MATHS - YEAR 11 Foundation Tier				RAG
	Whole year:			
1.	**Integer**	A **whole number** that can be positive, negative or zero.	$-3, 0, 92$	
2.	**Factor**	A number that **divides exactly** into another number without a remainder. It is useful to write factors in pairs.	The factors of 18 are: $1, 2, 3, 6, 9, 18$ The factor pairs of 18 are: $1, 18$ $2, 9$ $3, 6$	
3.	**Multiple**	The result of multiplying a number by an integer. The **times tables** of a number.	The first five multiples of 7 are: $7, 14, 21, 28, 35$	
4.	**Highest Common Factor (HCF)**	The **biggest** number that **divides exactly** into two or more numbers.	The HCF of 6 and 9 is 3 because it is the biggest number that divides into 6 and 9 exactly.	
5.	**Lowest Common Multiple (LCM)**	The **smallest** number that is in the **times tables** of each of the numbers given.	The LCM of 3, 4 and 5 is 60 because it is the smallest number in the 3, 4 and 5 times tables.	
6.	**Prime Number**	A number that has exactly two factors: one and itself.	The first ten prime numbers are: 2, 3, 5, 7, 11, 13, 17, 19, 23 and 29	
7.	**Prime Factor**	A factor which is a prime number.	The prime factors of 18 are: 2 ,3 Prime factorisation of 18 is 2 x 3 x 3	

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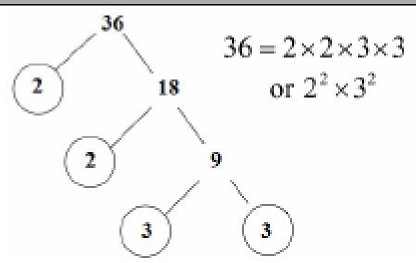
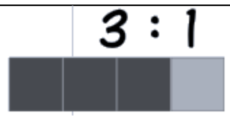
8.	**Product of Prime Factors**	Finding out which **prime numbers multiply** together to make the **original** number. Use a **prime factor tree.** Also known as 'prime factorisation'.		
9.	**Recurring**	A decimal number that has **digits that repeat forever.** The part that repeats is usually shown by placing a dot above the digit that repeats, or dots over the first and last digit of the repeating Pattern.	$\frac{1}{3} = 0.333\ldots = 0.\dot{3}$ $\frac{1}{7} = 0.142857142857\ldots$ $= 0.\dot{1}4285\dot{7}$ $\frac{77}{600} = 0.128333\ldots = 0.128\dot{3}$	
10.	**Ratio**	Ratio compares the size of **one part** to **another part.** Written using the ':' symbol.		
11.	**Proportion**	Proportion compares the size of **one part** to the size of the **whole.** Usually written as a fraction.	In a class with 13 boys and 9 girls, the proportion of boys is $\frac{13}{22}$ and the proportion of girls is $\frac{9}{22}$	
12.	**Simplifying Ratios**	**Divide** all parts of the ratio by a **common factor.**	5 : 10 = 1 : 2 (divide both by 5) 14 : 21 = 2 : 3 (divide both by 7)	
13.	**Ratios in the form 1 : n or n : 1**	**Divide** both parts of the ratio by one of the numbers to make **one part equal 1.**	5 : 7 = 1 : $\frac{7}{5}$ in the form 1 : n 5 : 7 = $\frac{5}{7}$: 1 in the form n : 1	
14.	**Sharing in a Ratio**	**1. Add** the total parts of the ratio. **2. Divide** the amount to be shared by this value to find the value of one part. **3. Multiply** this value by each part of the ratio. Use only if you **know the total.**	Share £60 in the ratio 3 : 2 : 1. 3 + 2 + 1 = 6 60 ÷ 6 = 10 3 x 10 = 30, 2 x 10 = 20, 1 x 10 = 10 £30 : £20 : £10	

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15.	**Proportional Reasoning**	Comparing two quantities and identifying what it has been multiplied by.	**7 bunches of flowers contain 42 flo** **How many flowers are in 1 bunch?** ÷7 — 7 bunches — 42 flowe 1 bunch — 6 flowe	
16.	**Unitary Method**	Finding the **value of a single unit** and then finding the necessary value by **multiplying** the single unit value.	3 cakes require 450g of sugar to make. Find how much sugar is needed to make 5 cakes. 3 cakes = 450g So 1 cake = 150g (÷ by 3) So 5 cakes = 750 g (x by 5)	
17.	**Ratio already shared**	Find what **one part** of the ratio is worth using the **unitary method.**	Money was shared in the ratio 3:2:5 between Ann, Bob and Cat. Given that Bob had £16, found out the total amount of money shared. £16 = 2 parts So £8 = 1 part 3 + 2 + 5 = 10 parts, so 8 x 10 = £80	
18.	**Best Buys**	Find the **unit cost** by **dividing** the **price by the quantity**. The **lowest** number is the best value.	8 cakes for £1.28 → 16p each (÷by 8) 13 cakes for £2.05 → 15.8p each (÷by 13) Pack of 13 cakes is best value.	
19.	**Percentage Change**	$\frac{\boldsymbol{Difference}}{\boldsymbol{Original}} \times \mathbf{100\%}$	A games console is bought for £200 and sold for £250. % change = $\frac{50}{200} \times 100 = 25\%$	
20.	**Fractions to Decimals**	**Divide the numerator by the denominator** using the bus stop method.	$\frac{3}{8} = 3 \div 8 = 0.375$	
21.	**Decimals to Fractions**	**Write as a fraction** over 10, 100 or 1000 and simplify.	$0.36 = \frac{36}{100} = \frac{9}{25}$	

John 10:10

I came to give life – life in all its fullness
High Expectations – No Excuses

Sapere Aude

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22.	**Percentages to Decimals**	**Divide by 100.**	$8\% = 8 \div 100 = 0.08$	
23.	**Decimals to Percentages**	**Multiply by 100.**	$0.4 = 0.4 \times 100\% = 40\%$	
24.	**Fractions to Percentages**	Percentage is just a fraction out of 100. **Make the denominator 100 using equivalent fractions.** When the denominator doesn't go in to 100, use a calculator and **multiply the fraction by 100.**	$\frac{3}{25} = \frac{12}{100} = 12\%$ $\frac{9}{17} \times 100 = 52.9\%$	
25.	**Percentages to Fractions**	Percentage is just a fraction out of 100. **Write the percentage over 100** and simplify.	$14\% = \frac{14}{100} = \frac{7}{50}$	
26.	**Increase or Decrease by a Percentage**	Non-calculator: **Find the percentage** and **add** or **subtract** it from the **original** amount. Calculator: Find the **percentage multiplier** and multiply.	Increase 500 by 20% (Non Calc): 10% of 500 = 50 so 20% of 500 = 100 500 + 100 = 600 Decrease 800 by 17% (Calc): 100%-17%=83% 83% ÷ 100 = 0.83 0.83 x 800 = 664	
27.	**Percentage Multiplier**	The **number** you **multiply** a quantity by to **increase or decrease** it by a **percentage.**	The multiplier for increasing by 12% is 1.12 The multiplier for decreasing by 12% is 0.88 The multiplier for increasing by 100% is 2.	

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28.	**Reverse Percentage**	Find the **correct percentage given in the question**, then work backwards to **find 100%.** Look out for words like **'before'** or **'original'.**	A jumper was priced at £48.60 after a 10% reduction. Find its original price. 100% - 10% = 90% 90% = £48.60 1% = £0.54 100% = £54	
29.	**Fraction**	A mathematical expression representing the **division** of one integer by another. Fractions are written as **two numbers separated by a horizontal line.**	$\frac{2}{7}$ is a 'proper' fraction. $\frac{9}{4}$ is an 'improper' or 'top-heavy' fraction.	
30.	**Numerator**	The **top** number of a fraction.	In the fraction $\frac{3}{5}$, 3 is the numerator.	
31.	**Denominator**	The **bottom** number of a fraction.	In the fraction $\frac{3}{5}$, 5 is the denominator.	
32.	**Unit Fraction**	A fraction where the **numerator is one** and the denominator is a positive integer.	$\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ *etc.* are examples of unit fractions.	
33.	**Mixed Number**	A number formed of both an **integer part** and a **fraction part.**	$3\frac{2}{5}$ is an example of a mixed number.	
34.	**Simplifying Fractions**	**Divide the numerator and denominator by the highest common factor.**	$\frac{20}{45}=\frac{4}{9}$	
35.	**Equivalent Fractions**	Fractions which represent the **same value.**	$\frac{2}{5}=\frac{4}{10}=\frac{20}{50}=\frac{60}{150}$ *etc.*	

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36.	**Comparing Fractions**	To compare fractions, they each need to be rewritten so that they have a **common denominator**. **Ascending** means **smallest to biggest**. **Descending** means **biggest to smallest**.	Put in to ascending order : $\frac{3}{4}, \frac{2}{3}, \frac{5}{6}, \frac{1}{2}.$ Equivalent: $\frac{9}{12}, \frac{8}{12}, \frac{10}{12}, \frac{6}{12}$ Correct order: $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{5}{6}$	
37.	**Fraction of an Amount**	**Divide** by the **bottom**, **times** by the **top.**	Find $\frac{2}{5}$ of £60 $60 \div 5 = 12$ $12 \times 2 = 24$	
38.	**Adding or Subtracting Fractions**	Find the **LCM of the denominators** to find a common denominator. Use equivalent fractions to change each fraction to the **common denominator**. Then just **add or subtract the numerators** and keep the **denominator the same.**	$\frac{2}{3} + \frac{4}{5}$ Multiples of 3: 3, 6, 9, 12, **15**.. Multiples of 5: 5, 10, **15**.. LCM of 3 and 5 = 15 $\frac{2}{3} = \frac{10}{15}$ $\frac{4}{5} = \frac{12}{15}$ $\frac{10}{15} + \frac{12}{15} = \frac{22}{15} = 1\frac{7}{15}$	
39.	**Multiplying Fractions**	**Multiply** the **numerators** together and **multiply** the **denominators** together.	$\frac{3}{8} \times \frac{2}{9} = \frac{6}{72} = \frac{1}{12}$	

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40.	**Dividing Fractions**	**‘Keep it, Flip it, Change it - KFC’** Keep the first fraction the same. Flip the second fraction upside down. Change the divide to a multiply. Multiply by the reciprocal of the second fraction.	$\frac{3}{4} \div \frac{5}{6} = \frac{3}{4} \times \frac{6}{5} = \frac{18}{20} = \frac{9}{10}$	
41.	**Rounding**	To make a number simpler but keep its value close to what it was. If the **digit to the right** of the rounding digit is **less than 5, round down.** If the **digit to the right** of the rounding digit is **5 or more, round up.**	74 rounded to the nearest ten is 70, because 74 is closer to 70 than 80. 152,879 rounded to the nearest thousand is 153,000.	
42.	**Decimal Place**	The **position** of a digit to the **right of a decimal point**.	In the number 0.372, the 7 is in the second decimal place. 0.372 rounded to two decimal places is 0.37, because the 2 tells us to round down. Careful with money - don’t write £27.4, instead write £27.40	
43.	**Significant Figure**	The significant figures of a number are the digits which **carry meaning** (ie. are significant) to the size of the number. The **first significant figure** of a number **cannot be zero**. In a number with a decimal, trailing zeros are not significant.	In the number 0.00821, the first significant figure is the 8. In the number 2.740, the 0 is not a significant figure. 0.00821 rounded to 2 significant figures is 0.0082. 19357 rounded to 3 significant figures is 19400. We need to include the two zeros at the end to keep the digits in the same place value columns.	

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44.	**Estimate**	To find something **close to the correct answer**.	An estimate for the height of a man is 1.8 metres.	
45.	**Approximation**	When using approximations to estimate the solution to a calculation, **round each number in the calculation to 1 significant figure.** ≈ means 'approximately equal to'	$\frac{348+692}{0.526} \approx \frac{300+700}{0.5} = 2000$ 'Note that dividing by 0.5 is the same as multiplying by 2'	
46.	**Square Number**	The number you get when you **multiply a number by itself**.	**1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225…** $9^2 = 9 \times 9 = 81$	
47.	**Square Root**	The **number you multiply by itself** to get another number. The reverse process of squaring a number.	$\sqrt{36} = 6$ because $6 \times 6 = 36$	
48.	**Solutions to $x^2 = ….$**	**Equations** involving **squares** have **two solutions**, one **positive** and one **negative**.	Solve $x^2 = 25$ $x = 5 \text{ or } x = -5$ This can also be written as $x = \pm 5$	
49.	**Cube Number**	The number you get when you **multiply a number by itself and itself again**.	1, 8, 27, 64, 125… $2^3 = 2 \times 2 \times 2 = 8$	
50.	**Cube Root**	The **number you multiply by itself and itself again** to get another number. The reverse process of cubing a number.	$\sqrt[3]{125} = 5$ because $5 \times 5 \times 5 = 125$	

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51.	**Powers of…**	Powers are the number of times a number is multiplied by itself.	The powers of 3 are: $3^1 = 3$ $3^2 = 9$ $3^3 = 27$ $3^4 = 81$ etc.	
52.	**Multiplication Index Law**	When **multiplying** with the same base (number or letter), **add the powers.** $\boldsymbol{a^m \times a^n = a^{m+n}}$	$7^5 \times 7^3 = 7^8$ $a^{12} \times a = a^{13}$ $4x^5 \times 2x^8 = 8x^{13}$	
53.	**Division Index Law**	When **dividing** with the same base (number or letter), **subtract the powers.** $\boldsymbol{a^m \div a^n = a^{m-n}}$	$15^7 \div 15^4 = 15^3$ $x^9 \div x^2 = x^7$ $20a^{11} \div 5a^3 = 4a^8$	
54.	**Brackets Index Laws**	When raising a power to another power, multiply the powers together. $\boldsymbol{(a^m)^n = a^{mn}}$	$(y^2)^5 = y^{10}$ $(6^3)^4 = 6^{12}$ $(5x^6)^3 = 125x^{18}$	
55.	**Notable Powers**	$\boldsymbol{p = p^1}$ $\boldsymbol{p^0 = 1}$	$99999^0 = 1$	
56.	**Standard Form**	$\boldsymbol{A \times 10^b}$ $where\ \boldsymbol{1 \le A < 10,}$ $\boldsymbol{b = integer}$	8400 = 8.4 x 10^3 0.00036 = 3.6 x 10^{-4}	
57.	**Multiplying or Dividing with Standard Form**	Multiply: **Multiply the numbers** and **add the powers.** Divide: **Divide the numbers** and **subtract the powers.**	$(1.2 \times 10^3) \times (4 \times 10^6)$ $= 8.8 \times 10^9$ $(4.5 \times 10^5) \div (3 \times 10^2)$ $= 1.5 \times 10^3$	

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58.	**Adding or Subtracting with Standard Form**	**Convert** in to **ordinary** numbers, **calculate** and then **convert back** in to standard form	$2.7 \times 10^4 + 4.6 \times 10^3$ $= 27000 + 4600 = 31600$ $= 3.16 \times 10^4$	
59.	**Expression**	A mathematical statement written using symbols, numbers or letters.	$3x + 2$ or $5y^2$	
60.	**Equation**	A statement showing that two expressions are equal.	$2y - 17 = 15$	
61.	**Identity**	An equation that is true for all values of the variables An identity uses the symbol: ≡	$2x \equiv x + x$	
62.	**Formula**	Shows the relationship between two or more variables.	Area of a rectangle = length x width or A= LxW	
63.	**Expand**	To expand a bracket, multiply each term in the bracket by the expression outside the bracket.	$3(x+7) = 3x + 21$	
64.	**Factorise**	The reverse of expanding. Factorising is writing an expression as a product of terms by 'taking out' a common factor.	$6x - 15 = 3(2x - 5)$, where 3 is the common factor.	
65.	**Solve**	To find the answer/value of something. Use inverse operations on both sides of the equation (balancing method) until you find the value for the letter.	Solve $2x - 3 = 7$ Add 3 on both sides $2x = 10$ Divide by 2 on both sides $x = 5$	
66.	**Inverse**	Opposite	The inverse of addition is subtraction. The inverse of multiplication is division.	

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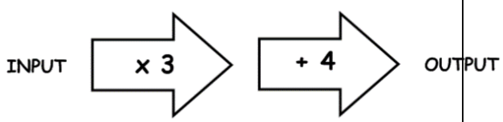
67.	**Substitution**	Replace letters with numbers. Be careful of $5x^2$. You need to square first, then multiply by 5.	$a = 3, b = 2\ and\ c = 5.$ Find: 1. $2a = 2 \times 3 = 6$ 2. $3a - 2b = 3 \times 3 - 2 \times 2 = 5$ 3. $7b^2 - 5 = 7 \times 2^2 - 5 = 23$	
68.	**Simplifying Expressions**	Collect 'like terms'. Be careful with negatives. x^2 and x are not like terms.	$2x + 3y + 4x - 5y + 3$ $= 6x - 2y + 3$ $3x + 4 - x^2 + 2x - 1$ $= 5x - x^2 + 3$	
69.	**x times x**	The answer is x^2 not $2x$.	Squaring is multiplying by itself, not by 2.	
70.	**$p \times p \times p$**	The answer is p^3 not $3p$.	If p = 2, then p^3 = 2x2x2=8, not 2x3 = 6	
71.	**$p + p + p$**	The answer is 3p not p^3.	If p = 2, then 2+2+2 = 6, not $2^3 = 8$	
72.	**Writing Formulae**	Substitute letters for words in the question.	Bob charges £3 per window and a £5 call out charge. $C = 3N + 5$ Where N=number of windows and C=cost	
73.	**Function Machine**	Takes an input value, performs some operations and produces an output value.		
74.	**Function**	A relationship between two sets of values.	$f(x) = 3x^2 - 5$ 'For any input value, square the term, then multiply by 3, then subtract 5'.	
75.	**Function notation**	$f(x)$ x is the input value. $f(x)$ is the output value.	$f(x) = 3x + 11$ Suppose the input value is $x = 5$ The output value is $f(5) = 3 \times 5 + 11 = 26$	

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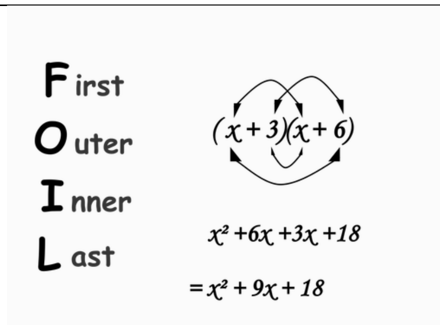
76.	**Quadratic**	A quadratic expression is of the form $ax^2 + bx + c$ where a, b and c are numbers, $a \neq 0$	Examples of quadratic expressions: x^2 $8x^2 - 3x + 7$ Examples of non-quadratic expressions: $2x^3 - 5x^2$ $9x - 1$	
77.	**Factorising Quadratics**	When a quadratic expression is in the form $x^2 + bx + c$ find the two numbers that add to give b and multiply to give c.	$x^2 + 7x + 10 = (x + 5)(x + 2)$ (because 5 and 2 add to give 7 and multiply to give 10) $x^2 + 2x - 8 = (x + 4)(x - 2)$ (because +4 and -2 add to give +2 and multiply to give -8)	
78.	**Difference of 2 Squares**	An expression of the form $a^2 - b^2$ can be factorised to give $(a + b)(a - b)$.	$x^2 - 25 = (x + 5)(x - 5)$	
79.	**Expanding double brackets**	When you expand double brackets use the FOIL method to make sure you don't forget any of the terms!	 	
80.	**Solving Quadratics by Factorising** $(\boldsymbol{a = 1})$	Factorise the quadratic in the usual way. Solve = 0 Make sure the equation = 0 before factorising.	Solve $x^2 + 3x - 10 = 0$ Factorise: $(x + 5)(x - 2) = 0$ $x = -5 \text{ or } x = 2$	

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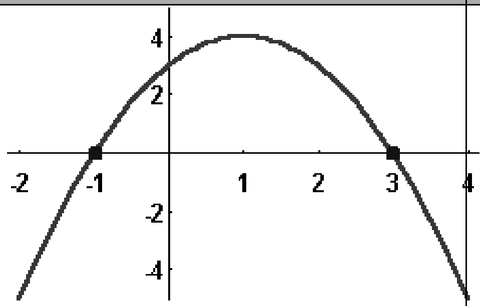
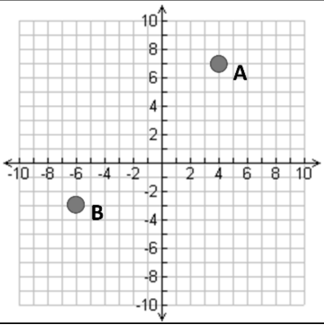
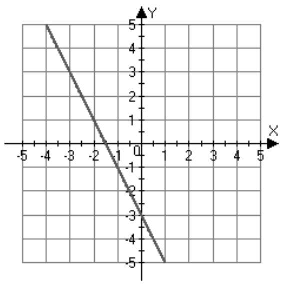
81.	**Roots of a Quadratic**	A root is a solution. The roots of a quadratic are the x-intercepts of the quadratic graph.		
82.	**Coordinates**	Written in pairs. The first term is the x-coordinate (movement across). The second term is the y-coordinate (movement up or down).	 A: (4,7) B: (-6,-3)	
83.	**Midpoint of a Line**	Method 1: add the x coordinates and divide by 2, add the y coordinates and divide by 2. Method 2: Sketch the line and find the values half way between the two x and two y values.	Find the midpoint between (2,1) and (6,9) $\frac{2+6}{2} = 4$ and $\frac{1+9}{2} = 5$ So, the midpoint is (4,5)	
84.	**Linear Graph**	Straight line graph. The general equation of a linear graph is $y = mx + c$ where m is the gradient and c is the y-intercept. The equation of a linear graph can contain an x-term, a y-term and a number.	Example:  Other examples: $x = y$ $y = 4$ $x = -2$ $y = 2x - 7$ $y + x = 10$ $2y - 4x = 12$	

<table>
<tr><th colspan="4">MATHS – YEAR 11
Foundation Tier</th><th>RAG</th></tr>
<tr><td></td><td colspan="3">Whole year:</td><td></td></tr>
<tr><td>85.</td><td>Plotting Linear Graphs</td><td>Method 1: Table of Values

Construct a table of values to calculate coordinates.

Method 2: Gradient-Intercept Method (use when the equation is in the form $y = mx + c$)

1. Plots the y-intercept.

2. Using the gradient, plot a second point.

3. Draw a line through the two points plotted.

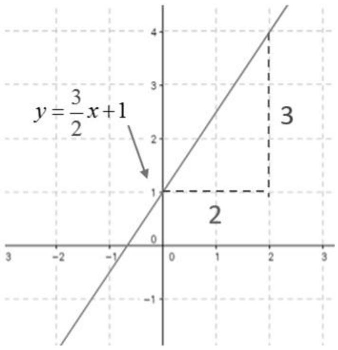
Method 3: Cover-Up Method (use when the equation is in the form $ax + by = c$)

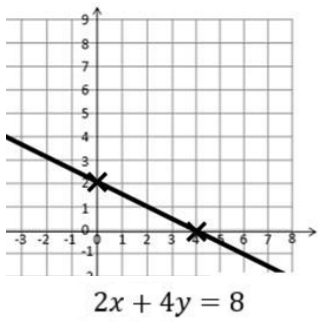
1. Cover the x term and solve the resulting equation. Plot this on the $x - axis$.

2. Cover the y term and solve the resulting equation. Plot this on the $y - axis$.

3. Draw a line through the two points plotted.</td><td>

x	-3	-2	-1	0	1	2	3
y= x +3	0	1	2	3	4	5	6





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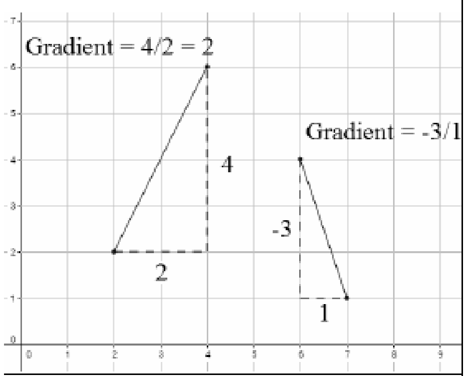
<tr><td>86.</td><td>Gradient</td><td>The gradient of a line is how steep it is.

Gradient =

$$\frac{Change\ in\ y}{Change\ in\ x} = \frac{Rise}{Run}$$

The gradient can be positive (sloping upwards) or negative (sloping downwards).</td><td>



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87.	**Linear Sequence**	A number pattern with a common difference.	2, 5, 8, 11… is a linear sequence	
88.	**Term**	Each value in a sequence is called a term.	In the sequence 2, 5, 8, 11…, 8 is the third term of the sequence.	
89.	**Term-to-term rule**	A rule which allows you to find the next term in a sequence if you know the previous term.	First term is 2. Term-to-term rule is 'add 3' Sequence is: 2, 5, 8, 11…	
90.	**nth term**	A rule which allows you to calculate the term that is in the nth position of the sequence. Also known as the 'position-to-term' rule. n refers to the position of a term in a sequence.	nth term is $3n - 1$ The 100th term is $3 \times 100 - 1 = 299$	
91.	**Finding the nth term of a linear sequence**	1. Find the difference. 2. Multiply that by n. 3. Substitute $n = 1$ to find out what number you need to add or subtract to get the first number in the sequence.	Find the nth term of: 3, 7, 11, 15… 1. Difference is +4 2. Start with $4n$ 3. $4 \times 1 = 4$, so we need to subtract 1 to get 3. nth term = $4n - 1$	
92.	**Fibonacci Type Sequences**	A sequence where the next number is found by adding up the previous two terms	The Fibonacci sequence is: $1,1,2,3,5,8,13,21,34 \ldots$	
93.	**Geometric Sequence**	A sequence of numbers where each term is found by multiplying the previous one by a number called the common ratio, r.	An example of a geometric sequence is: $2, 10, 50, 250 \ldots$ The common ratio is 5	

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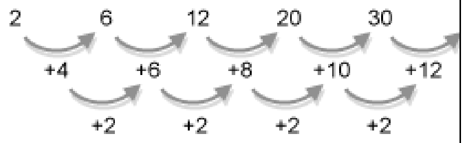
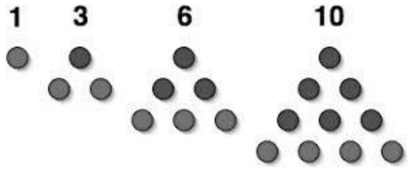
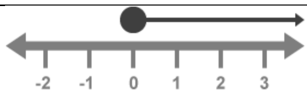
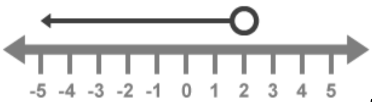
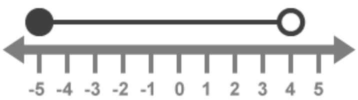
94.	**Quadratic Sequence**	A sequence of numbers where the second difference is constant. A quadratic sequence will have a n^2 term.		
95.	**Triangular numbers**	The sequence which comes from a pattern of dots that form a triangle. $1, 3, 6, 10, 15, 21 \ldots$		
96.	**Inequality**	An inequality says that two values are not equal. $a \neq b$ means that a is not equal to b.	$7 \neq 3$ $x \neq 0$	
97.	**Inequality symbols**	$x > 2$ means x is greater than 2 $x < 3$ means x is less than 3 $x \geq 1$ means x is greater than or equal to 1 $x \leq 6$ means x is less than or equal to 6	State the integers that satisfy $-2 < x \leq 4$. -1, 0, 1, 2, 3, 4	
98.	**Inequalities on a Number Line**	Inequalities can be shown on a number line. Open circles are used for numbers that are less than or greater than $(< or >)$. Closed circles are used for numbers that are less than or equal or greater than or equal $(\leq or \geq)$.	 $x \geq 0$  $x < 2$  $-5 \leq x < 4$	

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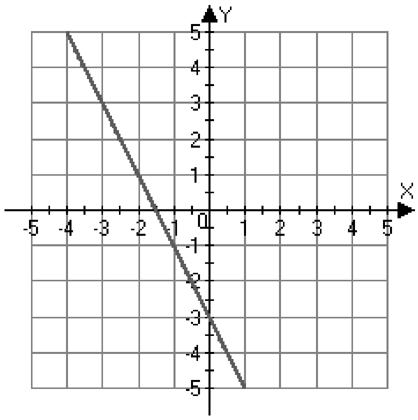
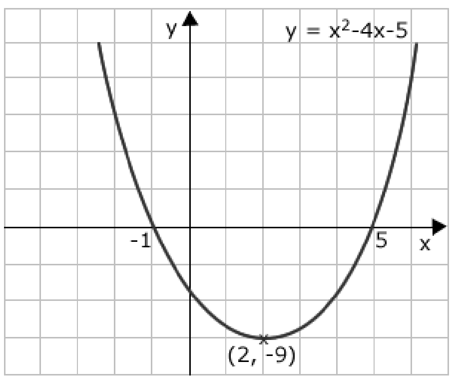
99.	**Linear Graph**	Straight line graph. The equation of a linear graph can contain an x-term, a y-term and a number.	Example:  Other examples: $x = y$ $y = 4$ $x = -2$ $y = 2x - 7$ $y + x = 10$ $2y - 4x = 12$	
100.	**Quadratic Graph**	A 'U-shaped' curve called a parabola. The equation is of the form $y = ax^2 + bx + c$, where a, b and c are numbers, $a \neq 0$. If $a < 0$, the parabola is upside down.		

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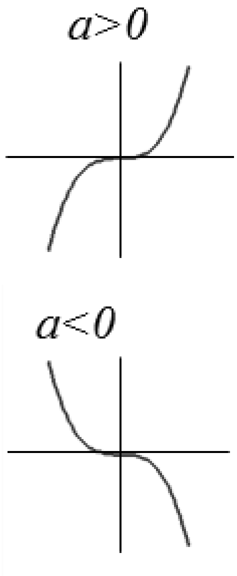
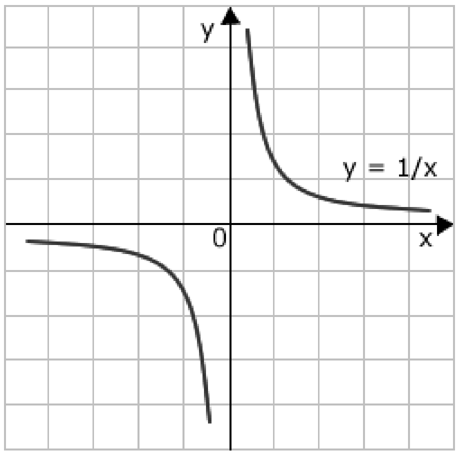
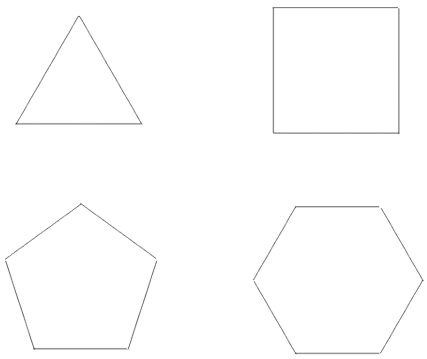
101.	**Cubic Graph**	The equation is of the form $y = ax^3 + k$, where k is an number. If $a > 0$, the curve is increasing. If $a < 0$, the curve is decreasing.		
102.	**Reciprocal Graph**	The equation is of the form $y = \frac{A}{x}$, where A is a number and $x \neq 0$. The graph has asymptotes on the x-axis and y-axis.		
103.	**Polygon**	A 2D shape with only straight edges.	Rectangle, Hexagon, Decagon, Kite etc.	
104.	**Regular**	A shape is regular if all the sides and all the angles are equal.	Some examples: 	

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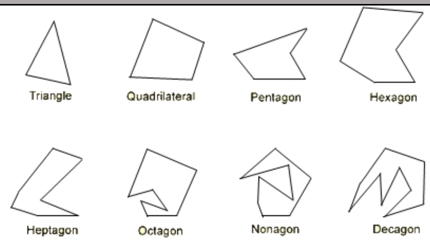
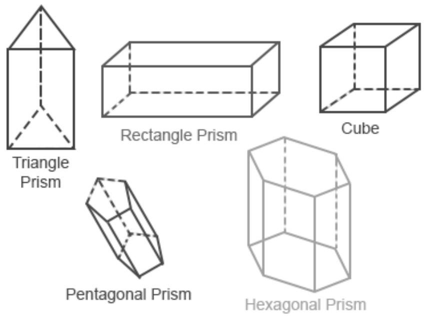
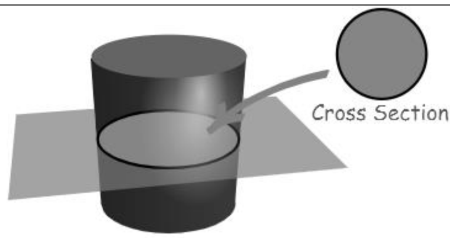
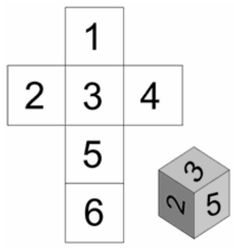
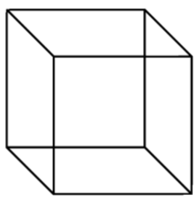
105.	**Names of Polygons**	3-sided = Triangle 4-sided = Quadrilateral 5-sided = Pentagon 6-sided = Hexagon 7-sided = Heptagon 8-sided = Octagon 9-sided = Nonagon 10-sided = Decagon		
106.	**Prism**	A prism is a 3D shape whose cross section is the same throughout.		
107.	**Cross Section**	The cross section is the shape that continues all the way through the prism.		
108.	**Net**	A pattern that you can cut and fold to make a model of a 3D shape.		
109.	**Properties of Solids**	Faces = flat surfaces Edges = sides/lengths Vertices = corners	A cube has 6 faces, 12 edges and 8 vertices. 	

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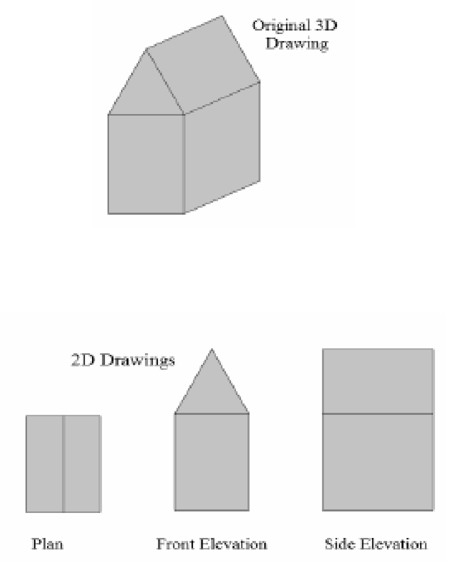
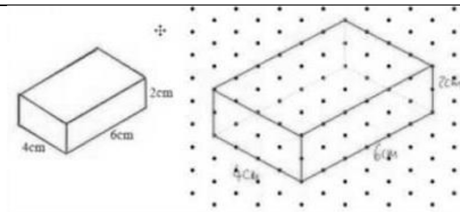
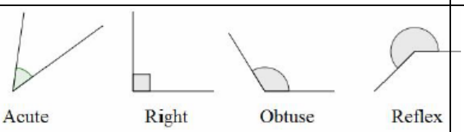
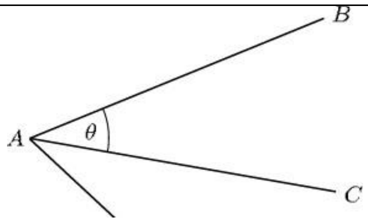
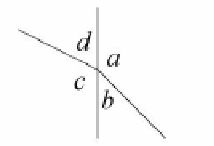
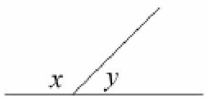
110.	**Plans and Elevations**	This takes 3D drawings and produces 2D drawings. Plan View: from above Side Elevation: from the side Front Elevation: from the front		
111.	**Isometric Drawing**	A method for visually representing 3D objects in 2D.		
112.	**Types of Angles**	Acute angles are less than 90°. Right angles are exactly 90°. Obtuse angles are greater than 90° but less than 180°. Reflex angles are greater than 180° but less than 360°.		
113.	**Angle Notation**	Can use one lower-case letters, eg. θ or x Can use three upper-case letters, eg. BAC		
114.	**Angles at a Point**	Angles around a point add up to 360°.	 $a+b+c+d=360^o$	
115.	**Angles on a Straight Line**	Angles around a point on a straight line add up to 180°.	 $x+y=180^o$	

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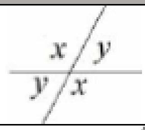
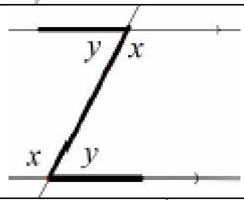
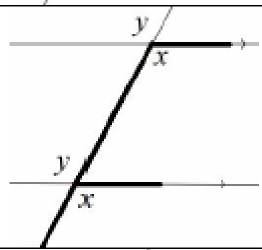
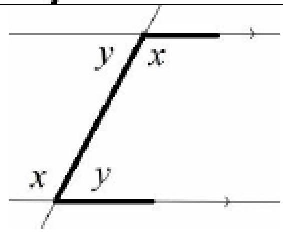
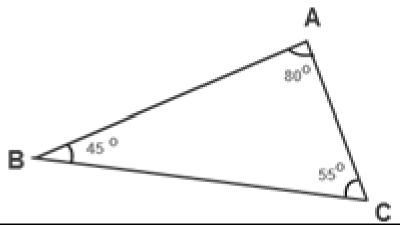
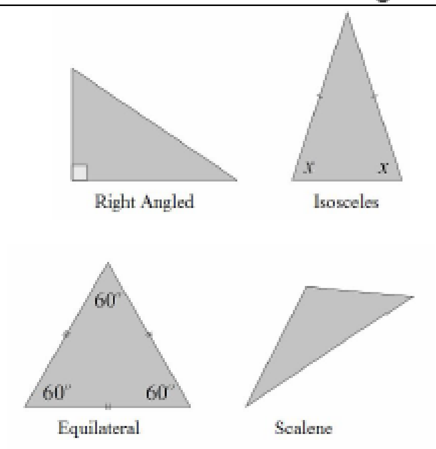
116.	**Opposite Angles**	Vertically opposite angles are equal.		
117.	**Alternate Angles**	Alternate angles are equal. They look like Z angles, but never say this in the exam.		
118.	**Corresponding Angles**	Corresponding angles are equal. They look like F angles, but never say this in the exam.		
119.	**Co-Interior Angles**	Co-Interior angles add up to 180°. They look like C angles, but never say this in the exam.		
120.	**Angles in a Triangle**	Angles in a triangle add up to 180°.		
121.	**Types of Triangles**	Right Angle Triangles have a 90° angle in. Isosceles Triangles have 2 equal sides and 2 equal base angles. Equilateral Triangles have 3 equal sides and 3 equal angles (60°). Scalene Triangles have different sides and different angles. Base angles in an isosceles triangle are equal.		

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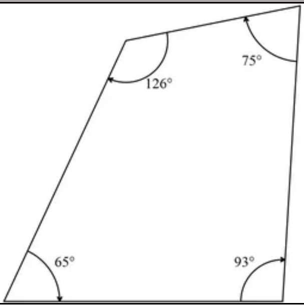
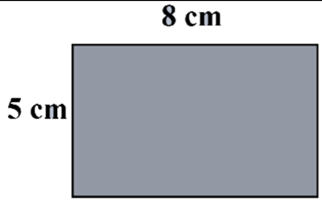
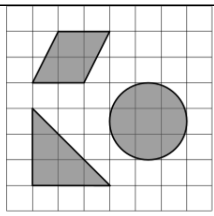
122.	**Angles in a Quadrilateral**	Angles in a quadrilateral add up to 360°.		
123.	**Sum of Interior Angles**	$(n-2)\times 180$ where n is the number of sides.	Sum of Interior Angles in a Decagon = $(10-2)\times 180 = 1440°$	
124.	**Size of Interior Angle in a Regular Polygon**	$\frac{(n-2)\times 180}{n}$ You can also use the formula: $180 - Size\ of\ Exterior\ Angle$	Size of Interior Angle in a Regular Pentagon = $\frac{(5-2)\times 180}{5} = 108°$	
125.	**Size of Exterior Angle in a Regular Polygon**	$\frac{360}{n}$ You can also use the formula: $180 - Size\ of\ Interior\ Angle$	Size of Exterior Angle in a Regular Octagon = $\frac{360}{8} = 45°$	
126.	**Perimeter**	The total distance around the outside of a shape. Units include: mm, cm, m etc.	 $P = 8+5+8+5 = 26cm$	
127.	**Area**	The amount of space inside a shape. Units include: mm^2, cm^2, m^2		

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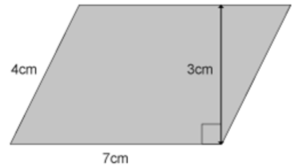
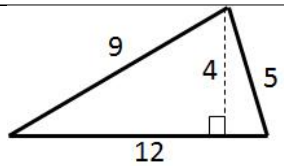
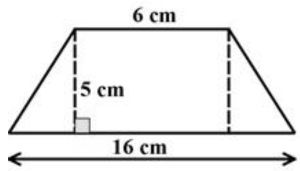
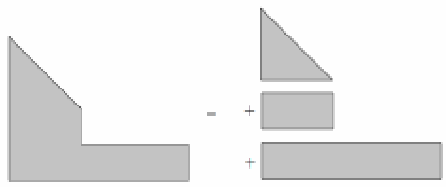
128.	**Area of a Rectangle**	Length x Width	 $A = 36cm^2$	
129.	**Area of a Parallelogram**	Base x Perpendicular Height Not the slanted height.	 $A = 21cm^2$	
130.	**Area of a Triangle**	Base x Height ÷ 2	 $A = 24cm^2$	
131.	**Area of a Trapezium**	$\frac{(a+b)}{2} \times h$ “Half the sum of the parallel side, times the height between them. That is how you calculate the area of a trapezium”	 (a = 6, b = 16, h = 5) $A = 55cm^2$	
132.	**Compound Shape**	A shape made up of a combination of other shapes put together		
133.	**Surface Area**	The total area of the surface of a three-dimensional object.	The surface area of a cube is the area of all 6 faces added together.	

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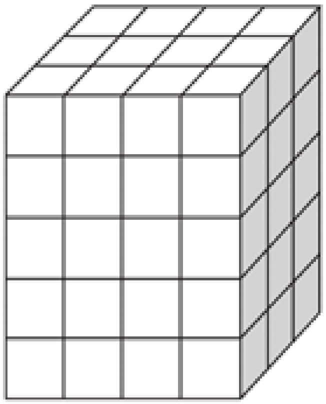
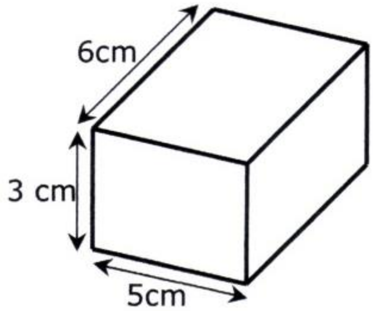
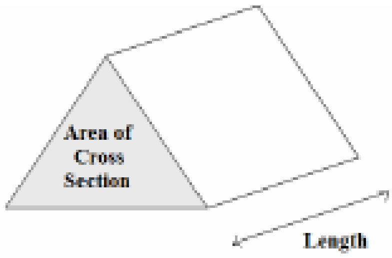
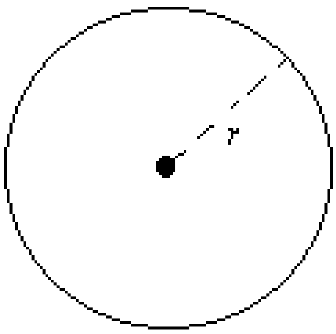
134.	**Volume**	Volume is a measure of the amount of space inside a solid shape. Units: mm^3, cm^3, m^3 etc.		
135.	**Volume of a Cube/Cuboid**	$V = Length \times Width \times Height$ $V = L \times W \times H$ You can also use the Volume of a Prism formula for a cube/cuboid.	 volume = 6 x 5 x 3 = 90 cm^3	
136.	**Volume of a Prism**	$\boldsymbol{V = Area\ of\ Cross\ Section \times Length}$ $\boldsymbol{V = A \times L}$		
137.	**Circle**	A circle is the locus of all points equidistant from a central point.		

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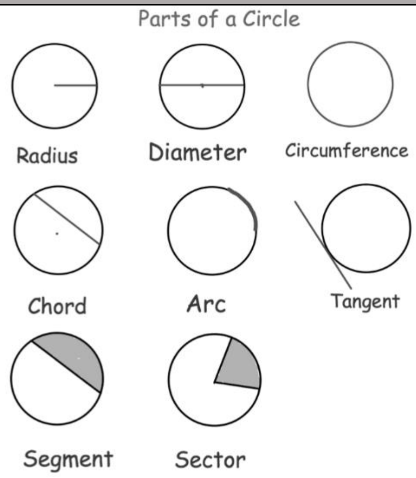
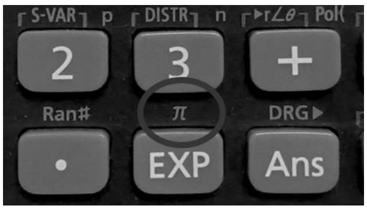
138.	**Parts of a Circle**	Radius – the distance from the centre of a circle to the edge Diameter – the total distance across the width of a circle through the centre. Circumference – the total distance around the outside of a circle Chord – a straight line whose end points lie on a circle Tangent – a straight line which touches a circle at exactly one point Arc – a part of the circumference of a circle Sector – the region of a circle enclosed by two radii and their intercepted arc Segment – the region bounded by a chord and the arc created by the chord		
139.	**Area of a Circle**	$\boldsymbol{A = \pi r^2}$ which means 'pi x radius squared'.	If the radius was 5cm, then: $A = \pi \times 5^2 = 78.5cm^2$	
140.	**Circumference of a Circle**	$\boldsymbol{C = \pi d}$ which means 'pi x diameter'	If the radius was 5cm, then: $C = \pi \times 10 = 31.4cm$	
141.	**$\boldsymbol{\pi}$ ('pi')**	Pi is the circumference of a circle divided by the diameter. $\boldsymbol{\pi \approx 3.14}$		

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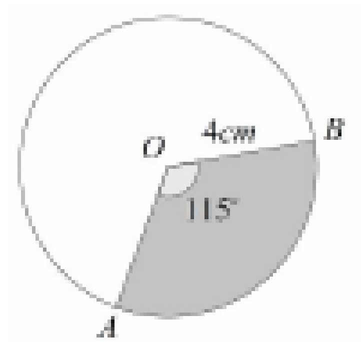
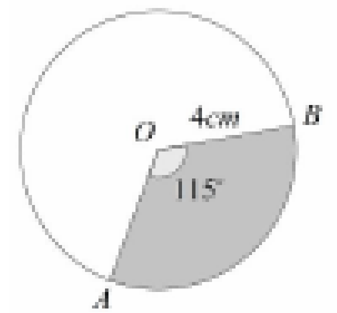
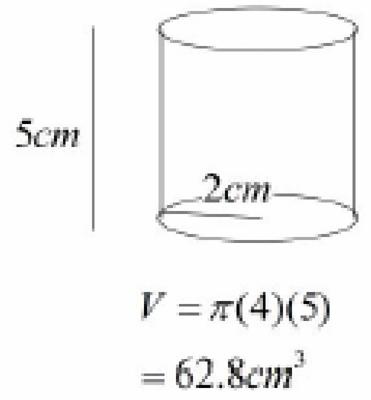
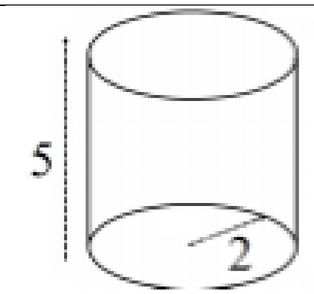
142.	**Arc Length of a Sector**	The arc length is part of the circumference. Take the angle given as a fraction over 360° and multiply by the circumference.	Arc Length = $\frac{115}{360} \times \pi \times 8 = 8.03cm$ 	
143.	**Area of a Sector**	The area of a sector is part of the total area. Take the angle given as a fraction over 360° and multiply by the area.	Area = $\frac{115}{360} \times \pi \times 4^2 = 16.1cm^2$ 	
144.	**Volume of a Cylinder**	$\boldsymbol{V = \pi r^2 h}$		
145.	**Surface Area of a Cylinder**	Curved Surface Area = $\boldsymbol{\pi dh}$ or $\boldsymbol{2\pi rh}$ Total SA = $\boldsymbol{2\pi r^2 + \pi dh}$ or $\boldsymbol{2\pi r^2 + 2\pi rh}$	 $Total\ SA = 2\pi(2)^2 + \pi(4)(5) = 28\pi$	

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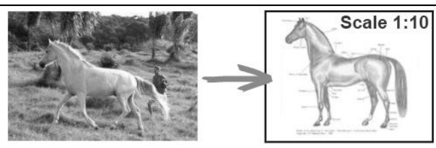
146.	**Metric System for Length**	A system of measures based on: - the metre for length Length: mm, cm, m, km	$1 kilometres = 1000\ metres$ $1\ metre = 100\ centimetres$ $1\ centimetre = 10\ millimetres$	
147.	**Metric System for Mass**	A system of measures based on: - the kilogram for mass Mass: mg, g, kg, tonne	$1\ tonne = 1000\ kilograms$ $1\ kilogram = 1000\ grams$ $1\ gram = 1000\ milligrams$	
148.	**Metric System for Volume**	A system of measures based on: - the litre for volume Volume: ml, cl, l	$1\ litre = 1000\ millilitres$ $1\ centilitre = 10\ millilitres$ $1\ litre = 100\ centilitre$	
149.	**Imperial System**	A system of weights and measures originally developed in England, usually based on human quantities Length: inch, foot, yard, miles Mass: lb, ounce, stone Volume: pint, gallon	$1 lb = 16\ ounces$ $1\ foot = 12\ inches$ $1\ gallon = 8\ pints$	
150.	**Metric and Imperial Units**	Use the unitary method to convert between metric and imperial units.	$5\ miles \approx 8\ kilometres$ $1\ gallon \approx 4.5\ litres$ $2.2\ pounds \approx 1\ kilogram$ $1\ inch = 2.5\ centimetres$	
151.	**Scale**	The ratio of the length in a model to the length of the real thing.	 Real Horse 1500 mm high 2000 mm long Drawn Horse 150 mm high 200 mm long	

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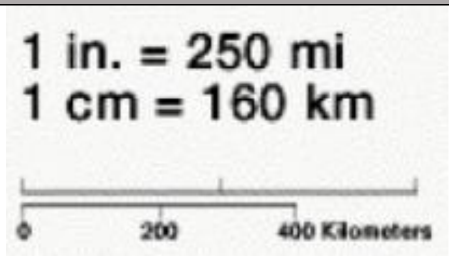
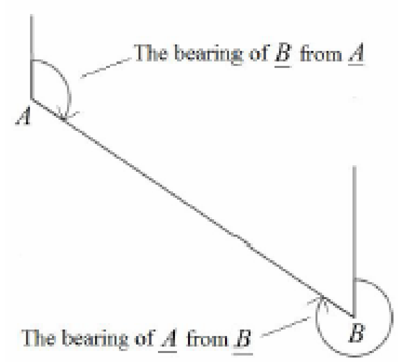
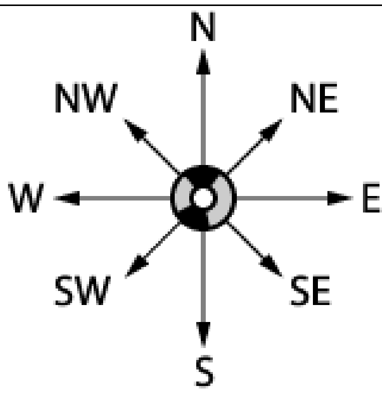
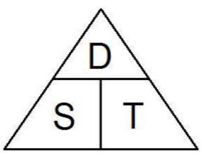
152.	**Scale (Map)**	The ratio of a distance on the map to the actual distance in real life.		
153.	**Bearings**	1. Measure from North (draw a North line) 2. Measure clockwise 3. Your answer must have 3 digits (eg. 047°) Look out for where the bearing is measured from.		
154.	**Compass Directions**	You can use an acronym such as 'Never Eat Shredded Wheat' to remember the order of the compass directions in a clockwise direction. Bearings: $NE = 045°, W = 270°\ etc.$		
155.	**Speed, Distance, Time**	Speed = Distance ÷ Time Distance = Speed x Time Time = Distance ÷ Speed  Remember the correct units.	Speed = 4mph Time = 2 hours Find the Distance. $D = S \times T = 4 \times 2$ $= 8\ miles$	

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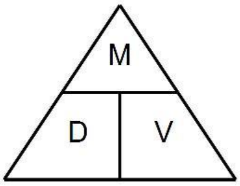
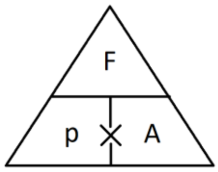
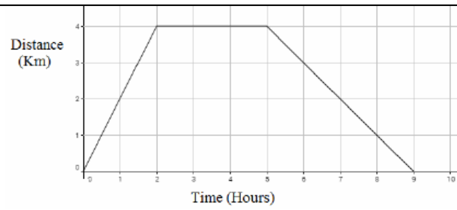
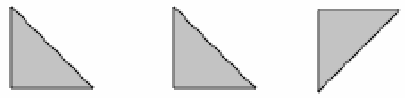
156.	**Density, Mass, Volume**	Density = Mass ÷ Volume Mass = Density x Volume Volume = Mass ÷ Density  Remember the correct units.	Density = 8kg/m³ Mass = 2000g Find the Volume. $V = M \div D = 2 \div 8 = 0.25m^3$	
157.	**Pressure, Force, Area**	Pressure = Force ÷ Area Force = Pressure x Area Area = Force ÷ Pressure  Remember the correct units.	Pressure = 10 Pascals Area = 6cm² Find the Force $F = P \times A = 10 \times 6 = 60\ N$	
158.	**Distance-Time Graphs**	You can find the speed from the gradient of the line (Distance ÷ Time) The steeper the line, the quicker the speed. A horizontal line means the object is not moving (stationary).		
159.	**Congruent Shapes**	Shapes are congruent if they are identical - same shape and same size. Shapes can be rotated or reflected but still be congruent.		

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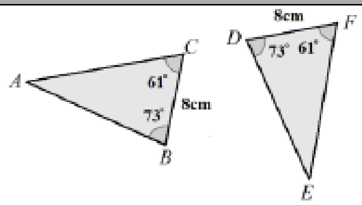
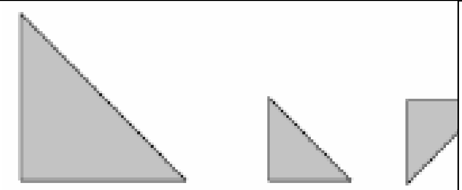
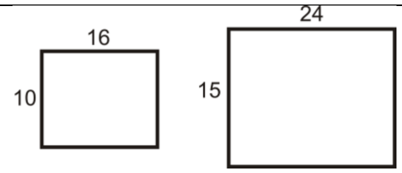
160.	**Congruent Triangles**	4 ways of proving that two triangles are congruent: 1. SSS (Side, Side, Side) 2. RHS (Right angle, Hypotenuse, Side) 3. SAS (Side, Angle, Side) 4. ASA (Angle, Side, Angle) or AAS ASS does not prove congruency.	 $BC = DF$ $\angle ABC = \angle EDF$ $\angle ACB = \angle EFD$ $\therefore$ The two triangles are congruent by AAS.	
161.	**Similar Shapes**	Shapes are similar if they are the same shape but different sizes. The proportion of the matching sides must be the same, meaning the ratios of corresponding sides are all equal.		
162.	**Scale Factor**	The ratio of corresponding sides of two similar shapes. To find a scale factor, divide a length on one shape by the corresponding length on a similar shape.	 Scale Factor = $15 \div 10 = 1.5$	

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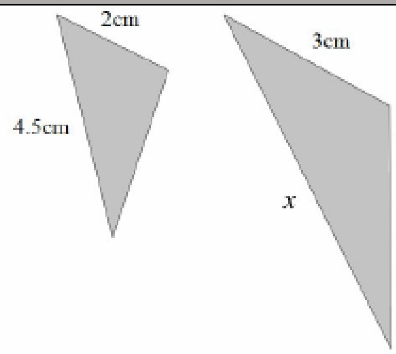
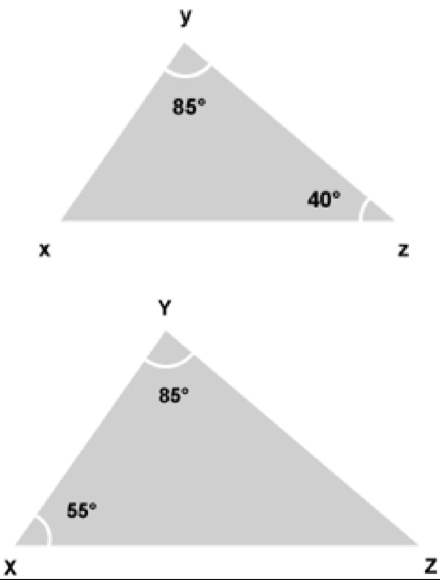
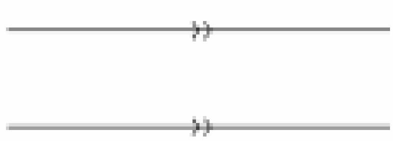
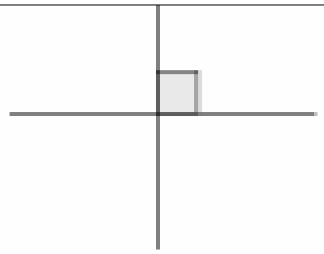
163.	**Finding missing lengths in similar shapes**	1. Find the scale factor. 2. Multiply or divide the corresponding side to find a missing length. If you are finding a missing length on the larger shape you will need to multiply by the scale factor. If you are finding a missing length on the smaller shape you will need to divide by the scale factor.	 Scale Factor = $3 \div 2 = 1.5$ $x = 4.5 \times 1.5 = 6.75cm$	
164.	**Similar Triangles**	To show that two triangles are similar, show that: 1. The three sides are in the same proportion 2. Two sides are in the same proportion, and their included angle is the same 3. The three angles are equal		
165.	**Parallel**	Parallel lines never meet.		
166.	**Perpendicular**	Perpendicular lines are at right angles. There is a 90° angle between them.		

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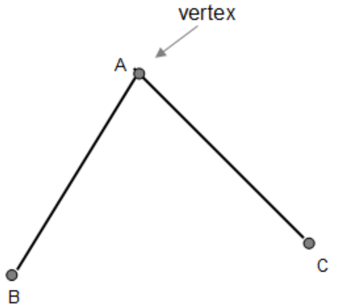
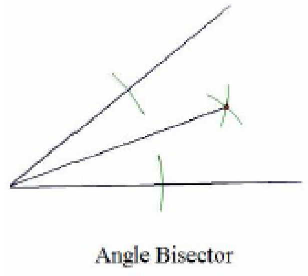
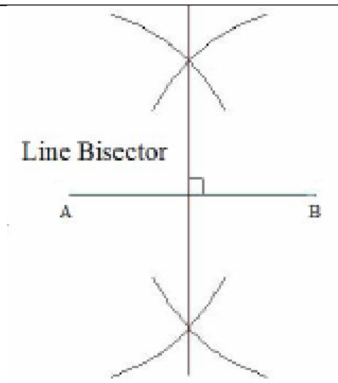
167.	**Vertex**	A corner or a point where two lines meet.		
168.	**Angle Bisector**	Angle Bisector: Cuts the angle in half. 1. Place the sharp end of a pair of compasses on the vertex. 2. Draw an arc, marking a point on each line. 3. Without changing the compass put the compass on each point and mark a centre point where two arcs cross over. 4. Use a ruler to draw a line through the vertex and centre point.	 	
169.	**Perpendicular Bisector**	Perpendicular Bisector: Cuts a line in half and at right angles. 1. Put the sharp point of a pair of compasses on A. 2. Open the compass over half way on line. 3. Draw an arc above and below the line. 4. Without changing the compass, repeat from point B. 5. Draw a straight line through the two intersecting arcs.		

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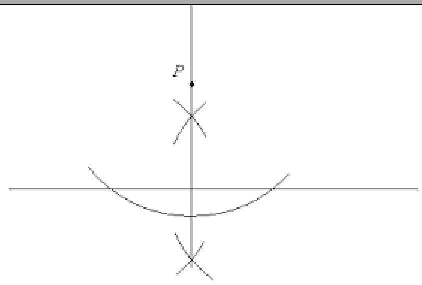
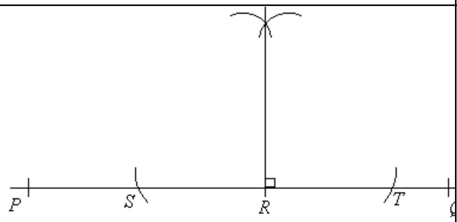
170.	**Perpendicular from an External Point**	The perpendicular distance from a point to a line is the shortest distance to that line. 1. Put the sharp point of a pair of compasses on the point. 2. Draw an arc that crosses the line twice. 3. Place the sharp point of the compass on one of these points, open over half way and draw an arc above and below the line. 4. Repeat from the other point on the line. 5. Draw a straight line through the two intersecting arcs.		
171.	**Perpendicular from a Point on a Line**	Given line PQ and point R on the line: 1. Put the sharp point of a pair of compasses on point R. 2. Draw two arcs either side of the point of equal width (giving points S and T) 3. Place the compass on point S, open over halfway and draw an arc above the line. 4. Repeat from the other arc on the line (point T). 5. Draw a straight line from the intersecting arcs to the original point on the line.		

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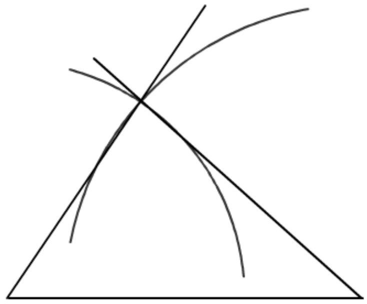
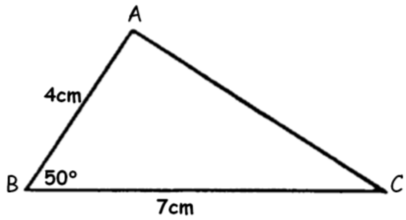
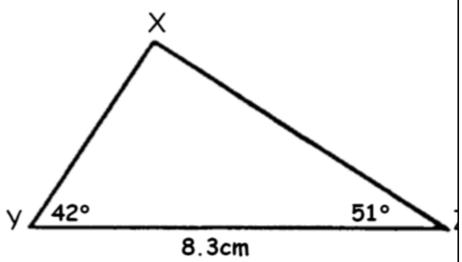
172.	**Constructing Triangles (Side, Side, Side)**	1. Draw the base of the triangle using a ruler. 2. Open a pair of compasses to the width of one side of the triangle. 3. Place the point on one end of the line and draw an arc. 4. Repeat for the other side of the triangle at the other end of the line. 5. Using a ruler, draw lines connecting the ends of the base of the triangle to the point where the arcs intersect.		
173.	**Constructing Triangles (Side, Angle, Side)**	1. Draw the base of the triangle using a ruler. 2. Measure the angle required using a protractor and mark this angle. 3. Remove the protractor and draw a line of the exact length required in line with the angle mark drawn. 4. Connect the end of this line to the other end of the base of the triangle.		
174.	**Constructing Triangles (Angle, Side, Angle)**	1. Draw the base of the triangle using a ruler. 2. Measure one of the angles required using a protractor and mark this angle. 3. Draw a straight line through this point from the same point on the base of the triangle. 4. Repeat this for the other angle on the other end of the base of the triangle.		

		MATHS – YEAR 11 Foundation Tier		RAG
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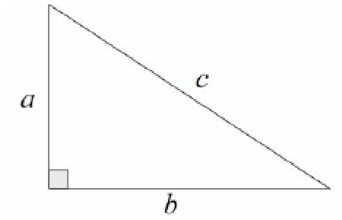
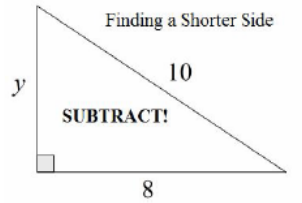
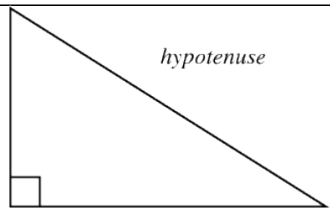
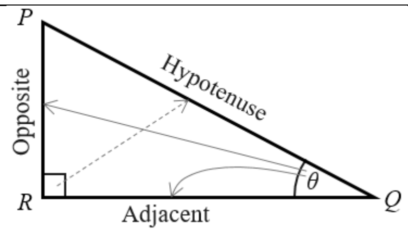
175.	**Pythagoras' Theorem**	For any right angled triangle: $$a^2 + b^2 = c^2$$  Used to find missing lengths. a and b are the shorter sides, c is the hypotenuse (longest side).	 $a = y,\ b = 8,\ c = 10$ $a^2 = c^2 - b^2$ $y^2 = 100 - 64$ $y^2 = 36$ $y = 6$	
176.	**Trigonometry**	The study of triangles.		
177.	**Hypotenuse**	The longest side of a right-angled triangle. Is always opposite the right angle.	 	
178.	**Adjacent**	Next to	 	

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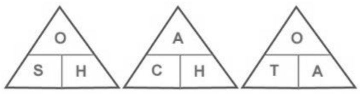
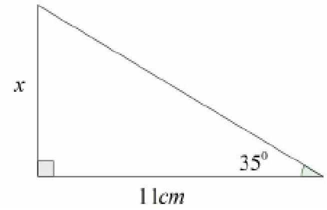
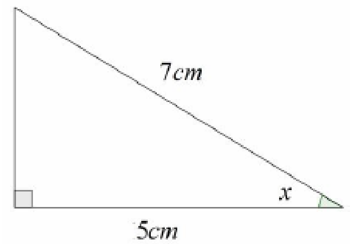
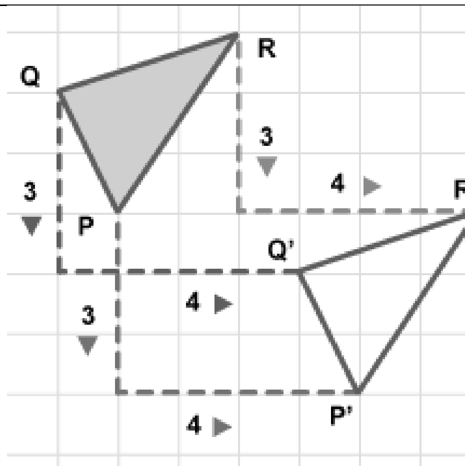
179.	**Trigonometric Formulae**	Use SOHCAHTOA. $\sin\theta = \frac{O}{H}$ $\cos\theta = \frac{A}{H}$ $\tan\theta = \frac{O}{A}$  When finding a missing angle, use the 'inverse' trigonometric function by pressing the 'shift' button on the calculator.	 Use 'Opposite' and 'Adjacent', so use 'tan' $\tan 35 = \frac{x}{11}$ $x = 11\tan 35 = 7.70cm$  Use 'Adjacent' and 'Hypotenuse', so use 'cos' $\cos x = \frac{5}{7}$ $x = cos^{-1}\left(\frac{5}{7}\right) = 44.4°$	
180.	**Translation**	Translate means to move a shape. The shape does not change size or orientation.		

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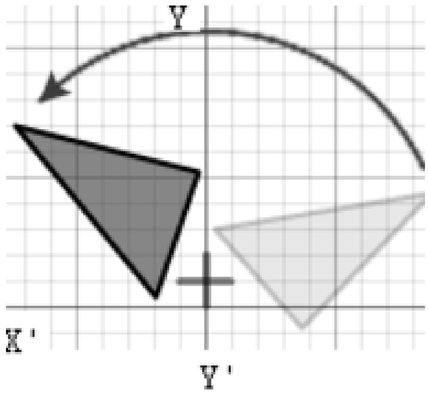
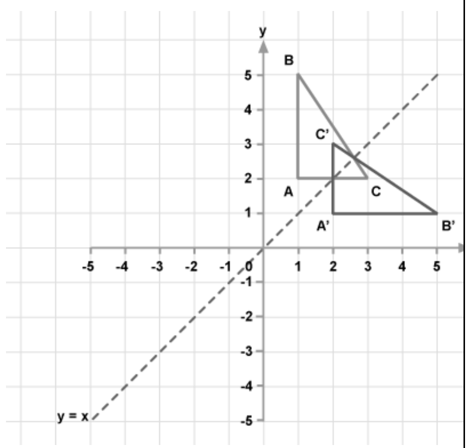
181.	**Column Vector**	In a column vector, the top number moves left (-) or right (+) and the bottom number moves up (+) or down (-)	$\binom{2}{3}$ means '2 right, 3 up' $\binom{-1}{-5}$ means '1 left, 5 down'	
182.	**Rotation**	The size does not change, but the shape is turned around a point. Use tracing paper.	Rotate Shape A 90° anti-clockwise about (0,1) 	
183.	**Reflection**	The size does not change, but the shape is 'flipped' like in a mirror. Line $x=?$ is a vertical line. Line $y=?$ is a horizontal line. Line $y=x$ is a diagonal line.	Reflect shape C in the line $y=x$ 	
184.	**Enlargement**	The shape will get bigger or smaller. Multiply each side by the scale factor.	Scale Factor = 3 means '3 times larger = multiply by 3' Scale Factor = ½ means 'half the size = divide by 2'	

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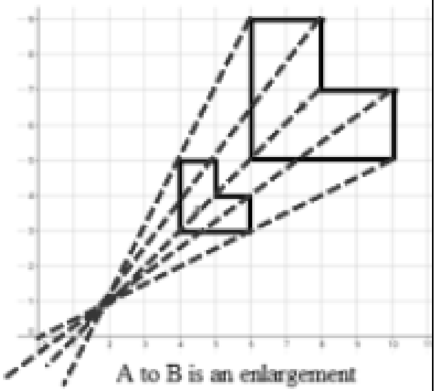
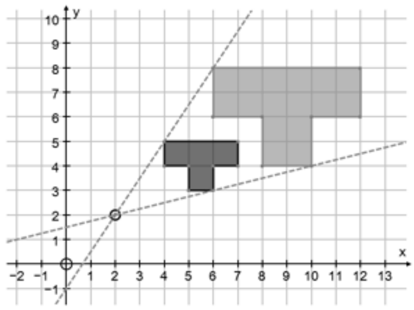
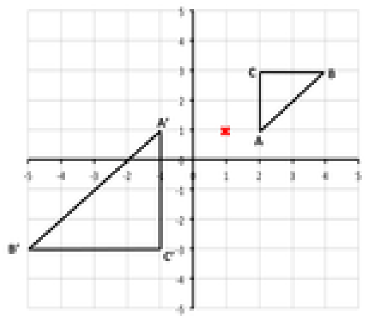
185.	**Finding the Centre of Enlargement**	Draw straight lines through corresponding corners of the two shapes. The centre of enlargement is the point where all the lines cross over. Be careful with negative enlargements as the corresponding corners will be the other way around.	 A to B is an enlargement SF 2 about the point (2,1)	
186.	**Describing Transformations**	Give the following information when describing each transformation: Look at the number of marks in the question for a hint of how many pieces of information are needed. If you are asked to describe a 'transformation', you need to say the name of the type of transformation as well as the other details.	- Translation, Vector - Rotation, Direction, Angle, Centre - Reflection, Equation of mirror line - Enlargement, Scale factor, Centre of enlargement	
187.	**Fractional Scale Factor Enlargements**	A fractional enlargement makes a shape smaller.		
188.	**Negative Scale Factor Enlargements**	Negative enlargements will look like they have been rotated. $SF = -2$ will be rotated, and also twice as big.	Enlarge ABC by scale factor -2, centre (1,1) 	

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189.	**Hypothesis**	A hypothesis is a statement that might be true or false but you haven't got enough evidence to support it either way YET. A hypothesis must be testable.	For example: Children who go to bed earlier score higher on their class tests	
190.	**Data Cycle**	The data Cycle has five parts to it: 1. Planning 2. Collecting Data 3. Processing and Representing data 4. Interpreting results Communicating results clearly and evaluating methods.		
191.	**Constraints**	During the planning phase you should consider the constraints of your investigation: • Time • Cost • Convenience • Ethical issues Confidentiality	For example, people might not want to answer personal questions about their age or where they live.	
192.	**Primary**	Data which you have collected yourself.	For example, you do a survey on your classmates about their favourite food	
193.	**Secondary**	Data which someone else has collected.	For example, you use census data to investigate national trends in salaries	
194.	**Quantitative**	Numerical data.	For example, how many siblings you have or how tall you are	
195.	**Qualitative**	Descriptive data (using words not numbers).	For example, your favourite food	
196.	**Discrete**	Numerical (quantitative) data which can be counted.	For example, how many siblings you have	

<table>
<tr><th colspan="4">MATHS - YEAR 11
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<tr><td></td><td colspan="3">Whole year:</td><td></td></tr>
<tr><td>197.</td><td>Continuous</td><td>Numerical (quantitative) data which can be measured.</td><td>For example, your mass or height</td><td></td></tr>
<tr><td>198.</td><td>Grouped</td><td>Data that has been bundled in to categories.

Seen in grouped frequency tables, histograms, cumulative frequency etc.</td><td><table><tr><th>Foot length, l, (cm)</th><th>Number of child</th></tr><tr><td>$10 \leqslant l < 12$</td><td>5</td></tr><tr><td>$12 \leqslant l < 17$</td><td>53</td></tr></table></td><td></td></tr>
<tr><td>199.</td><td>Population</td><td>The whole group you are interested in.</td><td>e.g. the population of the UK</td><td></td></tr>
<tr><td>200.</td><td>Sample</td><td>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.</td><td>A sample could be selecting 10 students from a year group at school.</td><td></td></tr>
<tr><td>201.</td><td>Sample Size</td><td>The larger a sample size, the closer those probabilities will be to the true probability.</td><td>A sample size of 100 gives a more reliable result than a sample size of 10.</td><td></td></tr>
<tr><td>202.</td><td>Biased sample</td><td>A sample that does not properly represent the population.</td><td></td><td></td></tr>
<tr><td>203.</td><td>Random Sample</td><td>A sample where each member of the population has an equal chance of being selected for the sample</td><td></td><td></td></tr>
<tr><td>204.</td><td>Mean</td><td>Add up the values and divide by how many values there are.</td><td>The mean of 3, 4, 7, 6, 0, 4, 6 is

$\frac{3+4+7+6+0+4+6}{7} = 5$</td><td></td></tr>
</table>

<table>
<tr><th colspan="4">MATHS - YEAR 11
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<tr><td></td><td colspan="3">Whole year:</td><td></td></tr>
<tr><td>205.</td><td>Mean from a Table</td><td>1. Find the midpoints (if necessary)

2. Multiply Frequency by values or midpoints

3. Add up these values

4. Divide this total by the Total Frequency

If grouped data is used, the answer will be an estimate.</td><td><table>
<tr><th>Height in cm</th><th>Frequency</th><th>Midpoint</th><th>F × M</th></tr>
<tr><td>$0 < h \leq 10$</td><td>8</td><td>5</td><td>8×5=40</td></tr>
<tr><td>$10 < h \leq 30$</td><td>10</td><td>20</td><td>10×20=200</td></tr>
<tr><td>$30 < h \leq 40$</td><td>6</td><td>35</td><td>6×35=210</td></tr>
<tr><td>Total</td><td>24</td><td>Ignore!</td><td>450</td></tr>
</table>
Estimated Mean height: 450 ÷ 24 = 18.75cm</td><td></td></tr>
<tr><td>206.</td><td>Median Value</td><td>The middle value.

Put the data in order and find the middle one.

If there are two middle values, find the number half way between them by adding them together and dividing by 2.</td><td>Find the median of: 4, 5, 2, 3, 6, 7, 6

Ordered: 2, 3, 4, 5, 6, 6, 7

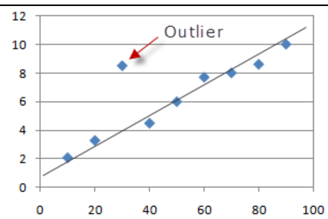
Median = 5</td><td></td></tr>
<tr><td>207.</td><td>Mode /Modal Value</td><td>Most frequent/common.

Can have more than one mode (called bi-modal or multi-modal) or no mode (if all values appear once).</td><td>Find the mode: 4, 5, 2, 3, 6, 4, 7, 8, 4

Mode = 4</td><td></td></tr>
<tr><td>208.</td><td>Range</td><td>Highest value subtract the Smallest value.

Range is a ‘measure of spread’. The smaller the range the more consistent the data.</td><td>Find the range: 3, 31, 26, 102, 37, 97.

Range = 102-3 = 99</td><td></td></tr>
<tr><td>209.</td><td>Outlier</td><td>A value that ‘lies outside’ most of the other values in a set of data.

An outlier is much smaller or much larger than the other values in a set of data.</td><td>
</td><td></td></tr>
</table>

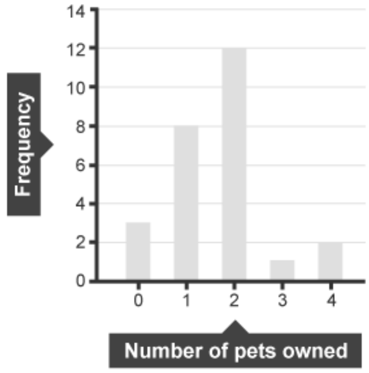
<table>
<tr><th colspan="4">MATHS - YEAR 11
Foundation Tier</th><th>RAG</th></tr>
<tr><td></td><td colspan="3">Whole year:</td><td></td></tr>
<tr><td>210.</td><td>Frequency Table</td><td>A record of how often each value in a set of data occurs.</td><td>
<table>
<tr><th>Number of marks</th><th>Tally marks</th><th>Frequency</th></tr>
<tr><td>1</td><td>𝍸 ||</td><td>7</td></tr>
<tr><td>2</td><td>𝍸</td><td>5</td></tr>
<tr><td>3</td><td>𝍸 |</td><td>6</td></tr>
<tr><td>4</td><td>𝍸</td><td>5</td></tr>
<tr><td>5</td><td>|||</td><td>3</td></tr>
<tr><td>Total</td><td></td><td>26</td></tr>
</table>
</td><td></td></tr>
<tr><td>211.</td><td>Bar Chart</td><td>Represents data as vertical blocks.

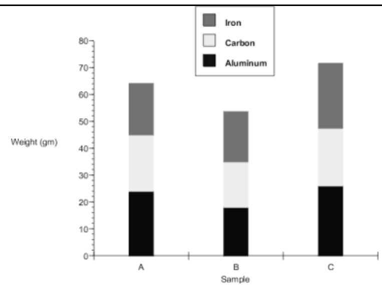
$x - axis$ shows the type of data

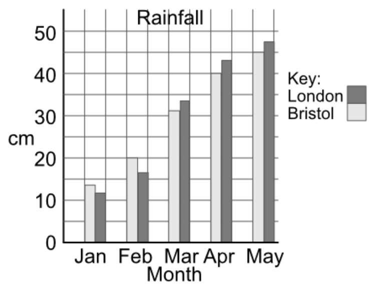
$y - axis$ shows the frequency for each type of data

Each bar should be the same width

There should be gaps between each bar

Remember to label each axis.</td><td>
</td><td></td></tr>
<tr><td>212.</td><td>Types of Bar Chart</td><td>Compound/Composite Bar Charts show data stacked on top of each other.

Comparative/Dual Bar Charts show data side by side.</td><td>



Dual Bar Chart</td><td></td></tr>
</table>

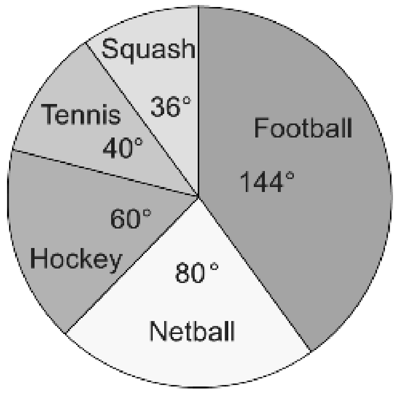
				RAG
	Whole year:			

213. Pie Chart

Used for showing how data breaks down into its constituent parts.

When drawing a pie chart, divide 360° by the total frequency. This will tell you how many degrees to use for the frequency of each category.

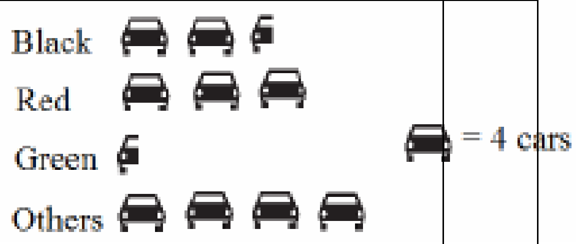
Remember to label the category that each sector in the pie chart represents.



214. Pictogram

Uses pictures or symbols to show the value of the data.

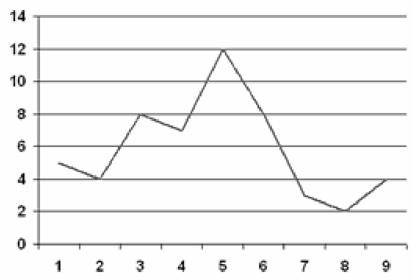
A pictogram must have a key.



215. Line Graph

A graph that uses points connected by straight lines to show how data changes in values.

This can be used for time series data, which is a series of data points spaced over uniform time intervals in time order.



216. Two Way Tables

A table that organises data around two categories.

Fill out the information step by step using the information given.

Make sure all the totals add up for all columns and rows.

Question: Complete the 2 way table below.

	Left Handed	Right Handed	Total
Boys	10		58
Girls			
Total		84	100

Answer: Step 1, fill out the easy parts (the totals)

	Left Handed	Right Handed	Total
Boys	10	*48*	58
Girls			*42*
Total	*16*	84	100

Answer: Step 2, fill out the remaining parts

	Left Handed	Right Handed	Total
Boys	10	*48*	58
Girls	*6*	*36*	*42*
Total	*16*	84	100

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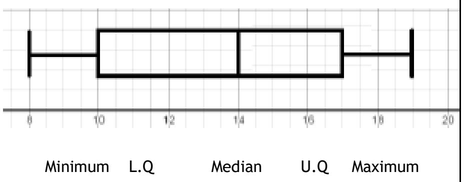
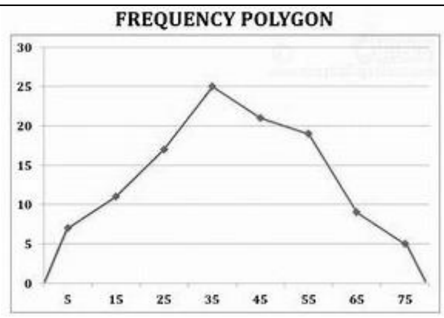
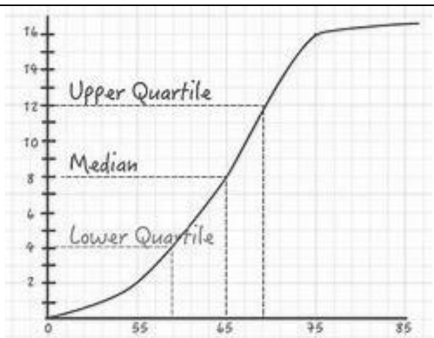
217.	**Box Plots**	The minimum, lower quartile, median, upper quartile and maximum are shown on a box plot. A box plot can be drawn independently or from a cumulative frequency diagram.		
218.	**Comparing Box Plots**	Write two sentences. 1. Compare the averages using the medians for two sets of data. 2. Compare the spread of the data using the range or IQR for two sets of data. The smaller the range/IQR, the more consistent the data. You must compare box plots in the context of the problem.	‘On average, students in class A were more successful on the test than class B because their median score was higher.’ ‘Students in class B were more consistent than class A in their test scores as their IQR was smaller.’	
219.	**Frequency polygon**	A frequency polygon is plotted against the **mid-points** of the data groups and is drawn with a ruler.		
220.	**Cumulative frequency**	A cumulative frequency diagram is plotted against the end-points of the data groups and is drawn free-hand with a smooth curve shape. They can be used to find the median (half-way) and quartile (25% and 75%) values.		

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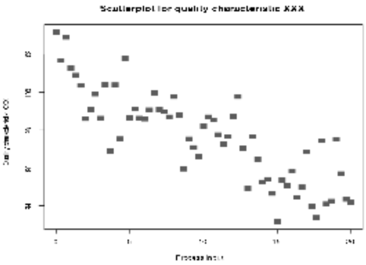
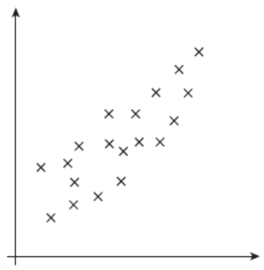
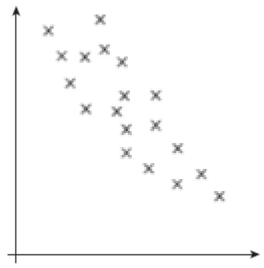
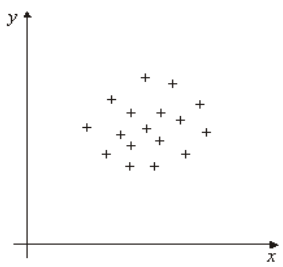
221.	**Correlation**	Correlation between two sets of data means they are connected in some way.	There is correlation between temperature and the number of ice creams sold.	
222.	**Causality**	When one variable influences another variable.	The more hours you work at a particular job (paid hourly), the higher your income from that job will be.	
223.	**Scatter Graph**	A graph in which values of two variables are plotted along two axes to compare them and see if there is any connection between them.		
224.	**Positive Correlation**	As one value increases the other value increases.		
225.	**Negative Correlation**	As one value increases the other value decreases.		
226.	**No Correlation**	There is no linear relationship between the two.		

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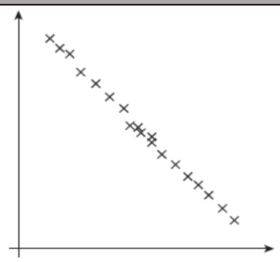
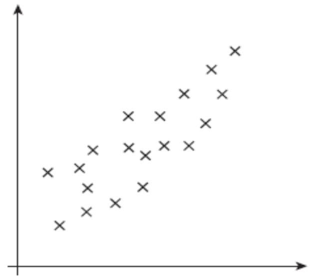
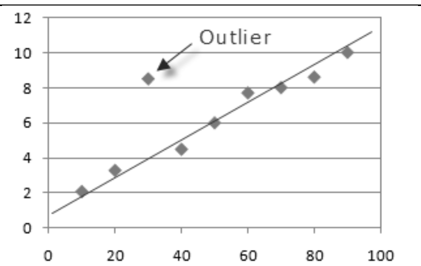
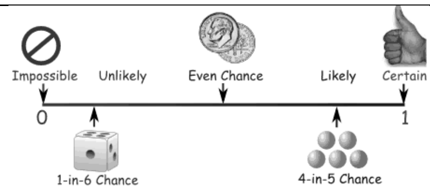
227.	**Strong Correlation**	When two sets of data are closely linked. The correlation may be positive or negative.	 A stronger negative correlation is shown here.	
228.	**Weak Correlation**	When two sets of data have correlation, but are not closely linked. The correlation may be positive or negative.	 A weaker positive correlation is shown here.	
229.	**Outlier**	A value that 'lies outside' most of the other values in a set of data. An outlier is much smaller or much larger than the other values in a set of data.	 	
230.	**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.)	 	
231.	**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.	

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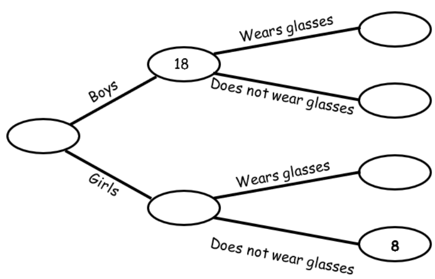
232.	**Theoretical Probability**	$\frac{Number\ of\ Favourable\ Outcomes}{Total\ Number\ of\ Possible\ Outcomes}$	Probability of rolling a 4 on a fair 6-sided die = $\frac{1}{6}$.	
233.	**Relative Frequency**	$\frac{Number\ of\ Successful\ Trials}{Total\ Number\ of\ Trials}$	A coin is flipped 50 times and lands on Tails 29 times. The relative frequency of getting Tails = $\frac{29}{50}$.	
234.	**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? $0.2 \times 40 = 8\ games$	
235.	**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.	
236.	**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	
237.	**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.		

<table>
<tr><th colspan="4">MATHS – YEAR 11
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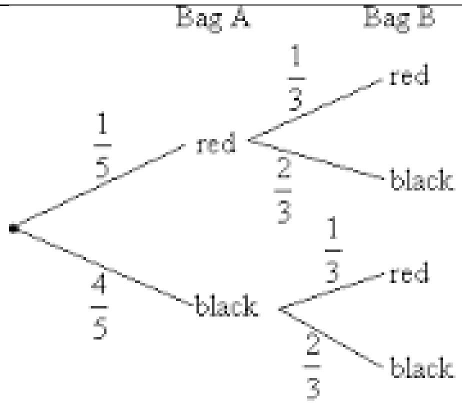
<tr><td></td><td colspan="3">Whole year:</td><td></td></tr>
<tr><td>238.</td><td>Sample Space</td><td>The set of all possible outcomes of an experiment.</td><td>
<table>
<tr><td>+</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr>
<tr><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>1</td></tr>
<tr><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>1</td></tr>
<tr><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>1</td></tr>
</table>
</td><td></td></tr>
<tr><td>239.</td><td>Tree Diagrams</td><td>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.</td><td>
</td><td></td></tr>
<tr><td>240.</td><td>Independent Events</td><td>The outcome of a previous event does not influence/affect the outcome of a second event.</td><td>An example of independent events could be replacing a counter in a bag after picking it.</td><td></td></tr>
<tr><td>241.</td><td>Dependent Events</td><td>The outcome of a previous event does influence/affect the outcome of a second event.</td><td>An example of dependent events could be not replacing a counter in a bag after picking it.

‘Without replacement’</td><td></td></tr>
</table>

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242.	**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.	

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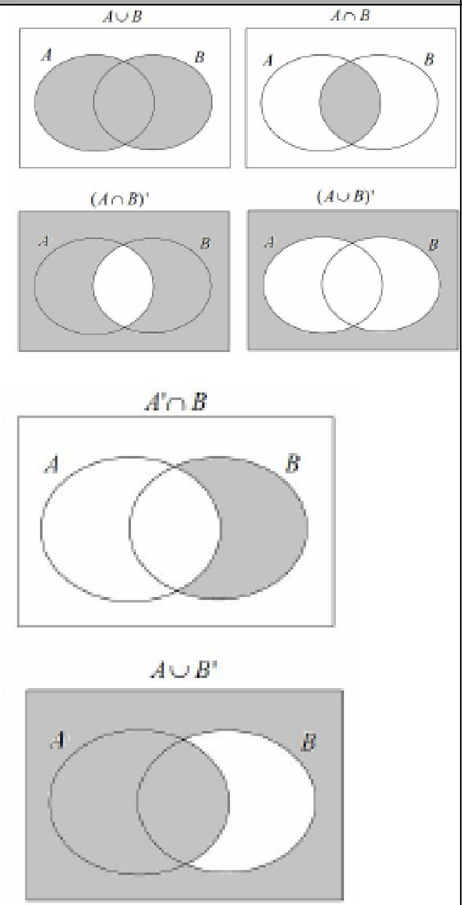
243.	**Venn Diagrams**	A Venn Diagram shows the relationship between a group of different things and how they overlap. You may be asked to shade Venn Diagrams as shown below and to the right.		
244.	**Venn Diagram Notation**	∈ means 'element of a set' (a value in the set) { } means the collection of 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}	

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245.	**AND Rule for Probability**	When two events, A and B, are independent: $P(A \text{ and } B) = P(A) \times P(B)$	What is the probability of rolling a 4 and flipping a Tails? $P(4 \text{ and } Tails) = P(4) \times P(Tails)$ $= \frac{1}{6} \times \frac{1}{2} = \frac{1}{12}$	
246.	**OR Rule for Probability**	When two events, A and B, are mutually exclusive: $P(A \text{ or } B) = P(A) + P(B)$	What is the probability of rolling a 2 or rolling a 5? $P(2 \text{ or } 5) = P(2) + P(5)$ $= \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$	
247.	**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.