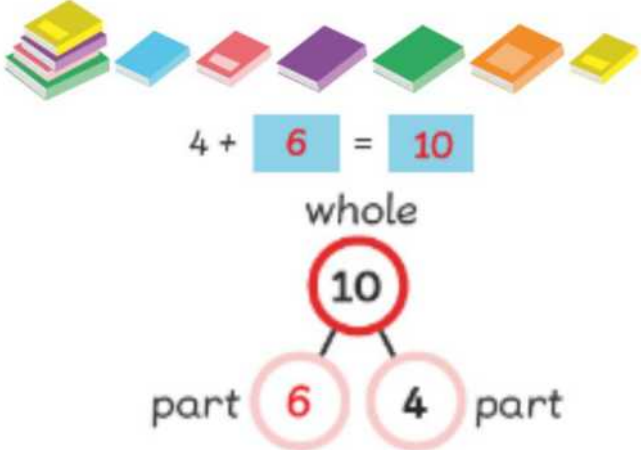





In the diagram that follows, each numeral represents the number of pieces of fruit.

	 	1
	 	2
	 	3
	 	4

<b>Numerator</b>	<p>The top part of a fraction is called the numerator and the bottom part is the denominator. The denominator shows how many equal parts are in the whole/the size of the parts and the numerator shows how many of the equal parts you are talking about.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>The numerator tells us the number of pieces. The denominator tells us the size of the pieces.</p> </div> <div style="text-align: center;">  </div> </div>
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<b>Odd Numbers</b>	<p>Any number that's not a multiple of 2 is an odd number. So, all whole numbers that you can't divide by 2 to give a whole number, are odd. An easy way to spot odd numbers is to remember that they all end in 1, 3, 5, 7 or 9. So 5, 51 and 463 are all odd numbers. This works for negative number as well, so -5, -51 and -463 are all odd numbers too.</p> <div style="text-align: center;"> <p>Even and Odd Numbers</p>  </div>
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<b>Obtuse Angles</b>	<p>Obtuse angles are larger than 90 degrees but smaller than 180 degrees.</p> 
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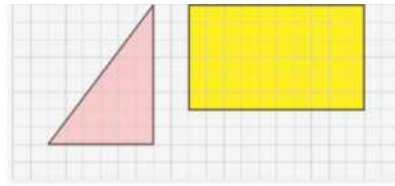
<p><b>Parallel Lines</b></p>	<p>Parallel lines are the same distance apart all the way along. They never meet, no matter how long they are.</p> 
<p><b>Part-Whole</b></p>	<p>This refers to the parts of an amount which add up to the whole.</p> 
<p><b>Percentages</b></p>	<p>A percentage is a special fraction with a denominator of 100. Per cent means parts for each 100. You write percentages using the symbol %. For example, 20 per cent (20%) means 20 parts for each 100, 20/100 or 20 hundredths.</p> <p> took a test.</p> <p>(a) Out of 10 arithmetic questions,  got 8 correct.</p> <p><input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p> got <math>\frac{80}{100}</math> or 80% of the arithmetic questions correct.</p> <p>(b) Out of 5 problem-solving questions,  got 3 correct.</p> <p><input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p> got <math>\frac{60}{100}</math> or 60% of the problem-solving questions correct.</p>
<p><b>Perfect Number</b></p>	<p>A perfect number is the sum of its factors (except for itself).</p> <p>For Example: 6 is a perfect number because if you add its factors (except for itself), the answer is 6.</p> $6 = 1 + 2 + 3$ <p>The next perfect number is 28.</p> $28 = 1 + 2 + 4 + 7 + 14$

## Perimeter

The distance around the edge of a shape is called its perimeter.

For example, if you walk around the edges of a field, you'll walk along the perimeter. Perimeter is a length, so you'll often be asked to measure it in millimetres, centimetres or metres.

Arrange the triangle and the rectangle to make a figure. Find the perimeter of the figure.



The perimeter of a figure is the distance around the figure.

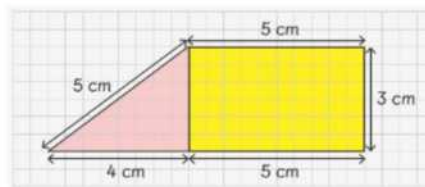


Is there more than one way to make a figure?



### Let's Learn

1 did this.



Perimeter = 22 cm

## Perpendicular

Lines that are perpendicular are at right angles to each other. Lines don't have to touch to be perpendicular.

Look for perpendicular lines.

These two lines are perpendicular.



AB is perpendicular to BC.



Are there more pairs of perpendicular lines?

## Picture Graph / Pictogram

A picture graph, also known as a pictogram, uses pictures or symbols to display information. Each symbol represents an amount, and you can use part of a symbol to represent a smaller amount.

### Let's Learn

1 This is a picture graph. It shows the number of stars each group has.



A picture graph is also called a pictogram.

The title tells us what the picture graph shows.

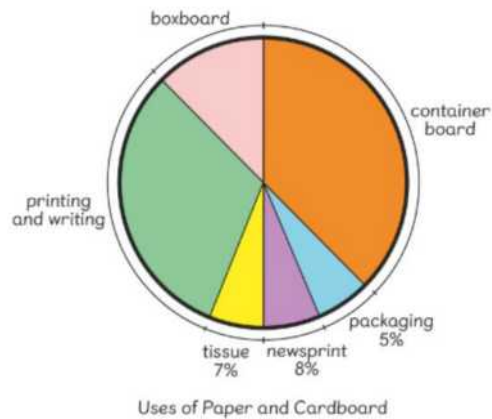


Class 1H's Reward Chart

Group	Stars	Number of stars
A	★★★★★★★★	8
B	★★★	3
C	★★★★★★★★	8
D	★★★★★★★★	9

**Pie Chart**

A pie chart gets its name from its round shape. Each “slice” of the pie represents a category, and the size of the slice represents the frequency of the data. The bigger the slice, the higher the frequency, so pie charts are a good way of showing at a glance how something is divided up.

**Place Holder**

In the number 360, the zero acts as a place holder. It has been placed to show that the 6 is actually worth 60. The place holder is always placed and never added. It shows that this number is  $300 + 60 + 0$ .

hundreds	tens	ones
3	6	0

**Place Value**

A digit’s place value is how much the digit is worth in a number. This depends on where in the number the digit sits.

For example: The 3 in the below number is in the tens column so it has the value of 3 tens which is the same as 30.

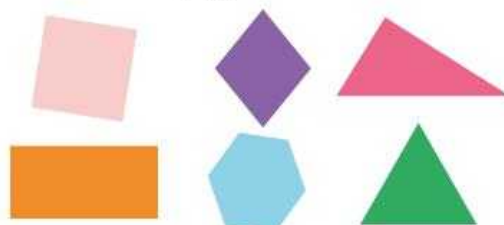
Show 5 472 737 on a place-value chart.

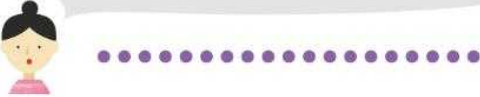


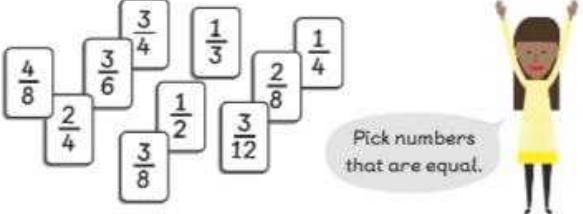
millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones
●●●	●●●	●●●●	●●	●●●●	●●	●●●●
5	4	7	2	7	3	7

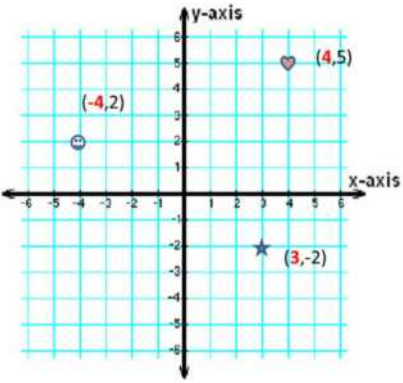
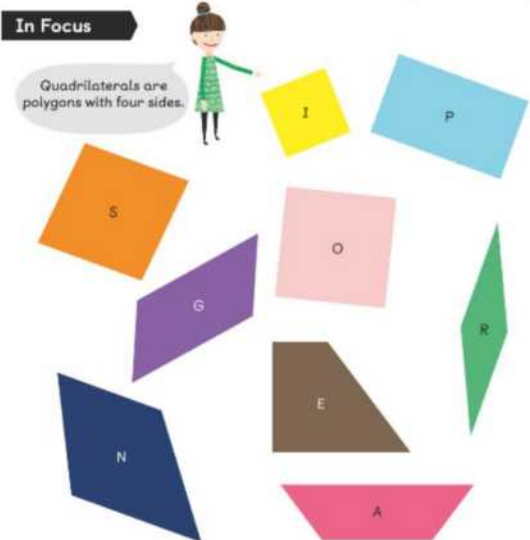
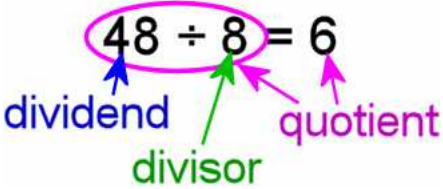
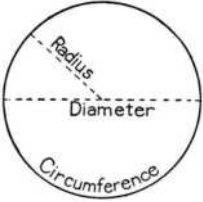
**Polygon**

Any 2D shape with straight sides is called a polygon. There are lots of different polygons. What makes a polygon different from (or the same as) another is the different number of sides it has, and the angles formed by their edges.

These are called polygons.



<p><b>Positive Numbers</b></p>	<p>All numbers greater than zero are positive numbers. You can write them with or without a plus sign (+) in front, for example, +1 or 1.</p> <p>These are some examples of positive numbers: 0.5, 1, 24, 356.</p>
<p><b>Prime Numbers</b></p>	<p>Are numbers which will divide exactly only by themselves and 1.</p> <p>These are the prime numbers to 30:  <b>2 3 5 7 11 13 17 19 23 29.</b></p> <p>There is only one way to organise 19 counters into rectangular or square arrangements.</p>  <p>This is not rectangular.</p>  <p>Neither is this.</p>  <p><math>19 = 1 \times 19</math></p> <p>19 has only 2 factors, 1 and itself.  19 is a prime number.</p> <p>A number greater than 1 that has only 2 factors, 1 and itself, is a prime number.</p>
<p><b>Product</b></p>	<p>The answer when something has been multiplied. e.g. the product of 3 and 4 is 12.</p> <div data-bbox="778 1243 1125 1585" style="border: 1px solid gray; padding: 10px; text-align: center;"> <p>Multiplication:</p> <p><b>6 x 3 = 18</b></p> <p>↑            ↑            ↑</p> <p>Factor      Factor      Product</p> <p>(Or Multiplier) (Or Multiplicand)</p> <p>Product</p> </div>
<p><b>Proper Fraction</b></p>	<p>In a proper fraction the numerator is smaller than the denominator.</p> <p>Proper fractions are also called common fractions. These are both proper fractions: <math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>.</p>  <p>Pick numbers that are equal.</p>
<p><b>Proportion</b></p>	<p>Proportion compares a part of something with the whole thing. It is the same as finding a fraction of a whole amount. For example, there are 5 fish in the bowl, 3 are orange. The proportion of orange fish is 3 in 5 or <math>\frac{3}{5}</math>.</p>

<p><b>Quadrants</b></p>	<p>The four areas on a grid formed by the axes are quadrants.</p> 
<p><b>Quadrilateral</b></p>	<p>“Quad” is a Latin word that means “four”, and quadrilaterals are polygons that have four sides and four angles.</p> 
<p><b>Quotient</b></p>	<p>A quotient is the whole number of times you can divide one number by another number. If you can't divide a number exactly, you have an amount left over. This is called a remainder. For example, in <math>8 \div 2</math> the quotient is 4.</p> 
<p><b>Radius</b></p>	<p>A radius is a straight line from the middle of a circle to a point on its edge. The plural of radius is radii (say 'ray-dee-eye'). A radius is half as long as a diameter.</p> 
<p><b>Ratio</b></p>	<p>Ratio compares one amount with another. For example, there are 3 orange fish to 2 purple fish in the bowl, so the ratio of orange fish to purple ones is 3 to 2.</p> <p>You write this as 3:2. It's useful to think of the two dots as meaning “compared to”.</p>

**In Focus**

Compare the amounts of each ingredient needed to make lemonade.

**Lemonade Recipe**

- 6 cups cold water
- 2 cups lemon juice (8:10 lemons)
- 1 cup sugar
- a pinch of salt

**Let's Learn**

1 For every 1 cup of sugar, you need 2 cups of lemon juice.

sugar: 1 cup  
lemon juice: 2 cups

2 For every 2 cups of lemon juice, you need 3 cups of cold water.

lemon juice: 2 cups  
cold water: 3 cups

The ratio of the volume of lemon juice to the volume of cold water needed is 1 : 3.

Ratio = 1 : 3

This means that for every 1 cup of lemon juice, 3 cups of cold water are needed.

We read 1 : 3 as '1 to 3'.

**Reflection**

When you reflect an object, you “flip” it, so that each point on the image is the same distance away from an imaginary mirror (called a mirror line) as the original.

**Reflex Angles**

Reflex angles are larger than  $180^\circ$  but smaller than  $360^\circ$ .

230°

This is a reflex angle

**Regrouping**

When renaming, we have to regroup. For example: 1 ten can be regrouped into 10 ones and 1 hundred can be regrouped into 10 tens.

**In Focus**

6 ones + 5 ones = 11 ones

What should Hannah do next?

**Let's Learn**

Add 236 and 345.

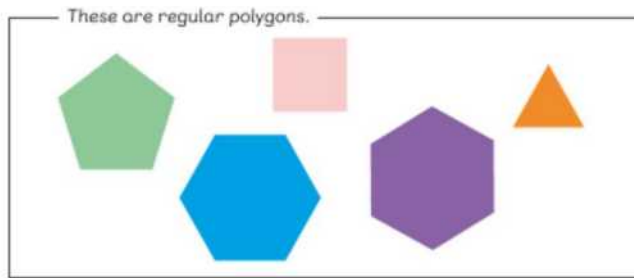
Step 1 Add the ones.  
6 ones + 5 ones = 11 ones  
Regroup the ones.  
11 ones = 1 ten + 1 one

Use to help you add.

h	t	o
2	3	6
+ 3	4	5
		1

## Regular Polygon

All sides in a regular polygon are the same length, and all angles are the same size.



## Remainder

A quotient is the whole number of times you can divide one number by another number. If you can't divide a number exactly, you have an amount left over. This is called a remainder. You can show remainders as whole numbers (with remainder or r. written in front of them or write them as fractions or decimals.

For example,  $10 \div 4 = 2$  remainder 2 or 2 r.2, or  $2 \frac{1}{2}$  or 2.5.

## Dividing with Remainder

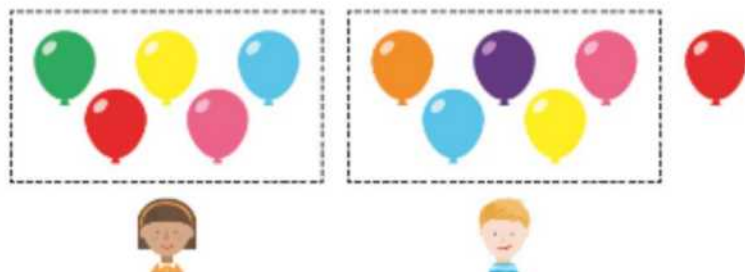
### In Focus



Holly divided the balloons equally between her 2 friends.  
How many balloons did each friend get?

### Let's Learn

1 There were 11 balloons.



$$11 \div 2 = 5 \text{ remainder } 1$$

The quotient is 5 and the remainder is 1.  
Each friend got 5 balloons.  
There was 1 balloon left over.

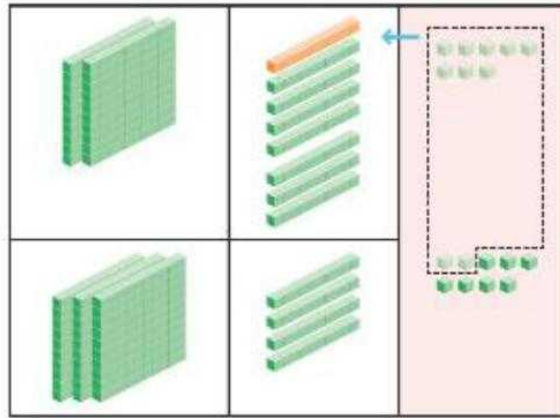
## Renaming: Addition

When we add ones and end up making more than 10 ones, we can rename the ones as a ten. We can also do this for tens if we make 10 lots of ten, we can rename it as 1 hundred or 100.

Add 278 and 349.

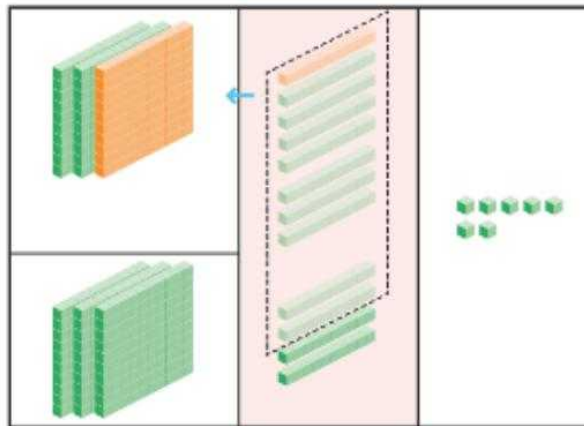
Step 1 Add the ones.  
 $8 \text{ ones} + 9 \text{ ones} = 17 \text{ ones}$   
 Regroup the ones.  
 $17 \text{ ones} = 1 \text{ ten} + 7 \text{ ones}$

The sum is the the total of 278 and 349.



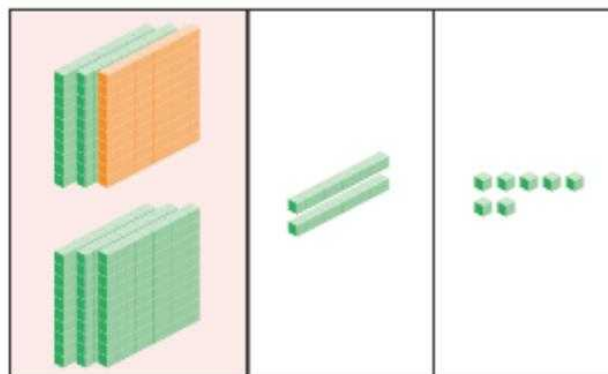
h	t	o
2	7	8
+ 3	4	9
		7

Step 2 Add the tens.  
 $1 \text{ ten} + 7 \text{ tens} + 4 \text{ tens} = 12 \text{ tens}$   
 Regroup the tens.  
 $12 \text{ tens} = 1 \text{ hundred} + 2 \text{ tens}$



h	t	o
1	7	8
2	7	8
+ 3	4	9
2		7

Step 3 Add the hundreds.  
 $1 \text{ hundred} + 2 \text{ hundreds} + 3 \text{ hundreds} = 6 \text{ hundreds}$



h	t	o
1	7	8
2	7	8
+ 3	4	9
6	2	7

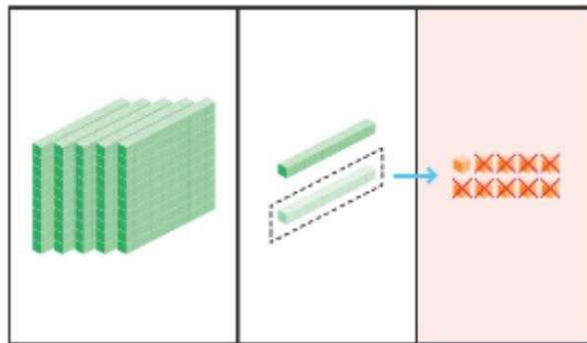
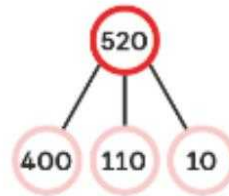
$$278 + 349 = 627$$

**Renaming:  
Subtraction**

If there are not enough ones to subtract (0-9) then we can rename 1 ten as 10 ones which will allow us to subtract (10-9). We can also do this for the tens, if there are not enough tens, we can rename 1 hundred as 10 tens.

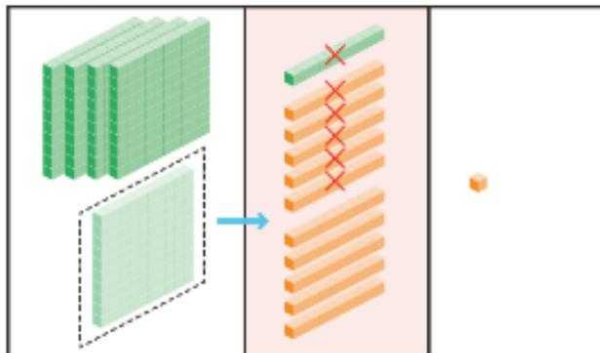
Subtract 269 from 520.

Step 1 Regroup 1 ten into 10 ones.  
Subtract the ones.  
 $10 \text{ ones} - 9 \text{ ones} = 1 \text{ one}$



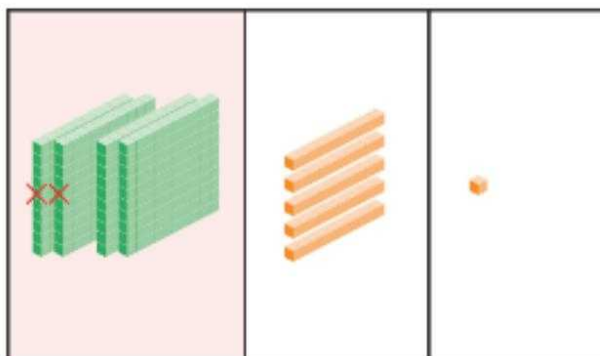
h	t	o
5	<del>1</del> 2	<del>10</del> 0
-	2	6
-		9
		1

Step 2 Regroup 1 hundred into 10 tens.  
Subtract the tens.  
 $11 \text{ tens} - 6 \text{ tens} = 5 \text{ tens}$



h	t	o
<del>4</del> 5	<del>1</del> 2 <sup>11</sup>	<del>10</del> 0
-	2	6
-		9
	5	1

Step 3 Subtract the hundreds.  
 $4 \text{ hundreds} - 2 \text{ hundreds} = 2 \text{ hundreds}$

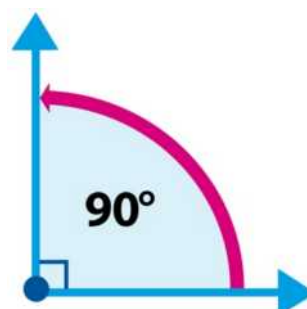


h	t	o
<del>4</del> 5	<del>2</del> 2 <sup>11</sup>	<del>10</del> 0
-	2	6
-	2	5
	2	5
	2	5
	2	5

$520 - 269 = 251$

**Right Angles**

A right angle is a quarter of a full turn. It measures  $90^\circ$ .





**Rules**

A rule is a pattern that a sequence follows. You can often find the rule for working out the next term in a sequence by looking at the difference between the numbers.

Charles is making a number pattern using a rule.



879 225, 859 225, 839 225, ...

Can you work out his rule?

**Let's Learn**

1 879 225, 859 225, 839 225, ...



He subtracts to get the next number.

He subtracts by 20 000 to get the next number.



879 225  
859 225  
839 225  
819 225  
799 225

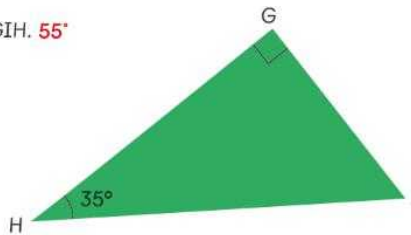
819 225, 809 225, 799 225



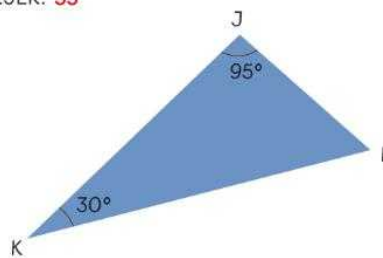
**Scalene Triangle**

A triangle with no equal sides and no equal angles. They can be right-angled triangles but don't have to be.

Find  $\angle GIH$ .  $55^\circ$



Find  $\angle JLK$ .  $55^\circ$



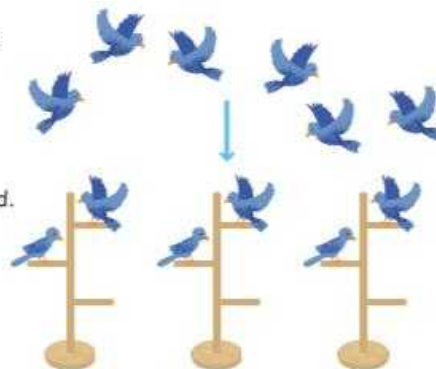
**Sharing**

One aspect of division is sharing into equal groups. By sharing the birds into three equal groups we can see that there are 2 birds on each stand/in each group.

Put 6 birds into 3 equal groups.

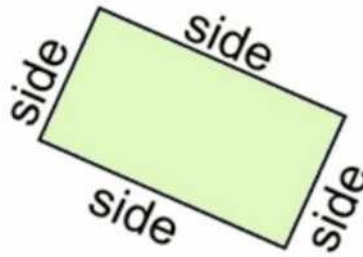
$$6 \div 3 = 2$$

There are 2 birds on each stand.



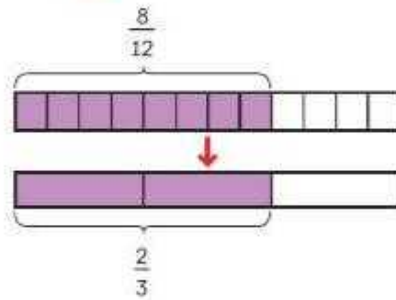
**Sides**

A side is the line between two vertices of a shape.

**Simplest Form**

This means that a fraction is written using the smallest numbers possible. This uses common factors.

2  $\frac{8}{12} = \frac{2}{3}$



Cut the roll into 3 equal pieces.

I will take 2 pieces.

$$\frac{8}{12} = \frac{2}{3}$$

4 is a common factor of 8 and 12.

$\frac{2}{3}$  is a fraction in the simplest form.

**Simplify**

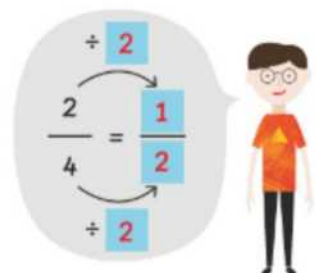
To simplify a fraction, divide the numerator and the denominator by the same number. This gives you an equivalent fraction that uses smaller numbers.

Eventually you can't divide the numerator and the denominator anymore. This means the fraction is in its simplest form or lowest terms.

1 Simplify each fraction.



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

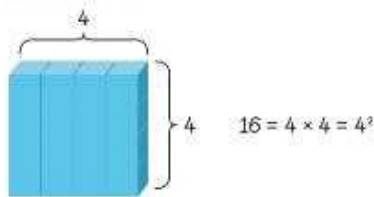
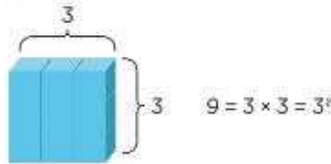
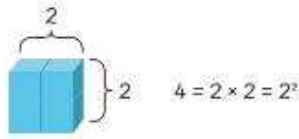


## Square Number

A square number is the total when a number is multiplied by itself.  
E.g.  $2 \times 2 = 4$ . This is written as  $2^2$ .

Square numbers to 100 are:  
**1 4 9 16 25 36 49 64 81 100**

Find other square numbers.



4, 9 and 16 are squares.

What do the 3 and 4 stand for?



What does each small 2 stand for?

## Sum

The sum is the total when you add together two or more numbers together. It only applies to addition.

### In Focus

What do we do to find the total number of pupils?

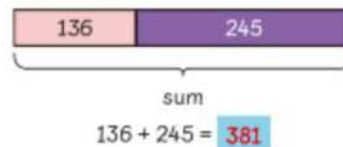
#### Bakerloo Primary School

Year 1 - Year 3 136 pupils

Year 4 - Year 6 245 pupils

### Let's Learn

Find the sum of 136 and 245.



When we add numbers, we get their sum, or total.



## Tally Chart

You can collect and sort data on a tally chart by drawing a line, called a tally, to show each item you count. By adding up the tallies in each row, you can see the frequency-the number of times the same piece of information occurs.

### In Focus



Present the number of different coloured beads on a tally chart.

### Let's Learn

Let's use  $///$  to count the number of beads.

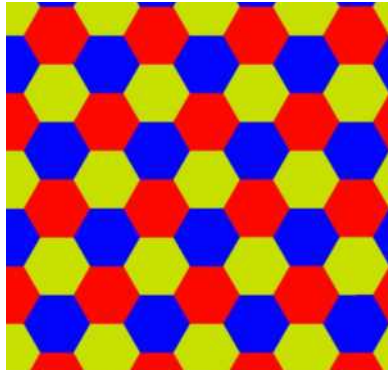


#### 1 Tally chart

yellow beads	$///$
green beads	$/// // // //$
blue beads	$/// // // // // //$
red beads	$/// // // // // // // //$

**Tessellation**

A pattern of shapes that fit together without leaving any gaps is a tessellation.



**Three-Dimensional Shapes (3D)**

A three-dimensional shape (3D) is anything that has length, width and thickness. 3D things can be solid or hollow and can be any shape or size. For example, both a brick and a balloon have 3D shapes.



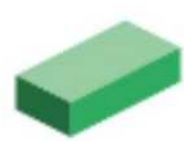
cone



cylinder



cube



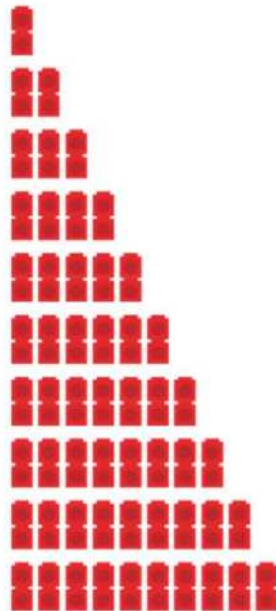
cuboid

**Times Tables**

Times tables are lists of multiplication facts. As well as helping you multiply in instant, knowing times tables will help you work out other number facts, too. These are usually known up to 12x12.

Use  in place of a sausage.

Use  to make groups of 2.



$1 \times 2 = 2$

$2 \times 2 = 4$

$3 \times 2 = 6$

$4 \times 2 = 8$

$5 \times 2 = 10$

$6 \times 2 = 12$

$7 \times 2 = 14$

$8 \times 2 = 16$

$9 \times 2 = 18$

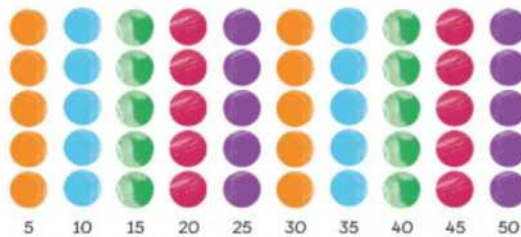
$10 \times 2 = 20$



What do you notice when you add one more group of 2?



Count in fives.



5 10 15 20 25 30 35 40 45 50

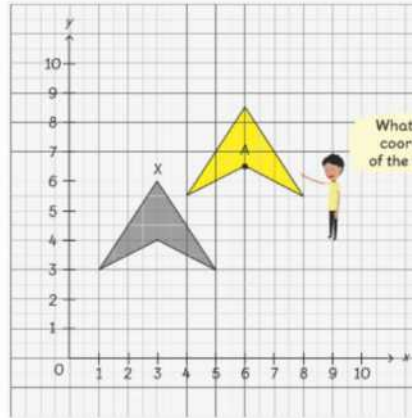
He has 50 marbles in all.

5, 10, 15, 20, 25, 30, 35, 40, 45, 50



**Translation**

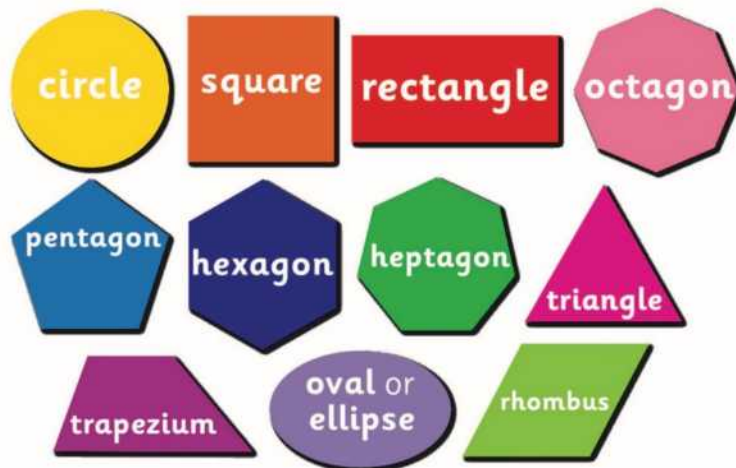
Sliding an object into a new position without flipping or turning it is called translation. The object and the translated image look the same, but they are different distances from a fixed point. Translation is a combination of sliding to the left or right, then sliding up or down.



The figure is translated 3 units to the right and  $2\frac{1}{2}$  units upwards.  
As a result, the point X moves from (3, 6) to  $(6, 8\frac{1}{2})$ .

**Two-Dimensional Shapes (2D)**

Pictures of shapes on paper or card are called two-dimensional shapes, or 2D shapes for short. This means they have a length and width, but no thickness. Another name for a 2D shape is a plane.



**Vertical**

Something that is at right angles to the horizon is vertical.

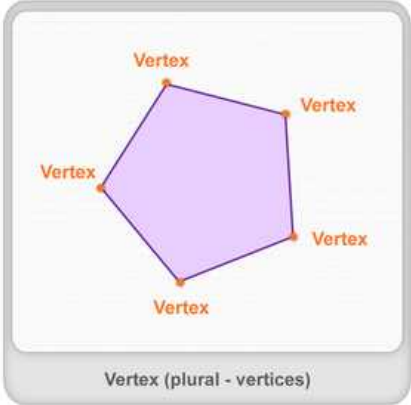
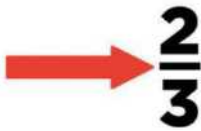
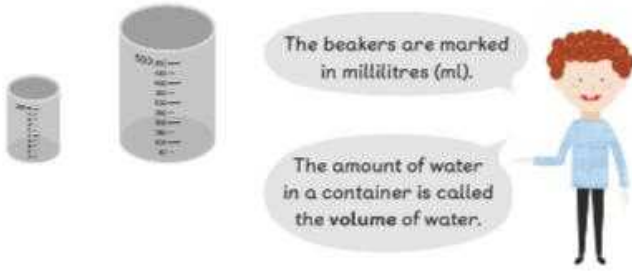
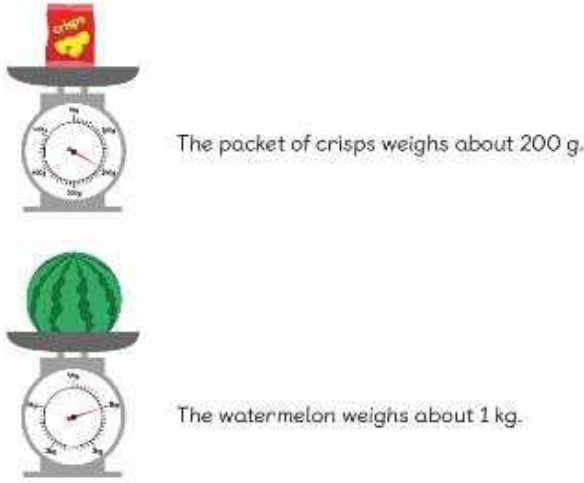
The box sits on a table.  
Are there vertical lines?



**Vertices**

2D shapes: Each corner of a polygon, where two sides meet, is called a vertex. The plural is vertices.

3D shapes: a vertex is a point on a 3D shape where three or more its faces meet. Vertices is the plural. The top vertex is an apex.

	
<p><b>Vinculum</b></p>	<p>The vinculum is the horizontal line used to separate the numerator and denominator in a fraction.</p> 
<p><b>Volume</b></p>	<p>Volume is the amount of 3D space a 3D shape takes up. You measure volume in cubic units, for example cubic millimetres (mm<sup>3</sup>), cubic centimetres (cm<sup>3</sup>) or cubic meters (m<sup>3</sup>).</p> <p>We measure volume with measuring beakers.</p> 
<p><b>Weight</b></p>	<p>Weight measures the pull of gravity on the “stuff” in an object. Scientists use special units to measure weight, but in everyday life, people use the word “weight” to mean how heavy something is and they measure it using the units of mass.</p> <p>We use weighing scales.</p> 
<p><b>Zero</b></p>	<p>Zero is the digit 0, which stands for no amount. You can use zero on its own or with other digits to keep them in the right place within a number. The place holder is always placed and never added.</p>