

In partnership with



**Dr Frost
LEARNING**

STRIDE INTO *THE FUTURE* OF ASSESSMENT

Teacher Companion Guide

Shapes



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Overview

Stride is a new offering from AQA which is designed to empower students and quickly identify and close their knowledge gaps in mathematics. Designed to help students starting their GCSEs – either for the first time or as a resit – the tests are accessible for all and adapt to students' knowledge, delivering the right amount of challenge.

Our new maths tests will allow teachers to pinpoint gaps in their students' conceptual knowledge - saving them time and empowering students, who will understand how to improve. They're fully funded for schools and colleges, easy to use for teachers and engaging for students.

The five short tests, created with the [Key Stage 1 and 2](#) and [Key Stage 3](#) guidance in mind, focus on key areas of maths that experts have identified as the most impactful for GCSE success. They come with personalised learning and next steps to allow students to develop in both knowledge and confidence.

Rationale

We know that maths is a hierarchical subject, with knowledge being built upon foundational maths which underpins the new concept. We have analysed data from hundreds of thousands of exam questions and found that even though content is first encountered in the early stages of a learner's schooling, a significant proportion of learners answer questions on the foundations of maths incorrectly.

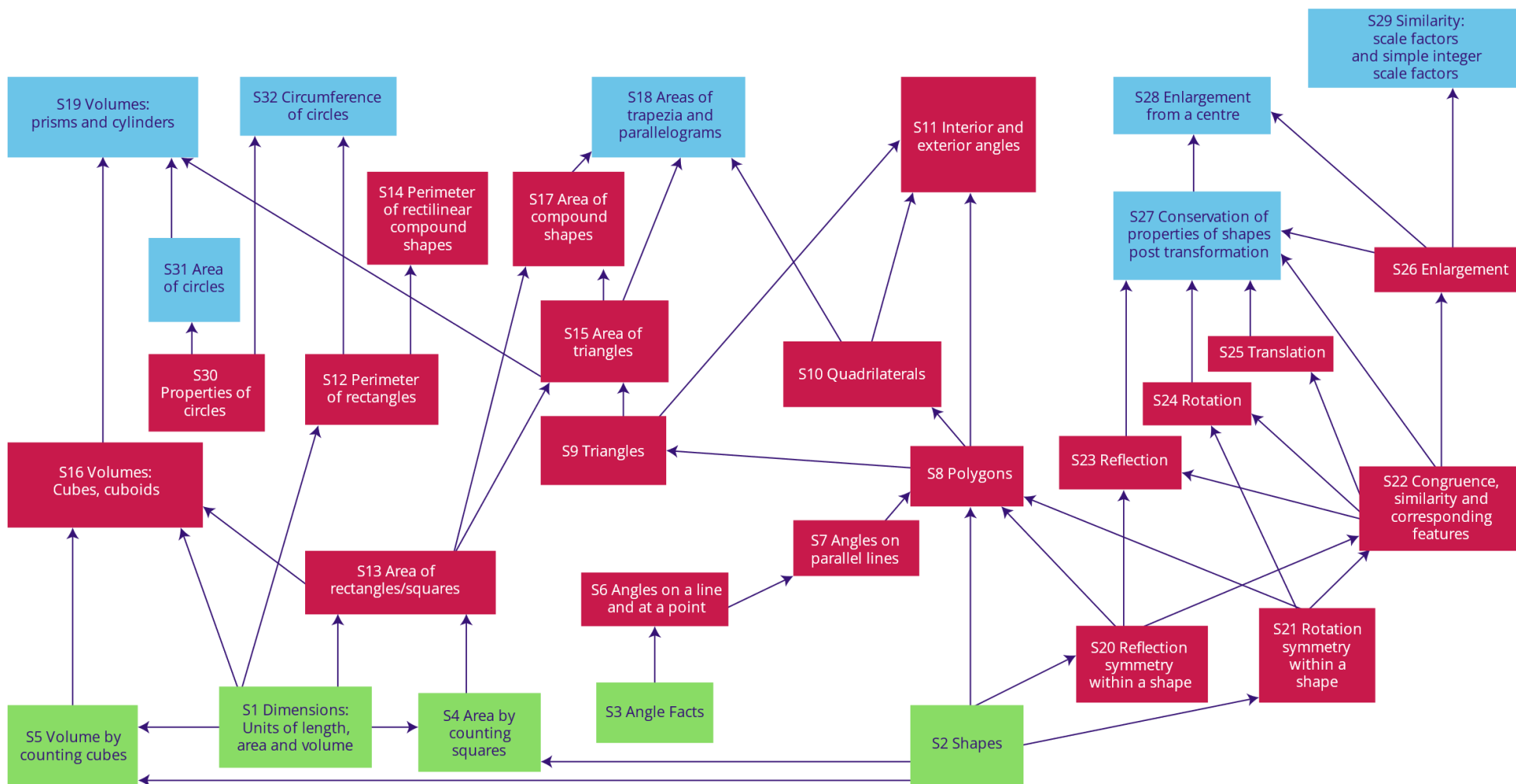
With this in mind, we want to empower teachers to take control of their classrooms and provide a nurturing environment in which gaps within key prerequisite understanding are identified and corrective instruction is deployed, filling the gaps and ensuring that more complex content can be taught, safe in the knowledge that learners have the underlying knowledge required to be successful in their lessons, and thrive in the GCSE examinations.

Key features

The Shapes Concept Map, shown on the next page, shows the importance of S8 Polygons with a significant number of predecessors, bringing this knowledge together and progressing S9 Triangles, S10 Quadrilaterals and S11 Interior and Exterior Angles. Knowledge of the properties of quadrilaterals (S10) facilitates problem solving at GCSE.

The idea of congruence (and similarity) is key when working with the four transformations (S23, S24, S25, S26) and it's clear that learners must have significant expertise with S2 Shapes to succeed with the ideas of perimeter, area and volume which are prevalent in the Shapes knowledge space.

5. Shapes



S1 Dimensions: units of length, volume and area

What is being tested	Learners are being tested on their understanding of measures in differing numbers of dimensions, recalling common units.
Learning Objectives	<p>S1.1 Identify the units that represent length</p> <p>S1.2 Recall the definition of length</p> <p>S1.3 Identify the units that represent area</p> <p>S1.4 Identify the units that represent volume</p> <p>S1.5 Recall the definition of volume</p> <p>S1.6 Know that volume is the amount of space occupied by a 3D figure in cubic units</p>
Predecessors	None
Successors	<p>S4 Area by counting squares</p> <p>S5 Volume by counting cubes</p> <p>S12 Perimeter of rectangles</p> <p>S13 Area of rectangles/squares</p> <p>S16 Volumes: Cubes, cuboids</p>
KS2 & KS3 Guidance	Learners encounter units for length in Year 2 (page 52, KS1 and KS2 guidance), area in Year 5 (page 269, KS1 and KS2 guidance) and volume in upper KS2, extending on this knowledge in Year 8 (page 183, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	15 Measuring using scales of lengths, mass and capacity
	186 Estimating measures in context
	New Lesson Resources
	N/A
	Legacy Lesson Resources
	Units

S2 Shapes

What is being tested	Learners are being tested on their ability to identify common 2D shapes and 3D solids.
Learning Objectives	<p>S2.1 Identify basic 3D shapes (cube and cuboid, cone, cylinder and pyramid)</p> <p>S2.2 Categorise objects according to their dimensionality</p> <p>S2.3 Identify basic 2D shapes (circle, triangle, square etc)</p> <p>S2.4 Match polygons to their number of sides</p>
Predecessors	None
Successors	<p>S4 Area by counting squares</p> <p>S5 Volume by counting cubes</p> <p>S8 Polygons</p> <p>S20 Reflection symmetry within a shape</p> <p>S21 Rotation symmetry within a shape</p>
KS2 & KS3 Guidance	Learners begin to recognise shapes and solids in Year 1 (page 42, KS1 and KS2 guidance).
Dr Frost Learning Platform References	DF Index skills
	25 Introduction to 2D shapes
	32 Introduction to 3D shapes
	78 Properties of polygons
	New Lesson Resources
	N/A
Legacy Lesson Resources	
KS3/GCSE 2D Shapes	

S3 Angle facts

What is being tested	Learners are being tested on their ability to describe an angle as a fraction of a whole revolution.
Learning Objectives	<p>S3.1 Recall the definition of angle</p> <p>S3.2 Recall the number of degrees equivalent to a full turn</p> <p>S3.3 Recall the number of degrees equivalent to a half of a full turn</p> <p>S3.4 Recall the number of degrees equivalent to a quarter of a full turn</p> <p>S3.5 Match the terms acute, obtuse and reflex angles with their definitions (improve definitions)</p> <p>S3.6 Identify the correct notation of an angle (single correct answer, remove reverse notation)</p>
Predecessors	None
Successors	S6 Angles on a line and at a point
KS2 & KS3 Guidance	Learners begin to consider angles as parts of a full turn in Year 3 (page 134, KS1 and KS2 guidance).
Dr Frost Learning Platform References	DF Index skills
	13 Understanding directional language
	62 Identifying right-angles and relating to other angles and turns
	76 Types of angle
	179 Geometric notation for shapes and lines
	New Lesson Resources
N/A	
Legacy Lesson Resources	
Angles	

S4 Area by counting squares

What is being tested	Learners are being tested on their understanding of area, and their ability to find areas by counting squares.
Learning Objectives	<p>S4.1 Find the area of a rectangle by counting squares</p> <p>S4.2 Find the area of a simple 2D shape by counting squares</p> <p>S4.3 Recall the definition of area</p> <p>S4.4 Find the area of a 2D shape by counting squares and half squares</p> <p>S4.5 Know that the area of a square of side 1cm is 1 square centimetre</p>
Predecessors	<p>S1 Dimensions: Units of length, area and volume</p> <p>S2 Shapes</p>
Successors	S13 Area of rectangles/squares
KS2 & KS3 Guidance	Learners begin to calculate area in Year 5 (page 269, KS1 and KS2 guidance).
Dr Frost Learning Platform References	DF Index skills
	80 Area of shapes by counting squares
	New Lesson Resources
	In Development
	Legacy Lesson Resources
	GCSE/KS3 - Area & Perimeter by Counting

S5 Volume by counting cubes

What is being tested	Learners are being tested on their understanding of volume, and their ability to find volumes by counting cubes.
Learning Objectives	<p>S5.1 Calculate volume of a cuboid by counting cubes</p> <p>S5.2 Find how many more cubes are needed to fill the cuboid</p> <p>S5.3 Find how many more cubes are needed to make a cuboid</p> <p>S5.4 Identify the volume of a cube of side 1cm</p> <p>S5.5 Find the volume of a shape made from cubes</p>
Predecessors	<p>S1 Dimensions: Units of length, area and volume</p> <p>S2 Shapes</p>
Successors	S16 Volumes: Cubes, cuboids
KS2 & KS3 Guidance	Learners begin to work with volume in upper KS2, extending on this knowledge in Year 8 (page 183, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	144 Volume of rectilinear prisms using unit length blocks
	New Lesson Resources
	N/A
	Legacy Lesson Resources
	Volumes (pre-GCSE)

S6 Angles on a line and at a point

What is being tested	Learners are being tested on their ability to recall common angle facts and apply these to calculate missing angles.
Learning Objectives	<p>S6.1 Recall how many degrees there are at a point</p> <p>S6.2 Recall that vertically opposite angles are equal</p> <p>S6.3 Recall the number of degrees on a straight line</p> <p>S6.4 Recall the definition of perpendicular</p> <p>S6.5 Calculate the size of an unknown angle at a point</p> <p>S6.6 Calculate the size of an unknown angle on a straight line</p>
Predecessors	S3 Angle Facts
Successors	S7 Angles on parallel lines
KS2 & KS3 Guidance	Learners begin to recognise relationships with angles that meet at a point, and at a point on a straight line, in KS2 and build on this knowledge in Year 8 (page 195, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	63 Identifying vertical, horizontal, parallel and perpendicular lines
	110 Sum of the angles on a straight line and angles around a point
	147 Vertically opposite angles
	New Lesson Resources
	Angles on a Straight Line, Around a Point & Vertically Opposite Angles
Legacy Lesson Resources	
Angles	

S7 Angles on parallel lines

What is being tested	Learners are being tested on their understanding of the relationship between angles when parallel lines are crossed by a transversal.
Learning Objectives	<p>S7.1 Recall the definition of parallel</p> <p>S7.2 Determine the value of a corresponding angle on the given diagram</p> <p>S7.3 Identify corresponding angles on parallel lines</p> <p>S7.4 Identify alternate angles on parallel lines</p> <p>S7.5 Calculate missing angles on parallel lines</p> <p>S7.6 Calculate missing angles on parallel lines with 2 transversals</p>
Predecessors	S6 Angles on a line and at a point
Successors	S8 Polygons
KS2 & KS3 Guidance	Learners begin to recognise relationships with angles in parallel lines in Year 8 (page 195, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	262 Alternate, corresponding and cointerior angles
	New Lesson Resources
	Angles on Parallel Lines
	Legacy Lesson Resources
	Angles

S8 Polygons

What is being tested	Learners are being tested on their ability to distinguish between regular and irregular polygons.
Learning Objectives	<p>S8.1 Identify drawings of polygons</p> <p>S8.2 Identify irregular and regular polygons</p> <p>S8.3 Recall the definition of a regular polygon</p> <p>S8.4 Know the features of a polygon</p> <p>S8.5 Know that squares are regular quadrilaterals</p> <p>S8.6 Know that equilateral triangles are regular triangles</p>
Predecessors	<p>S2 Shapes</p> <p>S7 Angles on parallel lines</p> <p>S20 Reflection symmetry within a shape</p> <p>S21 Rotation symmetry within a shape</p>
Successors	<p>S9 Triangles</p> <p>S10 Quadrilaterals</p> <p>S11 Interior and exterior angles</p> <p>S22 Congruence, similarity and corresponding features</p>
KS2 & KS3 Guidance	Learners begin to distinguish between regular and irregular polygons in Year 4 (page 197, KS1 and KS2 guidance).
Dr Frost Learning Platform References	DF Index skills
	25 Introduction to 2D shapes
	77 Types of quadrilaterals and triangles
	78 Properties of polygons
	New Lesson Resources
	N/A
Legacy Lesson Resources	
KS3/GCSE 2D Shapes	

S9 Triangles

What is being tested	Learners are being tested on their ability to recall common angle facts in special triangles and apply these to calculate missing angles.
Learning Objectives	<p>S9.1 Recall the sum of angles in any triangle</p> <p>S9.2 Match drawings of types of triangles and their names</p> <p>S9.3 Identify the properties of angles in equilateral triangles</p> <p>S9.4 Identify the properties of sides in isosceles triangles</p> <p>S9.5 Calculate a missing angle in a scalene triangle</p> <p>S9.6 Calculate a missing angle in an isosceles triangle</p>
Predecessors	S8 Polygons
Successors	<p>S11 Interior and exterior angles</p> <p>S15 Area of triangles</p>
KS2 & KS3 Guidance	Learners begin to recognise relationships with angles in triangles in Year 8 (page 195, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	77 Types of quadrilaterals and triangles
	149 Sum of angles in a triangle
	150 Base angles of an isosceles triangle
	New Lesson Resources
	In Development
	Legacy Lesson Resources
<p>KS3/GCSE 2D Shapes</p> <p>Angles</p>	

S10 Quadrilaterals

What is being tested	Learners are being tested on their ability to recognise special quadrilaterals and apply angle facts to calculate missing angles.
Learning Objectives	<p>S10.1 Match drawings of different quadrilaterals and their names</p> <p>S10.2 Know the equal sides properties of quadrilaterals</p> <p>S10.3 Know the parallel sides properties of quadrilaterals</p> <p>S10.4 Know the angle properties of quadrilaterals</p> <p>S10.5 Know the diagonal properties of quadrilaterals</p>
Predecessors	S8 Polygons
Successors	<p>S11 Interior and exterior angles</p> <p>S18 Areas of trapezia and parallelograms</p>
KS2 & KS3 Guidance	Learners begin to appreciate the properties of special quadrilaterals in Year 8 (page 195, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	77 Types of quadrilaterals and triangles
	151 Sum of angles in a quadrilateral
	New Lesson Resources
	In Development
	Legacy Lesson Resources
<p>KS3/GCSE 2D Shapes</p> <p>Angles</p>	

S11 Interior and exterior angles

What is being tested	Learners are being tested on their understanding of the relationship between interior and exterior angles in polygons, using the angle sum of polygons to calculate missing angles.
Learning Objectives	<p>S11.1 Identify interior and exterior angles</p> <p>S11.2 Recall what the sum of exterior angles of a polygon equals to</p> <p>S11.3 Know the sum of the interior and exterior angles at a vertex is 180 degrees</p> <p>S11.4 Recall the sum of the interior angles in a 3,4,5, 6 sided polygon</p> <p>S11.5 Calculate a missing exterior angle based on the interior angles of a triangle</p> <p>S11.6 Calculate a missing interior angle in a quadrilateral</p>
Predecessors	<p>S8 Polygons</p> <p>S9 Triangles</p> <p>S10 Quadrilaterals</p>
Successors	None
KS2 & KS3 Guidance	Learners begin to recognise relationships with interior and exterior angles in polygons in Year 8 (page 195, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	261 Interior and exterior angles of regular and irregular polygons
	New Lesson Resources
	Interior Angles Of Polygons
	Exterior Angles of Polygons
	Legacy Lesson Resources
GCSE Interior & Exterior Angles	
	Angles

S12 Perimeter of rectangles

What is being tested	Learners are being tested on their understanding of perimeter, using this knowledge to calculate missing lengths.
Learning Objectives	<p>S12.1 Know that the perimeter of a 2D shape is the total of the length of its sides</p> <p>S12.2 Find the perimeter of a rectangle</p> <p>S12.3 Write the formula for the perimeter of a rectangle</p> <p>S12.4 Calculate the length of one side of a rectangle when given one length and the perimeter</p> <p>S12.5 Identify the formula for the perimeter of a rectangle</p> <p>S12.6 Know that rectangles with the same area can have different perimeters</p>
Predecessors	S1 Dimensions: Units of length, area and volume
Successors	<p>S14 Perimeter of rectilinear compound shapes</p> <p>S32 Circumference of circles</p>
KS2 & KS3 Guidance	Learners first encounter perimeter in Year 4 (page 197, KS1 and KS2 guidance).
Dr Frost Learning Platform References	DF Index skills
	64 Measuring perimeter for 2D shapes
	79 Perimeter of a 2D shape by adding lengths
	New Lesson Resources
	Perimeter of Shapes by Counting & Measurement
	Legacy Lesson Resources
GCSE/KS3 - Area & Perimeter by Counting	
GCSE/KS3 Area & Perimeter of Quadrilaterals & Triangles	

S13 Area of rectangles/squares

What is being tested	Learners are being tested on their understanding of area, calculating the area of rectangles and squares.
Learning Objectives	<p>S13.1 Calculate the area of a rectangle using the formula length \times width</p> <p>S13.2 Match rectangles to their areas (both lengths given)</p> <p>S13.3 Calculate the side of a square given the area</p> <p>S13.4 Calculate the length of one side of a rectangle given the area</p> <p>S13.5 Match rectangles to their lengths (Area and one length given)</p>
Predecessors	<p>S1 Dimensions: Units of length, area and volume</p> <p>S4 Area by counting squares</p>
Successors	<p>S15 Area of triangles</p> <p>S16 Volumes: Cubes, cuboids</p> <p>S17 Area of compound shapes</p>
KS2 & KS3 Guidance	Learners begin to calculate area in Year 5 (page 269, KS1 and KS2 guidance).
Dr Frost Learning Platform References	DF Index skills
	138 Area of a rectangle by using the formula
	New Lesson Resources
	In Development
	Legacy Lesson Resources
	GCSE/KS3 Area & Perimeter of Quadrilaterals & Triangles

S14 Perimeter of rectilinear compound shapes

What is being tested	Learners are being tested on their understanding of perimeter, calculating the perimeter of compound rectilinear shapes.
Learning Objectives	<p>S14.1 Identify the missing lengths of compound shapes</p> <p>S14.2 Calculate perimeter of compound 2D shapes using the given required lengths</p> <p>S14.3 Calculate perimeter of compound 2D shapes when not all required lengths are given</p>
Predecessors	S12 Perimeter of rectangles
Successors	None
KS2 & KS3 Guidance	Learners extend their knowledge of perimeter to compound shapes in Year 6 (page 322, KS1 and KS2 guidance).
Dr Frost Learning Platform References	DF Index skills
	180 Perimeter of rectilinear shapes
	New Lesson Resources
	Perimeter of Rectilinear Shapes
	Legacy Lesson Resources
	GCSE/KS3 Area & Perimeter of Quadrilaterals & Triangles

S15 Area of triangles

What is being tested	Learners are being tested on their understanding of area, drawing on their ability to calculate the area of rectangles and squares to calculate the area of triangles.
Learning Objectives	<p>S15.1 Know the relationship between area of a triangle and rectangle</p> <p>S15.2 Identify the height of a triangle</p> <p>S15.3 Identify the formula of the area of a triangle</p> <p>S15.4 Calculate the area of a triangle using the formula</p> <p>S15.5 Calculate the height of a triangle, given its area and base</p>
Predecessors	<p>S9 Triangles</p> <p>S13 Area of rectangles/squares</p>
Successors	<p>S17 Area of compound shapes</p> <p>S18 Areas of trapezia and parallelograms</p> <p>S19 Volumes: prisms and cylinders</p>
KS2 & KS3 Guidance	Learners extend their knowledge of area to triangles in Year 6 (page 322, KS1 and KS2 guidance).
Dr Frost Learning Platform References	DF Index skills
	140 Area of a triangle
	New Lesson Resources
	N/A
	Legacy Lesson Resources
	GCSE/KS3 Area & Perimeter of Quadrilaterals & Triangles

S16 Volumes: cubes, cuboids

What is being tested	Learners are being tested on their understanding of volume, calculating the volume of cuboids and cubes.
Learning Objectives	<p>S16.1 Calculate the volume of a cuboid made of cubes</p> <p>S16.2 Calculate volume of a cube using $l \times l \times l$ (unit given)</p> <p>S16.3 Calculate volume of a cuboid using $l \times w \times h$</p> <p>S16.4 Calculate the length of the side of a cube, given the volume</p> <p>S16.5 Calculate the length of a missing side of a cuboid, given its volume and 2 sides</p>
Predecessors	<p>S1 Dimensions: Units of length, area and volume</p> <p>S5 Volume by counting cubes</p> <p>S13 Area of rectangles/squares</p>
Successors	S19 Volumes: prisms and cylinders
KS2 & KS3 Guidance	Learners encounter volume in upper KS2, extending on this knowledge in Year 8 (page 183, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	145 Volume of a cube or cuboid
	230 Problem solving involving volume of a cuboid
	New Lesson Resources
	N/A
	Legacy Lesson Resources
	Volumes (pre-GCSE)

S17 Area of compound shapes

What is being tested	Learners are being tested on their understanding of area, drawing on their ability to calculate the area of rectangles, squares and triangles to calculate the area of compound shapes.
Learning Objectives	<p>S17.1 Identify divisions of a compound shape that can be used to calculate its area</p> <p>S17.2 Calculate the area of a compound shape (rectangle + rectangle)</p> <p>S17.3 Calculate the area of a compound shape (rectangle + triangle)</p> <p>S17.4 Calculate the area of a 2D compound shape by splitting the area and adding the parts (rectangle + triangle)</p>
Predecessors	<p>S13 Area of rectangles/squares</p> <p>S15 Area of triangles</p>
Successors	S18 Areas of trapezia and parallelograms
KS2 & KS3 Guidance	Learners extend their knowledge of area to compound shapes in Year 6 (page 322, KS1 and KS2 guidance).
Dr Frost Learning Platform References	DF Index skills
	181 Area of composite rectilinear shapes
	182 Area of composite shapes using rectangles and triangles
	New Lesson Resources
	Area of Rectilinear Shapes
	Legacy Lesson Resources
GCSE/KS3 - Area & Perimeter by Counting	
GCSE/KS3 Area & Perimeter of Quadrilaterals & Triangles	

S18 Areas of trapezia and parallelograms

What is being tested	Learners are being tested on their understanding of area, drawing on their ability to calculate the area of rectangles to calculate the area of parallelograms and trapezia.
Learning Objectives	<p>S18.1 Identify the height of a parallelogram</p> <p>S18.2 Identify the height of a trapezium</p> <p>S18.3 Identify the formula of the area of a parallelogram</p> <p>S18.4 Calculate the area of a parallelogram using the formula</p> <p>S18.5 Identify the formula of the area of a trapezium</p> <p>S18.6 Calculate area of a trapezium using the formula</p>
Predecessors	<p>S10 Quadrilaterals</p> <p>S15 Area of triangles</p> <p>S17 Area of compound shapes</p>
Successors	None
KS2 & KS3 Guidance	Learners begin to calculate the area of parallelograms in KS2, extending their knowledge to trapezia in Year 7 (page 73, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	184 Area of trapeziums
	139 Area of a parallelogram
	New Lesson Resources
	N/A
	Legacy Lesson Resources
	GCSE/KS3 Area & Perimeter of Quadrilaterals & Triangles

S19 Volumes: prisms and cylinders

What is being tested	Learners are being tested on their understanding of volume, drawing on their understanding of the properties of prisms to calculate the volume of prisms and cylinders.
Learning Objectives	<p>S19.1 Identify prisms</p> <p>S19.2 Know the properties of prisms</p> <p>S19.3 Calculate volume of a simple prism (given cross-sectional area)</p> <p>S19.4 Calculate the length of a prism, given its volume and base area</p> <p>S19.5 Identify the formula for the volume of a cylinder</p> <p>S19.6 Calculate volume of a cylinder</p>
Predecessors	<p>S15 Area of triangles</p> <p>S16 Volumes: Cubes, cuboids</p> <p>S31 Area of circles</p>
Successors	None
KS2 & KS3 Guidance	Learners extend their knowledge of volume to prisms and cylinders in Year 8 (page 183, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	231 Volume of a prism
	233 Volume of a cylinder
	New Lesson Resources
	N/A
	Legacy Lesson Resources
	<p>Volumes (pre-GCSE)</p> <p>Volumes & Surface Area (GCSE)</p>

S20 Reflection symmetry within a shape

What is being tested	Learners are being tested on their understanding of reflection symmetry.
Learning Objectives	<p>S20.1 Categorise the properties of lines of symmetry in shapes</p> <p>S20.2 Match shapes with their number of lines of symmetry</p> <p>S20.3 Recall the definition of line symmetry</p> <p>S20.4 Know the line symmetry properties of triangles</p> <p>S20.5 Know the line symmetry properties of quadrilaterals</p>
Predecessors	S2 Shapes
Successors	<p>S8 Polygons</p> <p>S22 Congruence, similarity and corresponding features</p> <p>S23 Reflection</p>
KS2 & KS3 Guidance	Learners begin to appreciate reflection symmetry in Year 4 (page 201, KS1 and KS2 guidance).
Dr Frost Learning Platform References	DF Index skills
	25 Introduction to 2D shapes
	78 Properties of polygons
	New Lesson Resources
	N/A
	Legacy Lesson Resources
	GCSE Symmetry

S21 Rotation symmetry within a shape

What is being tested	Learners are being tested on their understanding of rotational symmetry.
Learning Objectives	<p>S21.1 Identify order of rotational symmetry of a given shape</p> <p>S21.2 Know the rotational symmetry properties of quadrilaterals</p> <p>S21.3 Know the rotational symmetry properties of triangles</p> <p>S21.4 Recall the definition of rotational symmetry</p> <p>S21.5 Know a regular polygon has rotational symmetry equal to its number of sides</p> <p>S21.6 Know that the lowest order of rotational symmetry is 1</p>
Predecessors	S2 Shapes
Successors	<p>S8 Polygons</p> <p>S22 Congruence, similarity and corresponding features</p> <p>S24 Rotation</p>
KS2 & KS3 Guidance	Learners encounter rotational symmetry in Year 9 (page 214, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	280 Rotational symmetry
	New Lesson Resources
	N/A
	Legacy Lesson Resources
	KS3/GCSE Rotational Symmetry

S22 Congruence, similarity and corresponding features

What is being tested	Learners are being tested on their understanding of congruence and similarity.
Learning Objectives	<p>S22.1 Recall the definition of transformation</p> <p>S22.2 Categorise characteristics of congruent shapes</p> <p>S22.3 Define similar shapes</p> <p>S22.4 Identify corresponding sides and angles</p> <p>S22.5 Identify shapes that are congruent</p> <p>S22.6 Identify similar shapes</p>
Predecessors	S21 Rotation symmetry within a shape
Successors	<p>S23 Reflection</p> <p>S24 Rotation</p> <p>S25 Translation</p> <p>S26 Enlargement</p> <p>S27 Conservation of properties of shapes post transformation</p>
KS2 & KS3 Guidance	Learners begin to appreciate congruence and similarity in Year 9 (page 214, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	129 Similar shapes with integer scale factors
	290 Properties of congruent shapes
	291 Properties of similar shapes
	New Lesson Resources
	Properties of Similar Shapes with Simple Scale Factors
	Legacy Lesson Resources
Similarity (Pre-GCSE) Similarity (GCSE) Congruent Triangle Proofs	

S23 Reflection

What is being tested	Learners are being tested on their ability to apply reflection as a transformation, drawing on their understanding of reflection symmetry.
Learning Objectives	<p>S23.1 Identify the line of reflection when a shape is reflected</p> <p>S23.2 Identify the image of a shape when transformed by a reflection</p> <p>S23.3 Know that a reflection needs a mirror line</p> <p>S23.4 Know that a reflection changes a shape's sense</p> <p>S23.5 Reflect a simple 2D shape in a mirror line</p> <p>S23.6 Identify the equation of the line of reflection of a given shape and its reflected image</p> <p>S23.7 Draw the image of a shape when it is transformed by a reflection around $y = x$ line</p> <p>S23.8 Draw the image of a shape when it is transformed by a reflection around a specified line</p>
Predecessors	<p>S20 Reflection symmetry within a shape</p> <p>S22 Congruence, similarity and corresponding features</p>
Successors	S27 Conservation of properties of shapes post transformation
KS2 & KS3 Guidance	Learners begin to appreciate reflection symmetry in Year 4 (page 201, KS1 and KS2 guidance).
Dr Frost Learning Platform References	DF Index skills
	81 Reflecting a shape in a mirror line (no axes)
	153 Reflecting a shape on axes using a given mirror line
	278 Reflecting a shape in a line with given equation
	279 Describing a reflection
	New Lesson Resources
N/A	
Legacy Lesson Resources	
Transformations	

S24 Rotation

What is being tested	Learners are being tested on their ability to apply rotation as a transformation, drawing on their understanding of rotational symmetry.
Learning Objectives	<p>S24.1 Identify an anticlockwise direction</p> <p>S24.2 Identify a clockwise direction</p> <p>S24.3 Recognise different angles of rotation</p> <p>S24.4 Identify the image of a shape when it is transformed by a rotation</p> <p>S24.5 Identify the image of a shape when rotated around the origin</p> <p>S24.6 Know that a rotation needs a centre and an angle</p> <p>S24.7 Know that a rotation changes orientation and not sense</p> <p>S24.8 Identify the image of a shape when rotated around a specified centre of rotation in co-ordinate format</p> <p>S24.9 Find a centre of rotation</p>
Predecessors	<p>S21 Rotation symmetry within a shape</p> <p>S22 Congruence, similarity and corresponding features</p>
Successors	S27 Conservation of properties of shapes post transformation
KS2 & KS3 Guidance	Learners encounter the idea of rotation in KS2 and extend this idea in Year 7 (page 112, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	13 Understanding directional language
	281 Rotating a shape by a given angle around a given point
	282 Describing a rotation
	New Lesson Resources
	N/A
Legacy Lesson Resources	
Transformations	

S25 Translation

What is being tested	Learners are being tested on their ability to apply translation as a transformation.
Learning Objectives	<p>S25.1 Identify a translated shape from its description</p> <p>S25.2 Know that a translation preserves a shape's orientation and sense</p> <p>S25.3 Know which is the original shape and which is the image in a translation</p> <p>S25.4 Know that a translation needs horizontal and vertical components</p> <p>S25.5 Describe a translation from a diagram</p>
Predecessors	S22 Congruence, similarity and corresponding features
Successors	S27 Conservation of properties of shapes post transformation
KS2 & KS3 Guidance	Learners encounter the idea of translation in KS2 and extend this idea in Year 7 (page 112, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	82 Translating a shape using directional language (no axes)
	154 Translating a shape on axes using directional language
	New Lesson Resources
	N/A
	Legacy Lesson Resources
	Transformations

S26 Enlargement

What is being tested	Learners are being tested on their ability to apply enlargement as a transformation, drawing on their understanding of similar shapes.
Learning Objectives	<p>S26.1 Identify the image of a shape when it is transformed by an enlargement</p> <p>S26.2 Identify the scale factor of enlargement of two similar shapes</p> <p>S26.3 Enlarge a shape on a grid by a simple integer scale factor</p> <p>S26.4 Enlarge a shape on a grid by a simple fractional scale factor</p>
Predecessors	S22 Congruence, similarity and corresponding features
Successors	<p>S27 Conservation of properties of shapes post transformation</p> <p>S28 Enlargement from a centre</p> <p>S29 Similarity: scale factors and simple integer scale factors</p>
KS2 & KS3 Guidance	Learners encounter the idea of enlargement in KS2 and extend this idea in Year 7 (page 112, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	129 Similar shapes with integer scale factors
	292 Determine unknown lengths in similar shapes
	294 Describing an enlargement/dilation for a positive integer scale factor
	296 Describing an enlargement/dilation for a positive decimal or positive fractional scale factor
	297 Enlarging/dilating a shape by a decimal or fractional scale factor
New Lesson Resources	
	N/A
Legacy Lesson Resources	
	Enlargement

S27 Conservation of properties of shapes post transformation

What is being tested	Learners are being tested on their understanding of transformations, drawing on their understanding of congruence and similarity.
Learning Objectives	<p>S27.1 Identify the transformations that preserve the properties of congruence</p> <p>S27.2 Recognise that enlarging a shape does not change the size of angles but changes the length of the sides</p> <p>S27.3 Match types of transformation with their descriptions</p> <p>S27.4 Match transformations to their diagrams</p>
Predecessors	<p>S22 Congruence, similarity and corresponding features</p> <p>S23 Reflection</p> <p>S24 Rotation</p> <p>S25 Translation</p> <p>S26 Enlargement</p>
Successors	S28 Enlargement from a centre
KS2 & KS3 Guidance	Learners begin to appreciate the four transformations in KS2 and extend this knowledge in Year 7 (page 112, KS3 guidance).
Dr Frost Learning Platform References	<p>DF Index skills</p> <p>81 Reflecting a shape in a mirror line (no axes)</p> <p>82 Translating a shape using directional language (no axes)</p> <p>153 Reflecting a shape on axes using a given mirror line</p> <p>154 Translating a shape on axes using directional language 294</p> <p>Describing an enlargement/dilation for a positive integer scale factor</p> <p>278 Reflecting a shape in a line with given equation</p> <p>279 Describing a reflection</p> <p>281 Rotating a shape by a given angle around a given point</p> <p>282 Describing a rotation</p> <p>295 Enlarging/dilating a shape by a given positive integer scale factor around a given centre of enlargement/dilation.</p> <p>296 Describing an enlargement/dilation for a positive decimal or positive fractional scale factor</p> <p>297 Enlarging/dilating a shape by a decimal or fractional scale factor</p>

	New Lesson Resources
	N/A
	Legacy Lesson Resources
	Transformations Enlargement

S28 Enlargement from a centre

What is being tested	Learners are being tested on their ability to apply enlargement as a transformation, applying this knowledge to enlargements from different centres.
Learning Objectives	<p>S28.1 Describe the properties (scale factor and centre of enlargement) when given two similar shapes</p> <p>S28.2 Know that an enlargement needs a centre and a scale factor</p> <p>S28.3 Identify the centre of enlargement given two similar shapes</p> <p>S28.4 Enlarge a shape on a grid by a simple positive integer scale factor given the centre of enlargement</p>
Predecessors	<p>S26 Enlargement</p> <p>S27 Conservation of properties of shapes post transformation</p>
Successors	S29 Similarity: scale factors and simple integer scale factors
KS2 & KS3 Guidance	Learners begin to appreciate the centre of enlargement in Year 7 (page 115, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	294 Describing an enlargement/dilation for a positive integer scale factor
	295 Enlarging/dilating a shape by a given positive integer scale factor around a given centre of enlargement/dilation.
	296 Describing an enlargement/dilation for a positive decimal or positive fractional scale factor
	297 Enlarging/dilating a shape by a decimal or fractional scale factor
	New Lesson Resources
	N/A
	Legacy Lesson Resources
	Enlargement

S29 Similarity: Scale factors and simple integer scale factors

What is being tested	Learners are being tested on their ability to apply their knowledge of similarity.
Learning Objectives	<p>S29.1 Recall that corresponding lengths in similar shapes are in the same ratio</p> <p>S29.2 Recognise how to calculate the scale factor that links two similar shapes</p> <p>S29.3 Calculate the scale factor that links two similar shapes</p> <p>S29.4 Calculate missing lengths in similar shapes using a scale factor</p>
Predecessors	<p>S26 Enlargement</p> <p>S28 Enlargement from a centre</p>
Successors	None
KS2 & KS3 Guidance	Learners explore scale factors in KS2 and extend on this idea in Year 7 (page 112, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	129 Similar shapes with integer scale factors
	291 Properties of similar shapes
	292 Determine unknown lengths in similar shapes
	New Lesson Resources
	Properties of Similar Shapes with Simple Scale Factors
	Legacy Lesson Resources
Similarity (Pre-GCSE) Similarity (GCSE)	

S30 Properties of circles

What is being tested	Learners are being tested on their understanding of the properties of a circle.
Learning Objectives	<p>S30.1 Match diameter, radius, circumference with their graphical representations</p> <p>S30.2 Know the relationship between radius and diameter</p> <p>S30.3 Recognise the calculation to find the radius from the diameter</p> <p>S30.4 Define the relationship between circumference and diameter of a circle</p>
Predecessors	None
Successors	<p>S31 Area of circles</p> <p>S32 Circumference of circles</p>
KS2 & KS3 Guidance	Learners begin to explore the properties of circles in Year 8 (page 183, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	141 Basic terms in relation to circles
	New Lesson Resources
	Circumference of a Circle
	Legacy Lesson Resources
	GCSE/KS3 Area & Circumference of Circles

S31 Area of circles

What is being tested	Learners are being tested on their ability to calculate the area of circles.
Learning Objectives	<p>S31.1 Calculate area of a circle with given radius using π given as 3.14</p> <p>S31.2 Identify the formula to calculate the area of a circle</p> <p>S31.3 Calculate the radius of a circle, given the area</p> <p>S31.4 Recognise how to calculate a diameter from an area</p>
Predecessors	S30 Properties of circles
Successors	S19 Volumes: prisms and cylinders
KS2 & KS3 Guidance	Learners extend upon their knowledge of area, calculating the area of circles in Year 8 (page 189, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	210 Area of a full circle
	New Lesson Resources
	Area of a Circle
	Legacy Lesson Resources
	GCSE/KS3 Area & Circumference of Circles

S32 Circumference of circles

What is being tested	Learners are being tested on their ability to calculate the circumference of circles.
Learning Objectives	<p>S32.1 Identify the calculation for circumference with a given radius</p> <p>S32.2 Identify the formula to calculate the circumference of a circle</p> <p>S32.3 Identify the calculation for approx diameter of a circle with given circumference</p> <p>S32.4 Calculate circumference of a circle with given diameter using π given as 3.14</p>
Predecessors	<p>S12 Perimeter of rectangles</p> <p>S30 Properties of circles</p>
Successors	None
KS2 & KS3 Guidance	Learners extend their knowledge of perimeter to include the circumference of a circle in Year 8 (page 185, KS3 guidance).
Dr Frost Learning Platform References	DF Index skills
	209 Circumference of a full circle
	New Lesson Resources
	Circumference of a Circle
	Legacy Lesson Resources
	GCSE/KS3 Area & Circumference of Circles

Contributors

AQA

We're an independent education charity, providing high quality assessments that are fair, reliable, and support students in their educational journey.

Our qualifications expertise dates back to 1903, when our predecessor boards were founded by five leading universities. Today, we're the largest provider of academic qualifications taught in schools and colleges.

We set and mark the papers for over half of all GCSEs and A-levels taken every year. But exams are only part of the story – we also make sure the content of our qualifications support great teaching.

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Dr Frost Learning

The vision of Dr Frost Learning is to provide high quality education for all regardless of income, centred around the core philosophy that education is a fundamental right and central to addressing social inequality on a global level. We believe learning is for everyone. Dr Frost Learning has helped students in isolated communities, prisons, and students outside of a mainstream school environment. Additionally, Jamie Frost received the Global Teacher Prize Covid Hero Award 2020 for the role of the platform in supporting schools during Covid lockdowns.

Our platform includes over 1500 question generators, with more in development, along with videos to support student understanding, which can be set as homework tasks for students or used for independent learning. We also provide advanced data analytics for teachers to track student progress. We're constantly striving to innovate, with research into AI to provide tailored learning plans for students based on their activity.

Sometimes one size doesn't fit all and we have worked hard to ensure coverage for curricula worldwide. In addition to our own question generators, we work with exam boards in the UK and internationally to contribute to our bank of over 40,000 exam questions and create courses for teachers and students on the platform.

Our offering also includes free comprehensive classroom resources, with a focus on teaching for understanding. Each lesson is designed to both scaffold and stretch students on their mathematics journey, and reduce teacher workload.

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Notes from Dr Frost Learning:

- Though the DF Index provides a comprehensive framework of mathematical ideas, not all of the subskills have associated live Question Generators as yet. As such, you may find some subskills are unavailable at this time. These are being continually updated and we aim to have much of the KS1-4 content completed by Summer 2025.
- It is important to note that each skill can include ideas across various Key Stages or levels of prior attainment, with the subskills higher in the alphabet including more complexity. As such, **not all subskills within these listed skills will be applicable** to the content listed here or for the specific misconceptions held by their students. Teachers should use their discretion as to whether the full skill or just a portion of subskills should be assigned to their students
- Resources are split into 'New' and 'Legacy' categories. Any 'New' resources have been published after October 2023 to fulfil out charitable aims. These have a new format and a focus on teaching for understanding, stretch and scaffold. Anything published before this is referred to as 'Legacy' – these resources were created by Jamie Frost for use with his own classes, and shared before establishing the charity, and thus the content or pacing may not be appropriate for your students.