

Number and Place Value

Knowledge Organiser

Key Vocabulary	Compare and Order		
millions	equals	greater than	less than
thousands	$26 + 38 = 8 \times 8$	$23\ 873 > 8256$	$901\ 198 < 1\ 091\ 098$
hundreds	Both calculations have the value 64.	The number on the left has 2 ten thousands and the number on the right has 0 ten thousands.	The number on the right has 1 million and the number on the left has 0 millions.
tens	smallest 898 6735 6835 7019 9002 11 235 greatest		
ones			
zero			
place value			
greater than			
less than			
order			
round			
rounded			
negative number			
partition			
digit			
interval			
sequence			
linear sequence			

Negative Numbers



Counting in Powers of 10

Counting in 10s

365	375	385	395	405	415
-----	-----	-----	-----	-----	-----

The tens increase until 9 tens becomes one more hundred and 0 tens.

Counting in 10 000s

276 109	286 109	296 109	306 109
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The ten thousands increase until 9 ten thousands become one more hundred thousand and 0 ten thousands.

Counting in 100s

2841	2941	3041	3141	3241	3341
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The hundreds increase until 9 hundreds becomes one more thousand and 0 hundreds.

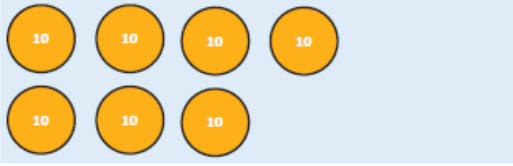
Counting in 100 000s

2 972 151	3 072 151	3 172 151	3 272 151
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The hundred thousands increase until 9 hundred thousands becomes one more million and 0 hundred thousands.

Addition and Subtraction

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Key Vocabulary	Addition	Subtraction
Add	Place Value Grid: $3274 + 5601 = 8875$	Place Value Grid: $35\,727 - 6313 = 29\,414$
Total	Th 	TTh  2 ten thousands left
Make		Th  5 thousands - 6 thousands cannot be done. Exchange ten thousand for ten thousands becoming 15 thousands - 6 thousands = 9 thousands
Plus		
Sum		H  7 hundreds - 3 hundreds = 4 hundreds
More	H 	T  2 tens - 1 ten = 1 ten
Altogether		O  7 ones - 3 ones = 4 ones
Difference	T 	
Subtract	O 	O  7 ones - 3 ones = 4 ones
Less		
Minus		
Take away		
Column addition	Column Method Starting with the ones, add each column in turn. Regroup tens, hundreds, thousands, ten thousands and/or as required.	Column Method Starting with the ones, subtract each column in turn. Exchange tens, hundreds, thousands and/or ten thousands as required.
Column subtraction	$\begin{array}{r} 45864 \\ + 23497 \\ \hline 69361 \\ 111 \end{array}$	$\begin{array}{r} 35727 \\ - 6313 \\ \hline 29414 \end{array}$
Estimate		
Inverse operation		
Number facts		
Place value		
Complex		

Converting Units

Knowledge Organiser

Key Vocabulary

mass

gram

kilogram

capacity

volume

millilitre

centilitre

litre

millimetre

centimetre

kilometre

Converting Mass



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

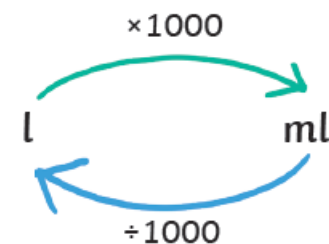
$$\frac{1}{10}\text{kg} = 0.1\text{kg} = 100\text{g}$$

$$\frac{1}{4}\text{kg} = 0.25\text{kg} = 250\text{g}$$

$$\frac{1}{2}\text{kg} = 0.5\text{kg} = 500\text{g}$$

$$\frac{3}{4}\text{kg} = 0.75\text{kg} = 750\text{g}$$

Converting Capacity



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

$$\frac{1}{10}\text{l} = 0.1\text{l} = 100\text{ml}$$

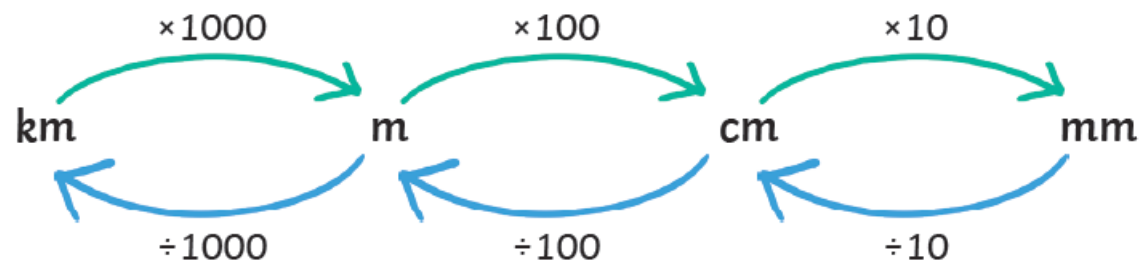
$$\frac{1}{4}\text{l} = 0.25\text{l} = 250\text{ml}$$

$$\frac{1}{2}\text{l} = 0.5\text{l} = 500\text{ml}$$

$$\frac{3}{4}\text{l} = 0.75\text{l} = 750\text{ml}$$

$$\frac{1}{100}\text{l} = 0.01\text{l} = 10\text{ml}$$

Converting Length



$$1000\text{ metres} = 1\text{ kilometre}$$

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

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

$$\frac{1}{10}\text{km} = 0.1\text{km} = 100\text{m}$$

$$\frac{1}{4}\text{km} = 0.25\text{km} = 250\text{m}$$

$$\frac{1}{2}\text{km} = 0.5\text{km} = 500\text{m}$$

$$\frac{3}{4}\text{km} = 0.75\text{km} = 750\text{m}$$

Decimals

Key Vocabulary

tenths

hundredths

decimal tenths

decimal hundredths

decimal equivalents

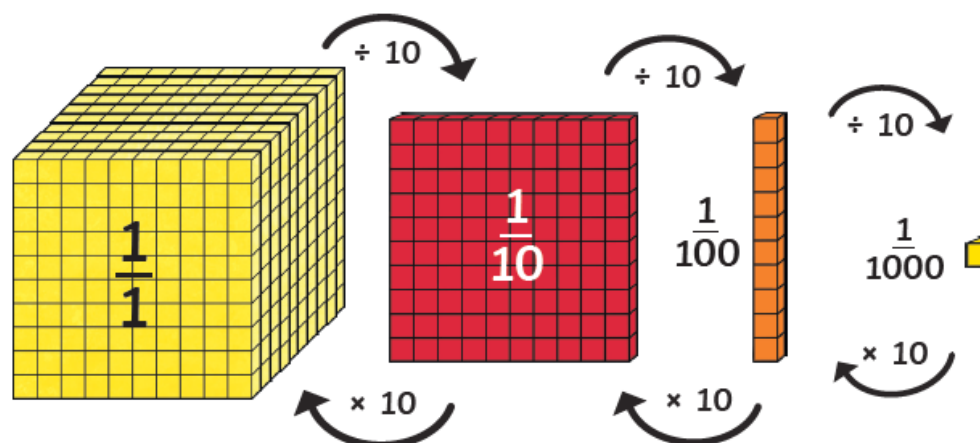
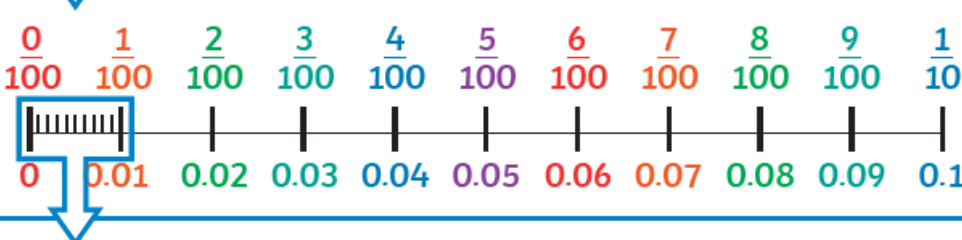
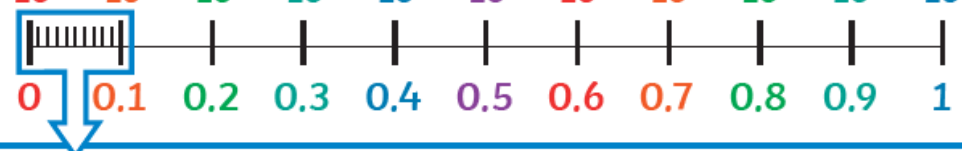
part-whole model

rounding

decimal point

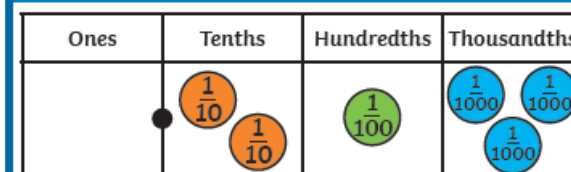
place value

Tenths, Hundredths and Thousandths

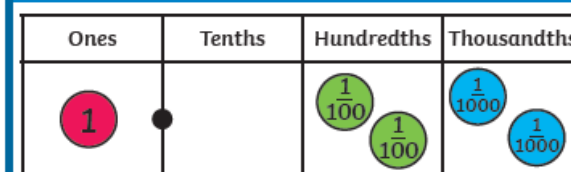


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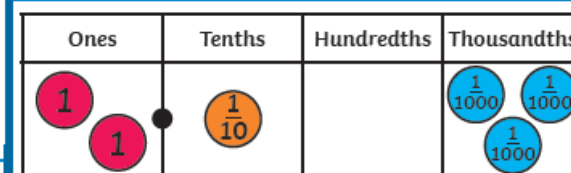
Order and Compare Numbers with Three Decimal Places



0 . 2 1 3



1 . 0 2 2



2 . 1 0 3

Decimal Numbers as Fractions

$$0.71 = \frac{71}{100} = \frac{7}{10} + \frac{1}{100}$$

$$0.37 = \frac{37}{100} = \frac{3}{10} + \frac{7}{100}$$

Fractions

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Key Vocabulary

numerator

denominator

unit fraction

non-unit fraction

whole

equivalent

mixed number

improper fraction

simplest form

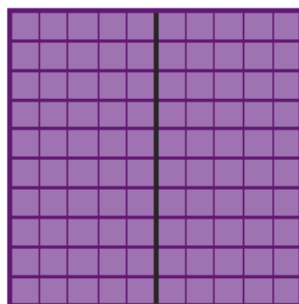
multiple

common denominator

common numerator

Equivalent Fractions

To find equivalent fractions, we multiply or divide the numerator and denominator by the same number.

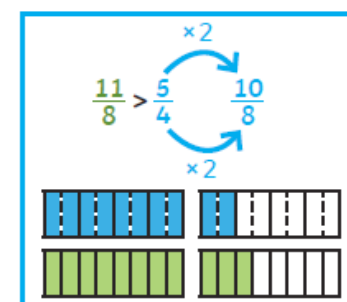
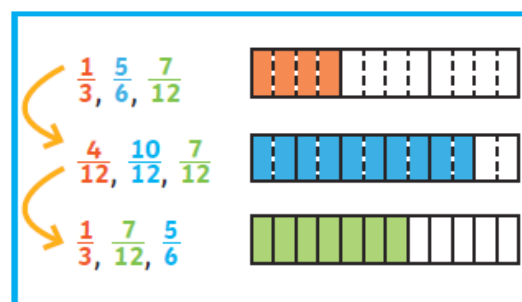


$$\frac{1}{2} = \frac{5}{10} = \frac{50}{100}$$

Diagram showing the multiplication of numerator and denominator by 5 and 10 to find equivalent fractions.

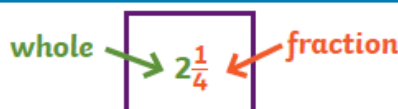
Compare and Order Fractions

We can compare and order fractions by using common denominators.



Mixed Numbers

Mixed numbers contain a whole number and a fraction.



Improper Fractions

An improper fraction has a numerator which is greater than or equal to the denominator.

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

Convert an Improper Fraction to a Mixed Number

$$\frac{9}{4}$$

Diagram showing the division of 9 by 4, resulting in 2 with a remainder of 1. The remainder 1 is written as 1/4, giving the mixed number 2 1/4.

This shows you the whole number and the fraction.

Convert a Mixed Number to an Improper Fraction

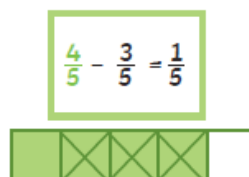
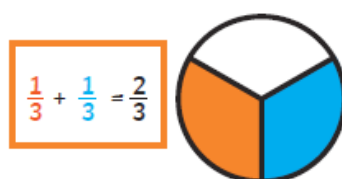
Multiply the whole by the denominator to make an improper fraction.

$$2 \frac{5}{6} = \frac{12}{6} + \frac{5}{6} = \frac{17}{6}$$

Add the fractions together.

Adding and Subtracting Fractions

To add or subtract fractions with denominators that are multiples of the same number, we must change one fraction to have the same denominator.



$$\frac{1}{4} + \frac{3}{8} = \frac{2}{8} + \frac{3}{8} = \frac{5}{8}$$

$$\frac{5}{6} - \frac{2}{3} = \frac{5}{6} - \frac{4}{6} = \frac{1}{6}$$



Volume

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Key Vocabulary

cubed

area

cross-section

prism

cube

cuboid

face

length

height

width

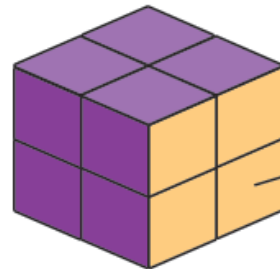
depth

Volume of Cubes and Cuboids

Volume is measured in cubed units. For example, **cm³**, **m³** and **km³**.

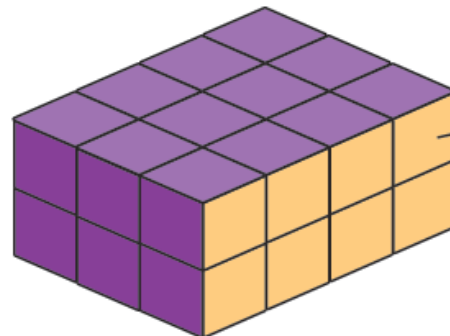
To calculate the volume of cubes and cuboids:

1. Calculate the area of the cross-section (one face).
2. Multiply the area of the cross-section (one face) by its depth.



$$\text{Area of cross section (face)} = 2\text{cm} \times 2\text{cm} = 4\text{cm}^2$$

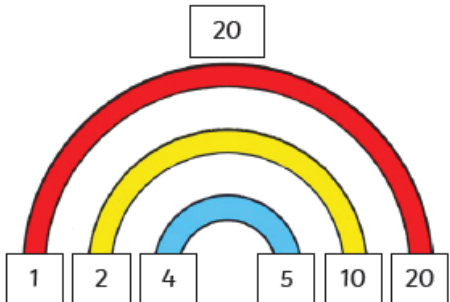
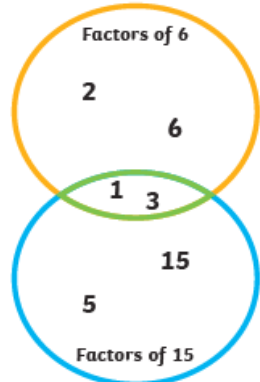
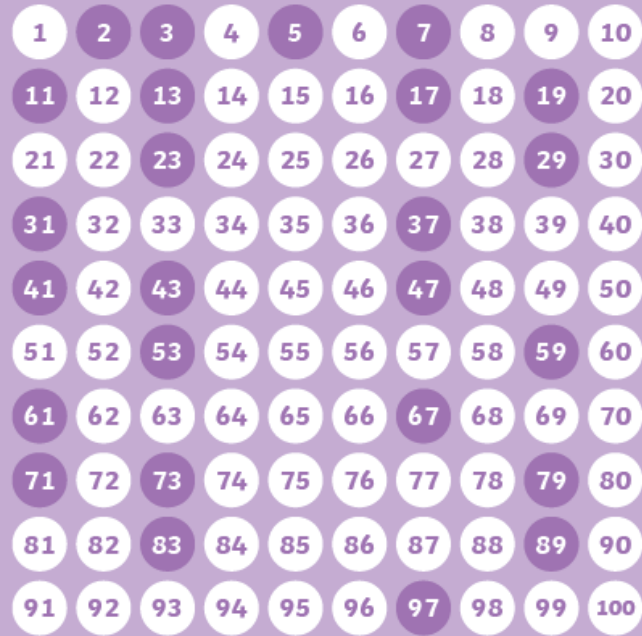
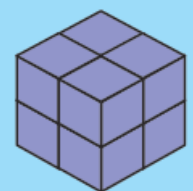
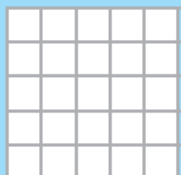
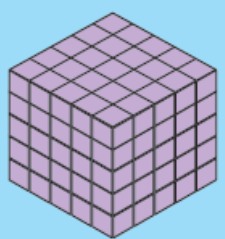
$$4\text{cm}^2 \times 2\text{cm} = \text{Volume of } 8\text{cm}^3$$



$$\text{Area of cross section (face)} = 4\text{cm} \times 2\text{cm} = 8\text{cm}^2$$

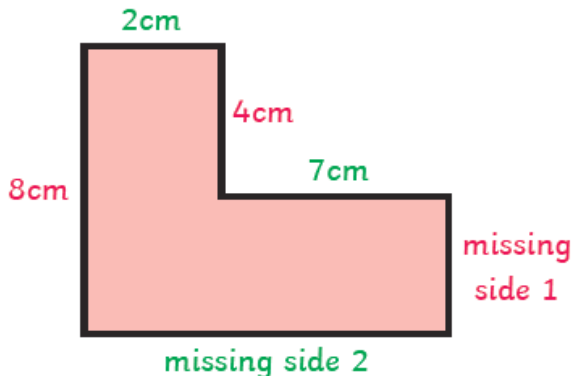
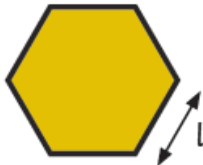
$$8\text{cm}^2 \times 3\text{cm} = \text{Volume of } 24\text{cm}^3$$



Multiplication and Division		Knowledge Organiser	
Key Vocabulary	Factors	Prime Numbers	
multiply	A factor is a number that divides into another number exactly, without leaving a remainder.  The factors of 20 are 1, 2, 4, 5, 10 and 20. The factor pairs are: 1 and 20 2 and 10 4 and 5 A common factor is a factor of 2 or more numbers. 		
groups of			
lots of			
times			
divide			
share			
remainder			
factor	Squared ² and Cubed ³ Numbers	Related Calculations	
multiple	  $2^2 = 4$ $2 \times 2 = 4$ $2^3 = 8$ $2 \times 2 \times 2 = 8$   $5^2 = 25$ $5 \times 5 = 25$ $5^3 = 125$ $5 \times 5 \times 5 = 125$	$8 \times 9 = 72$ $80 \times 9 = 720$ $9 \times 8 = 72$ $90 \times 8 = 720$	
product			
		$72 \div 9 = 8$ $720 \div 9 = 80$ $72 \div 8 = 9$ $720 \div 8 = 90$	

Perimeter and Area

Knowledge Organiser

Key Vocabulary	Measure Perimeter	Calculate Perimeter
metre	Measure the perimeter of a rectangle: 	Calculate the missing sides of this rectilinear shape to find the perimeter: 
kilometre		
perimeter		
length	Measure the length (l) and width (w). Perimeter = l + w + l + w or (l + w) × 2	* This shape is not drawn to the dimensions specified. Missing side 1 + 4cm = 8cm, so missing side 1 = 4cm. Missing side 2 = 2cm + 7cm = 9cm Perimeter = sum of all sides = 2cm + 4cm + 7cm + 4cm + 9cm + 8cm = 34cm
width	Measure the perimeter of regular shapes:  Measure the length (l) and count the number of sides (s) on the shape. Perimeter = l × s	
rectangle	Measure the perimeter of irregular shapes: 	
rectilinear		
dimensions		
	Measure the length of each side and add them together.	

Position and Direction

Knowledge Organiser

Key Vocabulary

coordinate

quadrant

x-axis

y-axis

reflection

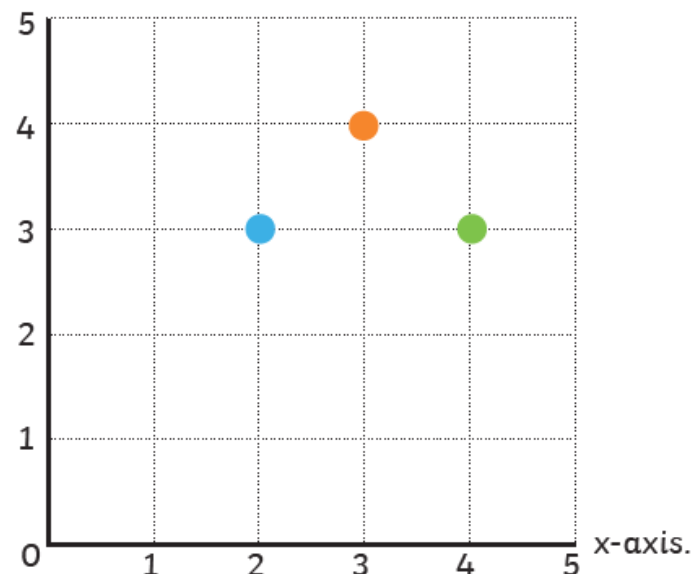
mirror line

translation

horizontal

vertical

y-axis.



Coordinates are a useful way to locate a position on a map or grid.

The numbers across the horizontal line of the grid are on the **x-axis**.

The numbers on the vertical line of the grid are on the **y-axis**.

We always read or write the number on the x-axis before the y-axis.

The x and y position are written in brackets with a comma.

The coordinate of the orange spot is **(3, 4)**.

To help you remember which point to read or write first, simply remember to move 'along the corridor and up the stairs'.

In other words, move on the **x-axis** and then move on the **y-axis**.

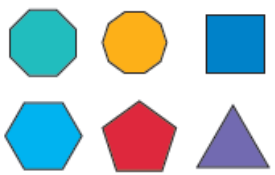
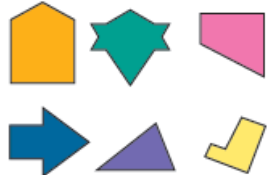


Properties of Shape

Key Vocabulary

angle
right angle
acute
obtuse
reflex
protractor
horizontal
vertical
parallel
perpendicular
polygon
regular
irregular
two-dimensional
three-dimensional
flat face
curved surface
edge
curved edge
vertex
apex

Regular and Irregular Polygons

Regular	Irregular
	

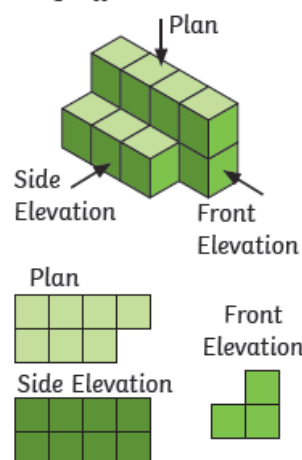
A polygon is any two-dimensional shape formed with straight lines.

In a regular polygon, all the sides and angles are equal.

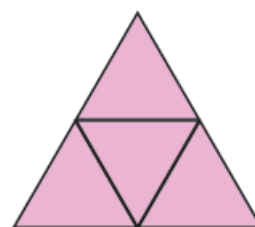
In an irregular polygon, the sides and angles are not equal.

Representations

Cube models can be drawn as 2D representations using different elevations.



A shape net is a 2D drawing of an unfolded 3D shape. When you are drawing or reasoning about shape nets, think carefully about where the edges of the faces meet.



Shape net of a tetrahedron.

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Properties of 3D Shapes

Name	Surfaces		Edges		Vertices	Picture
	Flat	Curved	Flat	Curved		
cube	6	0	12	0	8	
cuboid	6	0	12	0	8	
square-based pyramid	5	0	8	0	5	
tetrahedron	4	0	6	0	4	
triangular prism	5	0	9	0	6	
pentagonal prism	7	0	15	0	10	
hexagonal prism	8	0	18	0	12	
octagonal prism	10	0	24	0	16	
octahedron	8	0	12	0	6	

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A cone has an apex. This is because a vertex is the point where two straight edges meet and a cone has no straight edges.

Statistics Knowledge Organiser

Statistics Knowledge Organiser

Key Vocabulary	Reading and Understanding Tables	Completing Tables
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axis	A table to show ticket prices at a	Here is a table showing the favourite drink flavours of some children.
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		Bous	Girls	Total
continuous data	local cinema.			

horizontal							
	Ticket	Weekday	Weekend	Orange	8		18

data	Ticket Type	Weekday Price	Weekend Price	5			
				Blackcurrent		6	

interpret	3						
Adult	£6	£7.50					
Total	15						

label	Adult	20	27.50
Child	64	64	50

To find how many have voted for blackcurrant, look at the total

line graph	Child	24	24.50
maximum value	Student	£5.50	£6

maximum value	Student	29.50	29	The maximum value of the function is 29.50 for orange.
minimum value				

Identify the value	In order to understand the data	
pattern	Looking at the data, we can see that	To find how many girls voted for orange, look at the total number of

pattern	presented in a table, you must read	To find how many girls voted for orange, look at the total number of
predict	the table's title and the headings	votes for orange and subtract the number of votes from boys.

predict	the table's title and the headings .	1. Look for "range" and "start," and the number of "end" from "range."
relationship	Remember to always look at the	2. Look for "end" and "start," and the number of "end" from "range."

heading that **each piece of information**

scale	falls under.	of girls or the total number of voters, simply add up the values from the appropriate row or column.
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[illegible]

table	Timetables
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tally	Here is a bus timetable:
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timetable	Here is a bus timetable.	Three different buses
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The diagram shows a bus route starting at a pink box labeled "The bus starts at this time and location". The route is represented by a horizontal line with five colored segments: light blue, pink, orange, light blue, and pink. A bracket above the horizontal line is labeled "horizontal". A vertical line segment is shown to the left of the horizontal line, labeled "vertical".

x-axis	Mill Road	0726		0842	The bus starts at this time and location.
	High Street	0730	0802		

y-axis	High Street	0729	0803		The bus does not stop here.
	Pitsmoor Road	0759	0833		

10:00	Fulwood	0845	0919	0946	The bus terminates at this time and location.
10:00	Fulwood	0845	0919	0946	

Reading and Understanding Tables	Completing Tables
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A table to show ticket prices at a local cinema.	Here is a table showing the favourite drink flavours of some children.		
	Boys	Girls	Total

Ticket Type	Weekday Price	Weekend Price
Adult	£6	£7.50
Child	£4	£4.50
Student	£5.50	£6

To find how many boys voted for blackcurrant, look at the total number of boys who voted and subtract the number of votes

In order to understand the data presented in a table, you must read the **table's title** and the **headings**. Remember to always look at the heading that **each piece of information** falls under.

Timetables

Here is a bus timetable:

		Three different buses			
Bus stop locations	Mill Road	0726		0842	The bus starts at this time and location.
	High Street	0729	0803		The bus does not stop here.
	Pitsmoor Road	0759	0833		
	Fulwood	0845	0919	0946	The bus terminates at this time and location.

The bus starts at this time and location.

The bus does not stop here.

The bus terminates at this time and location.