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| **H Unit 19: Proportion** | **Road Map** | | | | | |
| In this unit you will learn about Algebra. The aims are as follows:  **LG1**: Knowledge  **LG2**: Application  **LG3**: Skills | Assessment Grades |  |  | | | |
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| **Themes** | **Learning Goals/Outcomes/Content** | | |  |  |  |
| 19a Reciprocal and exponential graphs; Gradient and area under graphs | Recognise, sketch and interpret graphs of the reciprocal function  with *x* ≠ 0 | | |  |  |  |
| State the value of *x* for which the equation is not defined; | | |  |  |  |
| Recognise, sketch and interpret graphs of exponential functions *y* = *kx* 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. | | |  |  |  |

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| 19b Direct and inverse proportion | 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. |  |  |  |

**Links:**

LG1: You will recognise and sketch graphs of exponential and reciprocal functions. You will know the effect of different transformations on graphs and their equations. You will know how to estimate the area under a curve by dividing it into strips, and how to estimate the gradient of a curve at a given point by drawing a tangent and calculating the gradient of the tangent. You will know how to set up and use equations for direct and inverse proportion.

LG2: You will apply your knowledge of gradient and area to estimate distance or acceleration from a speed / time graphs and interpret your calculation using appropriate units.

LG3: You will use your problem solving skills and mastery of proportion to set up and solve equations for direct and inverse proportion from word problems.