AC1: Key Outcomes – Year 10

Curriculum: Mathematics

Excellence. No Excuses.

Section	Knowledge Code:	Outcomes:	How students will demonstrate success:
1	M10.1.1	Students will be able to order numbers (integers, negatives, decimals and fractions including mixed numbers). Use inequalities signs.	Order numbers including negatives (Consecutive and not). Decide which is larger ; -3 or 2 type questions Order basic decimal numbers e.g. 3.5, 4.6, 2.3 etc... Those with similar digits; 4.4, 4.04, 4.4404 etc… Understand the terms 'ascending' and 'descending'. To use equivalent fractions to order fractions of different amounts including mixed numbers (using different methods of changing the fraction, including improper fractions to compare the denominator). Use <,>, ≤, ≥, =, to separate numbers. 5<7. To answer simple inequality statements e.g. x<5, 4,3,2,1,0,-1 (Including negatives x>-5, -4,-3,-2,-1,0,1)
2	M10.1.2	Students will be able to use four operations with; integers, decimals and fractions including mixed numbers. Including negatives.	To use standard methods for four operations. Using scaling for decimals and bus stop where necessary. To include mixed numbers. To use the skills gained with mixed numbers with the four operations. Ensuring pupils know how to convert into improper fractions and back again. Understand rules and implications (why) for negative numbers
3	M10.1.3	Students will be able to round to decimal places and significant figures.	Use of line to aid where to round ; 43200 to nearest 1000, 43|200 look at next digits to decide to round up or down. Decimals Use of line to aid where to round e.g. round 4.6643 to 2d.p. 4.66|43 = 4.66 (2dp) .To round numbers to 1s.f. 2 s.f. etc... To demonstrate this using different magnitudes of numbers also looking at numbers like 2350024 rounded to 4 sf (for the misconceptions)
4	M10.1.4	Students will be able to calculate calculations in the correct order (BIDMAS) and know how to find the reciprocals for integers, fractions and decimals.	To demonstrate pupils can perform all the operation in the correct order. E.g. 3 + 2x 4 and including powers and brackets. Understand that =/- and x/÷ are equivalent and can be in either order. E.g. 4x3/2 - here you would do the multiply first. To ensure that pupils know the term "reciprocal" understand it's use and application. Including decimals into fractions and then finding the reciprocal. Mixed numbers. And where you get a fraction in the denominator and how to deal with this. The reciprocal of an integer.
5	M10.1.5	Students will be able to find error intervals for numbers (F/H) Limits of accuracy/Bounds (H*)	Find error intervals to a given accuracy. Use the inequality symbols to describe an error interval. For higher students develop into upper and lower bounds, making sure pupils can use all four operations and find the upper and lower bounds for the calculations.
6	M10.1.6	Students will be able to estimate using common sense and pictures to scale. To use sensible approximations in real life calculations.	Students to make sensible estimates of a range of measures in everyday settings and make sensible estimates of a range of measures in real-life situations, for example estimate the height of a man. Students will be able to evaluate if a solution is sensible. Students will be able to check answers are sensible by using approximations.
7	M10.1.7	Students will be able to write expressions for algebraic situations including real life contexts for all 4 operations. And simplify by collecting like terms	Use of a letter and a number e.g. y + y + y = 3y (which is also 3 x y) Including 3 x y = 3y and a x b = ab and three ; 3 ÷ y = a x a = a^2 and a x b x b = ab^2 mixed with integers; 3 a x a x b = $3ab^2$ Examples such as 3x + 4x + 3y + 4y, $3x^2 + 2x + 4x^2$ ensuring misconceptions about what is 'like' are emphasised.
8	M10.1.8	Students will be able to use index laws for multiplication (integer powers) and division.	To use letters and numbers for the base. E.g. 3^2 x 3^4 and a^3 x a^5 powers can go negative. To use letters and numbers for the base $\frac{4^4}{4^3}$, $\frac{a^6}{a^2}$ Powers can go negative
9	M10.1.9	Students will be able to expand and factorise single. Expand double brackets	Single brackets including x(x+3) and negative numbers 2(x-4), -3(x-4) etc…Factorise expressions e.g. 3x + 6 by taking out common factors (ensuring that the highest common factor is used) Also can look at powers $x^2 + 4x$ and $6x^2 – 3x$ etc.. Students will be able to simplify e.g. 3x + 4(x+5) etc... Students will be able to expand a double bracket to get a quadratic.

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10	M10.1.10	Students will be able to factorise quadratics	Factorise quadratic expressions (Foil/product sum/complete the square (H), diff of two squares, ax^2 (H)), simplify by factorising and cancelling expressions of the form ax2 +bx+c / dx2 + ex + f (A4H)
11	M10.1.11	Students will be able to substitute into expressions and formulae	Substitute into expressions using different letters to gain an answer. Negatives can be used. Real life formulae including shapes (area for example) and cost of items per hour etc…
12	M10.1.12	Students will be able to differentiate between expressions, equations, formulae and identities	To have equations/expressions and formulae and identify which each are. Pupils should know the definition of an equation/expression and formula. Equation can be solved has an '='. Expression doesn't have an equals (but can get a unique solution using substitution, a formula has multiple letters (can get a unique solution using substitution). Identities – something that is true no matter what is substituted. ≡. To use identities to solve RHS LHS problems.
13	M10.1.13	Students will be able to use numerical and algebraic function machines.	Students will use functions machines with all operations forward and backwards (inverse). Students will be expected to find the function for each part of the chain . Students will be able to use function machines with algebraic operations. Finding expressions from the function machine.
14	M10.1.14	Students will be able to complete the square (H*)	To complete the square for quadratics where the coefficient of x^2 is 1
15	M10.1.15	Students will be able to complete the square a>1 (H*)	To complete the square for quadratics where the coefficient of x^2 is more than 1
16	M10.1.16	Students will be able to expand 3 brackets (H*)	Expand 3 brackets. Ensuring there is a mixture of coefficients (3x+4)(x-2)(6x-2) etc… Include square brackets (or cube brackets). Have difference of two squares.
17	M10.1.17	Students will be able to understand and solve function problems (H*)	Students to be taught the function notation and how this affects the x value. f(x) = y, f(x) = 2x +3 etc… Pupils will substitute x values and will work out composite functions. Inverse functions to be solved. Function machines to explain the mechanics for composite functions and inverses.
18	M10.1.18	Students will be able to draw and interpret bar charts, vertical line graph, pictograms, frequency tables, two way tables and pie charts	Students will be able to draw and interpret bar charts, vertical line graph, pictograms, frequency tables, two way tables and pie charts. Ensure pupils draw accurately and leaving the right gaps for bar charts. Key for pictograms. Titles (including axes). Scale should be accurate and appropriate for the data. Finding the total and the fraction of 360^0 for each item. To find out information from pie charts. Including how many are in a group, using the angle for the sector. Compare pie charts to each other. To understand that without the total pie charts show the proportion in each group.
19	M10.1.19	Students will be able to draw and interpret scatter diagrams	To be able to draw a scatter graph using a table of values. To understand the features of positive, negative and no correlation. What makes correlation. Understand what does positive and negative correlation means. E.g. as something increases the other decreases. To draw an appropriate line of best fit, know that you can't draw a line of best fit for no correlation. To pick values using a line of best fit, to identify points that do not fit the correlation, outliers, (for example it might be the price of cars and the anomaly is an exotic old rare car). To know not to use the line of best fit for data that isn't in the main part of the data.
20	M10.1.20	Students will be able to classify different types of data	Looking at a list be able to tell if it is continuous or discrete data. Be able to suggest what data is. Grouped vs ungrouped data. Primary vs secondary data.
21	M10.1.21	Students will be able to find averages and the range from a list. Including comparing data sets and finding averages from tables (including grouped data)	Find the mode from a list. Understand no mode. Find the median from an even and odd set of data. Sorting in ascending order. Strategies for finding the middle number. Find the mean from a set of data. Understand about decimal context such as what does 2.3 children mean. State that this is not an average but a measure of spread. To use the 3 averages to compare two or more sets of data. To compare data that is represented from graphs and make conclusions. Such as more ice creams were sold on Wednesdays. Students will use lists, tables or diagrams to calculate averages and find an estimate of the mean for a grouped frequency distribution, knowing why it is an estimate. Find the interval containing the median for a grouped frequency distribution. Choose an appropriate measure to be the 'average', according to the nature of the data. E.g. use mode for this type of data and median to cut out extreme data at the ends of the list (know what might cause such values e.g. speed recording error etc…)

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22	M10.1.22	Students will be able to understand, find and describe samples of data	Understand what is meant by a sample. That a sample may or not reflect a population. Understand what affects a sample and how to gain a good sample that represents the population. Measures of central tendency and dispersion and using statistical diagrams to explain a population.
23	M10.1.23	Students will be able to draw cumulative frequency graphs (H*)	Understand the term cumulative. Apply this to a grouped frequency table (good to point out that this could be used for averages). Emphasize the coordinates for the graph (especially the first point). When plotting the curve emphasize the nature of the curve (elongated s, never going back on itself – for checking).
24	M10.1.24	Students will be able to draw a box plot. Read a box plot and find values for a box pot given information. (H*)	Understand quartiles draw these on the graph to find a box plot. The median - 50%. Interquartile range. To compare box plots stating range and IQR (spread – consistency). To draw a box plot given parts of the information. E.g. you may be given the IQR and the LQ and the UQ has to be found.
25	M10.1.25	Students will be able to plot and interpret histograms (H*)	Frequency density to understand the importance of this for a histogram. To draw a histogram with grouped data. To find the correct scale for the frequency density. To read from a histogram, emphasising the area of the bar is the frequency. To Estimate values from a histogram.
26	M10.1.26	Students will be able to find lines of symmetry, rotational symmetry from 2D shapes	Draw line segments to show lines of symmetry. To use lines of symmetry to mirror a shape, diagonally and well as vertically and horizontally. To find rotational symmetry by inspection or using aids such as tracing paper. Understanding the difference between rotational and line symmetry.
27	M10.1.27	Students will be able to classify 3D shapes using their properties	Know face, edge, vertex and identify these on 3D shapes.
28	M10.1.28	Students will be able to measure a line segment and an angle and will be able to read and interpret a scale	Use a ruler to measure to the nearest mm. Use a protractor (180^0) to measure angles. To know how to measure angles that are over 180^0 .To read from different types of scale making sue pupils understand about markers and how these can change from one scale to another. Be able to work out.
29	M10.1.29	Students will be able to draw and use an accurate scale drawing. Including estimation. Plans and elevations. Isometric paper.	To use estimation for real objects. E.g. knowing the height of a door estimate the height of the house. (To scale and not to scale drawings). To understand a scale and draw diagrams correctly using this scale. Draw nets of common 3D shapes. Use the nets to work out areas of faces and surface area. To be able to recognise a shape from its elevations. To draw the elevations of 3d shapes.
30	M10.1.30	Students will be able to read and use maps. Including bearings	Students will be able to find out what the scale is by measuring parts of a map and use the information given about it to find the scale. E.g. the wall measures 10m in real life it measures 5cm therefore the scale is… Use compass points. Pupils will draw scale drawings given information presented in a paragraph or diagrams. 3 Figure bearings. Ensuring the North is drawn and measured clockwise. Pupils will be able to go AB and BA. Follow instructions with bearings and scales to solve problems.
31	M10.1.31	Students will be able to construct shapes and solve Loci problems.	constructions (triangle, equilateral triangle, perpendicular – line given a point, from a given point, angle bisector, angle of $60^{0.}$ draw circles or part circles given the radius or diameter. Construct diagrams of 2D shapes. Construct a region, for example, bounded by a circle and an intersecting line. Construct loci, for example, given a fixed distance from a point and a fixed distance from a given line. Construct loci, for example, given equal distances from two points construct loci, for example, given equal distances from two-line segments. Construct a region that is defined as, for example, less than a given distance or greater than a given distance from a point or line segment. Describe regions satisfying several conditions.