Introduction to Quantitative Reasoning

Content	Cross – curricular link
Risk	Understanding risk is important in business, science and in careers which involve looking after other people such as teaching and health.
Percentages	A good understanding of percentages is important for everyday life, understanding the news and in business, science and social science.
Interpretation of data	The collection and interpretation of data is important in science, social science, geography and is also used in many careers, in politics, business and in understanding the news. The ability to spot errors and rogue figures is part of the CBI's definition of functional numeracy.
Estimation	Estimation is included in the requirements for biology, chemistry, psychology, geography, geology and environmental science A levels. The ability to spot errors is included in the CBI's definition of functional numeracy.
Foreign exchange	Nearly all students will go abroad at some time and need to be able to decide where to change their money and to calculate rough equivalent prices in pounds when shopping abroad.
Graphs and gradients	Interpreting graphs is important in science, business, economics, geography, psychology and social science; it is also important for future life and work – graphs are used in magazines and reports.
Appreciation and depreciation	Ideas of appreciation and depreciation are important when thinking about investments (including pension funds), the value of cars, houses and other major purchases including those made by businesses.
Standard form	Standard form is used in science to write very large or small numbers; it is also called scientific notation.
Measures and scaling	Some students will need to interpret scale drawings and photographs as part of future work and study but most students will use online or paper maps when planning a journey or researching a place they intend to visit. Relationships between lengths, areas, weights and volumes of similar figures are especially important in biology but also in manufacturing when considering how to scale up a container to a larger size.
Exponentials and logarithmic scales	Exponential growth is used as a model for population growth and so has applications in all the social sciences as well as business, economics and science. Exponential decay is important in business when modelling depreciation and also in science for radioactive decay. Radioactive decay is important in carbon dating in archaeology and also in considering issues to do with nuclear power so a basic understanding of it is important for all citizens. Examples of logarithmic scales are pH in chemistry, decibels and the Richter scale for earthquakes. Logarithmic scales are sometimes used in graphs showing economic data to make the scale more manageable.
Modelling	Modelling is intrinsic to the use of mathematics in real life situations, especially in science and economics. Due to the easy availability of computers, mathematical models are used to predict how an epidemic might unfold, the possible effects of climate change and the long term effects of national economic strategy. It is helpful for every informed citizen to have a general understanding of mathematical modelling.

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The Normal distribution	The Normal distribution is used as a model in biology and psychology; related distributions are used in economics.
Statistical problem solving	These skills are essential for anyone who is likely to use statistics in science, business or social science and is also a useful insight for all informed citizens to ensure that they have an insight into the power and limitations of statistical enquiry.
Probability	An understanding of conditional probability is important in both medicine and law so this section is especially relevant to students who intend to work in health, law and social work as well as for sport and for every citizen who may have to interpret medical or legal information one day either as a patient or on a jury.
Financial problem solving	Financial situations are arising in either business or in personal life.

Statistical Problem Solving	
Content	**Cross – curricular link**
Statistical Problem Solving Cycle	This cycle underpins all statistical investigation and problem solving and so is essential for anyone who is likely to use statistics in science, business, economics, geography or psychology. It also provides a useful insight for all informed citizens, ensuring that they have an understanding of the power and limitations of statistical enquiry.
Inference – hypothesis testing	This knowledge is essential for anyone who is likely to use statistics in science, geography or psychology and also provide a useful insight for all informed citizens, ensuring that they have an understanding of the nature of statistical inference.
Raw data	The skills associated with handling raw data are essential for anyone who is likely to use statistics in science, business, economics, geography or psychology and also provide a useful insight for all informed citizens.
Graphs, charts and summary measures	These are essential life skills for all citizens.
Standard deviation and mean	These measures are essential for anyone who is likely to use statistics for inference and understanding their meaning provides a necessary level of insight for a citizen to be informed.
The Normal distribution	Understanding the Normal distribution is essential for anyone needing to use statistics for modelling, for example in biology or psychology and for parametric hypothesis testing; it also provides an important insight for all informed citizens.
The χ^2 test	This test is essential for anyone who is likely to carry out investigative work in a variety of subjects, including biology, geography and psychology.
Spearman's rank correlation	This test is widely used in the analysis of investigative work in a variety of subjects, including biology, geography and psychology.
Product moment correlation	This measure is widely used in the analysis of and reporting on data in many subjects and in everyday life, so understanding its meaning is important to those who need to use it technically and also, on a more descriptive level, to citizens in their everyday lives.