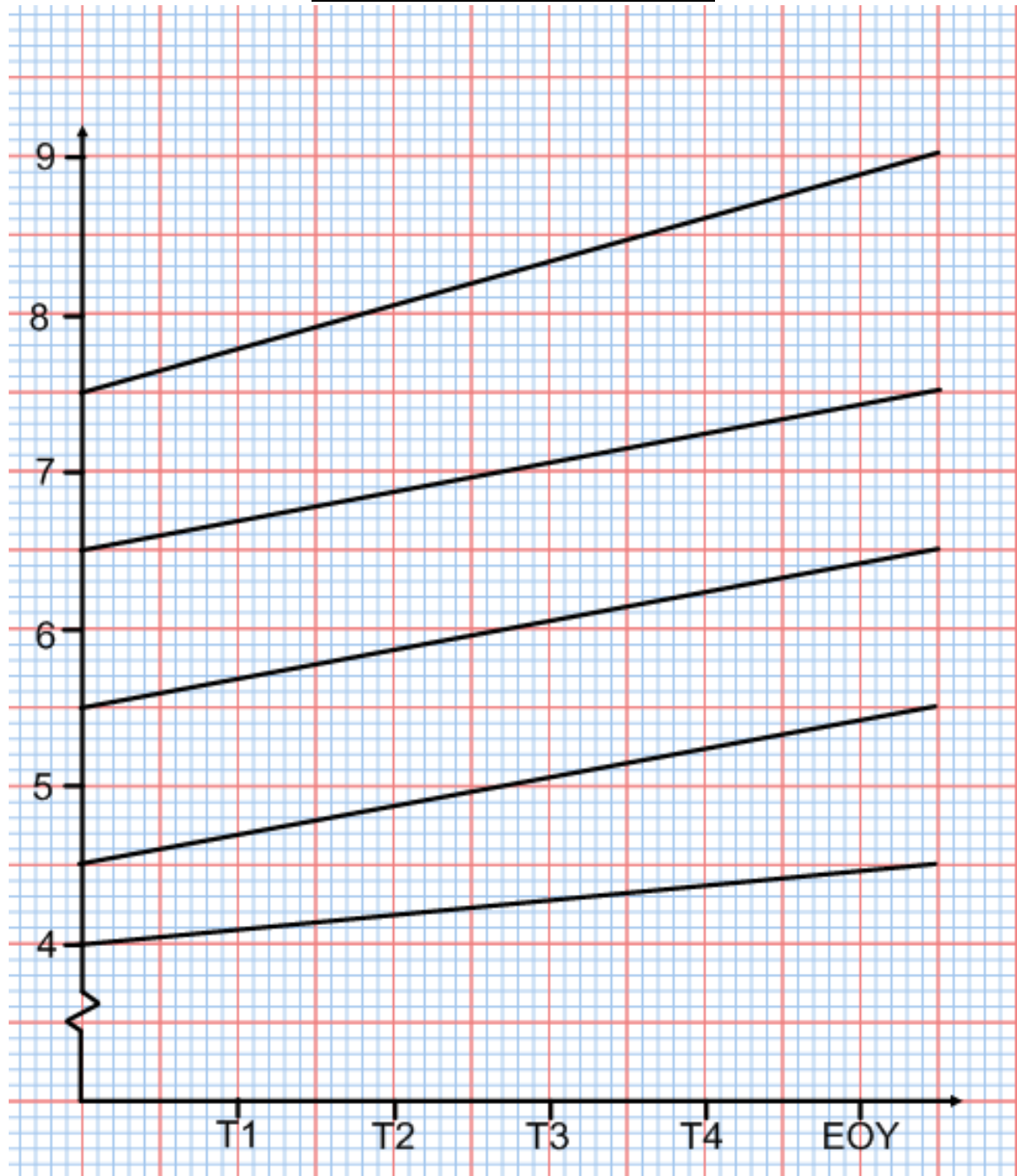


**Mathematics KS3
Year 9
Pupil Booklet**

Name.....Form.....



Year 9 Progress Chart



After each test you must plot your level on the graph and then set your targets.

TEST	TARGETS
1	
2	
3	
4	
EOY	

Year 9

Autumn Term 1 Objectives

Algebra 1&2	Level	Assessment	😊	😐	😞
Describe and generate simple number sequences	4				
Generate terms of a sequence (term-to-term and position-to-term) from formulae	6				
Write an expression to describe nth term of a sequence	6				
Find the inverse of a linear function	7				
Construct functions from real-life problems and plot their graphs	6				

Number 1	Level	Assessment	😊	😐	😞
+, - simple fractions	5				
+, - fractions	6				
$x \div$ an integer by a fraction	6				
+, -, $x \div$ fractions	7				
Use the equivalence of fractions and % to compare proportions	6				
Find % increase/decrease	6				
Use ratios to solve problems	6				
Use proportional reasoning to solve problems	6				
Understand the effect of $x \div$ by numbers between 0 and 1	7				
Use known facts to derive products e.g. 0.03×8	5				
Use order of operations (BIDMAS)	4				
Estimate answers to calculations	4				
Check answers using inverse operations	5				

Algebra 3	Level	Assessment	😊	😐	😞
Know definitions of equation, identity, formula, function	6				
Construct and solve linear equations (unknown on both sides)	6				
Use trial and improvement to solve equations	6				
Calculate proportional change using equations	7				

Extension Objectives Autumn Term 1					
Algebra 1&2	Level	Assessment	😊	😐	😞
Find nth term of a quadratic sequence	7				
Plot the graph of an inverse function	7				
Know properties of quadratic functions	7				

Number 1	Level	Assessment	😊	😐	😞
Make estimates using 1 significant figure	7				
Recognise and use reciprocals	7				
Calculate proportional change using multiplicative methods	7				

Algebra 3	Level	Assessment	😊	😐	😞
Solve simultaneous equations using algebra	7				
Solve simultaneous equations using graphs	7				

Year 9

Autumn Term 2 Objectives

<i>Shape 1</i>	<i>Level</i>	<i>Assessment</i>	☺	☹	⊗
Distinguish between conventions, definitions and derived properties	7				
Use angles at a point, in a triangle, on a straight line and opposite	5				
Classify quadrilaterals by their properties	6				
Know definitions of parts of a circle	-				
Work out angles in polygons (interior/exterior)	6				
Use corresponding, alternate and supplementary angles	6				
Construct triangles (RHS)	6				
Find loci of objects moving to a rule	7				

<i>Data 1</i>	<i>Level</i>	<i>Assessment</i>	☺	☹	⊗
Ask questions, work out how to answer and collect the data required	5				
Use two way tables	6				
Construct simple line graphs for time series	6				
Use scatter diagrams and state correlation	6				
Compare two distributions using range and mean, median or mode	5				
Make hypotheses and test them	7				
Write a report on a survey, backing it up with appropriate diagrams and interpreting results	-				

Extension Objectives Autumn Term 2					
Shape 1	Level	Assessment	☺	☹	⊗
Understand angle proofs (triangle, quad, exterior)	6				
Use Pythagoras' Theorem	7				
Circle Theorem – tangent meets radius at 90°	7				
Circle Theorem – perpendicular from centre to chord bisects the chord	7				
Constructing triangles – know when they are unique (SSS,SAS,ASA,RHS) and when they are not (SSA,AAA)	7				

Data 1	Level	Assessment	☺	☹	⊗
Identify possible sources of bias and how to minimise it	7				
Construct box plots	7				
Use frequency polygons	7				
Draw a line of best fit on a scatter diagram	7				
Understand correlation	7				
Find median and quartiles for large data sets	7				
Estimate mean, median and quartiles for grouped data	7				
Write a report on a survey, backing it up with appropriate diagrams and interpreting results	-				

Year 9

Spring Term 1 Objectives

<i>Shape 2</i>	<i>Level</i>	<i>Assessment</i>	😊	😐	😞
Convert between area and volume measures	5				
Find circumferences and areas of circles	6				
Find volumes (and surface areas) of cuboids	6				
Calculate surface areas and volumes of prisms	7				

<i>Number 2</i>	<i>Level</i>	<i>Assessment</i>	😊	😐	😞
Round decimals to nearest decimal place	5				
$+$, $-$, \times , \div decimals to 2 places	5				
Convert between fractions and decimals by division	6				
Know that a recurring decimal is an exact fraction	6				
Calculator – powers, roots, brackets, $\sqrt{\quad}$, \pm	6				
Check answers using inverse operations	5				

<i>Extension Objectives Spring Term 1</i>					
<i>Shape 2</i>	<i>Level</i>	<i>Assessment</i>	😊	😐	😞
Divide a line in a given ratio on a grid	7				
Pythagoras Theorem (lengths of lines on grid)	7				
Upper/lower bounds (measurement)	7				
Use speed and density equations	7				
Find lengths of arcs and areas of sectors (circles)	7				
Volumes of prisms - cylinders	7				

<i>Number 2</i>	<i>Level</i>	<i>Assessment</i>	😊	😐	😞
Use standard form	8				
Use significant figures	6				
Make estimates using 1 significant figure	7				
Change recurring decimals to fractions	8				
Calculator – reciprocal key and standard form	8				

Year 9

Spring Term 2 Objectives

<i>Algebra 4</i>	<i>Level</i>	<i>Assessment</i>	😊	😐	😞
Write numbers as products of prime factors	5				
Use ICT to estimate squares and cube roots	5				
Use simple index laws inc. algebra	6				
Find the equation of a straight line (m and c)	7				
Construct functions from real-life problems and plot their graphs	6				
Plot and interpret real-life graphs inc. distance-time	6				

<i>Data 2</i>	<i>Level</i>	<i>Assessment</i>	😊	😐	😞
Find theoretical probabilities	5				
Find experimental probabilities	5				
Make sample spaces for 1 or 2 events	6				
Use the fact that probabilities add up to 1	6				
Estimate probabilities from experimental data	6				
Compare experimental and theoretical probability	6				

<i>Shape 3</i>	<i>Level</i>	<i>Assessment</i>	😊	😐	😞
Distinguish between conventions, definitions and derived properties	7				
Know if two 2-D shapes are congruent	6				
Rotate, reflect and translate shapes on a grid	5				
Enlarge shapes using +ve whole numbers	6				
Use and interpret maps and scale drawings	6				
Use ratio and direct proportion	5				
Use ratios to solve problems	6				

Extension Objectives Spring Term 2					
Algebra 4	Level	Assessment	😊	😐	😞
Use laws of indices inc. fractions and negative	7				
Plot graphs of linear, quadratic, cubic and reciprocal functions	8				

Data 2	Level	Assessment	😊	😐	😞
Use relative frequency to compare experiments	7				

Shape 3	Level	Assessment	😊	😐	😞
Distinguish between demonstration and proof	7				
Use congruence and similarity	8				
Enlarge shapes using fractions and integers	7				
Use sine, cosine and tangent ratios in right-angled triangles	8				

Year 9

Summer Term

Following your KS3 Tests, the GCSE work starts. You will do 3 units of work in Year 9.

Unit 1 GCSE: Geometrical Reasoning

Objectives:

-Use accurately the vocabulary, notation and labelling conventions for lines, angles and shapes;

-Distinguish between conventions, facts, definitions and derived properties

A **convention** is an agreed way of illustrating, notating or describing a situation.

Conventions are arbitrary – alternatives could have been chosen.

Examples of geometrical conventions are:

- the ways in which letters are used to label the angles and sides of a polygon;
- the use of arrows to show parallel lines;
- the agreement that anticlockwise is taken as the positive direction of rotation.

A **definition** is a minimum set of conditions needed to specify a geometrical term, such as the name of a shape or a transformation. Examples are:

- A polygon is a closed shape with straight sides.
- A square is a quadrilateral with all sides and all angles equal.
- A degree is a unit for measuring angles, in which one complete rotation is divided into 360 degrees.

A **derived property** is not essential to a definition, but consequent upon it. Examples are:

- The angles of a triangle add up to 180° .
- A square has diagonals that are equal in length and that bisect each other at right angles.
- The opposite sides of a parallelogram are equal in length.

Distinguish between a practical demonstration and a proof.

For example, appreciate that the angle sum property of a triangle can be demonstrated practically by folding the corners of a triangular sheet of paper to a common point on the base and observing the result. A proof requires deductive argument, based on properties of angles and parallels, that is valid for all triangles.

Identify properties of angles and parallel and perpendicular lines, and use these properties to solve problems

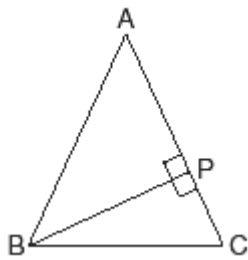
Understand a proof that the sum of the angles of a triangle is 180° and of a quadrilateral is 360° , and that the exterior angle of a triangle equals the sum of the two interior opposite angles.

Explain how to find, calculate and use properties of the interior and exterior angles of regular and irregular polygons.

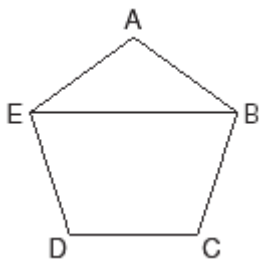
Identify and use the geometric properties of triangles, quadrilaterals and other polygons to solve problems; explain and justify inferences and deductions using mathematical reasoning.

Questions:

- 1 In the isosceles triangle shown, $AB = AC$. From B, a line BP has been drawn to meet the opposite side AC at right angles. Prove that $\angle PBC = \frac{1}{2}\angle CAB$.



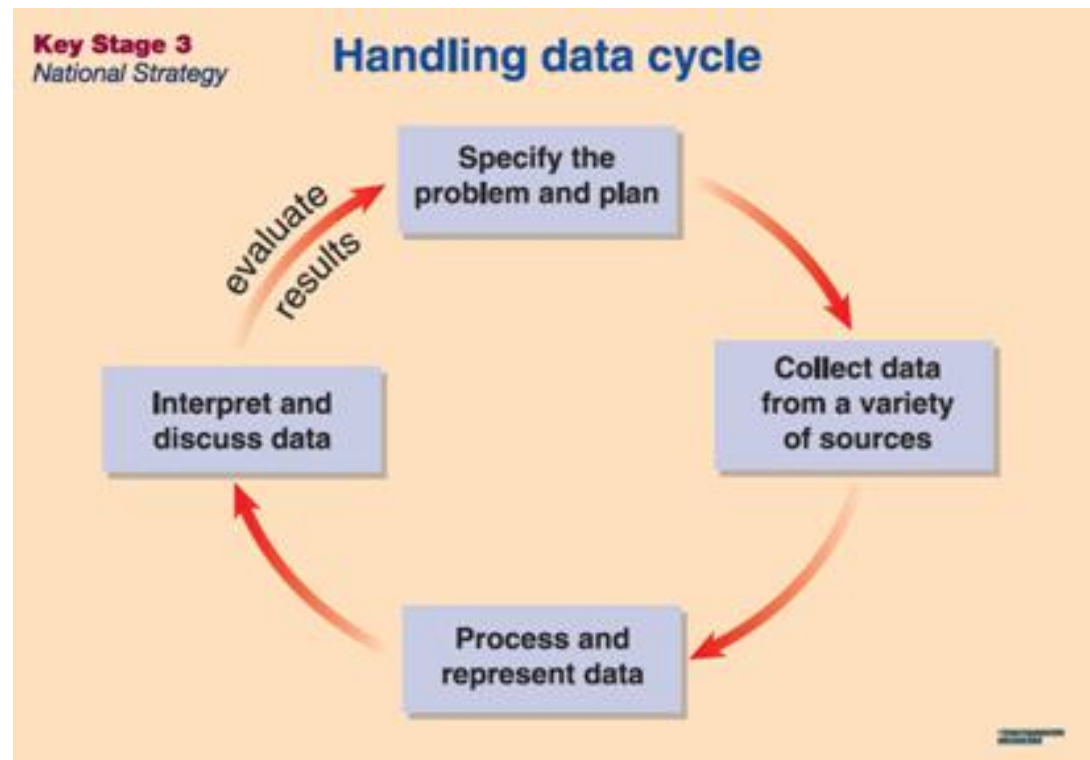
- 2 The diagram shows a regular pentagon ABCDE. Calculate $\angle ABE$, explaining each step of your reasoning.



Suppose you started with a regular hexagon? Or a regular n -gon?

Unit 2 GCSE: Data Handling

This unit focuses on questionnaires and using the Data Handling Cycle.



Specify the problem: Think of a question (hypothesis) that you would like to investigate. Design a questionnaire – remember some of the answers need to be quantitative (numerical) or you won't be able to use all your processing skills.

Collect Data: Use your questionnaire.

Process and represent: Organise in two way tables, frequency tables, grouped frequency tables, stem and leaf. Create frequency diagrams, box plots, line graphs, pie charts. Work out mean, median, quartiles, mode, range.

Interpret and discuss: State your conclusions. What did you discover? Use the diagrams to back up your findings.

You should produce your final piece of work as a clear report, saying what you did and including all of the above.

Unit 3 GCSE: Probability

This unit will cover all of the GCSE probability content and will finish with the creation of a Probability Game which you will then play with the rest of your class.

Objectives:

<i>Probability</i>	<i>Level</i>	<i>Assessment</i>	😊	😐	😞
Find theoretical probabilities	5				
Find experimental probabilities	5				
Make sample spaces for 1 or 2 events	6				
Use that fact that probabilities add up to 1 ('NOT rule')	6				
Estimate probabilities from experiments	6				
Compare experimental and theoretical probability	6				
Use relative frequency to compare experiments	7				
Use the 'AND' and 'OR' rules	8				
Use Tree Diagrams	8				
Know when to add or multiply two probabilities	8				