**Y12 Applied Maths Self-Assessment Sheets**

Chapter 1 – Data Collection

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| **Sub-topic** | **Progress Descriptor** | **☺** | **☹** |
| Sampling | Understand the vocabulary of sampling |  |  |
| Sampling | Comment on the advantages and disadvantages of samples and censuses |  |  |
| Sampling | Understand the implication of differences in the results from different samples |  |  |
| Sampling | Understand and carry out simple random sampling |  |  |
| Sampling | Understand and carry out systematic sampling |  |  |
| Sampling | Understand and carry out stratified sampling |  |  |
| Sampling | Select and critique a sampling technique in a given context |  |  |
| Sampling | Understand quota and opportunity sampling |  |  |
| Types of data | Understand the difference between qualitative and quantitative data |  |  |
| Types of data | Understand the difference between discrete and continuous data |  |  |
| Types of data | Understand the difference between grouped and ungrouped data |  |  |
| Sampling | Use sampling in the context of the large data set |  |  |
| What I need to do to improve… | | | |

Chapter 2 – Measures of Location and Spread

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| **Sub-topic** | **Progress Descriptor** | **☺** | **☹** |
| Calculations | Calculate the mean, median and mode of simple discrete data sets |  |  |
| Calculations | Calculate an estimate of the mean of grouped discrete data |  |  |
| Calculations | Calculate an estimate of the mean of grouped continuous data |  |  |
| Calculations | Understand quartiles and percentiles |  |  |
| Calculations | Estimate median values, quartiles and percentiles using linear interpolation |  |  |
| Calculations | Understand and calculate range |  |  |
| Calculations | Understand and calculate interquartile range and interpercentile ranges |  |  |
| Calculations | Calculate variance and standard deviation from simple raw data |  |  |
| Calculations | Calculate variance and standard deviation from grouped data and summary statistics |  |  |
| Calculations | Understand the principle of coding |  |  |
| Calculations | Calculate the mean and standard deviation of coded data |  |  |
| Calculations | Use statistical calculations in the context of the large data set |  |  |
| Calculations | Be able to use and calculate the statistic Sxx and understand its connection with the standard deviation |  |  |
| What I need to do to improve… | | | |

Chapter 3 – Representations of Data

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| **Sub-topic** | **Progress Descriptor** | **☺** | **☹** |
| Presentation | Recognise possible outliers in data sets |  |  |
| Presentation | Calculate outliers in data sets and clean data |  |  |
| Presentation | Draw box plots |  |  |
| Presentation | Draw box plots with outliers |  |  |
| Presentation | Draw and interpret cumulative frequency diagrams |  |  |
| Presentation | Draw and interpret histograms and frequency polygons |  |  |
| Presentation | Use histograms to calculate frequencies and probabilities |  |  |
| Presentation | Understand and identify skewness (or lack of symmetry) in data |  |  |
| Presentation | Compare data sets using a range of familiar calculations and diagrams |  |  |
| Presentation | Compare data sets in the context of the large data set |  |  |
| Presentation | Select and critique a presentation technique in a given context |  |  |
| Presentation | Make inferences about the population, and give interpretations, from data in diagrammatic or summary form |  |  |
| What I need to do to improve… | | | |

Chapter 4 – Correlation

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| **Sub-topic** | **Progress Descriptor** | **☺** | **☹** |
| Correlation | Know and understand the language of correlation and regression |  |  |
| Correlation | Draw and interpret scatter diagrams for bivariate data |  |  |
| Correlation | Recognise scatter diagrams that include distinct sections of the population |  |  |
| Correlation | Understand correlation and causation |  |  |
| Correlation | Calculate the regression-line equation from raw and summary data |  |  |
| Correlation | Make predictions using the regression line within the range of the data |  |  |
| Correlation | Understand the concepts of interpolation and extrapolation |  |  |
| Correlation | Use the principles of bivariate data analysis in the context of the large data set |  |  |
| What I need to do to improve… | | | |

Chapter 5 – Probability

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| **Sub-topic** | **Progress Descriptor** | **☺** | **☹** |
| Basic probability | Calculate probabilities for single events |  |  |
| Basic probability | Calculate probabilities from relative frequency tables and real data |  |  |
| Basic probability | Understand and use Venn diagrams for multiple events |  |  |
| Basic probability | Understand and use the definition of mutually exclusive in probability calculations |  |  |
| Basic probability | Understand and use the definition of independence in probability calculations |  |  |
| Basic probability | Draw and use simple tree diagrams with two branches and two levels |  |  |
| Basic probability | Draw and use tree diagrams with three branches and/or three levels |  |  |
| Basic probability | Relate independence to tree diagrams |  |  |
| Basic probability | Understand informally the link to probability distributions |  |  |
| What I need to do to improve… | | | |

Chapter 6 – Statistical Distributions

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| **Sub-topic** | **Progress Descriptor** | **☺** | **☹** |
| Discrete distributions | Understand the language of discrete probability distributions |  |  |
| Discrete distributions | Model simple discrete random variables as probability distributions |  |  |
| Discrete distributions | Understand and use the discrete uniform distribution |  |  |
| Discrete distributions | Calculate probabilities from discrete distributions |  |  |
| Discrete distributions | Understand and use the language of combinations |  |  |
| Discrete distributions | Understand the binomial distribution (and its notation) and its use as a model |  |  |
| Discrete distributions | Calculate binomial probabilities |  |  |
| Discrete distributions | Comment on the appropriateness of binomial and other models in describing real-world situations |  |  |
| Discrete distributions | Use statistical tables and calculators to find cumulative binomial probabilities |  |  |
| What I need to do to improve… | | | |

Chapter 7 – Hypothesis Testing

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| **Sub-topic** | **Progress Descriptor** | **☺** | **☹** |
| Hypothesis testing | Understand the language of hypothesis testing |  |  |
| Hypothesis testing | Understand that a sample is used to make inferences about a population |  |  |
| Critical values | Find critical values and critical regions for a binomial distribution |  |  |
| Critical values | Interpret critical values and critical regions in context |  |  |
| Testing the binomial | Carry out 1-tail tests for the binomial distribution |  |  |
| Testing the binomial | Calculate actual significance levels for a binomial distribution test |  |  |
| Testing the binomial | Carry out 2-tail tests for the binomial distribution (including an informal understanding of E(X) = np) |  |  |
| Testing the binomial | Interpret the results of a binomial distribution test in context |  |  |
| What I need to do to improve… | | | |

Chapter 8 – Modelling in Mechanics

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| **Sub-topic** | **Progress Descriptor** | **☺** | **☹** |
| Modelling | Understand how mechanics problems can be modelled mathematically |  |  |
| Modelling | Understand assumptions common in mathematical modelling |  |  |
| Quantities and units | Know fundamental quantities and SI units |  |  |
| Quantities and units | Know derived quantities and units |  |  |
| Quantities and units | Convert between derived units |  |  |
| Quantities and units | Understand the difference between a scalar quantity and a vector quantity |  |  |
| Quantities and units | Calculate magnitude and direction for a vector quantity |  |  |
| What I need to do to improve… | | | |

Chapter 9 – Constant Acceleration

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| **Sub-topic** | **Progress Descriptor** | **☺** | **☹** |
| Constant acceleration | Understand and use the language of kinematics |  |  |
| Constant acceleration | Understand graphs of displacement against time |  |  |
| Constant acceleration | Use and interpret graphs of displacement against time |  |  |
| Constant acceleration | Calculate and interpret gradients of displacement/time graphs |  |  |
| Constant acceleration | Understand graphs of velocity against time |  |  |
| Constant acceleration | Use and interpret graphs of velocity against time |  |  |
| Constant acceleration | Calculate and interpret gradients of velocity/time graphs |  |  |
| Constant acceleration | Calculate and interpret areas under velocity/time graphs |  |  |
| Constant acceleration | Use graphs to derive the equations of motion |  |  |
| Constant acceleration | Derive the other equations of motion algebraically |  |  |
| Constant acceleration | Use the equations of motion to solve problems in familiar contexts |  |  |
| Constant acceleration | Understand gravitational acceleration, its dependence on location and its value to varying degrees of accuracy |  |  |
| Constant acceleration | Use the equations of motion to solve problems involving vertical motion |  |  |
| Constant acceleration | Use the equations of motion to solve problems in unfamiliar contexts |  |  |
| Constant acceleration | Use the equations of motion in vector form to solve problems in 2D |  |  |
| What I need to do to improve… | | | |

Chapter 10 – Forces and Motion

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| **Sub-topic** | **Progress Descriptor** | **☺** | **☹** |
| Forces and motion | Understand the concept of force and identify forces in specific situations |  |  |
| Forces and motion | Use and understand weight |  |  |
| Forces and motion | Draw force diagrams |  |  |
| Forces and motion | Calculate resultant forces in perpendicular directions |  |  |
| Forces and motion | Understand Newton's first law and the concept of equilibrium |  |  |
| Forces and motion | Solve equilibrium problems involving single particles in familiar contexts |  |  |
| Forces and motion | Solve harder equilibrium problems |  |  |
| Forces and motion | Calculate resultant forces using vectors |  |  |
| Forces and motion | Understand Newton's second law |  |  |
| Forces and motion | Use Newton's second law to model motion in one direction |  |  |
| Forces and motion | Use Newton's second law to model motion in two directions |  |  |
| Forces and motion | Understand Newton's third law |  |  |
| Forces and motion | Solve simple problems involving particles which are connected or in contact in one dimension |  |  |
| Forces and motion | Solve simple problems involving connected particles by pulleys |  |  |
| Forces and motion | Apply Newton's laws to solve problems in unfamiliar contexts |  |  |
| What I need to do to improve… | | | |

Chapter 11 – Variable Acceleration

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| **Sub-topic** | **Progress Descriptor** | **☺** | **☹** |
| Variable acceleration | Write displacement, velocity and acceleration as functions of time |  |  |
| Variable acceleration | Use differentiation to determine functions for velocity and/or acceleration |  |  |
| Variable acceleration | Use differentiation to solve problems in kinematics |  |  |
| Variable acceleration | Solve problems involving maxima and minima |  |  |
| Variable acceleration | Use integration to determine functions for velocity and/or displacement |  |  |
| Variable acceleration | Use integration to solve problems in kinematics |  |  |
| Variable acceleration | Derive the equations of motion using calculus |  |  |
| Variable acceleration | Solve problems using calculus and the equations of motion |  |  |
| Variable acceleration | Solve general kinematics problems in less familiar contexts |  |  |
| What I need to do to improve… | | | |