



KS4 ASSESSMENT

MATHEMATICS

BRAMHALL HIGH SCHOOL

Score		Knowledge and Understanding
<p style="text-align: center;">8/9</p> <p style="text-align: center;">Well above expected level for a Year 10 student</p> <p style="text-align: center;">(8 and 9 will only be awarded for exceptional performance)</p>	A/A*	<ul style="list-style-type: none"> • Apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results. • Solve quadratic inequalities in one variable. Deduce turning points of quadratic functions by completing the square. Interpret the succession of two functions as a 'composite function'. Apply the concepts of average and instantaneous rate of change (gradients of chords and tangents) in numerical, algebraic and graphical contexts. Work with general iterative processes. • Use vectors to construct geometric arguments and proofs.
<p style="text-align: center;">6/7</p> <p style="text-align: center;">Above expected level for a Year 10 student</p>	B	<ul style="list-style-type: none"> • Simplify surd expressions involving squares (e.g. $12 = \sqrt{4 \times 3} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$) and rationalise denominators. Calculate with roots, and with fractional indices. Calculate exactly with surds. • Identify, describe and construct similar shapes, including on coordinate axes, by considering enlargement (including negative/fractional scale factors) • Apply them to find angles and lengths in right-angled triangles and, where possible, general triangles in three dimensional figures. • Know and apply the sine rule, $a/\sin A = b/\sin B = c/\sin C$, and the cosine rule, $a^2 = b^2 + c^2 - 2bc \cos A$, to find unknown lengths and angles. Know and apply $\text{Area} = \frac{1}{2}ab \sin C$ to calculate the area, sides or angles of any triangle. • Manipulate algebraic expressions by factorising quadratic expressions of the form $ax^2 + bx + c$. Solve quadratic equations by completing the square and by using the quadratic formula. Recognise and use simple geometric progressions (rn where n is an integer, and r is a rational number > 0 or a surd) and other sequences. • Sketch translations and reflections of a given function. Recognise, sketch and interpret graphs of exponential functions $y = kx$ for positive values of k, and the trigonometric functions (with arguments in degrees) $y = \sin x$, $y = \cos x$ and $y = \tan x$ for angles

		<p>of any size. Construct equations that describe direct and inverse proportion. Calculate surface area and volume of spheres, pyramids, cones and composite solids.</p> <ul style="list-style-type: none"> • Construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and know their appropriate use. "Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency including quartiles and inter-quartile range". Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling. • Describe the changes and invariance achieved by combinations of rotations, reflections and translations.
<p style="text-align: center;">5</p> <p style="text-align: center;">Expected level for a Year 10 student</p>	C	<ul style="list-style-type: none"> • Estimate powers and roots of any given positive number. • Know the formulae for: Pythagoras' theorem, $a^2 + b^2 = c^2$, and apply it to find lengths in right-angled triangles and, where possible, general triangles and in three dimensional figures. • Identify, describe and construct similar shapes, including on coordinate axes, by considering enlargement. Apply SOHCAHTOA to find angles and lengths in right-angled triangles in two dimensional figures. change recurring decimals into their corresponding fractions and vice versa . • Calculate surface area and volume of spheres, pyramids, cones. Construct and interpret diagrams for grouped discrete data and continuous data, i.e. cumulative frequency graphs, and know their appropriate use • Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors.
4	D	<ul style="list-style-type: none"> • Work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and $\frac{7}{2}$ or 0.375 or $\frac{3}{8}$). Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

<p>Approaching the expected level for a Year 10 student</p>		<ul style="list-style-type: none"> • Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy. • Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions. Divide proper fractions by whole numbers [for example, $1/3 \div 2 = 1/6$]. Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison. • Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples. • Calculate and interpret the mean as an average
<p>3</p> <p>Working towards the expected level for a Year 10 student</p>	<p>E</p>	<ul style="list-style-type: none"> • Work with percentages greater than 100%. Perform mental calculations, including with mixed operations and large numbers. Identify common factors, common multiples and prime numbers. Multiply/divide multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication/division. Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. Use the knowledge of the order of operations to carry out calculations involving the four operations. • Draw and translate simple shapes on the coordinate plane, and reflect them in the axes. Compare and classify geometric shapes based on their properties and sizes ... and find unknown angles in any triangles, quadrilaterals, and regular polygons. Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles. Recognise when it is possible to use formula for area and volume of shapes. • Compare and order fractions, including fractions > 1. Use common factors to simplify fractions; use common multiples to express fractions in the same denomination. Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $1/4 \times 1/2 = 1/8$]. Use written division methods in cases where the answer has up to two decimal places.

		<ul style="list-style-type: none">• Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts. Solve problems involving similar shapes where the scale factor is known or can be found.• Interpret and construct pie charts and line graphs and use these to solve problems.
1/2 Working towards the expected level for a Year 10 student	F/G	<ul style="list-style-type: none">• Recall multiplication and division facts for multiplication tables up to 12×12. Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers. Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000. Describe positions on the full coordinate grid (all four quadrants). draw 2-D shapes using given dimensions and angles. Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius.• Generate and describe linear number sequences.

Score		Knowledge and Understanding
<p style="text-align: center; font-size: 2em; font-weight: bold;">8/9</p> <p style="text-align: center;">Well above expected level for a Year 11 student</p> <p style="text-align: center; font-size: 0.8em;">(8 and 9 will only be awarded for exceptional performance)</p>	<p style="font-size: 1.5em; font-weight: bold;">A/A*</p>	<ul style="list-style-type: none"> • Apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results. • Solve quadratic inequalities in one variable. Deduce turning points of quadratic functions by completing the square. Interpret the succession of two functions as a 'composite function'. Apply the concepts of average and instantaneous rate of change (gradients of chords and tangents) in numerical, algebraic and graphical contexts. Work with general iterative processes. • Use vectors to construct geometric arguments and proofs.
<p style="text-align: center; font-size: 2em; font-weight: bold;">6/7</p> <p style="text-align: center;">Above expected level for a Year 11 student</p>	<p style="font-size: 1.5em; font-weight: bold;">B</p>	<ul style="list-style-type: none"> • Simplify surd expressions involving squares (e.g. $12 = \sqrt{4 \times 3} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$) and rationalise denominators. Calculate with roots, and with fractional indices. Calculate exactly with surds. • Identify, describe and construct similar shapes, including on coordinate axes, by considering enlargement (including negative/fractional scale factors) • Apply them to find angles and lengths in right-angled triangles and, where possible, general triangles in three dimensional figures. • Know and apply the sine rule, $a/\sin A = b/\sin B = c/\sin C$, and the cosine rule, $a^2 = b^2 + c^2 - 2bc \cos A$, to find unknown lengths and angles. Know and apply $\text{Area} = \frac{1}{2}ab \sin C$ to calculate the area, sides or angles of any triangle. • Manipulate algebraic expressions by factorising quadratic expressions of the form $ax^2 + bx + c$. Solve quadratic equations by completing the square and by using the quadratic formula. Recognise and use simple geometric progressions (rn where n is an integer, and r is a rational number > 0 or a surd) and other sequences. • Sketch translations and reflections of a given function. Recognise, sketch and interpret graphs of exponential functions $y = kx$ for positive values of k, and the trigonometric functions (with arguments in degrees) y

		<p>= $\sin x$, $y = \cos x$ and $y = \tan x$ for angles of any size. Construct equations that describe direct and inverse proportion. Calculate surface area and volume of spheres, pyramids, cones and composite solids.</p> <ul style="list-style-type: none"> • Construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and know their appropriate use. "Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency including quartiles and inter-quartile range". Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling. • Describe the changes and invariance achieved by combinations of rotations, reflections and translations.
<p style="text-align: center;">5</p> <p style="text-align: center;">Expected level for a Year 11 student</p>	C	<ul style="list-style-type: none"> • Estimate powers and roots of any given positive number. • Know the formulae for: Pythagoras' theorem, $a^2 + b^2 = c^2$, and apply it to find lengths in right-angled triangles and, where possible, general triangles and in three dimensional figures. • Identify, describe and construct similar shapes, including on coordinate axes, by considering enlargement. Apply SOHCAHTOA to find angles and lengths in right-angled triangles in two dimensional figures. change recurring decimals into their corresponding fractions and vice versa. • Calculate surface area and volume of spheres, pyramids, cones. Construct and interpret diagrams for grouped discrete data and continuous data, i.e. cumulative frequency graphs, and know their appropriate use • Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors.
<p style="text-align: center;">4</p> <p style="text-align: center;">Approaching the expected level for a Year 11 student</p>	D	<ul style="list-style-type: none"> • Work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and $\frac{7}{2}$ or 0.375 or $\frac{3}{8}$). Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts. • Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

		<ul style="list-style-type: none"> • Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions. Divide proper fractions by whole numbers [for example, $1/3 \div 2 = 1/6$]. Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison. • Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples. • Calculate and interpret the mean as an average
<p style="text-align: center;">3</p> <p style="text-align: center;">Working towards the expected level for a Year 11 student</p>	E	<ul style="list-style-type: none"> • Work with percentages greater than 100%. Perform mental calculations, including with mixed operations and large numbers. Identify common factors, common multiples and prime numbers. Multiply/divide multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication/division. Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. Use the knowledge of the order of operations to carry out calculations involving the four operations. • Draw and translate simple shapes on the coordinate plane, and reflect them in the axes. Compare and classify geometric shapes based on their properties and sizes ... and find unknown angles in any triangles, quadrilaterals, and regular polygons. Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles. Recognise when it is possible to use formula for area and volume of shapes. • Compare and order fractions, including fractions > 1. Use common factors to simplify fractions; use common multiples to express fractions in the same denomination. Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $1/4 \times 1/2 = 1/8$]. Use written division methods in cases where the answer has up to two decimal places. • Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts. Solve problems involving similar shapes where the scale factor is known or can be found. • Interpret and construct pie charts and line graphs and use these to solve problems.

1/2

Working towards the
expected level for a Year
11 student

F/G

- Recall multiplication and division facts for multiplication tables up to 12×12 . Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers. Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000. Describe positions on the full coordinate grid (all four quadrants). draw 2-D shapes using given dimensions and angles. Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius.
- Generate and describe linear number sequences.