

## Year 10 Higher Maths Knowledge Map – Autumn Term - (September-December)

<u>Key Word</u>	<u>Definition</u>	<u>Example</u>
Factors of a number	These are all the numbers that go into another without a remainder	Factors of 8: 1,2,4,8
Product of prime factors	Think factor tree! Keep dividing by the lowest possible prime number until you can't divide any longer.	$24 = 2 \times 2 \times 2 \times 3$ $27 = 3 \times 3 \times 3$ $42 = 2 \times 3 \times 7$
HCF (Highest Common Factor)	The largest number that goes into 2 different numbers. List the factors of the smaller number and see which is the largest one which will go into the 2nd number.	"Find the HCF of 8 and 28" Factors of 8 = 1,2,4 and 8 Factors of 28 = 1,2,4,7,14 and 28 Largest number in both = 4
LCM (Lowest Common Multiple)	The lowest number 2 different numbers will both go in to. Just list out the times tables of each and see which is the smallest number that appears in both lists.	LCM of 4 and 6 4TTs = 4,8,12,16,20,24,28 6TTs = 6,12,18,24,30,36 first number they both go in to = 12 = LCM
Simplify Fractions	Can you cancel the fraction? Look for common factors. Can you divide the numerator and the denominator by 2,3,4 etc	$\frac{2}{10} = \frac{1}{5}$ as you can divide top and bottom by 2. $\frac{7}{21} = \frac{1}{3}$ as both numerator and denominator divide by 7
Finding a fraction of a quantity	Divide by the bottom, times by the top. If you need $\frac{3}{8}$ of a number, divide by 8 and then multiply by 3.	$\frac{2}{5}$ of £60 $£60 \div 5 = £12$ $2 \times 12 = £24$
Ordering fractions	Get a common denominator and find equivalent fractions. At this point see which has the largest numerator when you list them out. 9 times out of 10 the denominator you want is in the question!	$\frac{1}{2}, \frac{2}{3}, \frac{5}{6}$ and $\frac{7}{12}$ All of these can be made into $\frac{12}{12}$ s. $\frac{6}{12}, \frac{8}{12}, \frac{10}{12}$ and $\frac{7}{12}$ . Now just put them in order of size. Make sure you answer using the original values.
Subtracting Fractions	The denominators must be the same (as with addition). When it is just subtract the numerators.	$\frac{4}{7} - \frac{1}{2} = \frac{8}{14} - \frac{7}{14} = \frac{1}{14}$ $\frac{1}{3} - \frac{1}{5} = \frac{5}{15} - \frac{3}{15} = \frac{2}{15}$
Multiplying Fractions	Multiply the numerators multiply the denominators and simplify if possible. Top times top, bottom times bottom.	$\frac{2}{7} \times \frac{3}{5} = \frac{6}{35}$ $\frac{4}{5} \times \frac{3}{4} = \frac{12}{20}$ or $\frac{3}{5}$
Dividing fractions	IN1, turn and times. Turn the second fraction upside-down and multiply as shown in the method above for multiplying.	$\frac{1}{4} \div \frac{3}{5}$ is the same as $\frac{1}{4} \times \frac{5}{3}$ Now just use the method above and simplify.
Pie Charts	A pie chart is a circle which means there are $360^\circ$ . Look out for right angles as they show $\frac{1}{4}$ of the data	If there are 40 people in a survey then each person will be worth $9^\circ$ of the pie chart as $360/40 = 9$
Mean (simple average)	Add the values up, divide by how many values there are. Find the mean of 3,4,7,6,4,6	$3 \cdot 4 \cdot 7 \cdot 6 \cdot 4 \cdot 6 \cdot 5$ 6
Mode or Modal	The number that appear most times in a list (there can be more than one mode)	4,5,2,3,6,4,7,8,4,5 Mode = 4
Range	Highest take lowest. Find the smallest value and subtract it from the largest.	3,15,26,37,97 range = 94
Median	Middle number. Put them in order and find the middle one. If there are two find half way between the two numbers.	4,5,2,3,6,7,6 in order 2,3,4,5,6,6,7 Median = 5
Line of best fit	Draw this on the scatter graph with roughly the same number of points either side to show the correlation.	
nth term formula of a sequence	Find the difference. Multiply that by n and see what you need to add to find it The example is going up by 4 each time. $4 \times 1 = 4$ so we need to subtract 1 to get 3. the nth term is $4n - 1$	
Sequences	Look out for (i) A common difference (is it going up or down by 2 or 3 each time?) (ii) Square numbers 1,4,9,16,25... (iii) Cube numbers  1, 8, 27, 64...	Rules such as "Add 2 each time" or "Square numbers" If asked for the 'nth term sequence' use the method below.

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Proportion	Find out the value of one item and then multiply it by the number you need.	3 cakes need 450g of sugar. Find how much sugar 5 cakes needs. $450 \div 3 = 150\text{g}$ per cake. Now multiply this by 5 to give 750g needed for 5 cakes
Ratio Sharing	Add the total parts. A ratio of 4:2:1 has 7 parts (not 3) Divide the amount to be shared Multiply by each part (making sure you use the correct units (£s here))	£60 in a 3:2:1 ratio 6 total parts so £60 divided by 6 = £10. Each part is worth £10 $3 \times £10 = £30$  $2 \times £10 = £20$
Angles in a polygons	Angles in triangles = $180^\circ$ angles in quadrilaterals = $360^\circ$	Quadrilateral is a 4 sided shape (square rectangle etc)
Angle facts	On a straight line = $180^\circ$ and angles around a point = $360^\circ$	
Angle Types	Acute, less than $90^\circ$ , Obtuse, $90^\circ$ to $180^\circ$ & Reflex angles greater than $180^\circ$	
Types of triangles	Right Angle Triangles have a $90^\circ$ angle. Isosceles triangles have 2 equal sides and 2 equal base angle Equilateral triangles have 3 equal sides and 3 equal angles ( $60^\circ$ each).	
Exterior angles of a regular polygon	For <u>regular</u> polygons divide 360 by the number of sides. The picture shows a regular hexagon which has 6 sides. $360/6 = 60$ which means the exterior angle is $60^\circ$	
Interior angles of regular a polygon	Find the exterior, draw a straight line and subtract the exterior angle from $180^\circ$ . For the sum just add the interior angles. Pictured to the right is a regular Hexagon. Each interior angle is $120^\circ$ (we know the exterior angle is $60^\circ$ from above)	
Bisecting an angle and loci.	Use a compass and keep it set in one position throughout the bisection. Bisecting an angle is shown to the right. You MUST leave your construction lines. Bisect means 'cut in half' Loci are the set of fixed points and will often include drawing a circle.	
Rotational Symmetry	How many times does the shape fit back on itself when you turn it $360^\circ$ ? Be careful with patterns as they will influence the order of symmetry. (See the last example). Use tracing paper if you need!	