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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Basic Probability**  |
| 1. Probability | The **likelihood/chance** of something happening.Is expressed as a number **between 0 (impossible) and 1 (certain)**.Can be expressed as a fraction, decimal, percentage or in words (likely, unlikely, even chance etc.) | Image result for math definition probability |
| 2. Probability Notation | **P(A)** refers to the **probability that event A will occur**. | P(Red Queen) refers to the probability of picking a Red Queen from a pack of cards. |
| 3. Theoretical Probability | $$\frac{Number of Favourable Outcomes}{Total Number of Possible Outcomes}$$ | Probability of rolling a 4 on a fair 6-sided die = $\frac{1}{6}$. |
| 4. Relative Frequency | $$\frac{Number of Successful Trials}{Total Number of Trials}$$ | A coin is flipped 50 times and lands on Tails 29 times. The relative frequency of getting Tails = $\frac{29}{50}$. |
| 5. Expected Outcomes | To find the number of expected outcomes, **multiply** the **probability** by the **number of trials**. | The probability that a football team wins is 0.2 How many games would you expect them to win out of 40?$$0.2 × 40 = 8 games$$ |
| 6. Exhaustive | Outcomes are **exhaustive** if they **cover the entire range of possible outcomes**.The **probabilities** of an **exhaustive** set of outcomes **adds up to 1**. | When rolling a six-sided die, the outcomes 1, 2, 3, 4, 5 and 6 are exhaustive, because they cover all the possible outcomes. |
| 7. Mutually Exclusive | Events are mutually exclusive if they **cannot happen at the same time**.The **probabilities** of an exhaustive set of **mutually exclusive** events **adds up to 1**. | Examples of mutually exclusive events:- Turning left and right- Heads and Tails on a coinExamples of non mutually exclusive events:- King and Hearts from a deck of cards, because you can pick the King of Hearts |
| 8. Frequency Tree | A diagram showing how information is categorised into various categories.The **numbers** at the ends of branches tells us how often something happened (**frequency**).The **lines** connected the numbers are called **branches**. |  |
| 9. Sample Space | The **set of all possible outcomes** of an experiment. | Image result for sample space |
| 10. Sample | A **sample** is a small selection of items from a population.A sample is **biased** if individuals or groups from the population are not represented in the sample. | A sample could be selecting 10 students from a year group at school. |
| 11. Sample Size | The larger a sample size, the closer those probabilities will be to the true probability. | A sample size of 100 gives a more reliable result than a sample size of 10. |

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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Probability (Trees and Venns)**  |
| 1. Tree Diagrams | Tree diagrams show **all the possible outcomes** of an event and calculate their probabilities.**All branches must add up to 1 when adding downwards.**This is because the **probability of something not happening** is **1 minus the probability that it does happen**.**Multiply** going **across** a tree diagram.**Add** going **down** a tree diagram. |  |
| 2. Independent Events | The outcome of a **previous event does not influence/affect the outcome of a second event**. | An example of independent events could be replacing a counter in a bag after picking it. |
| 3. Dependent Events | The outcome of a **previous event does influence/affect the outcome of a second event**. | An example of dependent events could be not replacing a counter in a bag after picking it.‘Without replacement’ |
| 4. Probability Notation | **P(A)** refers to the **probability that event A will occur**.**P(A’)** refers to the **probability that event A will not occur**.**P(A** $∪ $**B)** refers to the **probability that event A or B or both will occur.****P(A** $∩ $**B)** refers to the **probability that both events A and B will occur.** | P(Red Queen) refers to the probability of picking a Red Queen from a pack of cards.P(Blue’) refers to the probability that you do not pick Blue.P(Blonde $∪$ Right Handed) refers to the probability that you pick someone who is Blonde or Right Handed or both.P(Blonde $∩$ Right Handed) refers to the probability that you pick someone who is both Blonde and Right Handed. |
| 5. Venn Diagrams | A Venn Diagram shows the **relationship between a group of different things** and how they overlap.You may be asked to shade Venn Diagrams as shown below and to the right. |  |
| 6. Venn Diagram Notation | $\in $ means ‘**element of a set**’ (a value in the set){ } means the collection of values in the set.$ξ $means the ‘**universal set**’ (all the values to consider in the question)**A’ means ‘not in set A’ (called complement)****A** $∪ $**B means ‘A or B or both’ (called Union)****A** $∩ $**B means ‘A and B (called Intersection)** | Set A is the even numbers less than 10.A = {2, 4, 6, 8}Set B is the prime numbers less than 10.B = {2, 3, 5, 7}A $∪ $B = {2, 3, 4, 5, 6, 7, 8}A $∩ $B = {2}  |
| 7. AND rule for Probability | When two events, A and B, are **independent**:$$P\left(A and B\right)=P(A)×P(B)$$ | What is the probability of rolling a 4 and flipping a Tails?$$P\left(4 and Tails\right)=P\left(4\right)×P\left(Tails\right)$$$$=\frac{1}{6}×\frac{1}{2}=\frac{1}{12}$$ |
| 8. OR rule for Probability | When two events, A and B, are **mutually exclusive**:$$P\left(A or B\right)=P\left(A\right)+P(B)$$ | What is the probability of rolling a 2 or rolling a 5?$$P\left(2 or 5\right)=P\left(2\right)+P\left(5\right)$$$$=\frac{1}{6}+\frac{1}{6}=\frac{2}{6}=\frac{1}{3}$$ |
| 9. Conditional Probability | The probability of an event A happening, **given that** event B has already happened.With conditional probability, check if the numbers on the second branches of a tree diagram changes. For example, if you have 4 red beads in a bag of 9 beads and pick a red bead on the first pick, then there will be 3 red beads left out of 8 beads on the second pick. | Image result for probability conditional tree diagram |

**Knowledge Organiser**