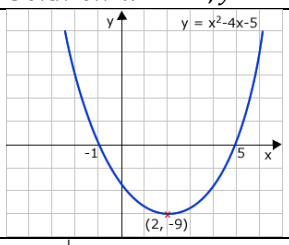
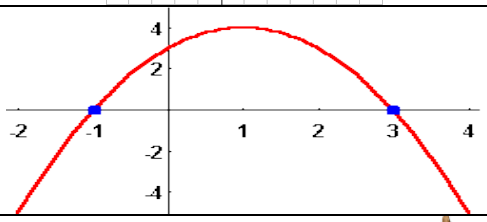
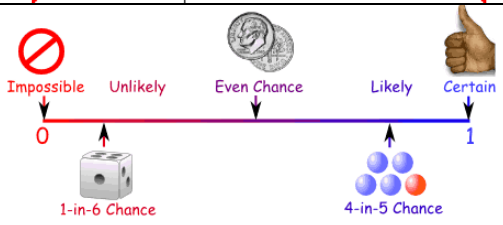
Year 9 Strand 4

Topic/Skill	Definition/Tips	Example
Solving Simultaneous Equations (by Elimination)	1. **Balance** the **coefficients** of one of the variables. 2. **Eliminate** this variable by adding or subtracting the equations (**Same Sign Subtract, Different Sign Add**) 3. **Solve** the linear equation you get using the other variable. 4. **Substitute** the value you found back into one of the previous equations. 5. **Solve** the equation you get. 6. **Check** that the two values you get satisfy both of the original equations.	$5x + 2y = 9$ $10x + 3y = 16$ Multiply the first equation by 2. $10x + 4y = 18$ $10x + 3y = 16$ Same Sign Subtract (+10x on both) $y = 2$ Substitute $y = 2$ in to equation. $5x + 2 \times 2 = 9$ $x = 1$ Solution: $x = 1, y = 2$
Solving Simultaneous Equations (by Substitution)	1. **Rearrange** one of the equations into the form $y = \ldots$ or $x = \ldots$ 2. **Substitute** the right-hand side of the rearranged equation into the other equation. 3. Expand and **solve** this equation. 4. **Substitute** the value into the $y = \ldots$ or $x = \ldots$ equation. 5. **Check** that the two values you get satisfy both of the original equations.	$y - 2x = 3$ $3x + 4y = 1$ Rearrange: $y - 2x = 3 \rightarrow y = 2x + 3$ Substitute: $3x + 4(2x + 3) = 1$ Solve: $3x + 8x + 12 = 1$ $11x = -11$ $x = -1$ Substitute: $y = 2 \times -1 + 3$ $y = 1$ Solution: $x = -1, y = 1$
Quadratic Graph	A '**U-shaped**' curve called a **parabola**. The equation is of the form $y = ax^2 + bx + c$, where a, b and c are numbers, $a \neq 0$. If $a < 0$, the parabola is **upside down**.	
Roots of a Quadratic	A root is a **solution**. The roots of a quadratic are the **x-intercepts of the quadratic graph**.	
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.)	

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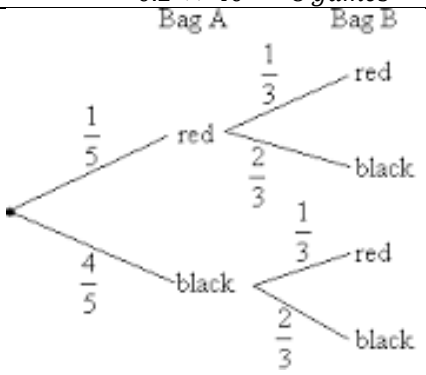
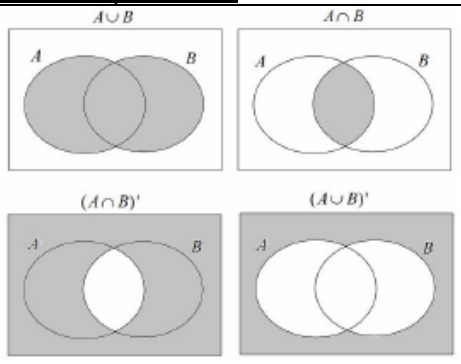
Probability Notation	**P(A)** refers to the **probability that event A will occur**.	P(Red Queen) refers to the probability of picking a Red Queen from a pack of cards.
Theoretical Probability	$\frac{\textbf{Number of Favourable Outcomes}}{\textbf{Total Number of Possible Outcomes}}$	Probability of rolling a 4 on a fair 6-sided die = $\frac{1}{6}$.
Relative Frequency	$\frac{\textbf{Number of Successful Trials}}{\textbf{Total Number of Trials}}$	A coin is flipped 50 times and lands on Tails 29 times. The relative frequency of getting Tails = $\frac{29}{50}$.
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? $0.2 \times 40 = 8\ games$
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.	
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 <u>replacing</u> a counter in a bag after picking it.
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. <u>'Without replacement'</u>
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.	
Venn Diagram Notation	∈ means '**element of a set**' (a value in the set) { } means the collection of values in the set.	Set A is the even numbers less than 10. A = {2, 4, 6, 8}

	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 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}