

Level3opaedia

'A level is a level'

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Numbers and the Number System

Understand place value in numbers to 1000	
Represent / compare numbers using number lines, 100-squares, base 10 materials etc.	What is wrong: $37 \times 10 = 3700$
Recognise that some numbers can be represented as different arrays	True/Never/Sometimes: 65 is closer to 70 than it is to 60
Use understanding of place value to multiply/ divide whole numbers by 10 (whole number answers)	
Use place value to make approximations	
Round whole numbers to the nearest 10, 100 or 1000.	Show me a number that is 50, when rounded to the nearest 10
	True/Never/Sometimes: 65 is closer to 70 than it is to 60
	Convince me that 490 is 0 when rounded to the nearest 1000
Recognise negative numbers in contexts such as temperature	
Order positive and negative whole numbers on a number line.	Show me a number smaller than 1, and another, and another ...
Fill in missing temperatures on a number line from -10°C to 10°C .	Show me an example of when you would need to use negative numbers
Order temperatures from coldest to hottest.	True/Never/Sometimes: -4 is bigger than -2
	Convince me that -9 is smaller than -4
Use simple fractions that are several parts of a whole and recognise when two simple fractions are equivalent	
Understand and use unit fractions such as $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{5}$, $\frac{1}{10}$ and find those fractions of shapes and sets of objects	Show me half of (these items), a third of, a quarter of, ...
Recognise and record fractions that are several parts of the whole such as $\frac{3}{4}$, $\frac{2}{5}$	What is the same/different: $\frac{1}{2}$ and $\frac{5}{10}$
Recognise some fractions that are equivalent to $\frac{1}{2}$	Convince me that <ul style="list-style-type: none"> a half is bigger than a quarter a half is the same as two quarters
Begin to use decimal notation in contexts such as money	
Know that £3.06 equals 306p	Show me a number: <ul style="list-style-type: none"> between 0.4 and 0.9, and another, ... smaller than 1, and another, and another ...
Place these long jump results in order, starting with the shortest: 2.07m, 1.89m, 2.65m, 2.30m	What is the same/different: 1.4, £1.40, 1.40 and 1.4m
	True/Never/Sometimes: 3.6 is the same as 3.60
	Convince me that 6.2 is halfway between 5.9 and 6.5

Calculating

Derive associated division facts from known multiplication facts	
<p>Use mental recall of the 2, 3, 4, 5 and 10 multiplication tables</p> <p>Given a number sentence, use understanding of operations to create related sentences, e.g. given $14 \times 5 = 70$, create $5 \times 14 = 70$, $70 \div 5 = 14$, $70 \div 14 = 5$, $14 \times 5 = 10 \times 5$ add 4×5</p> <p>Use inverses to find missing whole numbers in problems such as, 'I think of number, double it and add 5. The answer is 35. What was my number?'</p>	<p>$7 \times 3 = 21$. What else does this tell you?</p> <p>Here is a multiplication: $6 \times 10 = 60$. Show me a division using the same three numbers</p> <p>$? \div 4 = 23$. Convince me that ? is 92</p>
Add and subtract two-digit numbers mentally	
<p>Calculate $36 \square + 19$, $63 - 26$, and complements to 100 such as $100 - 24$</p>	<p>Show me 2 two digit numbers with a sum of 73</p> <p>What's wrong with this statement: $91 - 74 = 23$</p> <p>Convince me that $91 - 74 = 17$</p>
Add and subtract three digit numbers using written methods	
<p>Use written methods that involve bridging 10 or 100</p> <p>Add and subtract decimals in the context of money, where bridging is not required</p>	<p>Show me 2 three digit numbers with a sum of 473</p> <p>What's wrong with this statement: $191 - 174 = 23$</p> <p>Convince me that $191 - 174 = 17$</p>
Multiply and divide two digit numbers by 2, 3, 4 or 5 as well as 10 with whole number answers and remainders	
<p>Calculate</p> <ul style="list-style-type: none"> ▪ 49×3 ▪ $52 \div 4$ ▪ 13×10 ▪ $42 \div 10$ 	<p>Show me an example of a number when you divide by 5 gives a remainder of 1</p> <p>What's wrong: $19 \div 3 = 6.1$</p>
Use mental recall of addition and subtraction facts to 20 in solving problems involving larger numbers	
<p>Choose to calculate mentally, on paper or with apparatus</p> <p>Solve one-step whole number problems appropriately</p> <p>Solve two-step problems that involve addition and subtraction</p>	<p>Solve this $13 + ? = ! - 2$. Show me a similar example using number facts to 20</p> <p>$116 + 104 = 210$. How can you correct this?</p> <p>Convince me that $119 - 13 = 106$</p> <p>Convince me that $116 + 104 = 220$</p>
Solve whole-number problems involving multiplication or division, including those that give rise to remainders and round up or down, depending on context	
<p>Identify appropriate operations to use</p> <p>Round up or down after simple division, depending on context</p> <p>Understand finding a quarter of a number of objects as halving the number and halving again.</p> <p>Begin to know multiplication facts for 6, 8, 9 and 7x tables</p>	<p>Always, sometimes or never true: Finding a quarter is halving and halving again?</p>

Algebra

Recognise a wider range of sequences

Continue arithmetic sequences in either direction

Recognise a wider range of sequences including multiples of 2, 5 and 10

Show me an example of a number sequence:

- with an increasing pattern
- with a decreasing pattern

What is the same/different:

4, 7, 10, 13, ... and 13, 10, 7, 4, ...

True/Never/Sometimes: A sequence always goes up in equal steps

Convince me that the number '____' is in this sequence

Begin to understand the role of '=' (the 'equals' sign)

Find the missing numbers in the following: $12 + ? =$
 $\$ + 73 = 100$

Show me two numbers that total 100. Show me a number problem that can be solved using your solution.

What is the same/different about $38 + ? = 100$ and $62 + ? = 100$

True/Never/Sometimes: There are 100 different pairs of numbers that total 100

Shape, Space and Measures

Classify 3-D and 2-D shapes in various ways using mathematical properties such as reflective symmetry for 2-D shapes

Sort objects and shapes using more than one criterion, e.g. pentagon, not pentagon and all edges the same length/not the same length

Sort the shapes which have all edges the same length and all angles the same size from a set of mixed shapes and begin to understand the terms 'regular' and 'irregular'

Recognise right angled and equilateral triangles

Demonstrate that a shape has reflection symmetry by folding and recognise when a shape does not have a line of symmetry

Recognise common 3-D shapes e.g. triangular prism, square-based pyramid

Relate 3-D shapes to drawings and photographs of them, including from different viewpoints

Show me a triangle/quadrilateral/cuboid, and another, and another ...

Show me a shape with one right angle/two equal sides, and another, and another...

What is the same different about (diagrams of) these triangles / quadrilaterals, ...

True/Never/Sometimes: A triangle has a right-angle/obtuse angle, ...

Begin to recognise nets of familiar 3-D shapes, e.g. cube, cuboid, triangular prism, square-based pyramid

Describe the faces on familiar 3-D shapes, e.g. A square-based pyramid has one square face and four triangular faces.

Use nets to make 3-D shapes.

Show me an example of a net of a ..., and another...

What is the same / different about these two nets?

- different nets of the same shape
- of different shapes

How can you change this to make it the net of a ...? (start with an incorrect net)

How can you change this net (e.g. cuboid) to make it the net for this shape (e.g. cube)? How many / which faces do you need to change / add / remove?

True / Never / Sometimes:

- A cuboid has 2 square faces and 4 rectangular faces.
- A triangular prism has 2 triangular faces and 3 rectangular faces.
- The square faces of a cube are all the same size.

Convince me that this cannot be the net of the ...

Recognise shapes in different orientations and reflect shapes, presented on a grid, in a vertical or horizontal mirror line

Recognise angles which are bigger/smaller than 90° and begin to know the terms 'obtuse' and 'acute'

Show me a right/acute/obtuse angle, and another, and another ...

Show me a shape with one right angle/two acute-angles/... , and another, and another...

What is the same different about (diagrams of) these triangles / quadrilaterals, ...

True/Never/Sometimes: A triangle can have an obtuse angle

Convince me that a triangle cannot have two obtuse angles

Describe position and movement

Use everyday words to describe position and movement.

Use coordinates to describe position on a grid.

Use the eight compass directions N, S, E, W, NE, NW, SE, SW.

Show me an example of the instructions you could use to get someone (in classroom) to move from ... to ... Give different instructions for the same movement.

Show me an example of the instructions you could use to get from this square to this square (on a grid). Give different instructions for the same movement.

Show me an example of the compass directions you could use to get from ... to ... (on a map). Give different instructions for the same movement.

How can you change these directions so they start at / end at / avoid going past the ... ?

True / Never / Sometimes, using a map of the school:

- To get to the office, I must go past the staff room.
- I can get from Class 2 to Class 5 without turning right.
- I will have to turn 4 times on my way from the hall to the Class 3.
- Each classroom is next to the corridor.
- When I'm facing the notice board, the head teacher's office is on the right.
- The stockroom is between the front door and the toilets.

Use a wider range of measures including non-standard units and standard metric units of length, capacity and mass in a range of contexts

When measuring objects or reading scales

Begin to select appropriate units

Begin to understand area as a measure of surface and perimeter as a measure of length

Begin to find areas of shapes by counting squares and explain answers as a number of squares even if not using standard units such as cm^2 or m^2

Recognise angles as a measure of turn and know that one whole turn is 360 degrees

Show me 3 masses (in grams) with a total of 1kg, where all the masses are greater than 200g

True/Never/Sometimes: Large containers have a greater capacity than small ones

Use standard units of time

Read a 12-hour clock and generally calculate time durations that do not go over the hour

Show me 2 times with a difference of 30 minutes

Show me all 5 times between 2 o'clock and 3 o'clock with a difference of half an hour

True/Never/Sometimes: You should use a stop watch in seconds to time a running race

Handling Data

Gather information	
Decide what data to collect to answer a question such as 'what is the most common way to travel to school?'	Show me how we could record this data
Make appropriate choices for recording data, e.g. a tally chart or frequency table	Show me how we could represent this data
	True/Never/Sometimes: The best way to collect information is to ask your friends
Construct bar charts and pictograms, where the symbol represents a group of units	
Decide how best to represent data, for example whether a bar chart, Venn diagram or pictogram would show the information most clearly	Show me a way to represent this data in a chart
Decide upon an appropriate scale for a graph, for example labelled divisions of 2, or, for a pictogram, one symbol to represent 2 or 5	What is wrong with this bar chart (constructed incorrectly using a given table)
	How can you change this bar chart to show that (for example) 12 pupils travel to school by bike
	True/Never/Sometimes: A pictogram is the best way to represent data
Use Venn and Carroll diagrams to record their sorting and classifying of information	
Represent sorting using one or two criteria typical of level 2 and 3 mathematics such as shapes sorted using properties of number of right angles and number of equal sides	Show me an example of a number / shape / object that could go in this space of the Venn / Carroll diagram. Show me another...
	What is wrong:
	<ul style="list-style-type: none"> There will be no two-digit numbers in this part of the diagram. Only 3-D shapes will be in this part of the diagram. The label for this part of the diagram could be ...
	How can you change this label so that this number / shape / object can go in this part of the diagram?
	True / Never / Sometimes:
	<ul style="list-style-type: none"> A number in the three times table will always go here. 2-D shapes will go here or here.
	Convince me that this number / shape / object must / cannot go here.
Extract and interpret information presented in simple tables, lists, bar charts and pictograms	
Use a key to interpret represented data	Give me an example of (given an appropriate bar chart/pictogram) a popular pet
Read scales labelled in twos, fives and tens, including reading between labelled divisions such as a point halfway between 40 and 50 or 8 and 10	What is the same/different between this bar chart and this pictogram (constructed from the same data)
Compare data e.g. say how many more... than... and recognise the category that has most/least	Convince me that (given an appropriate bar chart/pictogram) most people in your class have at least one pet
Respond to questions of a more complex nature such as 'How many children took part in this survey altogether?' or 'How would the data differ if we asked the children in year 6?'	