

# Independent Study – How do I revise maths?

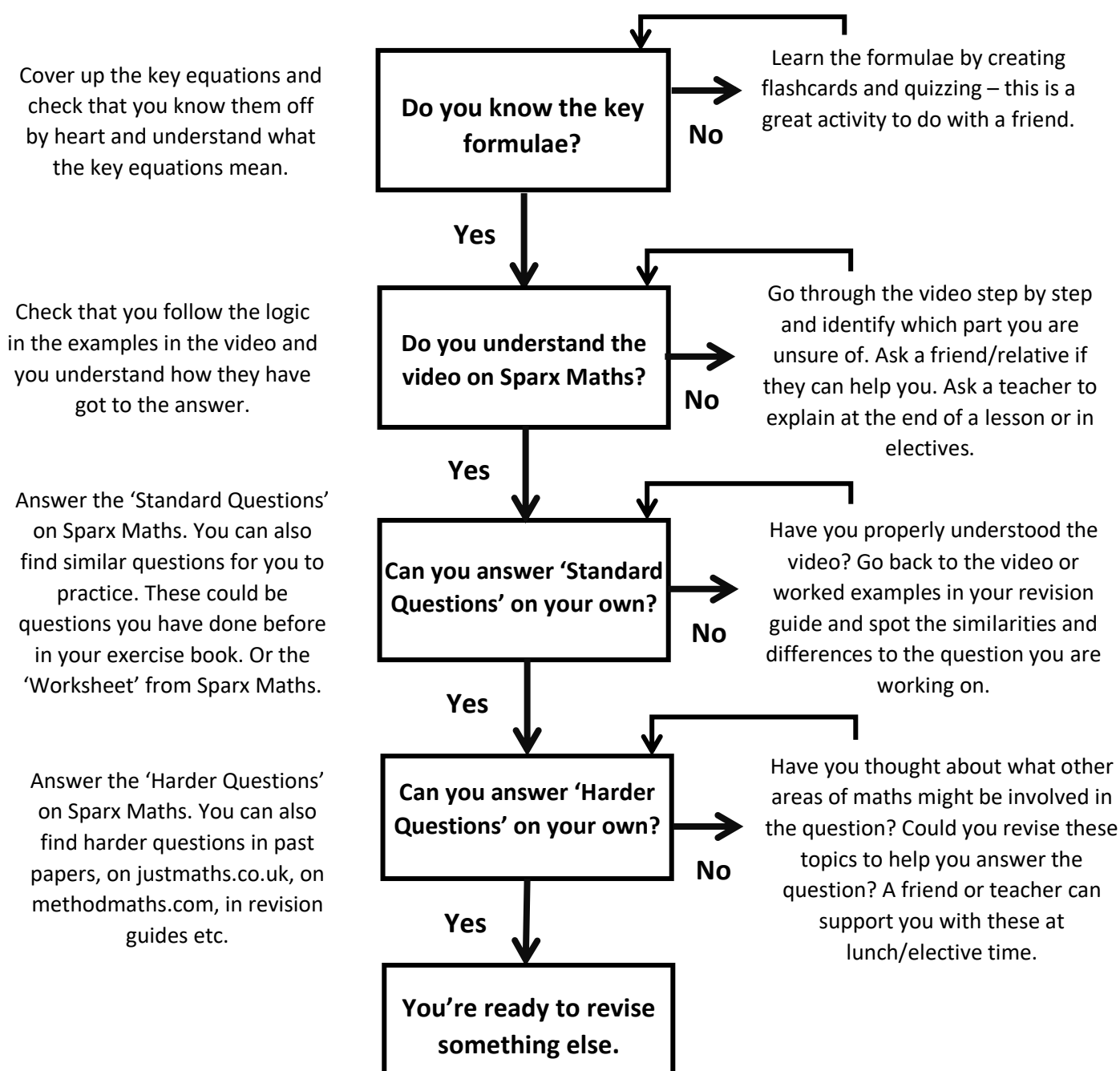
Here are some top tips to ensure that your maths revision is effective as possible.

**Step 1:** Decide what topic(s) you want to revise.

*\*It's important to pick a topic which will help you get better (not something you already know)\**

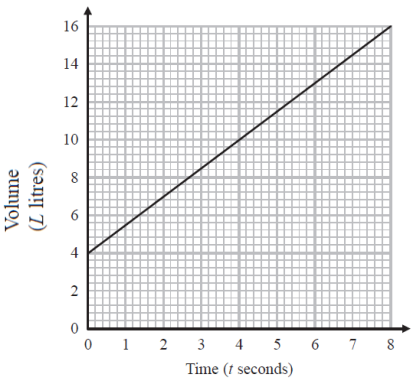
- Pick topics which you need to work on from previous mocks or the attached checklists.
- Look at the topics to revise for the next mock (shared on epraise).
- If in doubt, flick through the topics in your revision guide, topic booklets & Sparx Maths.

**Step 2:** Follow the flow chart below to check your understanding of the topic.



**Don't forget to practice answering past paper questions!**  
**You can access papers at past paper Friday.**

# Higher Checklist – Ratio, Proportion and Rates of Change

RAG	Sparx	Description of skill	Example(s) of question.		
	U577 U595	Sharing in a ratio	Share £35 in the ratio 3 : 4		
	U676	Ratio problems	Anne and Ben share money in the ratio 3 : 5. If Anne gets £21, how much does Ben get? If Ben gets £9 more than Anne, how much does Ben get?		
	U257	Scale drawings	Given a scale, work out the real-life size of an object. Construct a scale drawing of a real-life scenario.		
	U773 U671 U286	Percentage change and reverse percentage	Increase £40 by 5%.	Decrease £40 by 2.5%.	A jumper is £24 in a 20% off sale. How much was it before?
	U278	Express one quantity as a percentage of another	I buy a car for £3000. I sell it for £3200. What is the percentage profit?		
	U594	Compare / order fractions, decimals and percentages.	Write these in ascending order: $\frac{3}{4}$ , 0.8, $\frac{7}{10}$ , 71%, $\frac{36}{50}$		
	164	Compound interest	I invest £6000 in a bank account with an interest rate of 2% compound interest per year. How much money do I have after 3 years?		
	U610	Exchange rates	The exchange rate for pounds to Euros is £1 = €1.14 I convert £300 to euros, how many euros do I get? I convert €300 to pounds, how many pounds do I get?		
	U914 U638	Interpreting distance time graphs and other real-life graphs			<p>This graph shows the amount of liquid in a container over time.</p> <p>What does the y-intercept represent?</p> <p>What does the gradient represent?</p>
	U407 U721 U640 U357 U364 U138	Direct and inverse proportion	A is directly proportional to the square of B. When B = 5, A = 100. Find a formula connecting A and B. B is inversely proportional to the cube of C. Write a formula...		
	U562 U611	Gradients of distance- and velocity-time graphs	Find the gradient of the graph at t = 5 (by drawing a tangent). What does this gradient represent?		

## Higher Checklist – Number

RAG	Sparx	Description of skill	Example(s) of question.		
	U888	Decimals and fractions	Convert $\frac{3}{5}$ to a decimal.	Convert 0.35 to a fraction.	
	U330 U534	Standard form	Write 3500000 in standard form. Write 0.000000024 in standard form. Write $3.6 \times 10^4$ as a normal number.		
	U480 U298 U731 U965	Rounding	Round 7653 to the nearest 100. Round 3.696 to 2 decimal places. Round 0.000436 to 1 significant figure.		
	U235 U694	Powers	What is 2 to the power of 3? Write $7 \times 7 \times 7 \times 7 \times 7$ in index form. Which of these numbers is a power of 3: 6, 12, 18, 27?		
	U976	Order of Operations	Calculate $2 + 7 \times 5$ Add brackets to make this true: $10 - 2 \times 3 = 24$		
	U742 U548	Operations with negative numbers	Calculate $3 \times -6$	Calculate $-24 \div -3$	Calculate $4 + -6$
	U475 U224 U544 U538	Multiplying and dividing fractions	Calculate $\frac{2}{3} \times \frac{3}{5}$	Calculate $2\frac{1}{2} \div \frac{4}{5}$	
	U211 U739	Multiples and factors	Write down the first five multiples of 6. Write down the factors of 30. Write 45 as a product of prime factors.		
	U751 U529 U250	LCM and HCF	Find the HCF and LCM of 24 and 30. Find the HCF and LCM of $A = 2 \times 3^2 \times 5$ and $B = 2^3 \times 5^2$		
	U926	Interpret calculator displays	Calculate the following and write down all the decimals on your calculator display: $\frac{\sqrt{3.4 \times 6}}{5.2^3}$		
	U176 U95	Fractions and ratios	The ratio of cats to dogs is 3:2. What fraction are cats? $\frac{3}{7}$ of pets are cats. What is the ratio of cats to not cats?		
	U888	Fractions and percentages	Convert $\frac{2}{5}$ to a percentage. Convert 32% to a fraction in its simplest form.		
	U225 U299	Estimation	Estimate $2.3 \times 52$	Estimate $\frac{21.3 \times 7.4}{4.96}$	

	U388 U902	Converting metric units	Convert 300g to kilograms. Convert 1420ml to Litres. Convert 4.3km to m.		
	U248 U468 U663	Converting Area and Volume Units	Convert $3\text{m}^2$ to $\text{cm}^2$ Convert $35,000\text{cm}^3$ to $\text{m}^3$ Convert $470\text{cm}^3$ to L		
	U151	Compound measures	A car travels at 30mph for 5 hours. How far does it travel? A car travels 30 miles in 5 hours. How fast does it travel?		
	U736	Adding and subtracting fractions	Calculate $\frac{2}{3} + \frac{3}{5}$	Calculate $2\frac{1}{2} - \frac{4}{5}$	
	U235 U694	Index laws	Simplify $3^6 \times 3^7$ Simplify $a^5 \div a$ Simplify $(c^4)^3$	Find the value of $\frac{3 \times 3^6}{3^5}$	Simplify $(2ab^5)^3$
	U657 U301	Error intervals	A = 2.3 to 1 decimal place. Write an error interval for A. B is 27.4 truncated to 1d.p. Write an error interval for B.		
	U587	Upper and lower bounds	A = 2.3 to 1 d.p. B = 200 to 1 s.f. What is the lower and upper bound for $\frac{A}{B^2}$ ?		
	U550 U689	Recurring decimals	Convert $3.\dot{4}\dot{5}$ to a fraction in its simplest form. Convert $3.1\dot{5}$ to a fraction in its simplest form.		
	U369	Product rule	A menu has 3 starters, 5 mains and 4 desserts. How many combinations of 3-course meal are there?		
	U694 U985 U772	Fractional and negative indices	Calculate $4^{-2}$	Calculate $8^{-1/3}$	$\left(\frac{4}{25}\right)^{3/2}$
	U633 U338 U872 U499	Simplify surd expressions	Fully simplify: $\sqrt{45}$		Fully simplify: $\sqrt{2}(\sqrt{20} + \sqrt{45})$
	U707 U281	Rationalising the denominator	Rationalise the denominator $\frac{6}{\sqrt{3}}$	Rationalise the denominator $\frac{2+\sqrt{2}}{3-\sqrt{8}}$	
	U248 U468	Convert metric units of area and volume.	Convert $30\text{m}^2$ to $\text{cm}^2$	Convert $2.4\text{m}^3$ to $\text{cm}^3$	
	U264 U290 U161	Calculate with numbers in standard form	$(3.5 \times 10^8) \div (7 \times 10^{-2})$	$(3.5 \times 10^8) - (7 \times 10^7)$	

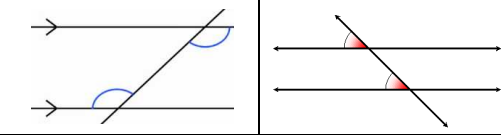
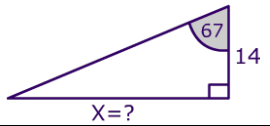
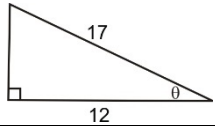
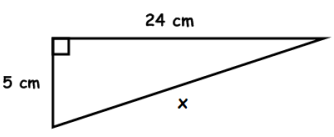
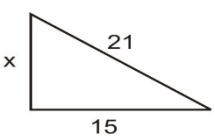
# Higher Checklist – Algebra

RAG	Sparx	Description of skill	Example(s) of question.																
	U498	$n^{\text{th}}$ term of linear sequences	Find the $n^{\text{th}}$ term of this sequence: 3, 7, 11, 15, ... The $n^{\text{th}}$ term is $4n - 5$ , what is the 20 <sup>th</sup> term? Is 108 in the sequence with $n^{\text{th}}$ term $4n + 1$ ?																
	U179 U768	Expanding single and double brackets	Expand $3x(2x - 5)$	Expand $(3 - x)^2$	Expand and simplify $(2z + 3)(3z - 4)$														
	U755 U325 U870 U505	Solving equations with one unknown	Solve $4x + 3 = 7$		Solve $\frac{3x+4}{2} = 3.5x$														
	U477 U848 U315 U741	Finding the equation of a line / Plotting Lines	Plot the graph $y = 3 - 2x$ What is the equation of this straight-line graph?																
	U365	Factorising single brackets	Factorise $6a + 15$	Fully factorise $14x - 21x^2$															
	U556	Changing the subject	Make c the subject $d = \frac{3c + b}{a}$	Make c the subject $d = \frac{3c+b}{2c+1}$															
	U759 U738 U145	Solve linear inequalities in one variable	Solve this inequality $-3 < 2x + 5 \leq 7$ Solve this inequality and draw on a number line: $2x - 1 < 8$																
	U235 U694	Simplify Indices	Simplify $a^6 \times a^{-2}$	Simplify $\frac{a^6 \times a^3}{a}$	Simplify $(3ab^3)^2$														
	U989	Plot quadratic graphs	Complete the table and sketch the graph $y = x^2 + 2x - 3$	<table border="1"> <tr> <td>X</td> <td>-2</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>Y</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>		X	-2	-1	0	1	2	3	Y						
X	-2	-1	0	1	2	3													
Y																			
	U601	Graphical solutions to equations	Use the graphs to find the roots of the equation $y = x^2 + 2x - 3$ to 1 decimal place. Use the graph to find the coordinate of the turning point.																
	U680 U978	Fibonacci-like sequences	Find the next two terms in this Fibonacci seq: a, 3a, 4a, ... What is the 8 <sup>th</sup> term in this Fibonacci seq: 3, 5, 8, 13, ...																
	U206 U958	Quadratic and geometric sequences	The $n^{\text{th}}$ term of a sequence is $3n^2 - 4$ . Find the 8 <sup>th</sup> term. The $n^{\text{th}}$ term of a sequence is $3 \times 2^n$ . Find the 5 <sup>th</sup> term.																
	U228 U960 U665	Solve quadratics by factorising or using quadratic formula	Factorise $x^2 - 9$ Solve by factorising $x^2 + 6x - 16 = 0$ Solve by factorising $x^2 = 18 - 6x$																
	U980 U593	Cubic and reciprocal graphs	Which of the following graphs is reciprocal? Which of the following could have equation $y = x^3$ Complete the table and plot the graph $y = 4/x$																

	U760 U757 U547 U836 U137	Solve linear simultaneous equations	Solve these simultaneous equations: $2x + 3y = 16$ $3x - 6y = 3$			
	U206	Find the nth term of quadratic sequences	Find the nth term of 2, 9, 18, 29, ...		Find the nth term of 3, 5, 11, 21, ...	
	U747	Solve and draw inequalities in two variables	Sketch and shade the region which satisfies: $y < 2x + 1$ and $x > 3$			
	U996 U895 U448	Inverse and composite functions	$f(x) = x^2 - 3$ $g(x) = \frac{1}{4x+2}$	Find $f^{-1}(x)$		Find $fg(x)$
	U103 U437 U294	Simplify algebraic fractions and solve equations.	Simplify: $\frac{2x - 8}{3x - 12}$		Simplify: $\frac{2x^2 + 3x - 5}{4x^2 - 25}$	
	U685 U457 U824	Algebraic fraction operations	Simplify: $\frac{x+3}{2x} \times \frac{x+5}{x+1}$		Solve: $\frac{4}{2x} + \frac{5}{x+1} = \frac{3}{2}$	
	U397 U589 U769	Find turning points by completing the square	Write $x^2 + 4x - 8$ in the form $(x + p)^2 + q$		Find the turning point of: $y = x^2 + 4x - 8$	
	U133	Solve and represent quadratic inequalities	Solve the inequality $x^2 + 5x < 24$ Show the solution on a number line.			
	U875 U269	Solve non-linear simultaneous equations	Solve the simultaneous equations: $x + 2y = 5$ $x^2 + y^2 = 81$			
	U229	Sketch and use real-life exponential graphs	Draw the graph for $y = 3e^{2x}$			
	U606	Expanding triple brackets	Expand $(x + 2)(x - 4)(x - 2)$		Expand $(x + 2)^3$	
	U562 U611	Area under velocity-time graphs	Find the area under this graph. What does the area represent?			
	U582	Algebraic proof	Prove that the difference of two consecutive square numbers is always a multiple of 8.			
	U567	Equations of circle and tangents	Draw the circle with equation $x^2 + y^2 = 25$		Find the equation of the tangent to the circle $x^2 + y^2 = 25$ at (3,4)	
	U168	Approximating solutions with iteration.	Use the iteration $x_{n+1} = \frac{2x_n + 18}{3}$ and $x_0 = 2.5$ to find a solution to 3 decimal places.			
	U598 U487	Translations and reflections of functions	$f(x + a)$	$f(x) + a$	$-f(x)$	$f(-x)$

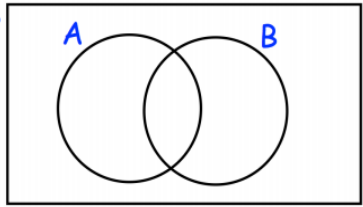
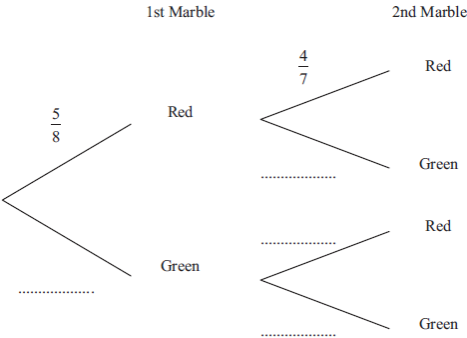
## Higher Checklist – Geometry and Measures

I can do this?	SM Clip	Description of skill	Example(s) of question.
	U174	Volume of prisms	Find the volume of this prism. Find the volume of a cylinder.
	U903 U564	Vector arithmetic	$\mathbf{a} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ , $\mathbf{b} = \begin{pmatrix} 4 \\ -3 \end{pmatrix}$ Find $\mathbf{a} - 2\mathbf{b}$
	U781 U889	Solve geometrical problems	A, B and C are three corners of a square. What are the coordinates of the fourth corner?
	U427	Interior and exterior angles of polygons	Find the missing angle in the octagon. What are the interior angles of a regular pentagon? What are the exterior angles of a regular hexagon?
	U743	Plans and elevations	Draw the plan and elevation of this 3D shape. Using the plan and elevations, sketch the 3D shape.
	U993 U351 U226 U934	Perimeter of 2D shapes	Find the perimeter of this compound shape.
	U519 U134	Enlargements (including fractional and negative scale factor)	Enlarge the shape by scale factor 1.5 from centre (0, 0). Describe the transformation that maps shape A to B.
	U604	Circle circumference	Find the circumference of the circle from the given radius or diameter.
	U767	Circle terminology	Identify and use the terms: centre, radius, diameter, tangent, circumference, chord, arc, segment, sector.
	U525 U107 U164	Bearings	What is the bearing of Ship B from Ship A. A ship travels 10miles at a bearing of 075. Draw a cross to show the final position of the ship on the map.
	U993 U970 U351 U424 U934	Area and perimeter of rectangles, parallelograms and compound shapes	Find the area/perimeter of this shape. Find the perimeter of the shape, given the area. Find the side length, given the area/perimeter.
	U945 U575	Area of Triangles	Find the area of the triangle. Find the height of the triangle given the area.
	U265 U904	Area of Trapezia	Find the area of the trapezium. Draw a triangle with the same area as this trapezium. The area of this trapezium is $30\text{cm}^2$ , find the height h.
	U696 U799	Rotation and reflection	Reflect this shape in the line $y = x$ . Rotate this shape by $90^\circ$ clockwise around point (0,1). Describe the transformation that maps shape A to B.

	U950	Areas of circles	Find the area of the circle to 1d.p. given the radius or diameter.
	U730 U655 U826	Vertically opposite, alternate & corresponding angles	Give a reason why the angles are equal. 
	U283 U546	Trigonometric ratios to find missing sides and angles.	 
	U929 U259 U871 U142	Surface area of cubes, cuboids, prisms and pyramids	Find the surface area of cuboids and prisms. Find a side length given the surface area. Find the volume given the surface area.
	U464	Surface area of cylinders	Find the surface area of cylinders.
	U523 U893 U771 U334 U561	Surface area of spheres, cones, frustums, and composite shapes	Find the surface area. Find a side length given the surface area. Find the volume given the surface area.
	U787 U245 U979	Standard constructions	Construct a perpendicular bisector. Construct a perpendicular line through a point. Bisect the given angle.
	U385 U541	Find missing sides of using Pythagoras.	 
	U820	Draw loci using a ruler and compass.	Shade the region that is more than 3m from corner A and less than 2 metres from wall AB.
	U221 U373	Arc lengths and areas of sectors.	Find the area and arc length of this sector.
	U627 U319 U450	Sketch trig graphs + know key trigonometric values	Draw the graph for $y = \sin(x)$ What is the value of $\tan(45)$ ?
	U790 U551 U578	Similarity and congruence	Show that two triangles are similar (AAA). Show two triangles are congruent (RHS, SSS, ASA, SAS). Use similarity to find the scale factor / missing side.
	U630 U110	Similarity facts for area and volume.	The ratio of surface areas of two similar shapes is 9:4. What is the ratio of volumes?

	U766 U455	Describing and completing combined transformations	Reflect A in $y = 2$ and then reflect this in $x = -1$ to get B. Describe a single transformation that maps shape A to B.
	U952 U691	Sine and cosine rule + Area of a triangle	Find the missing sides/angles/areas of non-right-angled triangles.
	U952	Sine Rule	Find the missing side/angle of this non-right-angled triangle.
	U591	Cosine Rule	Find the missing side/angle of this non-right-angled triangle.
	U592	Sine Rule for Area	Find the area of this non-right-angled triangle.
	U541	Pythagoras and trigonometry in 3D	A cube has side lengths of 5cm. What is the length of the diagonal of the cube through its centre?
	U632 U903 U564	Column vector operations	Calculate the following: $3 \begin{pmatrix} 6 \\ 0 \end{pmatrix} - 2 \begin{pmatrix} 4 \\ -1 \end{pmatrix}$
	U781	Vector geometry	Find the vector $\overrightarrow{AM}$ where $M$ is the midpoint of $AB$
	U660	Parallel vectors	Prove that AB and CD are parallel. Prove that points A, B and C lie on a straight line.
	U459 U251 U489 U130 U808	Applying Circle theorems	Find missing angles using a combination of circle theorems – giving full reasoning.
	U807	Circle Theorem Proofs	Prove that opposite angles in a cyclic quadrilateral add to $180^\circ$ . Prove that the angle at the centre is twice the angle at the circumference.

# Higher Checklist – Probability

I can do this?	SM Clip	Description of skill	Example(s) of questions
	/	Probability of equally likely outcomes	A dice is rolled two times. Draw a sample space diagram to show all the possible combinations of outcomes.
	U476 U748 U699	Place numbers in Venn diagrams	<p><math>\xi = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16\}</math></p> <p>A = multiples of 3 B = multiples of 5</p> <p>(a) Complete the Venn diagram One of the numbers is selected at random.</p> <p>(b) Write down <math>P(A \cap B)</math></p> 
	U166	Theoretical and experimental probability	The probability of rolling a six on a biased dice is 0.2. How many sixes would you expect to get in 400 rolls?
	U981	Solve problems using two-way tables	<p>49 of the 100 students are girls. 10 of the girls came by car. 16 boys walked. 21 of the 41 students who came by bicycle are boys.</p> <p>Work out the total number of students who walked to school.</p>
	U588 U729	Probability trees for independent and dependent events	 <p>Work out the probability that Dwayne takes marbles of different colours.</p>
	U476 U748 U699	Solve probability problems with Venn diagrams	<p>In a class there are</p> <ul style="list-style-type: none"> <li>11 students who play football and cricket</li> <li>9 students who do not play football or cricket</li> <li>17 students who play football</li> <li>13 students who play cricket</li> </ul> <p>Find the probability that a student chosen at random plays football or cricket or both.</p>

## Higher Checklist – Statistics

I can do this?	SM Clip	Description of skill	Example(s) of question.
	U162	Sampling and population	Explain how a sample may/may not be representative of the entire population.
	U717	Averages (+ advantages and disadvantages)	Calculate the mode, median, range and mean of a set of numbers. (What are the advantages/disadvantages of these averages?)
	U840	Frequency polygons	Draw a frequency polygon to represent this data. Use this frequency polygon to estimate the mean.
	U507 U520	Comparing data and distributions with graphs and charts	Draw a back to back stem and leaf diagram. Draw a dual/composite bar chart.
	U277	Use and interpret scatter graphs + inter/extra-polation	Identify outliers & correlation ( $\neq$ causation) Draw a line of best fit – use this line of best fit to estimate a value on the graph.
	U569 U981 U312	Frequency tables	Estimate the mean from a frequency table. Find the modal class interval. Find the class interval containing the median.
	U182 U642	Drawing and interpreting cumulative frequency graphs	Draw a cumulative frequency graph. Calculate the median / inter-quartile range. Calculate the number above/below a certain value.
	U879 U837	Drawing and interpreting boxplots	Draw a box plot from raw data / cumulative frequency. Calculate the number above/below quartile/median. Compare distributions (average + spread).
	U185 U814 U983 U267	Drawing and interpreting histograms	Draw a histogram (by calculating frequency density). Calculate frequencies from histograms. (Calculate the median from a histogram).