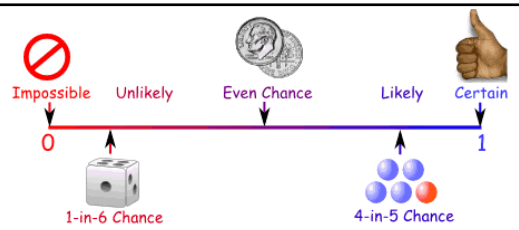
Topic/Skill	Definition/Tips	Example	Your Turn
Probability	The likelihood/chance of something happening. Is expressed as a fraction, decimal, percentage between 0 (impossible) and 1 (certain).		The chance of flipping a coin and getting heads is: The chance of flipping a coin and it flying into space is:
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.	I want to know about the favourite subjects of **all pupils in our school.** I conduct a survey asking girls in Year 11. What is wrong with my sample?
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.	Why don't survey's just ask everyone in the population?
Theoretical Probability	$\frac{Number\ of\ Favourable\ Outcomes}{Total\ Number\ of\ Possible\ Outcomes}$	Probability of rolling a 4 on a **fair** 6-sided die = $\frac{1}{6}$	The probability of rolling an even number on a fair 6-sided dice is:
Relative Frequency	$\frac{Number\ of\ Successful\ Trials}{Total\ Number\ of\ Trials}$	A coin is flipped 50 times and lands on Tails 29 times.	A dice is rolled 100 times and lands on 3 14 times. The relative frequency of getting 3 =

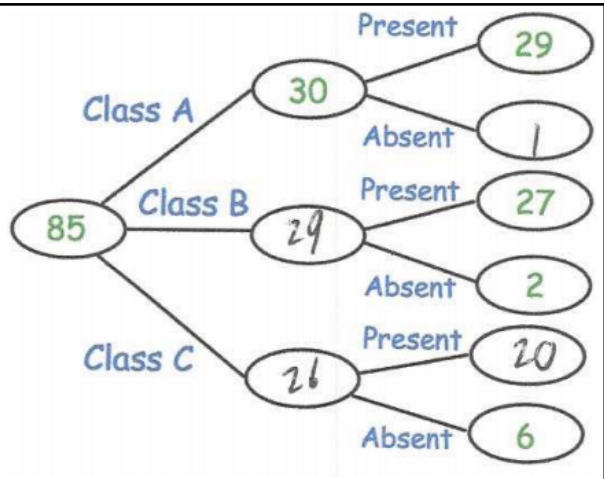
		The relative frequency of getting Tails = $\frac{29}{50}$.	
Exhaustive	Outcomes are exhaustive if they cover the entire range of possible outcomes. The probabilities of an exhaustive set of outcomes adds up to 1.	When rolling a six-sided die, the outcomes 1, 2, 3, 4, 5 and 6 are exhaustive, because they cover all the possible outcomes. $\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}=\frac{6}{6}=1$	When flipping a coin…
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 coin Examples of non mutually exclusive events: - King and Hearts from a deck of cards, because you can pick the King of Hearts	Put a tick or a cross for mutally exclusive (✔) and non mutually exclusive (**X**) events: Choosing a random pupil in a **high school survey:** - Getting someone with glasses or someone without glasses - Getting someone in Year 10 or in Year 11 - Getting a boy in Year 7 or a girl in Year 7
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 being late to	Tick the correct example: - Being in Year 7 and being in KS3

		school and eating a jacket potato for lunch	- Being a boy and liking maths
Dependent Events	The outcome of a previous event does influence/affect the outcome of a second event.	An example of dependent events could be being late to school and missing the train	Tick the correct example: - Flipping a coin and getting heads, and then flipping and getting heads again - Pulling a green marble out of a bag and then pulling another green marble
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? $0.2 \times 40 = 8\ games$	I roll a fair 6-sided dice 300 times. How many times would you expect to get a 5?
Probability Notation	P(A) refers to the probability that event A will occur. P(A') refers to the probability that event A will <u>not</u> 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.	All these are for fair 6-sided dice: P(6) refers to… P(1 ∪ 6)…

	P(A ∪ B) refers to the probability that event A <u>or</u> B <u>or</u> both will occur. P(A ∩ B) refers to the probability that <u>both</u> events A and B will occur.	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.	P(5')… P(3 ∩ 4)…
AND rule for Probability	When two events, A and B, are independent: $P(A\ and\ B) = P(A) \times P(B)$	What is the probability of rolling a 4 and flipping a Tails? $P(4\ and\ Tails) = P(4) \times P(Tails)$ $= \frac{1}{6} \times \frac{1}{2} = \frac{1}{12}$	What is the probability of rolling a 3 and flipping a Heads?
OR rule for Probability	When two events, A and B, are mutually exclusive: $P(A\ or\ B) = P(A) + P(B)$	What is the probability of rolling a 2 or rolling a 5? $P(2\ or\ 5) = P(2) + P(5)$ $= \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$	What is the probability of flipping and getting a Heads or a Tails?

<table>
<tr>
<td>Frequency Tree</td>
<td>A diagram showing how information is categorised into various categories.

The numbers at the ends of branches tells us how often something happened (frequency).

You can work out the missing numbers by making sure they add up.</td>
<td> 
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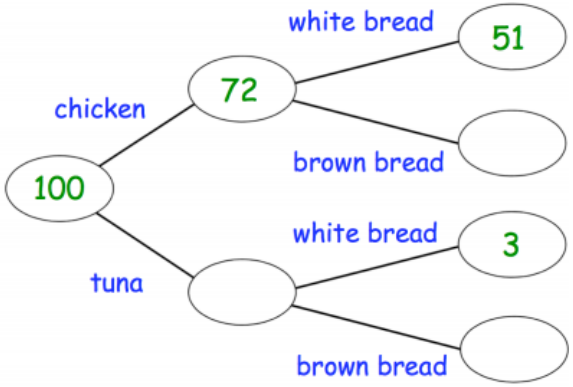
<td> 
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<td>Sample Space</td>
<td>The set of all possible outcomes of an experiment.

For example, the diagram shows all the different possible outcomes of rolling two dice and adding the scores.</td>
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<tr><th>+</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th></tr>
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<table>
<tr><th></th><th>Spinner 1</th><th></th><th></th></tr>
<tr><th>x</th><th>0</th><th>2</th><th>3</th></tr>
<tr><th>Spinner 2</th><th>1</th><td></td><td></td><td></td></tr>
<tr><th></th><th>3</th><td></td><td></td><td></td></tr>
<tr><th></th><th>5</th><td></td><td></td><td></td></tr>
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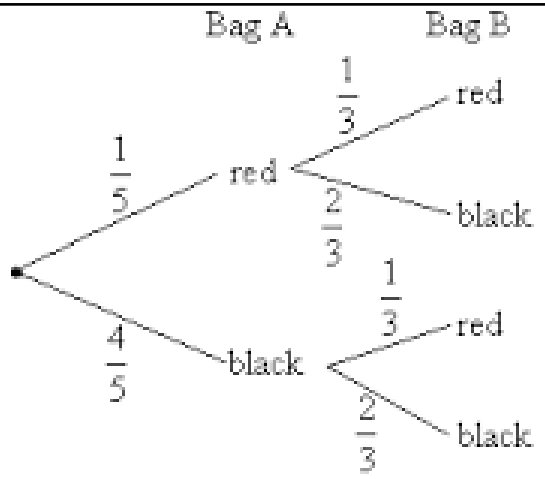
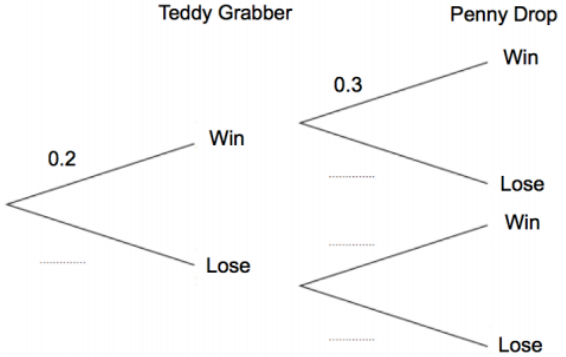
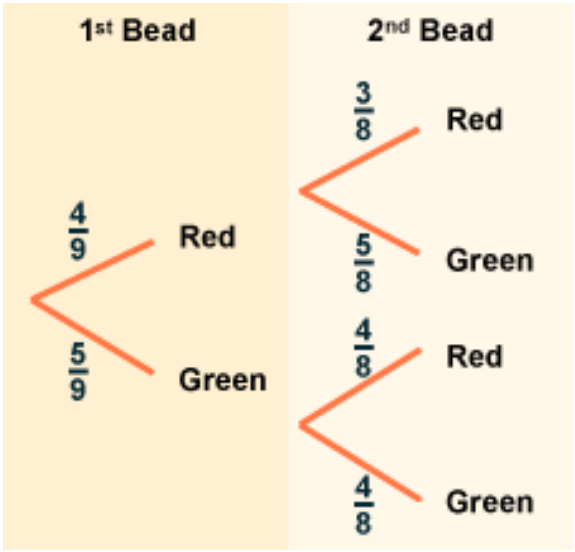
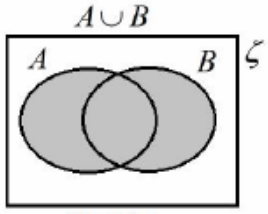
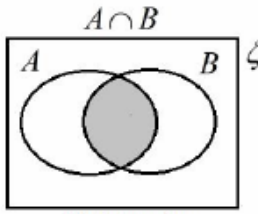
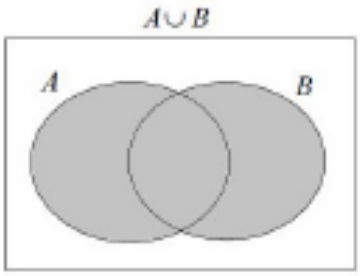
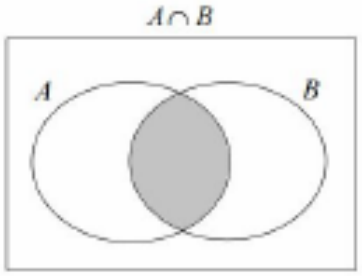
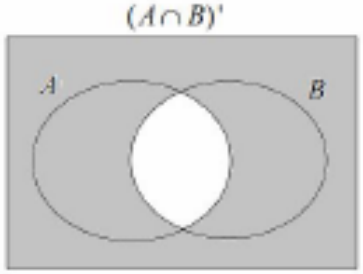
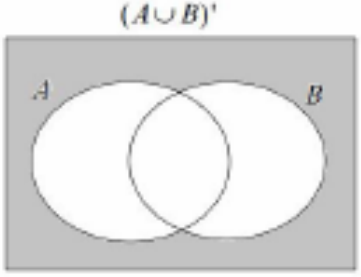
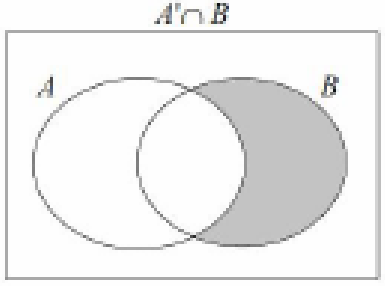
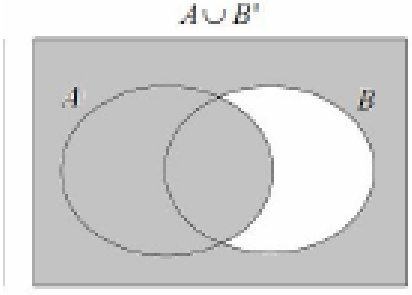
Tree Diagrams	Tree diagrams show all the possible outcomes of an event and calculate their probabilities. All branches must add up to 1 when adding downwards. This is because the probability of something not happening is 1 minus the probability that it does happen. They are **exhaustive.** Multiply going across a tree diagram to work out the probability of both events happening. Fractions or decimals, the process is the same	 The probability of getting a Black from Bag A and a Red from Bag B is $\frac{4}{5} \times \frac{1}{3} = \frac{4}{15}$	James goes to an arcade. He has one go on the Teddy Grabber. He has one go on the Penny Drop. The probability that he wins on the Teddy Grabber is 0.2. The probability that he wins on the Penny Drop is 0.3.  Find the probability that he wins both games:

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.**		Draw a tree diagram for a bag with 5 red marbles and 5 yellow marbles, with two counters picked:

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.  The Union 'A or B or Both'  The Intersection 'A and B'	     

Venn Diagram Notation	∈ 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}	Set A is the odd numbers less than 15. A = Set B is the square numbers less than 30. B = A ∪ B = A ∩ B = A' ∩ B =