

KS3 STAGE 8, STATISTICS, MATHS

Rationale and Context of Unit:	Core curriculum content:	Tier 2 & Tier 3 vocabulary explicitly taught:
<p><b>Understanding Risk</b> Key Skills:</p> <ul style="list-style-type: none"> <li>• Understand the equivalence between fractions, decimals and percentages</li> <li>• Compare fractions, decimals or percentages</li> <li>• Simplify a fraction by cancelling common factors</li> </ul> <p><b>Understanding Risk 2</b> Key Skills:</p> <ul style="list-style-type: none"> <li>• Convert between fractions, decimals and percentages</li> <li>• Understand the use of the 0-1 scale to measure probability</li> <li>• Work out theoretical probabilities for events with equally likely outcomes</li> <li>• Know how to represent a probability</li> <li>• Know that the sum of probabilities for all outcomes is 1</li> </ul> <p><b>Presentation of data</b> Key Skills:</p> <ul style="list-style-type: none"> <li>• Know the meaning of discrete data</li> <li>• Interpret and construct frequency tables</li> </ul>	<p><b>Understanding Risk</b> <b><u>Probability of a single event</u></b></p> <ul style="list-style-type: none"> <li>• Know that probability is a way of measuring likeliness</li> <li>• Know and use the vocabulary of probability</li> <li>• Understand the use of the 0-1 scale to measure probability</li> <li>• Assess likeliness and place events on a probability scale</li> <li>• List all the outcomes for an event</li> <li>• Identify equally likely outcomes</li> <li>• Work out theoretical probabilities for events with equally likely outcomes</li> <li>• Know how to represent a probability</li> <li>• Recognise when it is not possible to work out a theoretical probability for an event</li> <li>• Know that the sum of probabilities for all outcomes is 1</li> <li>• Apply the fact that the sum of probabilities for all outcomes is 1</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Probability</b>, Theoretical probability, <b>Event</b>, <b>Outcome</b>, Impossible, Unlikely, Evens chance, Likely, Certain, Equally likely, Mutually exclusive, Exhaustive, Possibility space and Experiment.</li> <li>• Outcome, Event, Experiment, Combined, Experiment, Frequency tree, Enumerate, Set, Venn diagram, Possibility space, Sample space, Equally likely outcomes, <b>Theoretical</b> and <b>Experimental</b> probability, Random, <b>Bias</b>, <b>Fairness</b> and Relative frequency.</li> <li>• <b>Data</b>, Categorical data, <b>Discrete</b> data, <b>Continuous</b> data, Grouped data, Quantitative, Qualitative, Table, Frequency table, <b>Frequency</b>, Histogram, Scale, Graph, Axis, Axes, Scatter graph (scatter diagram, scatter gram, scatter plot), Bivariate data, (Linear) Correlation, Positive <b>correlation</b> and Negative correlation.</li> <li>• <b>Average</b>, Spread, Consistency, Mean, Median, Mode, <b>Range</b>, Statistic, Statistics,</li> </ul>

<ul style="list-style-type: none"> <li>• Construct and interpret pictograms, bar charts, pie charts, tables and vertical line charts</li> </ul> <p><b>Measuring data</b></p> <p>Key Skills:</p> <ul style="list-style-type: none"> <li>• Understand the mean, mode and median as measures of typicality (or location)</li> <li>• Find the mean, median, mode and range of a set of data</li> <li>• Find the mean, median, mode and range from a frequency table</li> </ul>	<p><b>Understanding Risk 2</b></p> <p><b><u>Listing Outcomes</u></b></p> <ul style="list-style-type: none"> <li>• List all elements in a combination of sets using a Venn diagram</li> <li>• List outcomes of an event systematically</li> <li>• Use a table to list all outcomes of an event</li> <li>• List outcomes of an event using a grid (two-way table)</li> <li>• Use frequency trees to record outcomes of probability experiments</li> <li>• Make conclusions about probabilities based on frequency trees</li> <li>• Construct theoretical possibility spaces for combined experiments with equally likely outcomes</li> <li>• Calculate probabilities using a possibility space</li> </ul> <p><b><u>Theoretical and Experimental probability</u></b></p> <ul style="list-style-type: none"> <li>• Use theoretical probability to calculate expected outcomes</li> <li>• Use experimental probability to calculate expected outcomes</li> </ul> <p><b>Presentation of data</b></p> <p><b><u>Types of data</u></b></p> <ul style="list-style-type: none"> <li>• Know the meaning of continuous data</li> </ul>	<p>Approximate, Round, Estimate, Grouped frequency and Midpoint.</p> <p><b>Highlighted words <u>MUST</u></b> be explicitly taught, defined and recorded in student books as they are first met. Other listed words may be introduced verbally or written in a similar format.</p>
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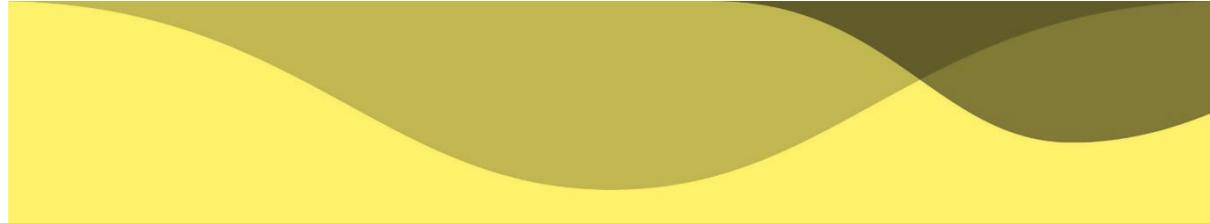
- Interpret a grouped frequency table for continuous data
- Construct a grouped frequency table for continuous data
- **Histograms**
- Construct histograms for grouped data with equal class intervals
- Interpret histograms for grouped data with equal class intervals
- Construct and use the horizontal axis of a histogram correctly
- **Scatter diagrams**
- Plot a scatter diagram of bivariate data
- Understand the meaning of 'correlation'
- Interpret a scatter diagram using understanding of correlation

**Measuring data**

- Find the modal class of set of grouped data
- Find the class containing the median of a set of data
- Find the midpoint of a class
- Calculate an estimate of the mean from a grouped frequency table
- Estimate the range from a grouped frequency table
- Analyse and compare sets of data
- Appreciate the limitations of different statistics (mean, median, mode, range)

	<ul style="list-style-type: none"> <li>• Choose appropriate statistics to describe a set of data</li> <li>• Justify choice of statistics to describe a set of data</li> </ul>	
<p><b>Challenge and Support:</b></p>	<ul style="list-style-type: none"> <li>• <b>World wide learning/ links to 21<sup>st</sup> century:</b></li> </ul>	<p><b>Cultural capital/ Industry/ Enrichment:</b></p>
<ul style="list-style-type: none"> <li>• Show me a pie chart representing the following information: Blue (30%), Red (50%), Yellow (the rest). And another. And another.</li> <li>• Always / Sometimes / Never: Bar charts are vertical</li> <li>• Always / Sometimes / Never: Bar charts, pie charts, pictograms and vertical line charts can be used to represent any data</li> <li>• Kenny says 'If two pie charts have the same section then the amount of data the section represents is the same in each pie chart.' Do you agree with Kenny? Explain your answer.</li> <li>• Show me a set of data with a mean (mode, median, range) of 5.</li> <li>• Always / Sometimes / Never. The mean is greater than the mode for a set of data</li> <li>• Always / Sometimes / Never. The mean is greater than the median for a set of data</li> <li>• Convince me that a set of data could have more than one mode.</li> <li>• What's the same and what's different: mean, mode, median, range?</li> </ul>	<ul style="list-style-type: none"> <li>• Statistics is the branch of mathematics that we use to analyse the things. It keeps us informed about, what is happening in the world around us. For example: weather forecasting, research, business, medicine and politics. Statistics enables students to appreciate how numerical methods are used in areas such as these.</li> </ul>	<ul style="list-style-type: none"> <li>• NRICH provides thousands of free online mathematics resources for ages 3 to 18 - completely free and available to all via their website (<a href="http://rich.maths.org/">rich.maths.org/</a>). These resources aim to:             <ul style="list-style-type: none"> <li>○ Enrich and enhance the experience of the mathematics curriculum for all learners</li> <li>○ Develop mathematical thinking and problem-solving skills</li> <li>○ Offer challenging, inspiring and engaging activities</li> </ul> </li> <li>• Functional Skills project</li> <li>• Norwich Castle trip – Averages, Budgeting</li> <li>• Careers Day – Design a play area, interpret financing, area, layout.</li> </ul>

Historical, Social, Moral, Spiritual, Cultural context:	Cross curricular links/ literacy/numeracy:	Common misconceptions:
<ul style="list-style-type: none"> <li>We live in an information rich world. Knowing how to construct accurate graphs and how to interpret data is important. Many graphs in newspapers are carefully designed to influence what we think by displaying the data in a particular way.</li> <li>Analysing large sets of data enables financial and insurance companies to make predictions about what might happen in the future. Young drivers have more accidents so their insurance costs more.</li> </ul>	<ul style="list-style-type: none"> <li>Science: science can provide the context for many basic statistics problems such as: calculation of average speed, distance and time; predictions of bacteria growth rates and understanding key factors effecting a healthy population.</li> <li>Geography: <b>statistics</b> on populations in different parts of the world at different periods, given as percentages and represented in a variety of forms (for example: Pie Charts).</li> <li>Literacy: Interpretation of written problems with conversion between these types of problems to pictorial and number representation.</li> <li>Correct use of specialised vocabulary.</li> </ul>	<ul style="list-style-type: none"> <li>Some pupils may think that the lines on a line graph are always meaningful</li> <li>Some pupils may think that each square on the grid used represents one unit</li> <li>Some pupils may confuse the fact that the sections of the pie chart total 100% and 360°</li> <li>Some pupils may not leave gaps between the bars of a bar chart</li> <li>If using a calculator some pupils may not use the '=' symbol (or brackets) correctly; e.g. working out the mean of 2, 3, 4 and 5 as <math>2 + 3 + 4 + 5 \div 4 = 10.25</math>.</li> <li>Some pupils may think that the range is a type of average</li> <li>Some pupils may think that a set of data with an even number of items has two values for the median, e.g. 2, 4, 5, 6, 7, 8 has a median of 5 and 6 rather than 5.5</li> <li>Some pupils may not write the data in order before finding the median.</li> </ul>
<b>Assessment timeline:</b>		
<ul style="list-style-type: none"> <li>Topic test assessments (BAM tests) are conducted at the end of each topic. These are roughly after 2 weeks per topic, but this may vary.</li> <li>Pre-checks are conducted at the start of the topic to test student prior knowledge. This informs lesson planning and delivery.</li> <li>Tracking assessments are conducted once a term with end of year formal exams, for reporting and checking cumulative knowledge.</li> <li>Testing data leads to discussions about setting, intervention groups and individual in-class intervention.</li> <li>All students have access to a wide range of resources to develop their understanding.</li> </ul>		



## Home learning

- Homework is set weekly for each group. This will often be via interactive websites with immediate feedback and support.
- Teachers have the autonomy to use whichever resource they wish within the criteria set for the topic.
- Students have access to lots of resources at home, including: Kerboodle, MyMaths, Mathswatch, PiXL Maths APP, PiXL Tmes Table App.

## Feedback

- Feedback is given after each topic test, tracking assessment and end of year exams. After tracking and end of year exams, this will include “Formative Marking” sheets which give feedback question by question to help support the students with priorities for further work.

### Length of unit (duration indicated in lessons)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
<b>Unit:</b>																													