



The Sutton Academy

# Knowledge Rich Curriculum Plan

Year 9 Prime – Probability

Lesson objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success	Feedback
To learn how to determine the probability of an event and expected frequency.	<ul style="list-style-type: none"> <li>Students will know how to calculate a missing probability from a list or table by adding and subtracting from 1.</li> <li>Students will know how to calculate a missing probability from a list or table by adding and subtracting from 1 where algebra is used or the probability of one event is two/three times the probability of another.</li> <li>Students will know how to use relative frequency to estimate the number of times an event will occur, for both experimental and theoretical probabilities.</li> <li>Students will know how to use the 'OR' rule to determine the probability of one or more outcomes and will know how to use this to find an estimate for the number of times an event occurs.</li> </ul>	<b>Probability</b> - the extent to which an event is likely to occur, often expressed as a fraction or decimal.	<ul style="list-style-type: none"> <li>Students will know how to write probabilities in words or fractions, decimals and percentages; for example, unlikely can be represented as 25%, 0.25 and <math>\frac{1}{4}</math>.</li> <li>Students will know how to find the probability of an event.</li> <li>Students will know that to calculate the probability of an event not occurring you need to subtract the given probabilities from 1.</li> </ul>	<p><b>Steps to Success – Probability of an event</b></p> <p>Step 1: Identify the number of times the particular event can happen.  Step 2: Identify the total number of possible outcomes.  Step 3: Use the formula below to calculate the probability of the event happening.</p> <p>Probability of an event happening = <math>\frac{\text{Number of ways it can happen}}{\text{total number of outcomes}}</math>  <i>N.B DO NOT simplify any fractions!</i></p> <p><b>Steps to Success – Probability tables</b></p> <p>If you consider <b>all possible outcomes</b> of an event (known as exhausting all options) then the probabilities must add up to 1.  To calculate the missing probability, calculate the total of the given probabilities and subtract from 1. It is important to read the question as sometimes it may tell you something extra.</p> <p><b>Steps to Success – Expected Frequency</b></p> <p>We can use relative frequency to calculate expected frequency, which is the number of times we expect an outcome to happen.  It is calculated as follows:  Expected frequency = probability <math>\times</math> number of trials</p>	
To learn how to list all the outcomes for events and use sample space diagrams.	<ul style="list-style-type: none"> <li>Students will know how to list all of the outcomes for events systematically to find probabilities.</li> <li>Students will know how to construct and use sample space diagrams to find probabilities.</li> <li>Students will know how to find a probability of one event given that another event has already occurred.</li> </ul>	<b>Systematically</b> – according to a fixed plan or system; methodically.	<ul style="list-style-type: none"> <li>Students need to know how to find the probability of an event.</li> </ul>	<p><b>Steps to Success – Listing Outcomes</b></p> <p><b>Step one:</b> Record all the outcomes for one of the objects. In the example of a single dice this would be 1,2,3,4,5 and 6.  <b>Step two:</b> With each outcome for the first object, record one of the outcomes for the second object. If the second item was a coin then the example outcomes could now say 1H, 2H, 3H, 4H, 5H and 6H.  <b>Step three:</b> Repeat the list of outcomes for all the <b>alternative</b> outcomes from the second object.</p> <p><b>Steps to Success – Sample Space Diagrams.</b></p> <p>Step 1 – Draw/complete the sample space diagram, ensuring that you carefully read what should be done. Look at the key words – Multiplied, the sum etc this determines what needs to be done.  Step 2 – Calculate the probabilities asked from the sample space diagram.</p>	
To learn how to use the product rule for counting	<ul style="list-style-type: none"> <li>Students will know how to determine the number of possible outcomes for an event using the product rule for counting.</li> </ul>	<b>Product</b> – in maths, a product is the result of multiplication	<ul style="list-style-type: none"> <li>Students need to know how to list the possible outcomes for an event systematically.</li> </ul>	<p><b>Steps to Success – Product Rule</b></p> <p>In order to find the total number of outcomes for two or more events, check if you will be using dependent or independent events.  <b>If your events are independent:</b>  Simply multiply each event together. This will give you the total number of outcomes for all events.  E.g. A restaurant offers 4 starters, 3 mains and 5 desserts.  <math>4 \times 3 \times 5 = 60</math>.  Therefore, there are 60 different three course meals that can be selected from the menu.  <b>If your events are dependent:</b></p>	

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				<p>Check the conditions for your independent events, if you are taking without replacement, remember to decrease the number of events <b>accordingly</b>. Similar to independent events, you will multiply your events together, making sure you decrease events where necessary. E.g. Sophie is going to give a card from a deck of card to three friends. How many different combinations of cards can there be? Sophie has 52 possible card to give the first friend, 51 possible cards for the second friend and 50 cards for the last friend. <math>52 \times 51 \times 50 = 13,260</math> Therefore, there are 13,260 possible combinations of cards that could be given out.</p>	
<p>To learn how to draw, complete and use two-way tables and frequency Trees.</p>	<ul style="list-style-type: none"> <li>Students will know how to complete a two-way table with given information.</li> <li>Students will know how to design and complete a two-way table from information.</li> <li>Students will know how to calculate probabilities from a two-way table.</li> <li>Students will know how to find a probability of one event given that another event has already occurred.</li> <li>Students will know how to complete a partially completed frequency tree and use it to find a frequency and/or calculate probabilities.</li> <li>Students will know how to complete a frequency tree from given information and use it to find a frequency and calculate probabilities.</li> <li>Students will know to complete frequency trees for more complex problems.</li> <li>Students will know how to find a probability of one event given that another event has already occurred.</li> </ul>	<p><b>Two-Way Table</b> – A two-way table is a way to show information about two different categories at the same time. You can use it to count how many times things happen and work out probabilities</p> <p><b>Frequency Tree</b> – a diagram used to show how a group of people/things can be broken up into certain categories</p>	<ul style="list-style-type: none"> <li>Students need to know how to find the probability of an event.</li> </ul>	<p><b>Steps to Success – Two way Tables</b></p> <p><b>Step 1</b> – Fill in any information that you know, some information may already be completed for you.</p> <p><b>Step 2</b> – Complete calculations (addition/subtraction) to find the missing values.</p> <p><b>Step 3</b> – The question may ask you to calculate the probability relating to the variables in the question.</p> <p><b>Steps to Success – Frequency Trees</b></p> <p><b>Step 1</b> – Read the information you have been given and put it into the appropriate part of the diagram</p> <p><b>Step 2</b> – Using the information in the table and/or any information in the question complete an appropriate calculation (addition or subtraction) to find the missing values.</p> <p><b>Step 3</b> – Check if the question is asking for anything else, such as a probability.</p>	
<p>To learn how to draw and use a tree diagram for independent events.</p>	<ul style="list-style-type: none"> <li>Students will know how to show given information on a probability tree diagram.</li> <li>Students will know how to complete probabilities using both decimals and fractions to represent probabilities.</li> <li>Students will know construct a probability tree for multiple events.</li> <li>Students will know how to use a probability tree diagram to represent outcomes of combined independent events (with replacement).</li> <li>Students will know how to use tree diagrams to calculate the probability of two combined independent events by multiplying across the branches (this can either be fractions or decimals).</li> </ul>	<p><b>Independent</b> – not subject to control by anything else</p> <p><b>Independent Events</b> – Two events are independent if one happening does not affect the chance of the other happening.</p>	<ul style="list-style-type: none"> <li>Students need to know how to multiply decimals.</li> <li>Students need to know how to multiply fractions.</li> </ul>	<p><b>Steps to Success – Drawing and Using Probability Trees</b></p> <p><b>Step 1:</b> Draw your first branches, you need as many lines as there are outcomes for the event.</p> <p><b>Step 2:</b> Write each of the different outcomes at the end of each of the branches.</p> <p><b>Step 3:</b> Write the probabilities on the branches for the tree diagram. Remember the probabilities of all outcomes should add up to 1.</p> <p><b>Step 4:</b> Draw out the branches for the next event and assign the probabilities in the same way.</p> <p><b>Step 4:</b> Identify the outcome you want to find the probability of list all the possible ways that the outcome can be achieved.</p> <p><b>Step 5:</b> Calculate the probability for each way that it can be achieved by multiplying the probabilities on the branches.</p> <p><b>Step 6:</b> If there was more than one way of achieving the outcome then add all of the probabilities together once you have calculated them all</p>	

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To learn how to draw and use a tree diagram for dependent events.	<ul style="list-style-type: none"> <li>Students will understand how and why the outcome of one event can impact the outcome of a subsequent event.</li> <li>Students will know how to complete and construct probability trees for dependent events.</li> <li>Students will know how to use probability trees to calculate the probabilities of combined events for dependent events.</li> </ul>	<p><b>Dependent</b> – Dependent means relying on or needing something else to happen or exist</p> <p><b>Conditional/ Dependent Events</b> – Two events are dependent if one happening affects the chance of the other happening.</p>	<ul style="list-style-type: none"> <li>Students will need to know how to draw and use a probability tree.</li> </ul>	<p><b>Steps to Success – Dependent Probability Trees</b></p> <p><b>Step 1:</b> Draw the appropriate number of branches for the first event and write one of the different possible outcomes at the end of each branch. There should be one branch for each outcome.</p> <p><b>Step 2:</b> Draw the appropriate number of branches from each of the initial branches for the second event and write one of the different possible outcomes at the end of each branch. If there are more than two events you will need to continue adding branches to the end of each outcome until you have represented all events.</p> <p><b>Step 3:</b> Assign your probabilities to the first branches you drew, taking care to read the question carefully</p> <p><b>Step 4:</b> Check whether the events are <b>independent, dependent</b> or <b>mutually exclusive</b></p> <p><b>Step 5:</b> Assign the appropriate probabilities to the branches for the next event (and any subsequent events). Remember, if the events are dependent you will need to adjust the probabilities to take this into account.</p>	
To learn how to create and use a Venn diagram to determine probabilities.	<ul style="list-style-type: none"> <li>Students will know how to put information into a Venn diagram and use it to determine probabilities.</li> <li>Students will know how to construct appropriate Venn diagrams to sort information.</li> <li>Students will know how to interpret a Venn diagram to find probabilities.</li> </ul>	<p><b>Venn Diagram</b> - A Venn diagram shows how groups (called sets) overlap. It helps us sort things and work out probabilities by showing what items belong to which group</p> <p><b>Intersection (<math>A \cap B</math>)</b> – The intersection means the part where two groups overlap. It shows the items that are in both groups.</p>	<ul style="list-style-type: none"> <li>Students need know how to sort information into a simple Venn diagram.</li> </ul>	<p><b>Steps to Success: Solving Venn Diagram Problems</b></p> <p><b>Step 1: Read the Problem Carefully</b> Understand what each circle in the Venn diagram represents and what information is given.</p> <p><b>Step 2: identify the Sets and Universal Set</b></p> <ul style="list-style-type: none"> <li>Note the total number of elements (universal set).</li> <li>Label each set (circle) clearly.</li> </ul> <p><b>Step 3: List Given Information</b> Write down all the numbers or facts given about each set, including overlaps and totals.</p> <p><b>Step 4: Fill in the Overlaps First</b> Start by placing numbers in the intersection(s) of the sets, as these are often provided or can be found first.</p> <p><b>Step 5: Fill in the Remaining Sections</b> Use the information about totals and overlaps to find the numbers in each exclusive part of the sets.</p> <p><b>Step 6: Calculate the Outside Section</b> If there is a universal set, subtract the sum of all parts inside the Venn diagram from the total to find elements outside all sets.</p> <p><b>Step 7: Double Check Totals</b> Make sure the numbers in the diagram add up correctly to given totals and the universal set.</p> <p><b>Step 8: Answer the Questions</b> Use the completed Venn diagram to answer whatever the problem asks.</p>	
To learn how to interpret and use set notation	<ul style="list-style-type: none"> <li>Students will know how to use very simple set notation to describe parts of the Venn diagram e.g. (A), (B), (A'), (B').</li> </ul>	<p><b>Union (<math>A \cup B</math>)</b> - The union means everything in A or B or both. It includes all the items</p>	<ul style="list-style-type: none"> <li>Students should know how to find the probability from a Venn diagram.</li> </ul>		

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	<ul style="list-style-type: none"> <li>Students will know how to use union (<math>A \cup B</math>) and intersection (<math>A \cap B</math>) notation.</li> <li>Students will know how to find probabilities using union and intersection notation.</li> </ul>	<p>that are in either group or in both.</p> <p><b>Complement (<math>A'</math>)</b> - The complement means everything not in a group. <math>A'</math> means everything not in A.</p>			

Mini Assessment 11