

Subject Content: Level 2

Use of numbers and the number system: students at Level 2 are expected to be able to use numbers of any size; read, write and make use of positive and negative integers of any size; use, order and compare integers, fractions, decimals, percentages and ratios as well as recognise the value of a digit in any whole or decimal number. They can use numerical and spatial patterns for a purpose and calculate with, and convert between, numbers written as fractions, decimals, percentages and ratios. For specific content on numbers and the number system – see below.

Level 2 - using numbers and the number system – <i>whole numbers, fractions, decimals and percentages</i>
1. Read, write, order and compare positive and negative numbers of any size
2. Carry out calculations with numbers up to one million including strategies to check answers including estimation and approximation
3. Evaluate expressions and make substitutions in given formulae in words and symbols
4. Identify and know the equivalence between fractions, decimals and percentages
5. Work out percentages of amounts and express one amount as a percentage of another
6. Calculate percentage change (any size increase and decrease), and original value after percentage change
7. Order, add, subtract and compare amounts or quantities using proper and improper fractions and mixed numbers
8. Express one number as a fraction of another
9. Order, approximate and compare decimals
10. Add, subtract, multiply and divide decimals up to three decimal places
11. Understand and calculate using ratios, direct proportion and inverse proportion
12. Follow the order of precedence of operators, including indices

Use of measures, shape and space: students at Level 2 are expected to be able to handle relationships between measurements of various kinds, use angles and coordinates when involving position and direction and make use of geometric properties in calculations with 2-D and 3-D shapes and understand the relationships between them. For specific content on measures, shape and space – see below.

Level 2 - measures, shape and space
13. Calculate amounts of money, compound interest, percentage increases, decreases and discounts including tax and simple budgeting
14. Convert between metric and imperial units of length, weight and capacity using a) a conversion factor and b) a conversion graph
15. Calculate using compound measures including speed, density and rates of pay

16. Calculate perimeters and areas of 2-D shapes including triangles and circles and composite shapes including non-rectangular shapes (formulae given except for triangles and circles)
17. Use formulae to find volumes and surface areas of 3-D shapes including cylinders (formulae to be given for 3-D shapes other than cylinders)
18. Calculate actual dimensions from scale drawings and create a scale diagram given actual measurements
19. Use coordinates in 2-D, positive and negative, to specify the positions of points
20. Understand and use common 2-D representations of 3-D objects
21. Draw 3-D shapes to include plans and elevations
22. Calculate values of angles and/or coordinates with 2-D and 3-D shapes

Handle information and data: students at Level 2 are expected to be able to construct, interpret and evaluate a range of statistical diagrams. They can calculate and interpret probabilities. They can calculate, analyse, compare and interpret appropriate data sets, tables, diagrams and statistical measures such as common averages (mean, median, mode) and spread (range), and use statistics to compare sets of data. They can identify patterns and trends from data as well as recognise simple correlation. For specific content on information and data see below.

Level 2 - handling information and data
23. Calculate the median and mode of a set of quantities
24. Estimate the mean of a grouped frequency distribution from discrete data
25. Use the mean, median, mode and range to compare two sets of data
26. Work out the probability of combined events including the use of diagrams and tables, including two-way tables
27. Express probabilities as fractions, decimals and percentages
28. Draw and interpret scatter diagrams and recognise positive and negative correlation

Solving mathematical problems and decision making: students at Level 2 are expected to be able to use the knowledge and skills listed above to recognise and obtain a solution or solutions to a complex problem. A complex problem is one which requires a multistep process, typically requiring planning and working through at least two connected steps or processes.

Individual problems are based on a combination of the knowledge and/or skills from the mathematical content areas (number and the number system; measures, shape and space; information and data). At Level 2 it is expected that the student will be able to address individual problems some of which draw upon a combination of all three mathematical areas and require students to make connections between those content areas.

Level 2 - solving mathematical problems and decision making

Students at Level 2 are expected to be able to:

- Read, understand, and use mathematical information and mathematical terms;
- Address individual problems as described above;
- Use knowledge and understanding to a required level of accuracy;
- Identify suitable operations and calculations to generate results;
- Analyse and interpret answers in the context of the original problem;
- Check the sense and reasonableness of answers; and
- Present and explain results clearly and accurately demonstrating reasoning to support the process and show consistency with the evidence presented.

The context of individual problems at this level will require interpretation and analysis in order for the student to be able independently to identify and carry out an appropriate mathematical process or processes.

Skill standards	Coverage and range	Assessment weighting
<p>Representing</p> <p>1. Understand routine and non-routine problems in familiar and unfamiliar contexts and situations.</p> <p>2. Identify the situation or problems and identify the mathematical methods needed to solve them.</p> <p>3. Choose from a range of mathematics to find solutions.</p>	<p>a) Understand and use positive and negative numbers of any size in practical contexts;</p> <p>b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places;</p> <p>c) Understand, use and calculate ratio and proportion, including problems involving scale;</p> <p>d) Understand and use equivalences between fractions, decimals and percentages;</p> <p>e) Understand and use simple formulae and equations involving one- or two-step operations;</p>	30–40%
<p>Analysing</p> <p>4. Apply a range of mathematics to find solutions.</p> <p>5. Use appropriate checking procedures and evaluate their effectiveness at each stage.</p>	<p>f) Recognise and use 2D representations of 3D objects;</p> <p>g) Find area, perimeter and volume of common shapes;</p> <p>h) Use, convert and calculate using metric and, where appropriate, imperial measures;</p>	30–40%
<p>Interpreting</p> <p>6. Interpret and communicate solutions to multi-stage practical</p>	<p>i) Collect and represent discrete and continuous data, using ICT where appropriate;</p> <p>j) Use and interpret statistical measures, tables and diagrams, for</p>	30–40%
<p>problems in familiar and unfamiliar contexts and situations.</p> <p>7. Draw conclusions and provide mathematical justifications.</p>	<p>discrete and continuous data, using ICT where appropriate;</p> <p>k) Use statistical methods to investigate situations;</p> <p>l) Use probability to assess the likelihood of an outcome.</p>	

Reformed Criteria Reference	Legacy Criteria Coverage
1. Read, write, order and compare positive and negative numbers of any size	a) Understand and use positive and negative numbers of any size in practical contexts
2. Carry out calculations with numbers up to one million including strategies to check answers including estimation and approximation	b) Carry out calculations with numbers of any size in practical contexts, to a given number of decimal places
3. Evaluate expressions and make substitutions in given formulae in words and symbols	e) Understand and use simple formulae and equations involving one- or two-step operations
4. Identify and know the equivalence between fractions, decimals and percentages	d) Understand and use equivalences between fractions, decimals and percentages
5. Work out percentages of amounts and express one amount as a percentage of another	
6. Calculate percentage change (any size increase and decrease), and original value after percentage change	
7. Order, add, subtract and compare amounts or quantities using proper and improper fractions and mixed numbers	
8. Express one number as a fraction of another	
9. Order, approximate and compare decimals	
10. Add, subtract, multiply and divide decimals up to three decimal places	
11. Understand and calculate using ratios, direct proportion and inverse proportion	c) Understand, use and calculate ratio and proportion, including problems involving scale
12. Follow the order of precedence of operators, including indices	
13. Calculate amounts of money, compound interest, percentage increases, decreases and discounts including tax and simple budgeting	
14. Convert between metric and imperial units of length, weight and capacity using a) a conversion factor and b) a conversion graph	h) Use, convert and calculate using metric and, where appropriate, imperial measures
15. Calculate using compound measures including speed, density and rates of pay	
16. Calculate perimeters and areas of 2-D shapes including triangles and circles and composite shapes including non-rectangular shapes (formulae given except for triangles and circles)	g) Find area, perimeter and volume of common shapes
17. Use formulae to find volumes and surface areas of 3-D shapes including cylinders (formulae to be given for 3-D shapes other than cylinders)	g) Find area, perimeter and volume of common shapes
18. Calculate actual dimensions from scale drawings and create a scale diagram given actual measurements	

19. Use coordinates in 2-D, positive and negative, to specify the positions of points	
20. Understand and use common 2-D representations of 3-D objects	f) Recognise and use 2D representations of 3D objects
21. Draw 3-D shapes to include plans and elevations	j) Use and interpret statistical measures, tables and diagrams, for discrete and continuous data, using ICT where appropriate
22. Calculate values of angles and/or coordinates with 2-D and 3-D shapes	
23. Calculate the median and mode of a set of quantities	
24. Estimate the mean of a grouped frequency distribution from discrete data	i) Collect and represent discrete and continuous data, using ICT where appropriate; k) Use statistical methods to investigate situations
25. Use the mean, median, mode and range to compare two sets of data	k) Use statistical methods to investigate situations
26. Work out the probability of combined events including the use of diagrams and tables, including two-way tables	l) Use probability to assess the likelihood of an outcome
27. Express probabilities as fractions, decimals and percentages	l) Use probability to assess the likelihood of an outcome
28. Draw and interpret scatter diagrams and recognise positive and negative correlation	j) Use and interpret statistical measures, tables and diagrams, for discrete and continuous data, using ICT where appropriate