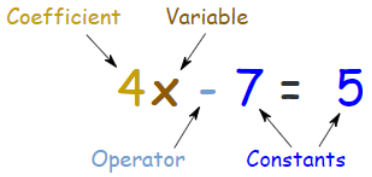
Year 9 Mathematics Higher HT 2

Algebra: the basics

Definitions

1.	Variable	A letter representing a varying or unknown quantity.	
2.	Coefficient	A number which multiplies a variable e.g. 4 is the coefficient in 4a	
3.	Term	One part of an expression/equation/formula Can involve multiplying and dividing coefficients and variables Separated from other terms by addition and subtraction	e.g. $4c$ $\frac{w}{5}$
4.	Like terms	Terms that have the same variable but have different coefficients	e.g. c + 4c are like terms c^2 and c^3 are not like terms
5.	Constant	A fixed value. A number on its own or sometimes a letter such as a, b or c to represent a fixed number.	
6.	Expression	One or a group of terms. Can include variables, constants, operators and grouping symbols. No 'equals' sign	e.g. 3y -3 $3y^2 + y^3$
7.	Equation	Contains an 'equals' sign, = Has at least one variable	e.g. 3y – 3 = 12
8.	Formula	A special type of equation that shows the relationship between a set of variables	
9.	Formulae	Plural of 'formula'	
10.	Identity	An equation that is true no matter what values are chosen, ≡	e.g. 3y ≡ 2y – y for any value of y.
11.	Subject	The variable on its own on one side of the equals sign.	
12.	Substitute	Replace a variable with a number.	$a = 3, b = 2$ *and* $c = 5$. **Find:** 1. $2a = 2 \times 3 = 6$ 2. $3a - 2b = 3 \times 3 - 2 \times 2 = 5$ 3. $7b^2 - 5 = 7 \times 2^2 - 5 = 23$
13.	Simplify	Minimising the size of an expression	

14.	Factorise	Splitting an expression into a product of factors	
15.	Expand	Removing brackets by using multiplication	
16.	Solve	Find the value of an unknown	

Algebraic Notation

17.	Adding like terms	Add the coefficients	$b + 2b = 3b$
18.	Subtracting like terms	Subtract the coefficients	$5b - 4b = b$
19.	Multiplying like terms	If the base is the same, add the powers	$b \times b = b^2$
20.	Dividing terms	If the base is the same, subtract the powers	$b^5 \div b^2 = b^3$
21.	Adding different terms	Cannot combine if the terms are different.	$b + 2c = b + 2c$
22.	Subtracting different terms	Cannot combine if the terms are different.	$3c - 4 = 3c - 4$
23.	Multiplying different terms	Combine with no '×' sign	$d \times e = de$
24.	Multiplying different terms with coefficients	Combine with no '×' sign, multiply the coefficients	$2d \times 3e = d6e$
25.	Dividing different terms	Write as fractions with no '÷' sign	$3d \div e = \frac{3d}{e}$
26.	Dividing different terms with coefficients	Write as fractions with no '÷' sign, simplify the coefficients where possible.	$14d \div 7e = \frac{2d}{e}$

Expanding (single brackets)

27.	Multiply all the terms inside the bracket, by the term on the outside.		
28.	$3(a + 4) = 3a + 12$	× | $2x$ | -3 $2x$ | $4x^2$ | $-6x$	$4x^2 - 6x$

Factorising (single brackets)

29.	• Find the highest common factor of the terms • This goes outside the bracket • Divide each term by the factor to get the new terms inside the bracket • Always check by expanding your bracket	$2x + 4y$ $5x^2y - 10xy$	$2(x + 2y)$ $5xy(x - 2)$

Expressions

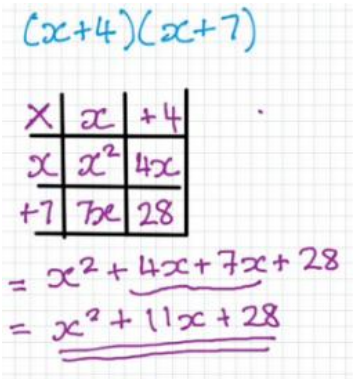
30.	Linear	Can be represented by a straight line No indices above 1	e.g. $2x + 2$
31.	Quadratic	An expression where the highest index is 2	e.g. $2x^2 + 2x + 2$

Expanding double brackets

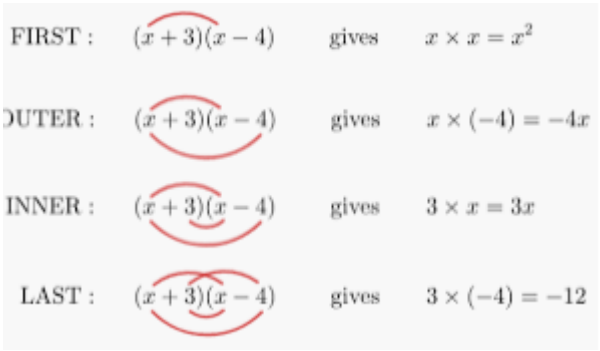
32. Everything in the first bracket must be multiplied by everything in the second

33.

Grid method



FOIL method



Factorising a quadratic expression

34. Factorising a quadratic in the form of $ax^2 + bx + c$

Multiply to 5

Factorise $x^2 + 5x + 6$ ← Add to 6

2 and 3 add to 5
2 and 3 multiply to 6

$(x + 2)(x + 3)$

Check: $(x + 2)(x + 3) = x^2 + 5x + 6$

35. Difference of two squares

A special type of quadratic which only has two terms.

One term is subtracted from the other

$x^2 - 25 = x^2 - 5^2 = (x + 5)(x - 5)$
$y^2 - 49 = y^2 - 7^2 = (y + 7)(y - 7)$
$a^2 - 16 = a^2 - 4^2 = (a + 4)(a - 4)$

Equations

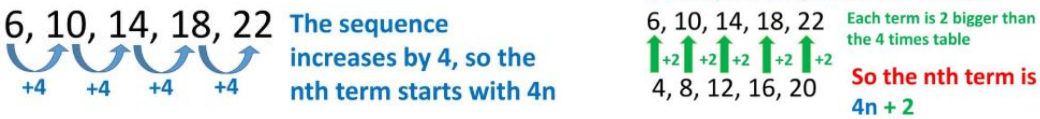
36. To solve equations we need to use inverse operations

37. What ever you do to one side of the equals sign you must do the same to the other

38.	One step	$x+4=7$ $(-4)\quad(-4)$ $x=11$ $x-5=12$ $(+5)\quad(+5)$ $x=17$ $3x=18$ $(\div 3)\quad(\div 3)$ $x=1$ $\frac{x}{4}=6$ $(\times 4)\quad(\times 4)$ $x=24$	
39.	Two step	Requires the use of two inverse operations	$2x-7=19$ $2x=26$ $x=13$
40.	With brackets	Expand the brackets first $5(2x+1)=35$ $10x+5=35$ $10x=30$ $x=3$	OR if possible divide by the number outside of the bracket first $4(2x+4)=20$ $2x+4=5$ $2x=1$ $x=\frac{1}{2}$
41.	Unknowns on both sides	Start by eliminating the unknown from one of the signs.	$5x+2=3x-8$ $2x+2=-8$ $2x=-10$ $x=-5$
42.	With fractions	Eliminate any terms that are being added or subtracted separate from the fraction first. $\frac{f}{5}+2=8$ $\frac{f}{5}=6$ $f=30$	If everything is part of the fraction then multiply by the denominator first. $\frac{f+2}{5}=8$ $f+2=40$ $f=38$

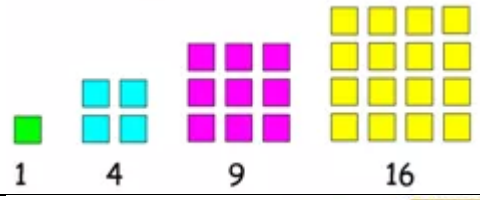
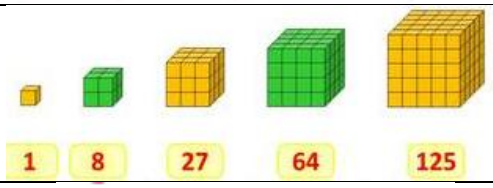
Changing the subject of a formula (rearranging)

43.	Always use inverse operations to isolate the term you have been asked to make the subject		
	If the letter you want as the subject appears twice you will need to factorise		
	Make u the subject: $v=u+at$ $(-\boldsymbol{at})$ $v-at=u$ So $u=v-at$	Make u the subject: $v^2=u^2+2as$ $(-\boldsymbol{2as})$ $v^2-2as=u^2$ $(\sqrt{\ })$ $\sqrt{v^2-2as}=u$ So $u=\sqrt{v^2-2as}$	Make m the subject: $I=mv-mu$ $(\boldsymbol{Factorise})$ $I=m(v-u)$ $(\div(\boldsymbol{v-u}))$ $\frac{I}{v-u}=m$ So $m=\frac{I}{v-u}$

Iteration		
44.	Iteration	The act of repeating a process to generate a sequence of outcomes or with the aim of of appraoching a desired result e.g. finding a solution to an equation
45.	Iterative sequence	The relationship between consecutive terms
46.	Roots	Solutions to an equation
47.	Change of sign	Two values with a root between them
Sequences		
48.	Sequence	An order pattern of numbers or diagrams
49.	Term	One of the numbers or diagrams in a sequence
50.	Term to term rule	The rule for moving from one term to the next in a sequence
51.	Formula	A rule written to describe a realtionship between twp quantities
52.	Arithmetic sequence	A sequence where the term to term rule is to addd or subtract the same amount each time
53.	Quadratic sequence	A sequence where the term to term rule is changing by the same amount each time The second difference is a constant amount.
54.	Geometric sequence	A sequence where the term to term rule is to multiply by the same amount each time
55.	Common ratio	The value a geometric sequence is multiplied by from one term to the next Denoted by the letter *r*
56.	Series	The sum of the terms in a sequence
57.	Position to term rule	The rule for finding any value of a sequence
58.	nth term rule for an arithmetic sequence	The rule to find any term in a sequence of numbers • Find the common difference between the terms • This becomes you coefficient of n (this is the times table the sequenc is linked to) • The number you need to add or subtract to get to the second term becomes the second term in the nth term rule 
59.	Nth term for a quadratic sequence	• Find the first difference • Find the second difference • Halve the second difference and multiply by n^2 to gain a new sequence of an^2 • Generate the first few term sof this seuence then subtract from the original sequence

		• Find the nth term of the remianing sequence $bn + c$ • The entire nth term is then $an^2 + bn + c$
60.	nth term for a geometric sequence	• Divide the second sequence by the first to find the common ratio, *r* • The nth term is ar^{n-1} where *a* is the first term and *n* is the term position in the sequence
61.	Finite	Has a final point
62.	Infinite	Carries on forever
63.	Ascending	Increases
64.	Descending	Decreases
65.	Linear function	An aruthmetic sequence that can be represented by a straight line graph

Special Sequences

66.	Square numbers	1, 4, 9, 16, 25, 36, 49, 64, 81, 100	
67.	Cube numbers	1, 8, 27, 64, 125	
68.	Triangular numbers	1, 3, 6, 10, 15, 21, 28	
69.	Fibonacci sequence	A sequence where each term is the sum of the two previous terms	
		e.g. 1, 1, 2, 3, 5, 8, 13, 21…	

Year 9 Mathematics
Higher
HT 3

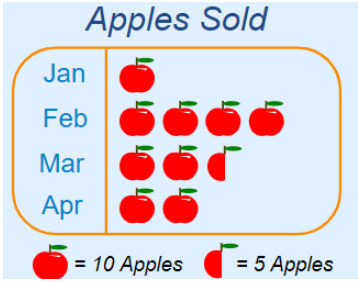
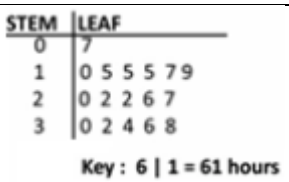
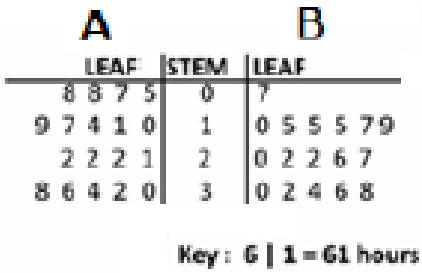
Definitions

1.	Qualitative Data	Non-numerical data	i.e. Colour of car
2.	Quantitative Data	Numerical data	i.e. House number
3.	Discrete Data	Numerical data that CANNOT be shown in decimals	i.e. Number of children in a class
4.	Continuous Data	Numerical data that CAN be shown in decimals	i.e. The heights of children in a class
5.	Grouped Data	Numerical data given in intervals	i.e. Year group ranges: Year 7-9 Year 10-11 Year 12-13

Averages

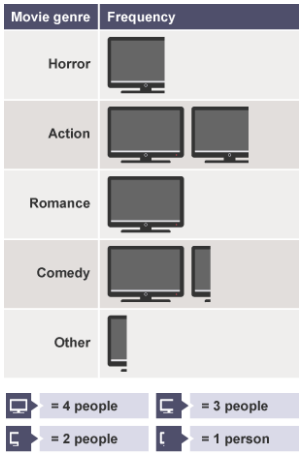
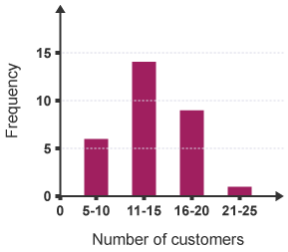
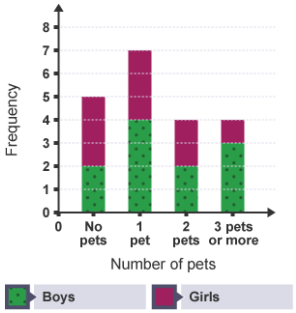
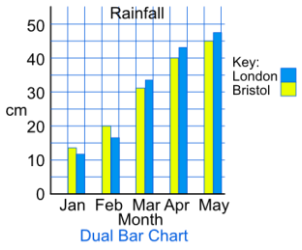
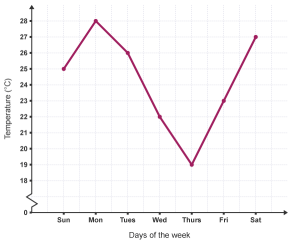
6.	Measure of location	A single value that describes a position in a data set	
7.	Measure of central tendency	A single value that describes the centre of the data	
8.	Measure of spread	A measure of how spread out the data is	
		Also known as 'measures or dispersion' or 'measures of variation'	
		Two simple measures of spread are range and interquartile range (IQR)	
9.	Mode (modal class)	The value that occurs most often	
10.	Range	The difference between the largest and smallest values in the data set	
11.	Median	The middle value when the data values are put in ascending order	
12.	Mean	Found by adding all number sin the data set and dividing by the number of values in the set	
		Can be calculate using the formula $\bar{x} = \frac{\Sigma x}{n}$	Where: $\bar{x}$ is the mean Σx is the sum of the data values n is the number of data values
		Mean from a frequency table $\bar{x} = \frac{\Sigma fx}{\Sigma f}$ Where Σfx is the sum of the products of data values and their frequencies and Σf is the sum of the frequencies	

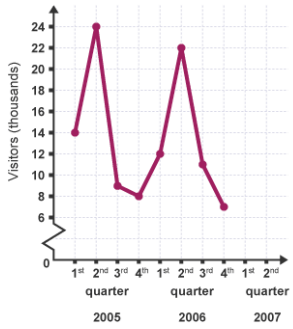
<table>
<tr><td colspan="4">Advantages and disadvantages of averages</td></tr>
<tr><td rowspan="4">13.</td><td>Average</td><td>Advantages</td><td>Disadvantages</td></tr>
<tr><td>Mean</td><td>Every value makes a difference</td><td>Affected by extreme values</td></tr>
<tr><td>Median</td><td>Not affected by extreme values</td><td>May not change even if a data value changes</td></tr>
<tr><td>Mode</td><td>Easy to find; not affected by extreme values; can be used for non-numerical data</td><td>There may not be a mode</td></tr>
<tr><td colspan="4">Averages from frequency tables</td></tr>
<tr><td>14.</td><td>Modal class</td><td colspan="2">The class with the highest frequency</td></tr>
<tr><td>15.</td><td>Median</td><td colspan="2">If the total frequency is n, then the median lies in the class with the $\frac{n+1}{2}$th value in it.</td></tr>
<tr><td>16.</td><td>Mean from a frequency table
Times →
Add ↓↓
Divide ←</td><td colspan="2">No of make-up items in handbags
<table>
<tr><th>No of Items x</th><th>Freq f</th><th>f x x</th></tr>
<tr><td>1</td><td>7</td><td>1x 7 =7</td></tr>
<tr><td>2</td><td>2</td><td>2x 2 =4</td></tr>
<tr><td>3</td><td>1</td><td>3x 1 =3</td></tr>
<tr><td>4</td><td>4</td><td>4x 4 =16</td></tr>
<tr><td>5</td><td>2</td><td>5x 2 =10</td></tr>
<tr><td></td><td>16</td><td>40</td></tr>
</table>
Mean = $\frac{40}{16}$ =2.5</td></tr>
<tr><td>17.</td><td>Estimated mean from a grouped frequency table
Times →
Add ↓↓
Divide ←</td><td colspan="2">
<table>
<tr><th>Class Interval</th><th>Mid-point</th><th>Frequency</th><th>Mid-point × Frequency</th></tr>
<tr><td>$140 \le h < 150$</td><td>145</td><td>6</td><td>145 × 6 = 870</td></tr>
<tr><td>$150 \le h < 160$</td><td>155</td><td>16</td><td>155 × 16 = 2480</td></tr>
<tr><td>$160 \le h < 170$</td><td>165</td><td>21</td><td>165 × 21 = 3465</td></tr>
<tr><td>$170 \le h < 180$</td><td>175</td><td>8</td><td>175 × 8 = 1400</td></tr>
<tr><td></td><td>Totals</td><td>51</td><td>8215</td></tr>
</table>
Mean = 8215 ÷ 51
=161.07843...
= 161.08 (2dp)</td></tr>
<tr><td>18.</td><td>Estimate of range from grouped frequency table</td><td colspan="2">The maxiumum possible value minus the smallest possible value.</td></tr>
<tr><td colspan="4">Averages from charts/graphs</td></tr>
</table>

19.	Bar chart	A chart to display discrete data where the height of the bar shows the frequency. 	Mean: 23 ÷ 10 = 2.3 Median: 2.5 Mode : 3 Range: 4-1 = 3
20.	Pictogram	A chart that uses pictures to represent quantities. Must include a key. 	Mean: 95÷4 = 23.75 Median: 22.5 Range: 30
21.	Stem and leaf diagram	 A diagram that shows groups of data arranged by place value. 'Leaves' should be in order. Must have a key.	Mean: 385÷17 = 22.6 Median: 22 Mode: 15 Range: 38-7 = 31
22.	Back to back stem and leaf	Compares two sets of results. Must have a key. 	Set A Mean: 356÷18 = 19.8 Median: 20 Mode: 22 Range: 38-5 = 33 Set B Mean: 385÷17 = 22.6 Median: 22 Mode: 15 Range: 38-7 = 31

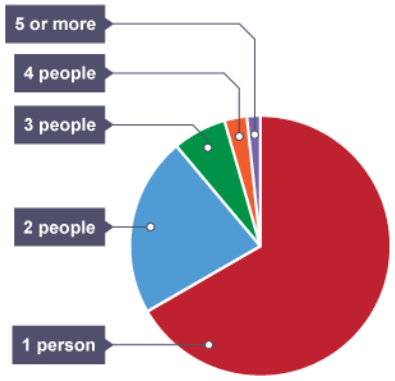
Representing data

23.	Two-Way Tables		Boys	Girls	TOTAL
		Pet	9	4	13
		No Pet	2	5	7
		TOTAL	11	9	20
					Two-way tables are a way of sorting data with two categories.

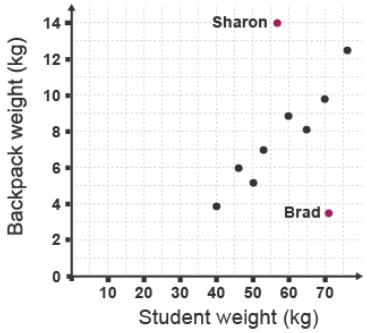
24.	Pictograms		Used to show frequencies Pictures and images used to represent frequency A key at the bottom helps you interpret the diagram
25.	Bar Charts		Frequency on the vertical axis, and categories along the horizontal axis. Used to compare frequencies
26.	Composite Bar Chart		Frequency on the vertical axis, and categories along the horizontal axis. Two shades used to show difference in proportion between sub-groups (i.e. gender) Used to compare frequencies within sub-groups
27.	Comparative Bar Chart		Frequency on the vertical axis, and categories along the horizontal axis. Bars are next to each other and used to show difference in frequency between sub-groups (i.e. gender) Used to compare frequencies within sub-groups
28.	Line Graph		A line graph is used to show a change or relationship between two variables. Once the points are plotted, they are joined with straight lines.

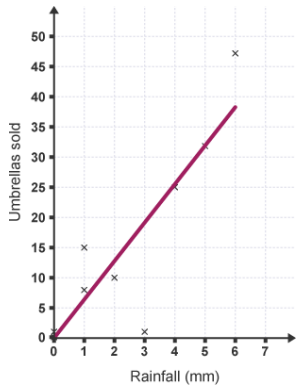
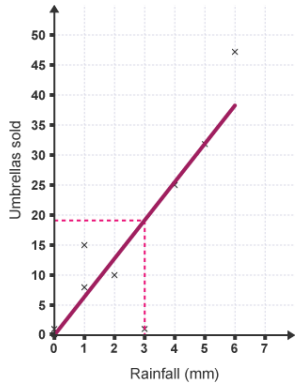
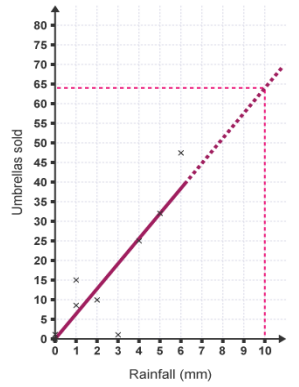
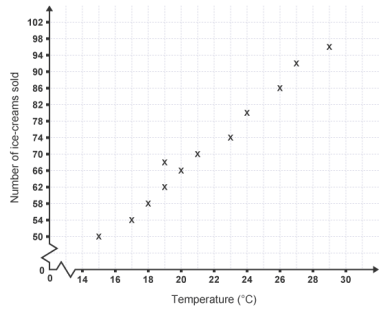
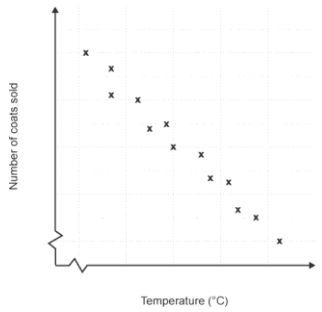
29.	Time-Series		A time-series graph plots frequencies (vertical) axis against time (horizontal). It is used to spot trends over time. Time could be: weeks, months, quarters (3 months), years
30.	Stem & Leaf Diagrams:	Key: 1 | 1 = 11 marks 0 | 9 1 | 1 6 7 8 2 | 1 2 7 7 8 8 9 3 | 0 0 1 5 6 7 8 9 4 | 0 1 2 5	A stem and leaf diagram shows numbers in a table format. It can be a useful way to organise data to find the median, mode and range of a set of data. Only one digit is allowed to be a 'leaf' There should be a key to help you interpret the diagram
31.	Pie Charts	A pie chart is a chart represented by a circle. It shows the proportion of each group at a glance.	

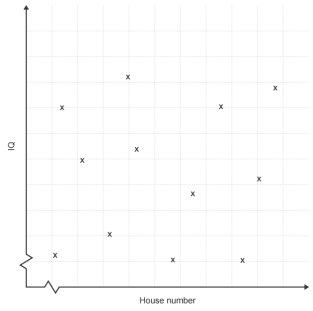
People travelling in a vehicle	Frequency	Calculation	Angle
1 person	120	$\frac{120}{180} \times 360°$	240°
2 people	40	$\frac{40}{180} \times 360°$	80°
3 people	13	$\frac{13}{180} \times 360°$	24°
4 people	5	$\frac{5}{180} \times 360°$	10°
5 or more	2	$\frac{2}{180} \times 360°$	4°
Total	180		



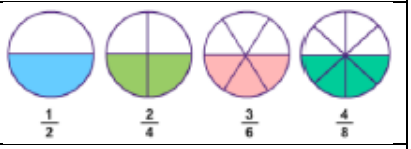
Scatter Graphs

32.	Outliers		Outliers don't follow the trend

33.	Line of Best Fit		A sensible straight line that goes as centrally as possible through the points plotted. It should also follow the same steepness of the crosses.	
34.	Interpolate		Using a line of best fit to estimate data <u>WITHIN</u> our range <u>For example</u>: To estimate how many umbrellas are sold with 3mm rain. • Find where 3 mm of rainfall is on the graph. • Draw a line by going across from 3 mm and then down.	
35.	Extrapolate		Continuing a line of best fit to estimate data <u>BEYOND</u> our range (not as reliable as interpolation) <u>For example</u>: To estimate how many umbrellas are sold with 10mm rain. • Continue the line of best fit. • Find where 10mm of rainfall is on the graph. • Draw a line by going across from 10mm and then down.	
36.	Positive Correlation		BOTH variables increase with each other	i.e. Ice creams sold vs Temperature
37.	Negative Correlation		ONE variable increases as the other decreases	i.e. Coats sold vs temperature

38.	No Correlation		NO relationship between variables	i.e. IQ and House Number
39.	Causation	If one variable causes a change in the other. • i.e. an increase temperature <u>WILL</u> cause an increase ice cream sales • i.e. the number of bee stings <u>WILL NOT</u> cause an increase in ice cream sales (although both will increase in hot weather)		

Fractions

1.	Fraction	Part of a whole	
2.	Numerator	The number on the top of the fraction	$\frac{numerator}{denominator}$
3.	Denominator	The number on the bottom of the fraction	
4.	Equivalent fractions	Fractions that have the same value but look different.	
5.	Improper fraction	A fraction where the numerator is larger than the denominator.	e.g. $\frac{4}{3}$
6.	Mixed number	A number made from integer and fraction parts.	e.g. $2\frac{2}{3}$
7.	Unit fraction	A fraction that has a numerator of 1	
8.	Reciprocal	The reciprocal of a number is 1 divided by the number.	e.g. the reciprocal of 3 is $\frac{1}{3}$
		Dividing by a number is the same as multiplying by its reciprocal	e.g. $\times$ by $\frac{1}{3}$ is the same as $\div$ by 3

Fractions - processes

9.	Simplifying fractions	Divide the numerator and denominator by the HCF.	$\frac{24}{30} = \frac{4}{5}$
10.	Finding equivalent fractions	Multiply the numerator and denominator by the same number	$\frac{4}{8} \times 2 = 8$ $\times 2 = 16$
11.	Comparing fractions	Write them with a common denominator	
12.	Fraction of an amount	Amount divided by the denominator then multiplied by the numerator	e.g. $\frac{5}{7}$ of 42 $42 \div 7 \times 5 = 30$
13.	Multiply fractions	Multiply the numerators and multiply the denominators	$\frac{6}{7} \times \frac{4}{5} = \frac{6 \times 4}{7 \times 5} = \frac{24}{35}$
14.	Divide fractions	• Flip the second fraction (find the reciprocal). • Change the divide to multiply. • Multiply the fractions.	$\frac{4}{7} \div \frac{5}{6} = \frac{4}{7} \times \frac{6}{5} = \frac{4 \times 6}{7 \times 5} = \frac{24}{35}$
15.	Add or subtract fractions	• Write as fractions with a common denominator. • Add or subtract the numerators	$\frac{2}{8} + \frac{1}{6} = \frac{6}{24} + \frac{4}{24} = \frac{10}{24} = \frac{5}{12}$
16.	Convert improper fractions to mixed numbers	• Divide the numerator by the denominator • The answer gives the whole number part.	$\frac{43}{6} = 7\frac{1}{6}$

		• The remainder becomes the numerator of the fraction part with the same denominator.	
17.	Convert mixed numbers to improper fractions	• Multiply the denominator by the whole number part. • Add the numerator to this. • Put the answer to this back over the denominator	$7\frac{1}{6} = \frac{6 \times 7 + 1}{6} = \frac{43}{6}$
18.	Adding and subtracting mixed numbers	• Convert mixed numbers to improper fractions • Transform both fractions so they have the same denominator • Add or subtract the numerators Convert back to mixed number if applicable	
19.	Multiplying mixed numbers	• Convert mixed numbers to improper fractions • Multiply numerators and multiply the denominators Convert back to mixed number if applicable	
20.	Dividing mixed numbers	• Convert mixed numbers to improper fractions • Flip the second fraction (find the reciprocal) • Change the divide sign to a multiply • Multiply the fractions Convert back to mixed number if applicable	
Percentages			
21.	Percentage	Means 'out of 100'	
22.	Multiplier	A decimal you multiply by to represent a percentage	
		To use a multiplier to find a percentage, divide your percentage by 100, then multiply the amount by this value.	
23.	Percentage increase	Calculate the percentage and add onto the original	
		Or use a multiplier	$amount \times \frac{100 + \%\ increase}{100}$
24.	Percentage decrease	Calculate the percentage and subtract from the original	
		Or use a multiplier	$amount \times \frac{100 - \%\ increase}{100}$
25.	Percentage change	$\frac{Change}{Original} \times 100$	
26.	Express one number as a percentage of another	$\frac{Number\ 1}{Number\ 2} \times 100$	
27.	Reverse percentage	Use when asked to find the priginal amount after a percentage increase or decrease.	

		Original Value x Multiplier = New Value Original Value = $\frac{\text{New Value}}{\text{Multiplier}}$	
28.	Interest	A fee paid for borrowing money or money earnt through investing.	
29.	Simple interest	Interest that is calculated as a percentage of the original	I = Prt I – Interest P – Original amount r – interest rate t - time
30.	Compound interest	When interest is calculate on the original amount and any previous interest OR $Original \times Multiplier^{time}$	$P\left(1+\frac{R}{100}\right)^{n}$ P – Original amount R – Interest rate n – the number of interest periods (e.g. yrs)
31.	Tax	A financial charge placed on sales or savings by the government e.g. VAT	
32.	Loss	Income minus all expenses, resulting in a negative value	
33.	Profit	Income minus all expenses, resulting in a positive value	
34.	Depreciation	A reduction in the value of a product over time	
35.	Annual	Means yearly	
36.	Per annum	Means per year	
37.	Salary	A fixed regular payment, often paid monthly	
FDP Conversions			
38.	Percentage to decimal	Divide by 100	
39.	Decimal to percentage	Multiply by 100	
40.	Fraction to percentage	Find an equivalent fraction with 100 as the denominator	
41.	Percentage to fraction	Write as a fraction over 100 then simplify	
42.	Fraction to decimal	Carry out division or convert to a percentage first	

43.	Decimal to fraction	Use place value to find the denominator and simplify or convert to a percentage first

Basics to memorise

44.	Fraction	$\frac{1}{100}$	$\frac{1}{10}$	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{4}$
	Decimal	**0.01**	**0.1**	**0.125**	**0.2**	**0.25**	**$0.\dot{3}$**	**0.5**	**$0.\dot{6}$**	**0.75**
	Percentage	1%	10%	12.5%	20%	25%	$33.\dot{3}$%	50%	$66.\dot{7}$%	75%

Terminating and recurring decimals

45.	Terminating decimal	Decimals that can be written exactly	e.g. 0.38
46.	Recurring decimal	Decimals where one digit or groups of digits are repeated	e.g. $0.\dot{7}$ = 0.7777... $0.\dot{8}5\dot{3}$ = 0.853853...

47. Converting a recurring decimal to a fraction

1. Let x = recurring decimal.
2. Let n = the number of recurring digits.
3. Multiply the recurring decimal by 10^n.
4. Subtract (1) from (3) to eliminate the recurring part.
5. Solve for x, expressing your answer as a fraction in its simplest form.

$0.\dot{7}$ (one recurring digit)

$$x = 0.7777...$$
$$10x = 7.777...$$
$$10x - x = 7$$
$$9x = 7$$
$$x = \frac{7}{9}$$

$1.2\dot{5}\dot{6}$ (two recurring digits)

$$x = 1.25656...$$
$$100x = 125.6565...$$
$$100x - x = 125.6565... - 1.256565...$$
$$99x = 124.4$$
$$x = \frac{124.4}{99} = \frac{1244}{990} = \frac{622}{495}$$

48. Converting a fraction to recurring decimals

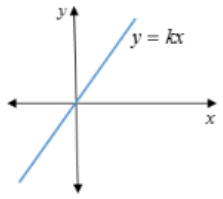
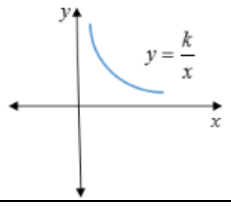
Carry out the neccesary division using a calcualtor or bus stop division

e.g. $\frac{4}{7}$ means $4 \div 7$

$$7 \overline{)\,4.^{4}0^{5}0^{1}0^{3}0^{2}0^{6}0^{4}0^{5}0} \quad 0.57142857$$

Ratio and Proportion

49.	Ratio	A relationship between two or more quantities
50.	Unit ratio	Used to compare ratios, one of the parts is 1
		The only time it is permissible to have a decimal in a ratio

51.	Equivalent	Ratios that have the same simplified form are said to be equivalent	
52.	Scale	A ratio that represents the relationship between a length on a drawing or a map and the actual length	
53.	Proportion	Compares a part with a whole	
54.	Direct proportion	Two quantities increase at the same rate	$y \propto x$ $y = kx$ for a constant k 
		Graph is a straight line that goes through the origin	
55.	Inverse/indirect proportion	One variable increases at a constant rate as the second variable decreases	$y \propto \frac{1}{x}$ $y = \frac{k}{x}$ for a constant k 
56.	Proportional	A change in one is always accompanied by a change in the other	
57.	Constant of proportionality	Represented by *k*	
		Its value stays the same	
58.	Share	Splitting into parts as defined by a ratio	
59.	Unitary method	Finding the value of 1 item then using this to find the value of any number of that item	
		Use to work out which products give the best value for money	

Working with ratios

60.	Simplifying ratio	Divide all parts by the highest common factor	e.g. 12:4 simplifies to 3:1 (divided by HCF of 4)
		All parts in the simplified version must be integers	
61.	Divide in a given ratio	Divide an amount so the ratio of the final values simplifies to the given ratio