

FOREST HILL GCSE MATHS OVERVIEW OF YEAR 10 SCHEMES OF WORK: NEW SPECIFICATION GRADE 9 TO 1 - SETS 1 & 2



AUTUMN 05/09/2016 12/09/2016 19/09/2016 26/09/2016 03/10/2016 10/10/2016 17/10/2016 24/10/2016 31/10/2016 07/11/2016 14/11/2016 21/11/2016 28/11/2016 05/12/2016 12/12/2016 19/12/2016 26/12/2016

1 2 3 4 5 6 7 half term 8 9 10 11 12 13 14 15 XMAS

	number	number	algebra/number	algebra	algebra	geometry & measures	geometry & measures	proportion	proportion	statistics & probability	algebra/ statistics & probability				
Set 1 (HIGHER)	calculate with integer and fractional indices	manipulate surds	Proof; simplifying algebraic expressions; add/subtract algebraic fractions - including solving	solve equations using quadratic formula or completing the square	perpendicular lines; graphical solutions to further simultaneous equations	congruency	vectors	direct & inverse proportion	mass, density & volume; force, pressure & area	histograms; tree diagrams involving algebraic expressions	transformations of functions	REVISION FOR NON-CALC TEST (PAPER 1)	COMPLETION OF NON-CALC TEST (PAPER 1)	work experience	work experience
Set 2 (HIGHER)	limits of accuracy; compound interest/depreciation without a calculator; standard form	standard form; raise a number by the power of zero or by a negative power	expanding bracketed expressions; factorising; difference of squares;	produce quadratic equations; solve equations by factorising	equation of a straight line; linear inequalities in two variables	similar shapes - area and volume; surface area of a cylinder	trigonometry; exact trigonometric values "special triangles"; scale factors of vectors;	ratio; distance, speed & time	mass, density & volume; force, pressure & area	mean from two different data sets; venn diagrams	formula for the nth term of a quadratic sequence; geometric progression	REVISION FOR NON-CALC TEST (PAPER 1)	COMPLETION OF NON-CALC TEST (PAPER 1)	work experience	work experience

SPRING 02/01/2017 09/01/2017 16/01/2017 23/01/2017 30/01/2017 06/02/2017 13/02/2017 20/02/2017 27/02/2017 06/03/2017 13/03/2017 20/03/2017 27/03/2017 03/04/2017 10/04/2017

1 2 3 4 5 6 half term 7 8 9 10 11 12 EASTER EASTER

	number	algebra/number	algebra	algebra	algebra	geometry & measures	geometry & measures	proportion	statistics & probability	statistics & probability				
Set 1 (HIGHER)	FEEDBACK OF NON-CALC PAPER	lower & upper bounds	instantaneous rate of change; area under the curve; proof	equation of a tangent to a circle; transformation of functions;	further simultaneous equations; quadratic inequalities	circle theorem proof	sine and cosine rule; area of a triangle; cones & spheres	direct & inverse proportion	histograms	tree diagrams; cumulative frequency graphs	REVISION & PAPER 2 CALCULATOR PAPER TEST	financial maths		
Set 2 (HIGHER)	FEEDBACK OF NON-CALC PAPER	compound interest/depreciation; reverse percentages	Graphs of functions	composite functions; binomial expansion	formula for the nth term of a quadratic sequence; geometric progression	trigonometry; exact trigonometric values "special triangles";	quadratic equations based on geometric context	mass, density & volume; force, pressure & area	pie charts; scatter diagrams; simple probability	tree diagrams; cumulative frequency graphs	REVISION & PAPER 2 CALCULATOR PAPER TEST	financial maths		

SUMMER 17/04/2017 24/04/2017 01/05/2017 08/05/2017 15/05/2017 22/05/2017 29/05/2017 05/06/2017 12/06/2017 19/06/2017 26/06/2017 03/07/2017 10/07/2017 17/07/2017

1 2 3 4 5 6 half term 7 8 9 10 11 12 13

	number	algebra	algebra	algebra/ geometry & measures	geometry & measures	proportion	statistics & probability						
Set 1 (HIGHER)	FEEDBACK FROM CALC. PAPER	calculate with integer and fractional indices	solve equations using quadratic formula or completing the square; simplify algebraic expressions	proof; transformation of functions	exponential functions; quadratic inequalities	circle theorem; vectors	direct & inverse proportion	histograms; estimate population; conditional probability	REVISION & PAPER 3 CALCULATOR PAPER TEST	revision for PPE	FEEDBACK FROM CALC. PAPER/ REVISION	END OF YR 10 PPE	END OF YR 10 PPE
Set 2 (HIGHER)	FEEDBACK FROM CALC. PAPER	express one quantity as a percentage of another; percentage increase/ decrease; compound interest/depreciation; reverse percentages; standard form	produce quadratic equations; solve equations by factorising	iteration; formula for the nth term of a quadratic sequence; geometric progression	equation of a straight line; linear inequalities in two variables	sine and cosine rule; area of a triangle; cones & spheres	similar shapes	mean from frequency tables; IQR from raw data; tree diagrams	REVISION & PAPER 3 CALCULATOR PAPER TEST	revision for PPE	FEEDBACK FROM CALC. PAPER/ REVISION	END OF YR 10 PPE	END OF YR 10 PPE

YEAR 10 SET 1 & 2 SCHEME OF WORK - NUMBER STRAND - AUTUMN

week	strand	SUPPORT	LEARNING OUTCOME	GRADE
1	number	division and multiplication; estimation	Multiply and divide whole numbers by a given multiple of 10	1
			Add, subtract, multiply and divide integers (including formal written methods)	1
			Multiply and divide decimal numbers by whole numbers and decimal numbers (up to 2 dp), eg $266.22 \div 0.34$	2
			Know that, eg $13.5 \div 0.5 = 135 \div 5$	2
			Use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2,3,4,5	3
			Estimate powers and roots of any given positive number	3
			Check their calculations by rounding, eg $39 \times 31 = 30 \times 30$	2
			Check answers by reverse calculation, eg if $9 \times 23 = 207$ then $207 \div 9 = 23$	2
			Estimate by rounding numbers to 1 significant figure before performing calculation	3
			<p>1. Work out 5.4×0.24</p> <p>4. Write the following numbers in order of size. Start with the smallest number.</p> <p style="text-align: center;">$0.6 \quad \frac{2}{3} \quad 65\% \quad 0.606$</p>	
2	number	LCM & HCF;	Find the HCF and the LCM of numbers	3
			Write a number as a product of its prime factors, eg $108 = 2 \times 2 \times 3 \times 3 \times 3 = 2^2 \times 3^3$	3
			<p>9. x and y are two numbers each greater than 3</p> <p>The Highest Common Factor (HCF) of x and y is 3</p> <p>The Lowest Common Multiple (LCM) of x and y is 36</p> <p>Find x and y.</p>	

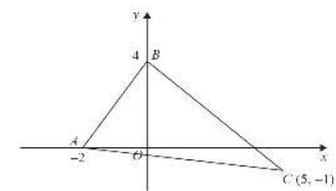
CORE	LEARNING OUTCOME	GRADE
limits of accuracy; compound interest/depreciation without a calculator; standard form	Find when numbers are given to a specific degree of accuracy, interpret limits of accuracy	5
	Use inequality notation to specify simple error intervals due to truncation or rounding	5
	Calculate the percentage of a given amount	3
	Express one number as a percentage of another number	3
	Find a percentage increase/decrease of an amount	4
	Calculate simple and compound interest for two, or more, periods of time including in financial mathematics	5
	<p>2. The height, H cm, of a table is measured as 72 cm correct to the nearest centimetre.</p> <p>Complete the following statement to show the range of possible values of H</p> <p style="text-align: center;">..... $\leq H <$</p>	
standard form; raise a number by the power of zero or by a negative power	Understand the standard form convention	3
	Convert numbers to, and from, standard form	3
	Add, subtract, multiply and divide numbers in standard form using a calculator	4
	Round numbers given in standard form to a given number of significant figures	4
	Calculate with numbers given in standard form with, and without, a calculator	5
	Use index rules to simplify and calculate numerical expressions involving powers (including negative)	5
	<p>4. Write the following numbers in order of size. Start with the smallest number</p> <p style="text-align: center;">$0.038 \times 10^2 \quad 3800 \times 10^{-4} \quad 380 \quad 0.38 \times 10^{-1}$</p>	

EXTENSION	LEARNING OUTCOME	GRADE
calculate with integer and fractional indices	Use index rules to simplify and calculate numerical expressions involving powers (including fractional)	7
	<p>8 The mass of Jupiter is 1.899×10^{27} kg.</p> <p>The mass of Saturn is 0.3 times the mass of Jupiter.</p> <p>(a) Work out an estimate for the mass of Saturn.</p> <p>Give your answer in standard form.</p> <p>7. Find the value of n so that $\frac{2^6 \times 2^3}{2^n} = 2^5$</p>	
manipulate surds	Calculate with roots	5
	Simplify surd expressions involving squares (e.g. $-\sqrt{12} = -\sqrt{4 \times 3} = -2\sqrt{3}$)	6
	Expand and simplify surd expressions involving two pairs of brackets	7
	Rationalise the denominator of fractions, and, eg write $(\sqrt{18} + \sqrt{10}) \div \sqrt{2}$ in the form $\frac{p + q\sqrt{2}}{r}$	8
	<p>11 Write down the value of $12^{\frac{2}{3}}$</p> <p>19 Simplify fully $\frac{(6 - \sqrt{5})(6 + \sqrt{5})}{\sqrt{31}}$</p> <p>You must show your working.</p>	

YEAR 10 SET 1 & 2 SCHEME OF WORK - ALGEBRA STRAND - 1ST PART OF TWO - AUTUMN

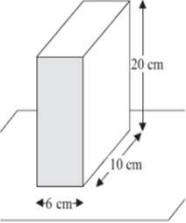
week	strand	SUPPORT	LEARNING OUTCOME	GRADE
3	algebra	changing the subject; laws of indices; substitution	Change the subject of a formula, eg convert the formula for converting Celsius into Fahrenheit into a formula that converts Fahrenheit into Celsius Multiply and divide powers of the same variable Substitute positive and negative numbers into simple algebraic formulae, including scientific formulae	4 3 3
<p>10. Make q the subject of the formula $5(q + p) = 4 + 8p$. Give your answer in its simplest form.</p> <p>13 $m = \sqrt{\frac{k^3 + 1}{4}}$</p> <p>Make k the subject of the formula.</p>				
4	algebra	solving equations involving two operations; produce linear expressions/equations; simultaneous equations	Solve linear equations with more than one operation Find the solution to a problem by writing an equation and solving it Solve linear equations involving a single pair of brackets Rearrange and solve linear inequalities in one variable and show the solution set on a number line, or to write down all the integer solutions Derive simultaneous equations Solve algebraically two simultaneous equations Interpret the solution of two simultaneous equations as the point of intersection of the corresponding lines	3 3 3 4 4 4
<p>8. $-6 \leq 2y < 5$</p> <p>y is an integer.</p> <p>Write down all the possible values of y.</p>				
5	algebra	graphs of straight lines	Substitute values of x into linear functions to find corresponding values of y Plot points for linear functions on a coordinate grid and draw the corresponding straight lines Interpret m and c as gradient and y -intercept in linear functions (graphically and algebraically) Understand that the graphs of linear functions are parallel if they have the same value of m	2 3 3 3

CORE	LEARNING OUTCOME	GRADE
expanding bracketed expressions; factorising; difference of squares;	Expand or factorise algebraic expressions involving one pair of brackets Expand and simplify expressions involving two pairs of brackets Factorise quadratic expressions (including the difference of two squares) Expand products of three or more binomials	4 4 5 5
produce quadratic equations; solve equations by factorising	produce quadratic equations based on context given, including geometric or numerical scenarios Solve quadratic equations (including those that require rearrangement) by factorising (including values of a not equal to 1)	6 6
<p>11. (a) Expand and simplify $(x - 3)(x + 5)$</p> <p>(b) Solve $x^2 + 8x - 9 = 0$</p>		
equation of a straight line; linear inequalities in two variables	Interpret the gradient of a straight line graph as a rate of change Change the subject of a formula for the equation of a straight line to interpret the gradient Writing down the coordinates of the midpoint of the line connecting two points Find the equation of the line through two given points, or through one point with a given gradient Solve linear inequalities in two variables Draw the graphs of linear inequalities in two variables and interpret the solution sets given by regions in the coordinate plane, or to identify all the integer coordinates with crosses	4 4 3 5 5 5

EXTENSION	LEARNING OUTCOME	GRADE
Proof; simplifying algebraic expressions; add/subtract algebraic fractions - including solving	Use algebra to support and construct arguments and proofs e.g. equivalent fraction of a recurring decimal; Simplify and manipulate algebraic expressions involving surds and algebraic fractions Solving linear equations involving algebraic fractions	8 6 7
<p>20 Prove algebraically that the difference between the squares of any two consecutive integers is equal to the sum of these two integers.</p> <p>14 Solve $\frac{x + 2}{3x} + \frac{x - 2}{2x} = 3$</p> <p>12. (a) Simplify fully $\frac{x^2 + 3x - 4}{2x^2 - 5x + 3}$</p>		
solve equations using quadratic formula or completing the square	Use the quadratic formula to solve quadratic equations (including those that require rearrangement) giving the answers to 3 s.f. or leaving the answer in surd form Use the method of completing the square to solve quadratic equations, leaving the answer in surd form Complete the square of a quadratic function (using this to write down the maximum/minimum of the function, refer to as turning points)	7 7 8
perpendicular lines; graphical solutions to further simultaneous equations	Know that the line perpendicular to $y = mx + c$ has gradient $-1/m$ Draw a circle of radius r centred at the origin Find graphically the approximate solutions of linear and circular simultaneous equations Find graphically the approximate solutions of linear and quadratic simultaneous equations	5 5 7 7
<p>23</p>  <p>Find an equation of the line that passes through C and is perpendicular to AB.</p>		

YEAR 10 SET 1 & 2 SCHEME OF WORK - GEOMETRY STRAND - AUTUMN

week	strand	SUPPORT	LEARNING OUTCOME	GRADE
6	geometry & measures	perimeter; compound area; volume of prisms; similar shapes - length	Use formulae for the volume of cuboids and prisms	2
			Solve a range of problems involving areas and volumes of prisms, including trapezia & cylinders	4
			Convert between units of volume	3
			Solve problems involving the volume of a cylinder	4
			Know the relationship between linear, area and volume scale factors of similar shapes	3
			Use integer and non-integer scale factors to find the length of a missing side in each of two similar shapes, given the lengths of a pair of corresponding sides	4



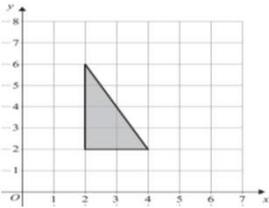
3. Jane has a carton of orange juice. The carton is in the shape of a cuboid.

The depth of the orange juice in the carton is 8 cm.

Jane closes the carton. Then she turns the carton over so that it stands on the shaded face.

Work out the depth, in cm, of the orange juice now.

week	strand	SUPPORT	LEARNING OUTCOME	GRADE
7	geometry & measures	transform shapes; describing transformations	Understand rotation as a (anticlockwise) turn about a given origin	2
			Identify order of rotational symmetry	2
			Understand translation as a combination of a horizontal and vertical shift including signs for directions; describe translations as 2D vectors	3
			Reflect shapes in a given mirror line; parallel to the coordinate axes and then $y = x$ or $y = -x$	3
			Recognise simple transformations of 2-D shapes	3
			Understand that shapes produced by translation, rotation and reflection are congruent to its image	3
			Distinguish properties that are preserved under transformations, eg write down the angles of a triangle that has been enlarged	3
			Transform triangles and other shapes by translation, rotation and reflection (including combinations of transformations)	3
			Enlarge shapes by a given scale factor from a given point, using positive whole number scale factors, then positive fractional scale factors	4
			Identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)	4
			Enlargement by negative and fractional scale factor	5
			Describe the changes and invariance achieved by combinations of rotations, reflections and translations	5



18.

Enlarge the shaded shape by a scale factor of $-1 \frac{1}{2}$, centre $(0, 4)$.

CORE	LEARNING OUTCOME	GRADE
similar shapes - area and volume; surface area of a cylinder	Apply the concept of similarity, including the relationships between lengths, areas and volumes in similar figures	5
	Calculate the surface area of cylinders	5
	Solve a range of problems involving surface area and volume, eg given the volume and length of a cylinder find the radius	5

22.

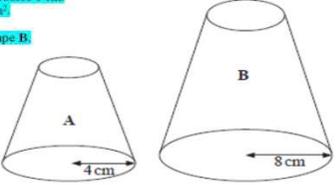
Two solid shapes, A and B, are mathematically similar.

The base of shape A is a circle with radius 4 cm.

The base of shape B is a circle with radius 8 cm.

The surface area of shape A is 80 cm².

(a) Work out the surface area of shape B.



The volume of shape B is 600 cm³.

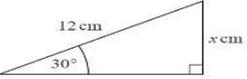
(b) Work out the volume of shape A.

trigonometry; exact trigonometric values "special triangles"; scale factors of vectors;	LEARNING OUTCOME	GRADE
	Use the trigonometric ratios to calculate unknown lengths in right-angled triangles	5
	Use trigonometric ratios (sin, cos and tan) to calculate angles in right-angled triangles	5
	Understand and use bearings	3
	Know the exact values of sinθ and cosθ for θ = 0°, 30°, 45°, 60° and 90°; know the exact values of tanθ for θ = 0°, 30°, 45° and 60°;	5
	Understand that 2a is parallel to a and twice its length	5
	Understand that a is parallel to -a and in the opposite direction	5
	Use and interpret vectors as displacements in the plane (with an associated direction)	5
	Represent vectors, and combinations of vectors, in the plane	5

7 (a) Write down the exact value of $\cos 30^\circ$

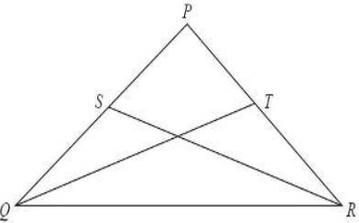
(b)

Given that $\sin 30^\circ = 0.5$, work out the value of x .



EXTENSION	LEARNING OUTCOME	GRADE
congruency	Prove formally geometric properties of triangles, eg that the base angles of an isosceles triangle are equal	8
	Prove formally that two triangles are congruent	8

17



$PQ = PR$.

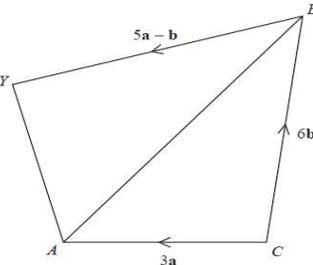
S is the midpoint of PQ .

T is the midpoint of PR .

Prove triangle QTR is congruent to triangle RSQ .

vectors	LEARNING OUTCOME	GRADE
	Use standard vector notation to combine vectors by addition, eg $\vec{AB} + \vec{BC} = \vec{AC}$ and $\vec{a} + \vec{b} = \vec{c}$	7
	Use vectors to construct geometric arguments and proofs	9

22



CAYB is a quadrilateral.

$\vec{CA} = 3\mathbf{a}$

$\vec{CB} = 6\mathbf{b}$

$\vec{BY} = 5\mathbf{a} - \mathbf{b}$

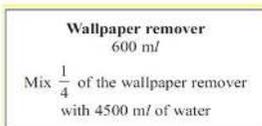
X is the point on AB such that $AX:XB = 1:2$

Prove that $\vec{CX} = \frac{2}{5}\vec{CY}$

YEAR 10 SET 1 & 2 SCHEME OF WORK - PROPORTION STRAND - AUTUMN

week	strand	SUPPORT	LEARNING OUTCOME	GRADE
8&9	proportion	ratio, distance, speed & time	Appreciate that, eg the ratio 1:2 represents 1/3 and 2/3 of a quantity i.e. relate ratio to fractions Divide quantities in a given ratio, eg divide £20 in the ratio 2:3 Relate ratio to linear functions Understand and use proportion as equality of ratios Calculate speed when, eg fractions of an hour must be entered as fractions or as decimals Use the relationship between distance, speed and time to solve problems	2 3 3 3 3 4

4. Suha has a full 600 ml bottle of wallpaper remover. She is going to mix some of the wallpaper remover with water. Here is the information on the label of the bottle.

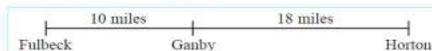


Suha is going to use 750 ml of water.

How many millilitres of wallpaper remover should Suha use? You must show your working.

prior knowledge	Write a ratio in its simplest form and find an equivalent ratio	2
simplifying ratio; unit pricing	Solve word problems involving ratios, eg find the cost of 8 pencils given that 6 cost 78p	2
conversion graphs	Interpret linear graphs, including conversion graphs and distance-time graphs	3
	Solve graphically simultaneous equations, eg find when/where the car overtakes the bus	3

13. The distance from Fulbeck to Ganby is 10 miles. The distance from Ganby to Horton is 18 miles.



Raksha is going to drive from Fulbeck to Ganby. Then she will drive from Ganby to Horton.

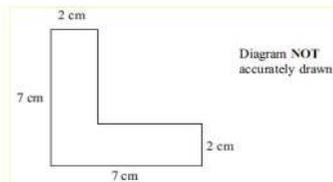
Raksha leaves Fulbeck at 10.00. She drives from Fulbeck to Ganby at an average speed of 40mph.

Raksha wants to get to Horton at 10.35.

Work out the average speed Raksha must drive at from Ganby to Horton.

CORE	LEARNING OUTCOME	GRADE
mass, density & volume; force, pressure & area	Convert between metric units of density, eg kg/m to g/cm	3
	Know that density is found by mass ÷ volume	4
	Use the relationship between density, mass and volume to solve problems, eg find the mass of an object with a given volume and density	4
	Convert between metric units of speed, eg km/h to m/s	3
	Convert between metric units of area, eg cm ² to m ²	3
	Know that pressure is found by force ÷ area	4
	Use the relationship between pressure, force and area to solve problems, eg find the pressure exerted with a given force and area	4

1.



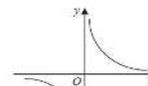
The diagram shows the cross-section of a solid prism. The length of the prism is 2 m.

The prism is made from metal. The density of the metal is 8 grams per cm³.

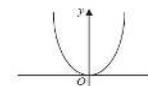
Work out the mass of the prism.

EXTENSION	LEARNING OUTCOME	GRADE
direct & inverse proportion	Identify direct & inverse proportion graphs	5
	Interpret equations that describe direct and inverse proportion	5
	Interpret direct and inverse proportions as algebraic functions, eg $y = x^2$ as $y = kx^2$	7
	Use given information to find the value of the constant of proportionality	7
	Use algebraic functions for direct and inverse proportionality, with their value of k , to find unknown values	7

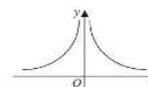
16 These graphs show four different proportionality relationships between y and x .



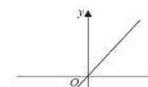
Graph A



Graph B



Graph C



Graph D

Match each graph with a statement in the table below.

YEAR 10 SET 1 & 2 SCHEME OF WORK - STATISTICS STRAND - AUTUMN

week	strand	SUPPORT	LEARNING OUTCOME	GRADE												
10	statistics & probability	frequency polygons; averages; probabilities from experiments; mutually exclusive events	Represent data as a frequency polygon Find the mode, the median, the mean, and the range for (small) sets of data Identify the mode from ungrouped frequency distributions and the modal class interval in grouped frequency distributions Find the class interval containing the median value grouped frequency distributions Know the advantages/disadvantages of using the different measure of average Compare distributions using a measure of average and the range Find estimates of probabilities by considering relative frequency in experimental results (including two-way tables) Know that the more an experiment is repeated the better the estimate of probability Understand that empirical unbiased samples tend towards theoretical probability distributions as the sample size increases Find the missing probability from a list or table	3 1 2 3 4 4 3 3 3 3												
<p>9. Sasha carried out a survey of 60 students. She asked them how many CDs they each have.</p> <p>This table shows information about the numbers of CDs these students have</p> <table border="1"> <thead> <tr> <th>Number of CDs</th> <th>0 – 4</th> <th>5 – 9</th> <th>10 – 14</th> <th>15 – 19</th> <th>20 – 24</th> </tr> </thead> <tbody> <tr> <td>Frequency</td> <td>8</td> <td>11</td> <td>9</td> <td>14</td> <td>18</td> </tr> </tbody> </table> <p>(a) Write down the class interval containing the median.</p> <p>(b) On the grid, draw a frequency polygon to show the information given in the table.</p>					Number of CDs	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	Frequency	8	11	9	14	18
Number of CDs	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24											
Frequency	8	11	9	14	18											

PRIOR KNOWLEDGE		
Apply stratified sampling		5
expected no. of times event occurs based on number of trials and probability		3
Represent data as:		
Verbal line graphs		2
Two-way tables		3
Bar charts, including dual bar charts, and histograms (equal class intervals)		3
Know that if the probability of an event occurring is p then the probability of it not occurring is $1 - p$		
Write down the probability associated with equally likely events, eg the probability of drawing an ace from a pack of cards.		3
Understand the difference between: primary and secondary data, discrete and continuous data		3
Design suitable data capture sheets for surveys and experiments		3
Understand about bias in sampling and how to minimise it		3
Choose and justify an appropriate sampling scheme, including random and systematic sampling		3
Give properties of populations or distributions from a sample, whilst knowing the limitations of sampling		3

CORE	LEARNING OUTCOME	GRADE
mean from two different data sets; venn diagrams	Calculate the mean when given the individual mean and sample size of two different data sets	4
	Work out the missing frequency when given the mean of the sample and the mean prior to the event	5
	Interpret sets from venn diagrams	4
	Interpret sets of unions/intersections	4
	Construct venn diagrams when given information about unions/intersections	5
	Calculate and interpret conditional probabilities through representation using Venn diagrams	7
<p>5. There are 18 packets of sweets and 12 boxes of sweets in a carton.</p> <p>The mean number of sweets in all the 30 packets and boxes is 14.</p> <p>The mean number of sweets in the 18 packets is 10.</p> <p>Work out the mean number of sweets in the boxes.</p>		

EXTENSION	LEARNING OUTCOME	GRADE												
histograms; tree diagrams involving algebraic expressions	Complete a histogram from a frequency table	7												
	Complete a frequency table from a histogram	7												
	Use a histogram to work out the frequency in part of a class interval	8												
	Solve probability problems involving tree diagrams whereby probability is expressed algebraically	8												
<p>15. The incomplete histogram and table give some information about the distances some teachers travel to school.</p> <p>(a) Use the information in the histogram to complete the frequency table.</p> <table border="1"> <thead> <tr> <th>Distance (d km)</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>$0 < d \leq 5$</td> <td>15</td> </tr> <tr> <td>$5 < d \leq 10$</td> <td>20</td> </tr> <tr> <td>$10 < d \leq 20$</td> <td></td> </tr> <tr> <td>$20 < d \leq 40$</td> <td></td> </tr> <tr> <td>$40 < d \leq 60$</td> <td>10</td> </tr> </tbody> </table> <p>(b) Use the information in the table to complete the histogram.</p>			Distance (d km)	Frequency	$0 < d \leq 5$	15	$5 < d \leq 10$	20	$10 < d \leq 20$		$20 < d \leq 40$		$40 < d \leq 60$	10
Distance (d km)	Frequency													
$0 < d \leq 5$	15													
$5 < d \leq 10$	20													
$10 < d \leq 20$														
$20 < d \leq 40$														
$40 < d \leq 60$	10													

YEAR 10 SET 1 & 2 SCHEME OF WORK - ALGEBRA STRAND - 2ND PART OF TWO - AUTUMN

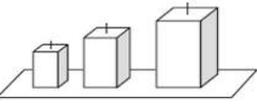
week	strand	SUPPORT	LEARNING OUTCOME	GRADE
11	algebra	formula for the nth term of a linear sequence	Find the nth term of a number sequence as an algebraic expression	3
			Explain why a number is, or is not, a member of a given sequence	3

CORE	LEARNING OUTCOME	GRADE
formula for the nth term of a quadratic sequence; geometric progression	Recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences	3
	Recognise and use simple geometric progression (r^n where n is an integer, and r is a rational number >0 or a surd) and other sequences	9
	Deduce expressions to calculate the nth term of quadratic sequences	7

EXTENSION	LEARNING OUTCOME	GRADE
transformations of functions	Represent translations in the x and y direction, reflections in the x -axis and the y -axis, and stretches parallel to the x -axis and the y -axis	7
	Sketch the graph of $y = f(x + 2)$, $y = f(x) + 2$, $y = 2f(x)$, $y = f(2x)$ given the shape of the graph $y = f(x)$	7
	Sketch the graph of $y = 3 \sin 2x$, given the graph of $y = \sin x$	8
	Find the coordinates of the minimum of $y = f(x + 3)$, $y = f(x) + 3$ given the coordinates of the minimum of $f(x) = x^2 - 2x$	8

YEAR 10 SET 1 & 2 SCHEME OF WORK - NUMBER STRAND - SPRING

week	strand	SUPPORT	LEARNING OUTCOME	GRADE
2	number	LCM & HCF; calculations involving fractions	Find the HCF and the LCM of numbers Write a number as a product of its prime factors, eg $108 = 2 \times 2 \times 3 \times 3 \times 3 = 2^2 \times 3^3$ Multiply and divide a fraction by an integer, by a unit fraction and by a general fraction (expressing the answer in its simplest form) Add, subtract, multiply & divide mixed numbers in a contextualised scenario using a calculator Write one number as a percentage of another number Write an improper fraction as a mixed number, and vice versa Add and subtract mixed numbers Multiply and divide mixed numbers Justify answers to calculations involving mixed numbers	3 3 3 3 3 2 4 4 4



(b) Describe one mistake that Dave made.

2. Bilal is making sets of three candles.

He puts a white candle, a silver candle and a gold candle into each set.

The candles are sold in packets of different sizes.

There are

25 white candles in a packet
 12 silver candles in a packet
 and 8 gold candles in a packet.

Bilal wants to use all the candles he buys.

(i) What is the smallest number of packets of white candles, of silver candles and of gold candles he needs to buy?

CORE	LEARNING OUTCOME	GRADE
	Use a multiplier to increase by a given percent, eg 1.1×64 increases 64 by 10%	3
compound interest/depreciation; reverse percentages	Calculate simple and compound interest for two, or more, periods of time including in financial mathematics	5
	Use the multiplier to find the original amount e.g. the original cost of an item given the cost after a 10% deduction	4

12. When a number is reduced by 30% the answer is 17920
 What is the number?

EXTENSION	LEARNING OUTCOME	GRADE
lower & upper bounds	Find when numbers are given to a specific degree of accuracy, the upper and lower bounds of perimeters and areas (and represented in other context); and interpret limits of accuracy	5

22 $D = \frac{x}{y}$

$x = 99.7$ correct to 1 decimal place.
 $y = 67$ correct to 2 significant figures.

Work out an upper bound for D .

YEAR 10 SET 1 & 2 SCHEME OF WORK - ALGEBRA STRAND - SPRING

week	strand	SUPPORT	LEARNING OUTCOME	GRADE
3	algebra	draw quadratic graphs; change the subject of a formula	Substitute values of x into a quadratic function to find the corresponding values of y	4
			Plot the graphs of quadratic functions for positive and negative values of a	4
			Find graphically the solutions of quadratic equations by considering the intercept on the x -axis and interpret as roots of quadratic functions	5
			Find graphically x -intercept of quadratic functions	5
			Change the subject of a formula, including the use of factorising to rearrange	5

1 Make t the subject of the formula $w = 3t + 11$

week	strand	functions	Interpret simple expressions as functions with inputs and outputs (where appropriate) <th>4</th>	4
			substitute algebraic expressions into a given function and simplify	4
			Interpret the reverse process as the 'inverse function'	4

14. f is the function $f(x) = 2x + 5$

(a) Find $f(3)$

(b) Express the inverse function f^{-1} in the form $f^{-1}(x) =$

$f^{-1}(x) = \dots$

18 $f(x) = 3x^2 - 2x - 8$

Express $f(x + 2)$ in the form $ax^2 + bx$

week	strand	nth term of a linear sequence; produce and solve equations; linear simultaneous equations <th>Find the nth term of a number sequence as an algebraic expression <th>3</th> </th>	Find the n th term of a number sequence as an algebraic expression <th>3</th>	3
			Explain why a number is, or is not, a member of a given sequence	3
			Solve linear equations with more than one operation	3
			Find the solution to a problem by writing an equation and solving it	3
			Solve simultaneous equations	4
			Understand arithmetic and geometric sequences	4

20. Here are the first 4 terms of a quadratic sequence.

7 18 33 52

Find an expression, in terms of n , for the n th term of the sequence.

6. The total cost of 3 apples and 4 pears is £1.84

The total cost of 5 apples and 2 pears is £1.76

Work out the cost of one apple and the cost of one pear.

CODE	LEARNING OUTCOME	GRADE
Graphs of functions	Plot and recognise cubic, reciprocal and exponential functions ($y = k^x$)	6
	Use the graphs of these functions to find approximate solutions to equations, eg $3x^3 = 5$ find x (and vice versa)	6
	Match equations with their graphs	6
	Sketch graphs of given functions	7
	Recognise, sketch and interpret graphs of trigonometric functions (with arguments in degrees) $y = \sin x$, $y = \cos x$ and $y = \tan x$ for angles of any size	8
	Recall the exact values of \sin and \cos for $0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90° ; know the exact values of \tan for $0^\circ, 30^\circ, 45^\circ$ and 60°	8

5. A farm has three car parks

South car park has x spaces

North car park has 48 more spaces than South car park

Central car park has four times as many spaces as South car park

The total number of spaces in South car park and Central car park is more than twice the number of spaces in North car park

Work out the least possible number of spaces in South car park

composite functions; binomial expansion	Interpret the succession of two functions as a 'composite function'	7
	Solve equations derived from use of composite functions	7
	Expand products of three or more binomials	5

13 Show that

$$(3x - 1)(x + 5)(4x - 3) - 12x^2 + 47x^2 - 62x + 15$$

for all values of x .

14.

g is the function $g(x) = x^2 - 25$

(c) Find $g(-3)$

(d) (i) Find $gf(x)$
Give your answer as simply as possible

$gf(x) = \dots$

(ii) Solve $gf(x) = 0$

formula for the n th term of a quadratic sequence; geometric progression	Recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences	1
	Recognise and use simple geometric progression (r^n where n is an integer, and r is a rational number $\neq 0$ or a surd) and other sequences	9
	Derive expressions to calculate the n th term of quadratic sequences	7

21 The number of bees in a beehive at the start of year n is P_n . The number of bees in the beehive at the start of the following year is given by

$$P_{n+1} = 1.05(P_n - 250)$$

At the start of 2015 there were 9500 bees in the beehive.

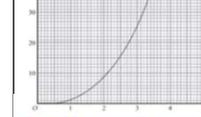
How many bees will there be in the beehive at the start of 2018?

17 Here are the first 5 terms of a quadratic sequence:

1 5 7 13 21

Find an expression, in terms of n , for the n th term of this quadratic sequence.

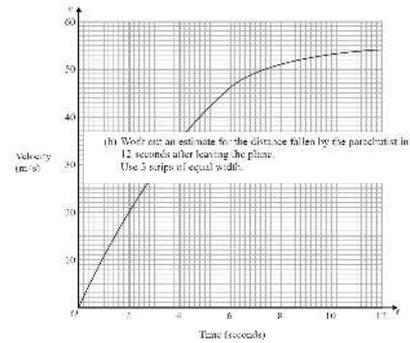
EXTENSION	LEARNING OUTCOME	GRADE
Instantaneous rate of change; area under the curve; proof	Plot graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration	8
	Calculate or estimate gradients of graphs and areas under graphs (including quadratic and other non-linear graphs), and interpret results in contexts such as distance-time graphs, velocity-time graphs and graphs in financial contexts	9
	Interpret the gradient at a point on a curve as the instantaneous rate of change; apply the concepts of average and instantaneous rates of change (for objects of chords and tangents) in numerical, algebraic and graphical contexts	9
	Use algebra to support and construct arguments and proofs e.g. equivalent fractions of a recurring decimal.	8



18. The graph shows the velocity, v metres per second, of a rocket at time t seconds:

Find an estimate for the rate of change of the velocity of the rocket at $t = 2$

20 The graph shows information about the velocity, v m/s, of a parachutist t seconds after leaving a plane.

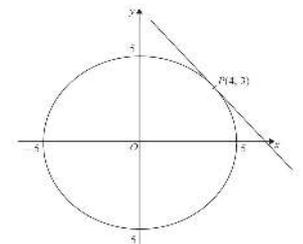


(b) Work out an estimate for the distance fallen by the parachutist in the first 12 seconds after leaving the plane. Use 3 strips of equal width.

(a) Work out an estimate for the acceleration of the parachutist at $t = 6$

equation of a tangent to a circle; transformation of functions.	Recognise and use the equation of a circle with centre at the origin	5
	Find the equation of the line through two given points, or through one point with a given gradient	5
	Know that the line perpendicular to $y = mx + c$ has gradient $-1/m$	5
	Find the equation of a tangent to a circle at a given point	9
	Represent translations in the x and y direction; reflections in the x -axis and the y -axis, and stretches parallel to the x -axis and the y -axis	7
	Sketch the graph of $y = f(x + 2)$, $y = f(x) + 2$, $y = 2f(x)$, $y = f(2x)$ given the shape of the graph $y = f(x)$	7
	Sketch the graph of $y = \sin 2x$ given the graph of $y = \sin x$	8
	Find the coordinates of the minimum of $y = f(x + 3)$, $y = f(x) + 3$ given the coordinates of the minimum of $f(x) = a, b, c$	8

23 Here is a circle, centre O , and the tangent to the circle at the point $P(4, 3)$ on the circle.



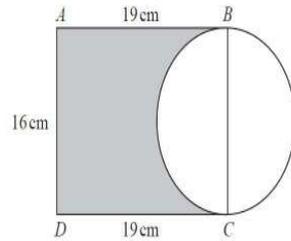
Find an equation of the tangent at the point P .

further simultaneous equations; quadratic inequalities	Find graphically the approximate solutions of linear and circular/quadratic simultaneous equations	7
	Find the exact solutions of linear and quadratic simultaneous equations	8
	Find the exact solutions of linear and circular simultaneous equations	8
	Solve quadratic inequalities in one variable; represent the solution set on a number line, using set notation and on a graph	9

YEAR 10 SET 1 & 2 SCHEME OF WORK - GEOMETRY STRAND - SPRING

week	strand	SUPPORT	LEARNING OUTCOME	GRADE
5	geometry & measures	area and circumference of a circle; compound shapes; similar triangles	Identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment	3
			Use and recall formulae to calculate circumference and areas of circles	3
			Calculate arc lengths, angles, and areas of sectors of circles	5
			Find the perimeter and area of shapes made up from triangles, rectangles and parts of circles	4
			Use the formula for the area of a trapezium	4
			Use integer and non-integer scale factors to find the length of a missing side in each of two similar shapes, given the lengths of a pair of corresponding sides	4

8 Here is a diagram showing a rectangle, $ABCD$, and a circle.



BC is a diameter of the circle.

Calculate the percentage of the area of the rectangle that is shaded.
Give your answer correct to 1 decimal place.

week	strand	SUPPORT	LEARNING OUTCOME	GRADE
6	geometry & measures	Pythagoras' theorem; angles in parallel lines; interior/exterior angles	Calculate missing length of a right-angled triangle when two sides are known	4
			Calculate the length of the line segment joining two points in the plane (all four quadrants) using Pythagoras' Theorem	4
			Use parallel lines to identify alternate and corresponding angles	3
			Find missing angles using properties of corresponding angles and alternate angles, giving reasons	4
			Calculate interior and exterior angles in a polygon	3
			Calculate and use the sums of the interior angles of convex polygons of sides 3, 4, 5, 6, 8 and 10	3
			Know, or work out, the relationship between the number of sides of a polygon and the sum of its interior angles	3
			Know that the sum of the exterior angles of any polygon is 360°	3
			Find the size of each exterior/interior angle of a regular polygon	3
			Construct triangles (including equilateral), and other 2-D shapes, given information about their side lengths and angles.	2
			Understand, by their experience of constructing them, that triangles satisfying SSS, SAS, ASA and RHS are unique, but SSA triangles are not	3



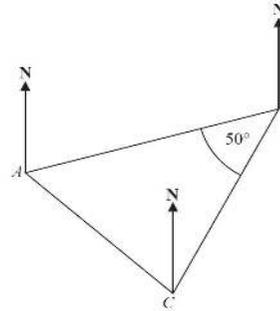
8.4 cm

3. A square has sides of length 8.4 cm.

Work out the length of a diagonal of the square.
Give your answer correct to 3 significant figures.

CORE	LEARNING OUTCOME	GRADE
trigonometry; exact trigonometric values "special triangles";	Use the trigonometric ratios to calculate unknown lengths in right-angled triangles	5
	Use trigonometric ratios (sin, cos and tan) to calculate angles in right-angled triangles	5
	Understand and use bearings	3
	Know the exact values of $\sin\theta$ and $\cos\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90° ; know the exact values of $\tan\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ$ and 60° .	5

9 The diagram shows the positions of three points, A , B and C , on a map.



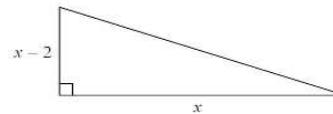
The bearing of B from A is 070°

Angle ABC is 50°
 $AB > CB$

Work out the bearing of C from A .

quadratic equations based on geometric context	produce quadratic equations when given the perimeter or area of 2D shapes	6
	Solve quadratic equations (including those that require rearrangement) by factoringising (including values of a not equal to 1), quadratic formula or completing the square	7

19 Here is a right-angled triangle.

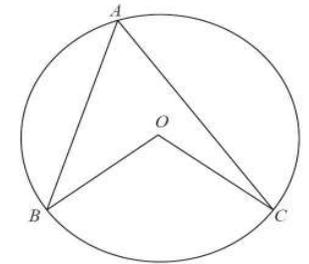


All measurements are in centimetres.
The area of the triangle is 2.5 cm^2 .

Find the perimeter of the triangle.
Give your answer correct to 3 significant figures.
You must show all of your working.

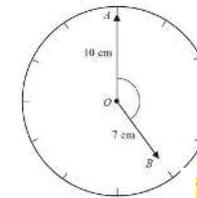
EXTENSION	LEARNING OUTCOME	GRADE
circle theorem proof	Understand and use circle theorems	5
	Use circle theorems to find unknown angles and explain their method — quoting the appropriate theorem(s)	5
	Apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results	9

24 A , B and C are points on the circumference of a circle centre O .



Prove that angle BOC is twice the size of angle BAC .

sine and cosine rule; area of a triangle; cones & spheres	Know and use the sine and cosine rules to find the unknown lengths, or angles, in non right-angle triangles	7
	Know and use the formula for the area of triangles given two lengths and an included angle	7
	Find the surface area and the volume of more complex shapes: spheres, pyramids, cones and composite solids.	7
	Solve more complex problems, eg given the surface area of a sphere find the volume	8

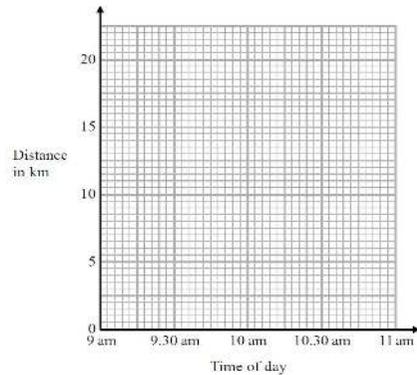


10. A circular clock face, centre O , has a minute hand OA and an hour hand OB .
 $OA = 10 \text{ cm}$
 $OB = 7 \text{ cm}$

Calculate the length of AB when the hands show 5 o'clock.
Give your answer correct to 3 significant figures.

YEAR 10 SET 1 & 2 SCHEME OF WORK - PROPORTION STRAND - SPRING

week	strand	SUPPORT	LEARNING OUTCOME	GRADE
7	proportion	ratio; distance, speed & time; exchange rates	Appreciate that, eg the ratio 1:2 represents $\frac{1}{3}$ and $\frac{2}{3}$ of a quantity i.e. relate ratio to fractions Divide quantities in a given ratio, eg divide £20 in the ratio 2:3 Relate ratio to linear functions Understand and use proportion as equality of ratios Calculate speed when, eg fractions of an hour must be entered as fractions or as decimals Use the relationship between distance, speed and time to solve problems Use exchange rates to convert between different units of currency	2 3 3 3 3 4 3
<p>2 Three companies sell the same type of furniture.</p> <p>The price of the furniture from Pooles of London is £1480 The price of the furniture from Jardins of Paris is €1980 The price of the furniture from Outways of New York is \$2250</p> <p>The exchange rates are</p> <p>£1 = €1.34 £1 = \$1.52</p> <p>Which company sells this furniture at the lowest price? You must show how you get your answer.</p> <p>5 At 9 am, Bradley began a journey on his bicycle.</p> <p>From 9 am to 9.36 am, he cycled at an average speed of 15 km/h. From 9.36 am to 10.45 am, he cycled a further 8 km.</p> <p>(a) Draw a travel graph to show Bradley's journey.</p>				



From 10.45 am to 11 am, Bradley cycled at an average speed of 18 km/h.

(b) Work out the distance Bradley cycled from 10.45 am to 11 am.

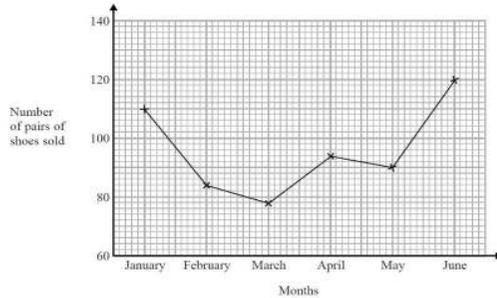
CORE	LEARNING OUTCOME	GRADE
mass, density & volume; force, pressure & area	Convert between metric units of density, eg kg/m to g/cm	3
	Know that density is found by mass ÷ volume	4
	Use the relationship between density, mass and volume to solve problems, eg find the mass of an object with a given volume and density	4
	Convert between metric units of speed, eg km/h to m/s	3
	Convert between metric units of area, eg cm ² to m ²	3
	Know that pressure is found by force ÷ area	4
	Use the relationship between pressure, force and area to solve problems, eg find the pressure exerted with a given force and area	4
<p>13. Liquid A has a density of 0.7 g/cm³ Liquid B has a density of 1.6 g/cm³</p> <p>140 g of liquid A and 128 g of liquid B are mixed to make liquid C.</p> <p>Work out the density of liquid C.</p>		

EXTENSION	LEARNING OUTCOME	GRADE
direct & inverse proportion	Identify direct & inverse proportion graphs	5
	Interpret equations that describe direct and inverse proportion	5
	Interpret direct and inverse proportions as algebraic functions, eg $y = kx^2$ as $y = kx^2$	7
	Use given information to find the value of the constant of proportionality	7
	Use algebraic functions for direct and inverse proportionality, with their value of k, to find unknown values	7
<p>15 A pendulum of length L cm has time period T seconds. T is directly proportional to the square root of L.</p> <p>The length of the pendulum is increased by 40%.</p> <p>Work out the percentage increase in the time period.</p>		

YEAR 10 SET 1 & 2 SCHEME OF WORK - STATISTICS STRAND - SPRING

week	strand	SUPPORT	LEARNING OUTCOME	GRADE
8 & 9	statistics & probability	frequency polygons; average from raw data; time series; stem and leaf diagram;	Produce frequency polygons from frequency tables with class intervals	3
			Find the mode, the median, the mean, and the range for (small) sets of data	1
			Know the advantages/disadvantages of using the different measures of average	4
			Represent data as a time series	3
			Identify trends in data over time	3
			Construct/interpret stem & leaf diagrams	4

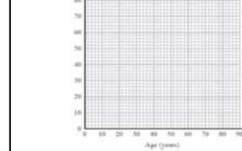
3 The time-series graph gives some information about the number of pairs of shoes sold in a shoe shop in the first six months of 2014



The sales target for the first six months of 2014 was to sell a mean of 96 pairs of shoes per month.

Did the shoe shop meet this sales target?
You must show how you get your answer.

CORE	LEARNING OUTCOME	GRADE
tree diagrams; cumulative frequency graphs	Know that the probability of A or B is $P(A) + P(B)$	5
	Know that the probability of A and B is $P(A) \times P(B)$	5
	Draw and use tree diagrams to solve probability problems (including examples of non-replacement)	5
	Draw a cumulative frequency table for grouped data (using the upper class boundary)	4
	Use a cumulative frequency diagram to solve problems, eg how many greater than a particular value	4
	Use a cumulative frequency diagram to find estimates for the median and quartiles of a distribution	5
	Draw a box plot to summarise information given in cumulative frequency diagrams	5
	Compare cumulative frequency diagrams and box plots to make inferences about distributions	5
	Consider outliers when calculating the range of a distribution	6



11. There are 200 workers at a factory.

The cumulative frequency table gives information about their ages.

Age (a years)	Cumulative frequency
$0 < a \leq 20$	25
$0 < a \leq 30$	70
$0 < a \leq 40$	138
$0 < a \leq 50$	175
$0 < a \leq 60$	186
$0 < a \leq 70$	194
$0 < a \leq 80$	200

(a) On the grid opposite, draw a cumulative frequency graph for this information.

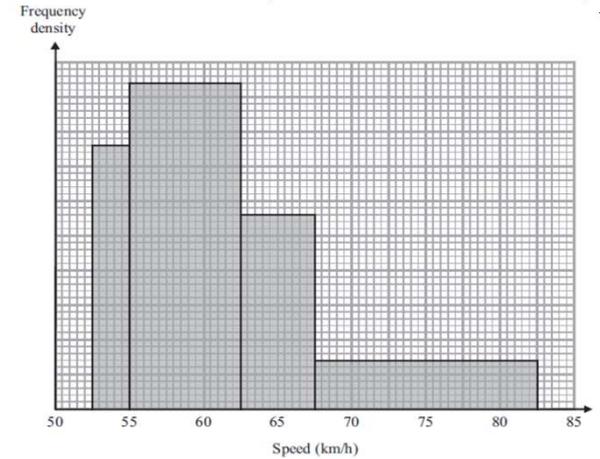
(b) Graham says,

"10% of workers at the factory are older than 65"

Is Graham correct?

You must show how you get your answer.

EXTENSION	LEARNING OUTCOME	GRADE
histograms	Use a histogram to work out the frequency in part of a class interval	8
		9



18. The histogram gives information about the speeds, in km/h, of some cars on a road.

Work out an estimate for the median speed

Give your answer correct to 1 decimal place. You must show your working.

YEAR 10 SET 1 & 2 SCHEME OF WORK - NUMBER STRAND - SUMMER

week	strand	SUPPORT	LEARNING OUTCOME	GRADE
1	number	m x n combinations; LCM & HCF; mixed fractions	apply systematic listing strategies, including use of the product rule for counting Know that if there are m ways of doing one task and for each of these there are n ways of doing another task, then the total number of ways the two tasks can be done is $m \times n$ ways Find the HCF and the LCM of numbers Write a number as a product of its prime factors, eg $108 = 2 \times 2 \times 3 \times 3 \times 3 = 2^2 \times 3^3$ Add and subtract mixed numbers Multiply and divide mixed numbers Justify answers to calculations involving mixed numbers	4 4 3 3 4 4 4

13 There are 14 boys and 12 girls in a class.
 Work out the total number of ways that 1 boy and 1 girl can be chosen from the class.

4. Show that $7\frac{1}{2} - 4\frac{2}{3} = 2\frac{5}{6}$

CORE	LEARNING OUTCOME	GRADE
express one quantity as a percentage of another; percentage increase/decrease; compound interest/depreciation; reverse percentages; standard form	Express one number as a percentage of another number	3
	Calculate the percentage increase/decrease of an amount	4
	Find when numbers are given to a specific degree of accuracy; interpret limits of accuracy	5
	Calculate simple and compound interest for two, or more, periods of time including in financial mathematics	5
	Use the multiplier to find the original amount e.g. the original cost of an item given the cost after a 10% deduction	4
	Understand the standard form convention	3
	Convert numbers to, and from, standard form	3
	Add, subtract, multiply and divide numbers in standard form using a calculator	4

1.

In 2015 the average time patients waited was 68 minutes.

The hospital has a target to reduce the average time patients wait to be treated in the Accident and Emergency department to 60 minutes in 2016.

(b) Work out the percentage decrease from 68 minutes to 60 minutes.

8.

Andy invests £12 000 in a variable rate compound interest account.

The interest is

- 2% for the first year
- 3.5% for the second year
- 5% for the third year

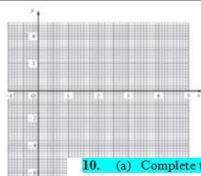
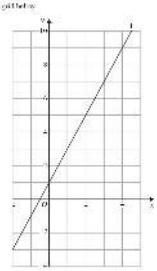
(b) Work out the value of Andy's investment at the end of 3 years.

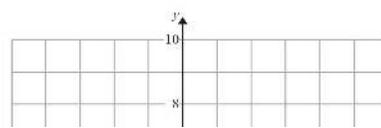
EXTENSION	LEARNING OUTCOME	GRADE
calculate with integer and fractional indices	Use index rules to simplify and calculate numerical expressions involving powers (including fractional)	7

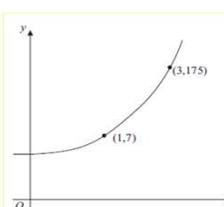
16. Given that $(2^{\frac{1}{3}})^n = \frac{2^x}{8^y}$

express n in terms of x and y .

YEAR 10 SET 1 & 2 SCHEME OF WORK - ALGEBRA STRAND - SUMMER

week	strand	SUPPORT	LEARNING OUTCOME	GRADE																
2	algebra	solving equations involving two operations; produce linear expressions/equations; change the subject of a formula	Solve linear equations with more than one operation Find the solution to a problem by writing an equation and solving it. Solve linear equations involving a single pair of brackets Rearrange and solve linear inequalities in one variable and show the solution set on a number line, or to write down all the integer solutions.	3 3 3 4																
		<p>8. Make t the subject of $5(t-g) = 2t+7$</p> <p>7. Ali was asked to solve the equation $6x - 2 = 3(x + 4)$</p> <p>Here is his working</p> $6x - 2 = 3(x + 4)$ $6x - 2 = 3x + 7$ $6x = 3x + 9$ $3x = 9$ $x = 3$ <p>Asif's answer is wrong. What mistake did he make?</p>																		
3	algebra	formula for the n th term of a linear sequence; quadratic graphs	Find the n th term of a number sequence as an algebraic expression Explain why a number is, or is not, a member of a given sequence Substitute values of x into a quadratic function to find the corresponding values of y Plot the graphs of quadratic functions for positive and negative values of x Find graphically the solutions of quadratic equations by considering the intercept on the x -axis and interpret as roots of quadratic functions. Find graphically y -intercept of quadratic functions	3 3 4 4 5 5																
		 <p>10. (a) Complete the table of values for $y = x^2 - 4x - 2$</p> <table border="1" data-bbox="358 790 705 853"> <tr> <td>x</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>y</td> <td></td> <td>-2</td> <td>-5</td> <td></td> <td></td> <td>-2</td> <td>3</td> </tr> </table> <p>(b) On the grid, draw the graph of $y = x^2 - 4x - 2$</p> <p>(c) Use your graph to estimate the values of x when $y = -3$</p>	x	-1	0	1	2	3	4	5	y		-2	-5			-2	3		
x	-1	0	1	2	3	4	5													
y		-2	-5			-2	3													
4	algebra	graphs of straight lines	Substitute values of x into linear functions to find corresponding values of y Plot points for linear functions on a coordinate grid and draw the corresponding straight lines Interpret m and c as gradient and y -intercept in linear functions (graphically and algebraically) Understand that the graphs of linear functions are parallel if they have the same value of m	2 3 3 3																
		 <p>Find the equation for the straight line L. Give your answer in the form $y = mx + c$</p>																		

CORE	LEARNING OUTCOME	GRADE
produce quadratic equations; solve equations by factorising	produce quadratic equations based on context given, including geometric or numerical scenarios Solve quadratic equations (including those that require rearrangement) by factorising (including values of a not equal to 1)	6 6
22 Here are the first five terms of an arithmetic sequence.		
	$7 \quad 13 \quad 19 \quad 25 \quad 31$ <p>Prove that the difference between the squares of any two terms of the sequence is always a multiple of 24</p>	
iteration, formula for the n th term of a quadratic sequence; geometric progression	Find approximate solutions to equations numerically using iteration (trial and improvement) Recognise and use simple geometric progression (r^n where n is an integer, and r is a rational number > 0 or a surd) and other sequences Deduce expressions to calculate the n th term of quadratic sequences	7 9 7
21 (a) Show that the equation $3x^2 - x^3 + 3 = 0$ can be rearranged to give		
	$x = 3 + \frac{3}{x^2}$ <p>(b) Using</p> $x_{n+1} = 3 + \frac{3}{x_n^2} \quad \text{with } x_0 = 3.2,$ <p>find the values of x_1, x_2 and x_3</p>	
equation of a straight line; linear inequalities in two variables	Interpret the gradient of a straight line graph as a rate of change Change the subject of a formula for the equation of a straight line to interpret the gradient Writing down the coordinates of the midpoint of the line connecting two points Find the equation of the line through two given points, or through one point with a given gradient Solve linear inequalities in two variables Draw the graphs of linear inequalities in two variables and interpret the solution sets given by regions in the coordinate plane, or to identify all the integer coordinates with crosses	4 4 3 5 5 5
10 On the grid, shade the region that satisfies all these inequalities.		
	$x + y < 4 \quad y > x - 1 \quad y < 3x$ <p>Label the region R.</p> 	

EXTENSION	LEARNING OUTCOME	GRADE
solve equations using quadratic formula or completing the square; simplify algebraic expressions	Use the quadratic formula to solve quadratic equations (including those that require rearrangement) giving the answers to 3 s.f. or leaving the answer in surd form Write a quadratic expression in the form $(x + p)^2 + q$; also complete the square where a is not 1 Complete the square of a quadratic function (using this to write down the maximum/minimum of the function, refer to as <i>learning points</i>) Use the method of completing the square to solve quadratic equations, leaving the answer in surd form Simplify and manipulate algebraic expressions involving surds and algebraic fractions Solve quadratic equations involving algebraic fractions	7 7 8 7 6 8
11 Write $x^2 + 2x - 8$ in the form $(x + m)^2 + n$ where m and n are integers.		
14 Write		
	$4 - \frac{(x+3)}{(x-2)} = \frac{x^2 + 5x + 6}{x - 2}$ <p>as a single fraction in its simplest form. You must show your working.</p>	
proof, transformation of functions	Use algebra to support and construct arguments and proofs e.g. equivalent fraction of a recurring decimal Represent translations in the x and y direction, reflections in the x -axis and the y -axis, and stretches parallel to the x -axis and the y -axis Sketch the graph of $y = f(x + 2)$, $y = f(x) + 2$, $y = 2f(x)$, $y = f(2x)$ given the shape of the graph $y = f(x)$ Sketch the graph of $y = 3 \sin 2x$, given the graph of $y = \sin x$ Find the coordinates of the minimum of $y = f(x + 3)$, $y = f(x) + 3$ given the coordinates of the minimum of $f(x) = x^2 - 2x$	8 7 7 8 8
16 The graph of $y = f(x)$ is transformed to give the graph of $y = -f(x + 3)$		
	<p>The point A on the graph of $y = f(x)$ is mapped to the point P on the graph of $y = -f(x + 3)$</p> <p>The coordinates of point A are $(9, 1)$ Find the coordinates of point P.</p>	
exponential functions; quadratic inequalities	Find the values of p and q in the function $y = pq^x$ given the graph of $y = pq^x$ Solve quadratic inequalities in one variable; represent the solution set on a number line, using set notation and on a graph	8 9
18.		
	 <p>The sketch shows a curve with equation $y = kx^a$ where k and a are constants, and $a > 0$ The curve passes through the points $(1, 7)$ and $(3, 175)$ Calculate the value of k and the value of a.</p>	

YEAR 10 SET 1 & 2 SCHEME OF WORK - GEOMETRY STRAND - SUMMER

week	strand	SUPPORT	LEARNING OUTCOME	GRADE
6	geometry & measures	area and circumference of a circle; geometric-based problems	Identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment	3
			Use and recall formulae to calculate circumference and areas of circles	3
			Calculate arc lengths, angles, and areas of sectors of circles	5
			Find the perimeter and area of shapes made up from triangles, rectangles and parts of circles	4
			Use the formula for the area of a trapezium	4
			Solve a range of problems involving areas and volumes of prisms, including trapezia & cylinders	4

6. Henry is thinking about having a water meter.

These are the two ways he can pay for the water he uses.

<p>Water Meter</p> <p>A charge of £28.20 per year</p> <p>plus</p> <p>91.22p for every cubic metre of water used</p> <p>1 cubic metre = 1000 litres</p>	<p>No Water Meter</p> <p>A charge of £107 per year</p>
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Henry uses an average of 180 litres of water each day.

Henry wants to pay as little as possible for the water he uses. Should Henry have a water meter?

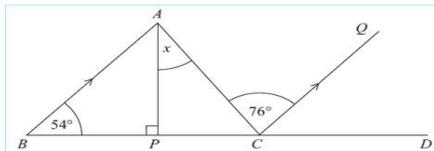
week	strand	SUPPORT	LEARNING OUTCOME	GRADE
	geometry & measures	angles in parallel lines; loc	Use parallel lines to identify alternate and corresponding angles	3
			Find missing angles using properties of corresponding angles and alternate angles, giving reasons	4
			Range of standard constructions including:	
			The midpoint and perpendicular bisector of a line segment The perpendicular from a point on a line The bisector of an angle A path equidistant from two points or two line segments A region bounded by a circle and an intersecting line Know that the perpendicular distance from a point to a line is the shortest distance to the line.	3
				5

$BPCD$ is a straight line.
 BA is parallel to CQ .
 AP is perpendicular to BC .

Angle $ABC = 54^\circ$
Angle $ACQ = 76^\circ$

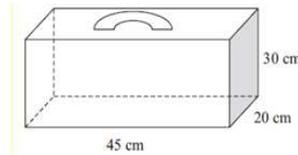
Work out the size of the angle marked x .
Give reasons for your answer.

1.



CORE	LEARNING OUTCOME	GRADE
Pythagoras' in 3D; trigonometry in 3D	Calculate the angle of elevation/depression	5
	Calculate the diagonal through a cuboid, or across the face of a cuboid	7
	Find the angle between the diagonal through a cuboid and the base of the cuboid	7
	Find the angle between a sloping edge of a pyramid and the base of the pyramid	7

11. The diagram shows Diana's suitcase. The suitcase is in the shape of a cuboid.



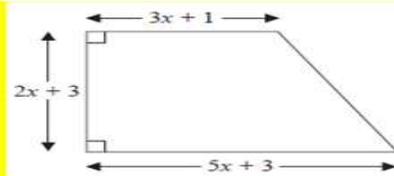
Diana has a walking stick that folds. The folded walking stick has a length of 60 cm.

Diana wants to put the folded walking stick in the suitcase.

Will the folded walking stick fit in the suitcase?

CORE	LEARNING OUTCOME	GRADE
quadratic equations based on geometric context; similar shapes	produce quadratic equations when given the perimeter or area of 2D shapes	6
	Solve quadratic equations (including those that require rearrangement) by factorising (including values of a not equal to 1), quadratic formula or completing the square	7
	Apply the concept of similarity, including the relationships between lengths, areas and volumes in similar figures	5

10. The diagram shows a trapezium.



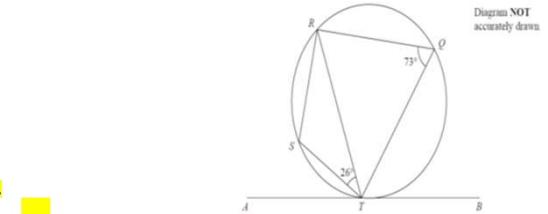
All the measurements are in centimetres. The area of the trapezium is 46 cm^2 .

(a) Show that $x^2 + 2x - 5 = 0$

(b) Solve the equation $x^2 + 2x - 5 = 0$. Give your solutions correct to 2 decimal places.

EXTENSION	LEARNING OUTCOME	GRADE
circle theorem; vectors	Understand and use circle theorems	5
	Use circle theorems to find unknown angles and explain their method – quoting the appropriate theorem(s)	5
	Apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results	9
	Use standard vector notation to combine vectors by addition, eg $\mathbf{AB} + \mathbf{BC} = \mathbf{AC}$ and $\mathbf{a} + \mathbf{b} = \mathbf{c}$	7
	Use vectors to construct geometric arguments and proofs	9

14.



Q, R, S and T are points on a circle. ATB is the tangent to the circle at T .

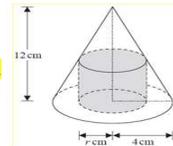
Angle $STR = 26^\circ$
Angle $RQT = 73^\circ$

Work out the size of angle STA .
Give a reason for each stage in your working.

EXTENSION	LEARNING OUTCOME	GRADE
sine and cosine rule; area of a triangle; cones & spheres	Know and use the sine and cosine rules to find the unknown lengths, or angles, in non right-angle triangles	7
	Know and use the formula for the area of triangles given two lengths and an included angle	7
	Find the surface area and the volume of more complex shapes: spheres, pyramids, cones and composite solids	7
	Solve more complex problems, eg given the surface area of a sphere find the volume	8

21. The diagram shows a cylinder inside a cone on a horizontal base.

The cone and the cylinder have the same vertical axis. The base of the cylinder lies on the base of the cone.



The circumference of the top face of the cylinder touches the curved surface of the cone.

The height of the cone is 12 cm and the radius of the base of the cone is 4 cm.

(a) Work out the curved surface area of the cone. Give your answer correct to 3 significant figures.

The cylinder has radius r cm and volume $V \text{ cm}^3$

(b) Show that $V = 12\pi r^2 - 3\pi r^3$

YEAR 10 SET 1 & 2 SCHEME OF WORK - PROPORTION STRAND - SUMMER

week	strand	SUPPORT	LEARNING OUTCOME	GRADE
7	similarity & proportion	ratio;	Appreciate that, eg the ratio 1:2 represents $\frac{1}{3}$ and $\frac{2}{3}$ of a quantity i.e. relate ratio to fractions Divide quantities in a given ratio, eg divide £20 in the ratio 2:3 Relate ratio to linear functions Understand and use proportion as equality of ratios	2 3 3 3
<p>3. There are only red beads and green beads in a bag. The ratio of the number of red beads to the number of green beads is 5 : 9</p> <p>(a) What fraction of the beads are red?</p> <p>There is a total of 84 beads in the bag.</p> <p>(b) How many of the beads are green?</p> <p>Susie is going to put some more beads in the bag. There will still be only red beads and green beads in the bag.</p> <p>Susie wants to have twice as many green beads as red beads in the bag.</p> <p>(c) What beads should she put in the bag? You must explain your answer.</p>				

CORE	LEARNING OUTCOME	GRADE
similar shapes	Apply the concept of similarity, including the relationships between lengths, areas and volumes in similar figures	5
<p>20 Mark has made a clay model. He will now make a clay statue that is mathematically similar to the clay model.</p> <p>The model has a base area of 6 cm^2 The statue will have a base area of 253.5 cm^2</p> <p>Mark used 2kg of clay to make the model.</p> <p>Clay is sold in 10kg bags. Mark has to buy all the clay he needs to make the statue.</p> <p>How many bags of clay will Mark need to buy?</p>		

EXTENSION	LEARNING OUTCOME	GRADE
direct & inverse proportion	Identify direct & inverse proportion graphs	5
	Interpret equations that describe direct and inverse proportion	5
	Interpret direct and inverse proportions as algebraic functions, eg $y = kx$ or $y = \frac{k}{x}$	7
	Use given information to find the value of the constant of proportionality	7
	Use algebraic functions for direct and inverse proportionality, with their value of k, to find unknown values	7
<p>13. Brian's band is playing at a concert in a hall.</p> <p>The loudness of a band varies inversely as the square of the distance from the band. Brian measures the normal loudness of his band as 100 decibels at a distance of 5 metres.</p> <p>The band has to stop playing if the loudness is 85 decibels or more at a distance of 5.4 metres.</p> <p>Does the band have to stop playing?</p>		

YEAR 10 SET 1 & 2 SCHEME OF WORK - STATISTICS STRAND - SUMMER

week	strand	SUPPORT	LEARNING OUTCOME	GRADE
8	statistics & probability	pie charts; scatter diagrams; simple probability	Construct pie charts from a frequency table Interpret pie charts e.g. calculate the frequency when given the angle of a sector	3 3
			Draw and produce a scatter graph Appreciate that correlation is a measure of the strength of association between two variables Distinguish between positive, negative and zero correlation using a line of best fit Appreciate that zero correlation does not necessarily imply 'no correlation' but merely 'no linear relationship'	3 4 4 4
			Draw a line of best fit by eye and understand what it represents Use a line of best fit to interpolate and extrapolate (whilst knowing the dangers of doing so)	4 4
			Identify outliers Apply the concept: probabilities of all mutually exclusive events add up to 1	4 3
		1 The scatter diagram shows information about 10 students. For each student, it shows the number of hours spent revising and the mark the student achieved in the Spanish test.		
			One of the points is an outlier. (a) Write down the coordinates of the outlier.	
			The Spanish test was marked out of 100 Lucia says, "I can see from the graph that had I revised for 18 hours I would have got full marks."	
			(d) Comment on what Lucia says.	

CORE	LEARNING OUTCOME	GRADE
mean from frequency tables; IQR from raw data; tree diagrams	Calculate the mean of data given in an ungrouped frequency distribution Understand and use the sigma notation for the mean of ungrouped, and grouped, data	3 3
	Use the mid interval value to find an estimate for the mean of data given in a grouped frequency distribution	4
	Find the median and quartiles for small sets of data	3
	Know that the probability of A or B is $P(A) + P(B)$	5
	Know that the probability of A and B is $P(A) \times P(B)$	5
	Draw and use tree diagrams to solve probability problems (including examples of non-replacement)	5
	Here are the marks that James scored in eleven maths tests. 16 12 19 18 17 13 13 20 11 19 17 (a) Find the interquartile range of these marks.	

EXTENSION	LEARNING OUTCOME	GRADE
histograms; estimate population; conditional probability	Use a histogram to work out the frequency in part of a class interval Use the capture-recapture method to estimate the size of a population	8 8
	Calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams	7
	Understand and apply the "AND" rule $P(A \text{ and } B) = P(A) \times P(B A)$	8
	Understand and apply the "OR" rule $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$	8
	18. A farmer wants to estimate the number of rabbits on his farm. On Monday he catches 120 rabbits. He puts a tag on each rabbit. He then lets the rabbits run away. On Tuesday the farmer catches 70 rabbits. 15 of these rabbits have a tag on them. Work out an estimate for the total number of rabbits on the farm. You must write down any assumptions you have made.	

prior knowledge	Apply statistics to describe a population	1
averages from raw data; median class interval	Find the mode, the median, the mean, and the range for (small) sets of data	1
	Identify the mode from ungrouped frequency distributions and the modal class interval in grouped frequency distributions	2
	Find the class interval containing the median value grouped frequency distributions	3
	Know the advantages/disadvantages of using the different measure of average	4
	Compare distributions using a measure of average and the range	4
probability from mutually exclusive events; expected outcome	Find the missing probability from a list or table	3
	Find estimates of probabilities by considering relative frequency in experimental results (including two-way tables)	3
	Know that the more an experiment is repeated the better the estimate of probability	3
	Understand that empirical unbiased samples tend towards theoretical probability distributions as the sample size increases	3
	Expected no. of times event occurs based on number of trials and probability	3