HIGHER GCSE UNIT SUMMARY: UNIT 19: Direct and indirect proportion: using statements of proportionality, reciprocal and exponential graphs, rates of change in graphs, functions, transformations of graphs

19a) **Reciprocal and exponential graphs; Gradient and area under graphs**

Unit Description	Taught	Revision Priority
Recognise, sketch and interpret graphs of the reciprocal function $y = \frac{1}{x}$ with $x \neq 0$		
State the value of x for which the equation is not defined;		
Recognise, sketch and interpret graphs of exponential functions $y = k^x$ for positive values of k and integer values of x;		
Use calculators to explore exponential growth and decay;		
Set up, solve and interpret the answers in growth and decay problems;		
Interpret and analyse transformations of graphs of functions and write the functions algebraically, e.g. write the equation of f(x) + a, or f(x – a): apply to the graph of y = f(x) the transformations y = –f(x), y = f(–x) for linear, quadratic, cubic functions; apply to the graph of y = f(x) the transformations y = f(x) + a, y = f(x + a) for linear, quadratic, cubic functions;		
Estimate area under a quadratic or other graph by dividing it into trapezia;		
Interpret the gradient of linear or non-linear graphs, and estimate the gradient of a quadratic or non-linear graph at a given point by sketching the tangent and finding its gradient;		
Interpret the gradient of non-linear graph in curved distance–time and velocity–time graphs: for a non-linear distance–time graph, estimate the speed at one point in time, from the tangent, and the average speed over several seconds by finding the gradient of the chord; for a non-linear velocity–time graph, estimate the acceleration at one point in time, from the tangent, and the average acceleration over several seconds by finding the gradient of the chord;		
Interpret the gradient of a linear or non-linear graph in financial contexts;		
Interpret the area under a linear or non-linear graph in real-life contexts;		
Interpret the rate of change of graphs of containers filling and emptying;		
Interpret the rate of change of unit price in price graphs.		

19b) **Direct and inverse proportion**

Unit Description	Taught	Revision Priority
Recognise and interpret graphs showing direct and indirect proportion;		
Identify direct proportion from a table of values, by comparing ratios of values, for x squared and x cubed relationships;		
Write statements of proportionality for quantities proportional to the square, cube or other power of another quantity;		
Set up and use equations to solve word and other problems involving direct proportion;		
Use $y = kx$ to solve direct proportion problems, including questions where students find k, and then use k to find another value;		
Solve problems involving inverse proportion using graphs by plotting and reading values from graphs;		
Solve problems involving inverse proportionality;		
Set up and use equations to solve word and other problems involving direct proportion or inverse proportion.		