

## Topic: Probability (Trees and Venns)

Topic/Skill	Definition/Tips	Example
<p>1. Tree Diagrams</p>	<p>Tree diagrams show <b>all the possible outcomes</b> of an event and calculate their probabilities.</p> <p><b>All branches must add up to 1 when adding downwards.</b> This is because the <b>probability of something not happening is 1 minus the probability that it does happen.</b></p> <p><b>Multiply</b> going across a tree diagram.</p> <p><b>Add</b> going down a tree diagram.</p>	
<p>2. Independent Events</p>	<p>The outcome of a <b>previous event does not influence/affect the outcome of a second event.</b></p>	<p>An example of independent events could be <u>replacing</u> a counter in a bag after picking it.</p>
<p>3. Dependent Events</p>	<p>The outcome of a <b>previous event does influence/affect the outcome of a second event.</b></p>	<p>An example of dependent events could be not replacing a counter in a bag after picking it. 'Without replacement'</p>
<p>4. Probability Notation</p>	<p><b>P(A)</b> refers to the <b>probability that event A will occur.</b></p> <p><b>P(A')</b> refers to the <b>probability that event A will <u>not</u> occur.</b></p> <p><b>P(A ∪ B)</b> refers to the <b>probability that event A <u>or</u> B <u>or</u> both will occur.</b></p> <p><b>P(A ∩ B)</b> refers to the <b>probability that <u>both</u> events A and B will occur.</b></p>	<p>P(Red Queen) refers to the probability of picking a Red Queen from a pack of cards.</p> <p>P(Blue')</p> refers to the probability that you do not pick Blue. <p>P(Blonde ∪ Right Handed) refers to the probability that you pick someone who is Blonde or Right Handed or both.</p> <p>P(Blonde ∩ Right Handed) refers to the probability that you pick someone who is both Blonde and Right Handed.</p>
<p>5. Venn Diagrams</p>	<p>A Venn Diagram shows the <b>relationship between a group of different things</b> and how they overlap.</p> <p>You may be asked to shade Venn Diagrams as shown below and to the right.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p><math>A \cup B</math></p> <p>The Union 'A or B or Both'</p> </div> <div style="text-align: center;"> <p><math>A \cap B</math></p> <p>The Intersection 'A and B'</p> </div> </div>	<div style="display: grid; grid-template-columns: 1fr 1fr; gap: 10px;"> <div style="text-align: center;"> <p><math>A \cup B</math></p> </div> <div style="text-align: center;"> <p><math>A \cap B</math></p> </div> <div style="text-align: center;"> <p><math>(A \cap B)'</math></p> </div> <div style="text-align: center;"> <p><math>(A \cup B)'</math></p> </div> </div>

6. Venn Diagram Notation	<p>∈ means ‘<b>element of a set</b>’ (a value in the set)  { } means the collection of values in the set.  ξ means the ‘<b>universal set</b>’ (all the values to consider in the question)</p> <p><b>A’ means ‘not in set A’ (called complement)</b>  <b>A ∪ B means ‘A or B or both’ (called Union)</b>  <b>A ∩ B means ‘A and B (called Intersection)</b></p>	<p>Set A is the even numbers less than 10.  A = {2, 4, 6, 8}</p> <p>Set B is the prime numbers less than 10.  B = {2, 3, 5, 7}</p> <p>A ∪ B = {2, 3, 4, 5, 6, 7, 8}  A ∩ B = {2}</p>
7. AND rule for Probability	<p>When two events, A and B, are <b>independent</b>:</p> $P(A \text{ and } B) = P(A) \times P(B)$	<p>What is the probability of rolling a 4 and flipping a Tails?</p> $P(4 \text{ and Tails}) = P(4) \times P(\text{Tails})$ $= \frac{1}{6} \times \frac{1}{2} = \frac{1}{12}$
8. OR rule for Probability	<p>When two events, A and B, are <b>mutually exclusive</b>:</p> $P(A \text{ or } B) = P(A) + P(B)$	<p>What is the probability of rolling a 2 or rolling a 5?</p> $P(2 \text{ or } 5) = P(2) + P(5)$ $= \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$
9. Conditional Probability	<p>The probability of an event A happening, <b>given that</b> event B has already happened.</p> <p>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.</p>	