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| **Title of unit:** | Sequences, Functions and Graphs |
| **Overview of unit:** | CoordinatesPatterns and sequences (linear and quadratic)Linear graphs (parallel and perpendicular)Quadratic, cubic, reciprocal and exponential graphsTransformations of graphsEquation of a circleInverse and composite functionsEstimating area under graphs |
| **Cross-curricular/ extra-curricular links:** | Geography – use grids to identify positionICT – spreadsheet skills, used in modelling and simulations, rely on the numeric, algebraic and graphical skills involved in constructing formulae and generating sequences, functions and graphsMusic – soundwaves, frequency and oscillation |
| **Literacy/ numeracy links:** | Worded problems/exam questionsKeywords displayed on all PPts - pattern, sequence, graph, coordinate, axes, straight line, linear, quadratic, cubic, reciprocal, exponential, circle, gradient, y-intercept, simultaneous, equation, arithmetic, geometric, Fibonacci, parallel, perpendicular, transformation, function, turning point, maximum, minimum, area, tangentWritten plenaries |

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| **Grade:** | **Learning objective:** | **Resources:** |
| **1** | Find next terms of a sequence given a ruleGenerate a number sequence from a patternUse coordinates in all four quadrants | [nth term, first term and sequences from patterns](https://www.piximaths.co.uk/nth-term)[Coordinates introduction](https://www.piximaths.co.uk/coordinates) |
| **2** | Plot straight line graphs of the form x = 4 and y = 2Find the nth term of an arithmetic sequence. | [Sketching linear graphs using the gradient and y-intercept](https://www.piximaths.co.uk/linear-graphs)[nth term, first term and sequences from patterns](https://www.piximaths.co.uk/nth-term) |
| **3** | Complete a table of values for equations such as y = 3x + 3 and draw the graphCalculate the gradient of a linear graph. | [Linear graphs using table of values](https://www.piximaths.co.uk/linear-graphs)[Sketching linear graphs using the gradient and y-intercept](https://www.piximaths.co.uk/linear-graphs) |
| **4** | Solve simultaneous equations graphicallyRecognise and use sequences of triangular, square and cube numbers and Fibonacci type sequences | [Solving simultaneous equations graphically](https://www.piximaths.co.uk/linear-graphs)  |
| **5** | Use y = mx + c to identify parallel linesFind the equation of a line through two points or one point with a given gradientRecognise and use sequences of quadratic and geometric sequencesSketch graphs of quadratic, cubic and reciprocal functions from a table of values | [Parallel and perpendicular graphs](https://www.piximaths.co.uk/linear-graphs)[Equation of a line from two coordinates](https://www.piximaths.co.uk/linear-graphs)[Quadratic nth term sequences](https://www.piximaths.co.uk/quadratic-nth-term)[Expanding double brackets and sketching quadratics](https://www.piximaths.co.uk/expanding-brackets)[Cubic equations and graphs](https://www.piximaths.co.uk/expanding-brackets)[Quadratic, cubic and reciprocal graphs](https://www.piximaths.co.uk/quadratic-cubic-reciprocal-graphs) |
| **6** | Use y = mx + c to identify perpendicular linesExplore the gradients of perpendicular straight-line graphsSketch graphs of exponential functions | [Parallel and perpendicular graphs](https://www.piximaths.co.uk/linear-graphs) |
| **7** | Explore the gradients of perpendicular straight-line graphsTransform the graphs of y = f(x), such as linear, quadratic, cubic, sine and cosine functions, using the transformations y = f(x) + a, y = f(x + a), y = f (ax) and y = af(x)Identify the turning point of a quadratic by sketching the graph | [Parallel and perpendicular graphs](https://www.piximaths.co.uk/linear-graphs)[Transformations of graphs](https://www.piximaths.co.uk/transformations-of-graphs)[Expanding double brackets and sketching quadratics](https://www.piximaths.co.uk/expanding-brackets)[Completing the square](https://www.piximaths.co.uk/solving-quadratic-equations) |
| **8** | Recognise the shapes of graphs of functions, including trigonometric functionsRecognise and use the equation of a circle centred at the originCalculate the nth term of a quadratic sequenceComplete the square of a quadratic to calculate its turning pointRecognise and use geometric sequences where the common ratio may be a surd | [Quadratic, cubic and reciprocal graphs](https://www.piximaths.co.uk/quadratic-cubic-reciprocal-graphs)[Equations of circles and tangents](https://www.piximaths.co.uk/equations-of-tangents)[Quadratic nth term sequences](https://www.piximaths.co.uk/quadratic-nth-term)[Completing the square](https://www.piximaths.co.uk/solving-quadratic-equations) |
| **9** | Interpret the reverse process as the ‘inverse function’Interpret the succession of two functions as a ‘composite function’Estimate gradients of graphs by drawing the tangent and calculating its gradientEstimate the area under a graph by calculating the area of the trapezium bounded by a chordFind an equation of a tangent to a circle at a given point, using the fact that it is perpendicular to the radius. | [Inverse functions](https://www.piximaths.co.uk/functions)[Composite functions](https://www.piximaths.co.uk/functions)[Equations of circles and tangents](https://www.piximaths.co.uk/equations-of-tangents)[Area under graphs and gradient, velocity-time graphs and acceleration/deceleration](https://www.piximaths.co.uk/area-under-graphs)[Equations of circles and tangents](https://www.piximaths.co.uk/equations-of-tangents) |