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| **Topic/Skill** | **Definition/Tips** | **Example**  **Topic: Summarising Data** |
| 1. Types of Data | **Qualitative** Data – **non-numerical** data  **Quantitative** Data – **numerical** data  **Continuous** Data – data that can take **any numerical value** within a given range.  **Discrete** Data – data that can take **only specific values** within a given range. | Qualitative Data – eye colour, gender etc.  Continuous Data – weight, voltage etc.  Discrete Data – number of children, shoe size etc. |
| 2. Grouped Data | Data that has been **bundled in to categories**.  Seen in grouped frequency tables, histograms, cumulative frequency etc. |  |
| 3. Primary /Secondary Data | **Primary** Data – **collected yourself** for a specific purpose.  **Secondary** Data – **collected by someone else** for another purpose. | Primary Data – data collected by a student for their own research project.  Secondary Data – Census data used to analyse link between education and earnings. |
| 4. Mean | **Add** up the values and **divide** by how many values there are. | The mean of 3, 4, 7, 6, 0, 4, 6 is |
| 5. Mean from a Table | 1. Find the midpoints (if necessary)  2. Multiply Frequency by values or midpoints  3. Add up these values  4. Divide this total by the Total Frequency  If **grouped** data is used, the answer will be an **estimate**. |  |
| 6. Median Value | The **middle** value.  Put the data in order and find the middle one.  If there are **two middle values**, find the number half way between them by **adding them together and dividing by 2**. | Find the median of: 4, 5, 2, 3, 6, 7, 6  Ordered: 2, 3, 4, **5**, 6, 6, 7  Median = 5 |
| 7. Median from a Table | Use the formula to find the position of the median.  is the total frequency. | If the total frequency is 15, the median will be the position |
| 8. Mode /Modal Value | **Most** frequent/common.  Can have more than one mode (called bi-modal or multi-modal) or no mode (if all values appear once) | Find the mode: 4, 5, 2, 3, 6, 4, 7, 8, 4  Mode = 4 |
| 9. Range | **Highest value subtract the Smallest value**  Range is a ‘measure of spread’. The smaller the range the more consistent the data. | Find the range: 3, 31, 26, 102, 37, 97.  Range = 102-3 = 99 |
| 10. Outlier | A value that ‘**lies outside**’ most of the other values in a set of data.  An outlier is **much smaller or much larger** than the other values in a set of data. | Image result for outlier maths |
| 11. Lower Quartile | **Divides** the **bottom half** of the data into **two halves**.  **LQ = value** | Find the lower quartile of: 2, **3**, 4, 5, 6, 6, 7  value 🡪 3 |
| 12. Lower Quartile | **Divides** the **top half** of the data into **two halves**.  **UQ = value** | Find the upper quartile of: 2, 3, 4, 5, 6, **6**, 7  value 🡪 6 |
| 13. Interquartile Range | The **difference** between the **upper quartile and lower quartile.**  The **smaller** the **interquartile range**, the **more** **consistent** the data. | Find the IQR of: 2, 3, 4, 5, 6, 6, 7 |

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| **Topic/Skill** | **Definition/Tips** | **Example**  **Topic: Representing Data** |
| 1. Frequency Table | A record of **how often each value** in a set of data **occurs**. | Image result for math definition frequency table |
| 2. Bar Chart | Represents data as vertical blocks.  shows the **type** of data  shows the **frequency** for each type of data  Each bar should be the **same width**  There should be **gaps** between each bar  Remember to **label** each axis. | Image result for gcse bar charts |
| 3. Types of Bar Chart | **Compound/Composite** Bar Charts show data stacked on top of each other.  **Comparative/Dual** Bar Charts show data side by side. | Image result for compound bar charts  Image result for comparative bar charts |
| 4. Pie Chart | Used for showing **how data breaks down** **into** its constituent **parts**.  When drawing a pie chart, **divide 360° by the total frequency**. This will tell you how many degrees to use for the frequency of each category.  Remember to **label** the category that each sector in the pie chart represents. | Image result for pie chart gcse  If there are 40 people in a survey, then each person will be worth 360÷40=9° of the pie chart. |
| 5. Pictogram | Uses **pictures** or symbols to **show the value** of the data.  A pictogram must have a **key**. |  |
| 6. Line Graph | A graph that uses **points connected by straight lines** to show how data changes in values.  This can be used for **time series data**, which is a series of data points spaced over uniform time intervals in **time order**. | Line Graph |
| 7. Two Way Tables | A table that **organises data** around **two categories.**  Fill out the information step by step using the information given.  Make sure all the totals add up for all columns and rows. |  |
| 8. Box Plots | The minimum, lower quartile, median, upper quartile and maximum are shown on a box plot.  A box plot can be drawn independently or from a cumulative frequency diagram. | Students sit a maths test. The highest score is 19, the lowest score is 8, the median is 14, the lower quartile is 10 and the upper quartile is 17. Draw a box plot to represent this information. |
| 9. Comparing Box Plots | Write two sentences.  1. Compare the **averages** using the **medians** for two sets of data.  2. Compare the **spread** of the data using the **range or IQR** for two sets of data.  The smaller the range/IQR, the more consistent the data.  You must compare box plots **in the context of the problem**. | ‘On average, students in class A were more successful on the test than class B because their median score was higher.’  ‘Students in class B were more consistent than class A in their test scores as their IQR was smaller.’ |

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| **Topic/Skill** | **Definition/Tips** | **Example**  **Topic: Systematic Listing** |
| 1. Combination | A collection of things, where the **order does not matter**. | How many combinations of two ingredients can you make with apple, banana and cherry?  Apple, Banana  Apple, Cherry  Banana, Cherry  3 combinations |
| 2. Permutation | A collection of things, where the **order does matter**. | You want to visit the homes of three friends, Alex (A), Betty (B) and Chandra (C) but haven’t decided the order. What choices do you have?  ABC  ACB  BAC  BCA  CAB  CBA |
| 3. Permutations with Repetition | When something has different types, there are  **choices each time**.  Choosing of something that has different types, the permutations are: | How many permutations are there for a three-number combination lock?  10 numbers to choose from and we choose 3 of them 🡪  permutations. |
| 4. Permutations without Repetition | We have to **reduce the number of available choices each time**.  One you have chosen something, you cannot choose it again. | How many ways can you order 4 numbered balls? |
| 5. Factorial | The factorial symbol ‘!’ means to multiply a series of descending integers to 1.  Note: |  |
| 6. Product Rule for Counting | If there are  **ways of doing something** and  **ways of doing something else**, then there are  **ways of performing both**. | To choose one of and one of means to choose one of  The rule says that there are choices. |

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| **Topic/Skill** | **Definition/Tips**  **Topic: Scatter Graphs** | **Example** |
| 1. Correlation | Correlation between two sets of data means they are **connected** in some way. | There is correlation between temperature and the number of ice creams sold. |
| 2. Causality | When one variable **influences** another variable. | The more hours you work at a particular job (paid hourly), the higher your income from that job will be. |
| 3. Positive Correlation | As one value **increases** the other value **increases**. |  |
| 4. Negative Correlation | As one value **increases** the other value **decreases**. |  |
| 5. No Correlation | There is **no linear relationship** between the two. |  |
| 6. Strong Correlation | When two sets of data are **closely linked**. | Image result for strong weak correlation definition math |
| 7. Weak Correlation | When two sets of data have correlation, but are **not closely linked**. | Image result for strong weak correlation definition math |
| 8. Scatter Graph | A graph in which values of **two variables** are plotted along two axes to **compare** them and see if there is any **connection** between them. | Image result for scatter diagram |
| 9. Line of Best Fit | A **straight line** that **best represents the data** on a scatter graph. | Image result |
| 10. Outlier | A value that ‘lies outside’ most of the other values in a set of data.  An outlier is **much smaller or much larger** than the other values in a set of data. | Image result for outlier maths |

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| **Topic/Skill** | **Definition/Tips** | **Example**  **Topic: Real Life Graphs** |
| 1. Real Life Graphs | Graphs that are supposed to model some real-life situation.  The actual meaning of the values depends on the labels and units on each axis.  The **gradient** might have a contextual meaning.  The **y-intercept** might have a contextual meaning.  The **area** under the graph might have a contextual meaning. | A graph showing the cost of hiring a ladder for various numbers of days.  The gradient shows the cost per day. It costs £3/day to hire the ladder.  The y-intercept shows the additional cost/deposit/fixed charge (something not linked to how long the ladder is hired for). The additional cost is £7. |
| 2. Conversion Graph | A line graph to **convert one unit to another**.  Can be used to convert units (eg. miles and kilometres) or currencies ($ and £)  Find the value you know on one axis, read up/across to the conversion line and read the equivalent value from the other axis. | Image result for conversion graph |
| 3. Depth of Water in Containers | Graphs can be used to show how the depth of water changes as different shaped containers are filled with water at a constant rate. |  |

**Knowledge Organiser**