The Sutton Academy

Knowledge Rich Curriculum Plan

Year 9 Support – Sequences and Graphs

Lesson objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge: *In order to understand this…*	Steps to Success	Feedback
To learn how to continue sequences of diagrams and numbers and identify and use the term-to-term rule.	• Students will know how to find the next terms in pattern sequences. • Students will know how to continue linear sequences to find subsequent terms. • Students will know how to continue geometric sequences to find subsequent terms. • Students will know how to continue other simple sequences. • Students will know how to identify the term to term rule for an arithmetic sequence. • Students will know how to identify the term to term rule for a geometric sequence. • Students will know how to use ascending/descending to describe sequences. • Students will know how to find missing terms in a sequence given the term-to-term rule • Students will know how to find missing terms within a sequence by first finding the term-to-term rule. • Students will know how to recognise and continue Fibonacci sequences. • Students will know that triangular numbers are numbers that make a triangular dot pattern. E.g. 1,3,6,10,15. **Opportunity for challenge:** • Students will know how to continue a quadratic sequence.	**Sequence** - a particular order in which related things follow each other. **Ascending –** going up **Descending** – going down **Linear or Arithmetic Sequence** – a number pattern which increases (or decreases) by the same amount each time **Geometric Sequence –** a sequence made by multiplying by the same value each time **Fibonacci Sequence –** a sequence of numbers in which each number is the sum of the two preceding numbers. The simplest is the series 1, 1, 2, 3, 5, 8, etc. **Triangular Numbers –** any of the series of numbers (1, 3, 6, 10, 15, etc.) obtained by continued adding of the natural numbers 1, 2, 3, 4, 5, etc. **Quadratic –** involving a squared algebraic term but no other power higher than 2 **Cultural capital**	• Students need to know how to continue a numerical, linear sequence.	<u>Steps to Success – Pattern Sequences</u> Step 1 – Identify how many items/pictures is contained in each pattern, you may want to write this above each one. Step 2 – Work out what has been done to the previous term to get the next term in the sequence e.g. +5 Step 3 – Continue to carry out the same calculation to each of the patterns until you reach the required pattern number. If asked to continue the pattern draw it. <u>Steps to Success – Linear Sequences</u> Step 1 – Identify the difference between each term, you may want to write it above the term, it is important to check that it is happening to each term. Step 2 – Either add or subtract to the previous term to find the next term/terms. <u>Steps to Success – Geometric Sequences</u> Step 1 – Identify the difference between each term for geometric sequences, they have either been multiplied or divided by a number Step 2 – Multiply or divide the term by the number to find the next terms in the sequence.	
To learn how to generate a sequence from the nth term.	• Students will know how to generate a linear sequence using the nth term. • Students will know how to generate a quadratic sequence from its nth term. • Students will know how to find the value of any term in a sequence by substitution. E.g. Find the 100th term. **Opportunity for challenge:** • Students will know how to solve problems involving generating sequences.	**Generate –** produce or create. **Substitute –** use or add in place of **nth Term –** a formula that enables us to find any term in a sequence. The ' n ' stands for the term number	• Students need to know how to substitute numbers into linear expressions and formulae. • Students need to know how to identify the term-to-term rule of a sequence.	<u>**Steps to Success – Using the nth term**</u> **Step 1**: Identify the nth term, if this is not given to you then you will need to calculate it. **Step 2**: If the question is asking you to find a particular term in the sequence, for instance the 100th term, you would substitute that number into the expression. **Step 3**: If the question is asking you to generate a sequence using the nth term you would substitute the numbers of the sequence in, e.g. for term 1, 1 for term 2, 2 etc	

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To learn how to use the nth term of a linear sequence.	• Students will know how to find the nth term of a linear sequence. • Students will know how to find the nth term of a pattern sequence. • Students will know how to identify and reason whether a term can be in a sequence. E.g. The sequence is made from all even numbers and the term is odd. • Students will know how to identify whether a term can be in a sequence given its nth term by forming and solving a linear equation. **Opportunity for challenge:** • Students will know how to find and use the nth term to determine whether a number will be in a linear sequence.		• Students need to know how to solve linear equations.	**Finding the nth term of linear sequences – Steps to success** **Step 1:** Find the differences between each term – these should be the same number. **Step 2:** Place your number in front of the letter n to get *a*n. **Step 3:** Substitute the number 1 into your nth term. **Step 4:** Work out what you would do to get to the first term in the sequence. **Step 5:** Make this adjustment to your nth term.	
To learn how to draw straight line graphs.	• Students will know how to plot graphs in the form y = x + c or y = x - c • Students will know how to plot graphs in the form y = mx • Students will know how to plot straight line graphs in the form y = mx + c by first completing a given table of values. • Students will know how to plot straight line graphs in the form y = mx + c by constructing their own table of values. **Opportunity for challenge:** • Students will know how to plot and draw graphs of straight lines in the form x + y = c	**Substitute –** use or add in place of	• Students need to know how to plot and read coordinates on a graph. • Students need to know how to substitute positive and negative integers into formulae.	**Steps to Success – Plotting Straight Line Graphs** **Step 1**: Use the table of values for your coordinates for drawing the graph. If a table is not provided, create one using the x values on the axis as the x values in your table. Substitute your x values into the equation of the line in order to find your y coordinates. Remember to use brackets and follow BIDMAS. **Step 2**: Choose a pair of coordinates (x,y) from your table to plot on the graph. Remember that the 'x' coordinate is for the horizontal axis and the 'y' coordinate is for the vertical axis. Mark this point on the graph. **Step 3:** Continue this process until all pairs of coordinates have been plotted. **Step 4:** Join up the points with one straight line using a pencil and a ruler. If the coordinates do not form a straight line, check each coordinate is plotted correctly.	
To learn how to interpret the equation of a straight line and calculate gradient.	• Students will know that the equation of a straight line can be written in the form y = mx + c where m tells us the gradient of the line and c tells us the y-intercept. • Students will know how to identify the gradient and y-intercept of a straight line given the equation in the form y = mx + c • Students will know how to calculate gradient between two pairs of coordinates. • Students will know that $gradient = \frac{change\ in\ y}{change\ in\ x}$	**Gradient** – steepness. The gradient of a line tells us how steep the line is.	• Students need to know how find the difference between two numbers, including negatives	**Steps to Success – Gradient of a line** **Step 1:** If you are calculating the gradient from a graph, identify two points on the line and write down their coordinates. **Step 2:** Calculate the difference between the y coordinates by subtract the y coordinates from each other. **Step 3:** Calculate the difference between the x coordinates by subtracting the x coordinates from each other. **Step 4:** Substitute the values into the formula $\frac{Change\ in\ y}{Change\ in\ x}$	

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To learn how to find the equation of a straight line.	• Students will know how to find the equation of a given straight line graph from two pairs of coordinates in the form y = mx + c • Students will know that they can select any two pairs of coordinates on the straight line to find the equation. • Students will know how to identify the y-intercept of a give straight line graph. **Opportunity for challenge:** • Students will know how to find the equation of a straight line given the gradient and a coordinate in the form (x, y) where the x-coordinate is 0.	**Intercept** – cross **Y-intercept** – the y-intercept tells us where a graph crosses the y-axis, this where x = 0 **Equation –** A mathematical statement that two amounts, or groups of symbols representing an amount, are equal: E.g. 3x - 3 = 15	• Students need to know how to read and identify coordinates. • Students need to know how to identify the gradient and y-intercept of a straight line given the equation in the form y = mx + c	**The equation of a straight line – Steps to Success** The equation of any straight line can be written in the general form **y = mx + c** Where **m** is the gradient of the line and **c** is the y-intercept **Step 1:** Identify two pairs of integer coordinates on the given straight line **Step 2:** Work out the difference between the y-coordinates **Step 3:** Work out the difference between the x-coordinates **Step 4:** Calculate the gradient between the two pairs of coordinate using: $$gradient = \frac{change\ in\ y\ coordinates}{change\ in\ x\ coordinates}$$ **Step 5:** Identify the y-intercept of the straight line, this is the point at which the line crosses the y-axis **Step 6:** Substitute the gradient and y-intercept into the equation of the straight line. If the y-intercept is positive, the equation of the line will end in +c, if it is negative it will end in – c	
To consolidate understanding of Straight line graphs	• Students will know how to plot straight line graphs • Students will know how to find the gradient of a line both from a graph and when given sets of coordinates. • Students will know how to find the equation of a line from a graph and when given coordinates.		• Students will know how to identify the gradient and y-intercept of a straight line given the equation in the form y = mx + c	Repeat Steps from previous lessons.	
To learn how to draw quadratic graphs.	• Students will know how to generate points for a quadratic graph in the form $y = ax^2 + bx + c$ where a = 1 and b and c are any integer including 0 both with and without a calculator. • Students will know how to plot a quadratic graph once they have generated the points. • Students will know that the points for a quadratic graph should be joined with a smooth curve.	**Quadratic –** An expression or equation where the highest power is 2. **Parabola –** the U or ∩ shape of a quadratic graph	• Students need to know how to substitute both positive and negative integers into formulae. • Students need to know how to use the order of operations.	**Steps to Success- Plotting Cubic Graphs** **Step 1**: If one isn't given, construct a table with one row for x-values and another for y-values. Use the values given in the question to determine what x-coordinates to use. **Step 2**: Substitute each x-value into the given equation to generate each y-value. **Step 3**: Plot each coordinate pair on the graph with an x. **Step 4:** Connect the points together with a curve, Do not use a ruler!	
Mini-Assessment 6					