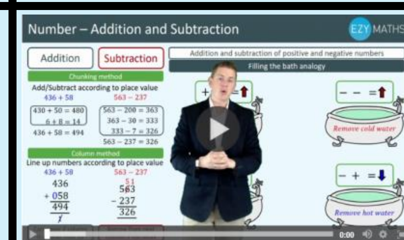
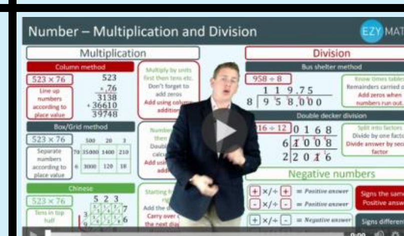
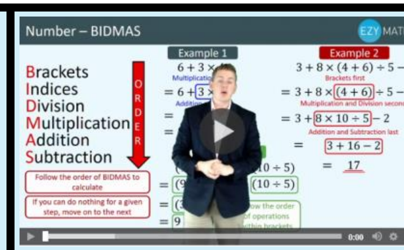
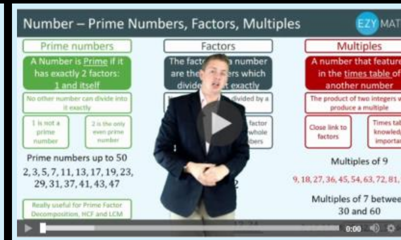
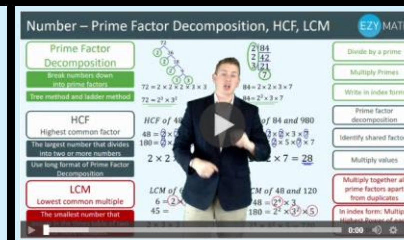
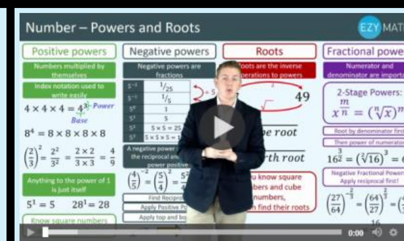
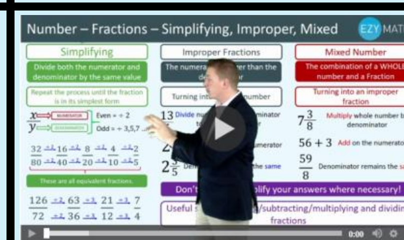
GCSE MATHS SNAPSHOTS

This is a recovery PDF file that will link you to each of the recap videos that cover each of the pages in the GCSE Maths Snapshots Booklet. Click on the video thumbnail to access the corresponding recap videos.

NUMBER – 19 RECAP VIDEOS		
N.1.	**Place Value and Number Lines** These are 2 topic areas of importance for foundation level students as they offer the opportunity to secure some key marks, potentially early in the paper.	
N.2.	**Rounding** Important to get right for questions which focus specifically on rounding, especially place value rounding. It is also important to avoid dropping careless marks by incorrectly rounding your final answers.	
N.3.	**Addition and Subtraction** As well as being able to use the appropriate method to add and subtract complex numbers, we explore the rules regarding the addition and subtraction of positive and negative numbers which is often an area where simple marks are lost in an exam.	
N.4.	**Multiplication and Division** It is important that you have a 'go-to' method whenever you are confronted with multiplication and division problems and here, we look at some of the methods that are commonly used. We also take a look at the laws surrounding the multiplication and division of positive and negative numbers, a crucial area that many people make mistakes on when applying to algebra style questions.	

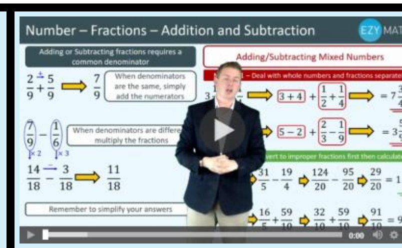
N.5.	**BIDMAS** The set of rules required to solve calculations was developed to ensure there was some regularity when confronted with calculations containing several different operations. An important topic when carrying out simple numerical problems but becomes crucial when starting to develop the skills required to solve algebraic problems. Don't forget to re-write your calculation at each stage so you can easily track what needs to be done next as you progress through the problem!	
N.6.	**Prime Numbers, Factors & Multiples** We look at the definitions and properties of prime numbers, factors and multiples. An important topic when looking to solve problems involving Highest common factor and Lowest common multiple. It can also prove useful when you need to divide by a double-digit number.	
N.7.	**Prime Factor Decomposition, HCF & LCM** We look at how to break down numbers into products of their primes and then use the information to calculate the HCF and LCM of two or more numbers. It is important to be confident in breaking down numbers into a product of their primes as this provides the foundation for solving HCF and LCM problems. You may come across questions involving HCF and LCM that will not require you to carry out prime factor decomposition. These are normally involved in best buy problems.	
N.8.	**Powers and Roots** There are three areas to be aware of when dealing with powers. Here, we take you through positive powers, negative powers and fractional powers. If you ever end up dealing with negative fractional powers, then look to deal with the negative element first then move onto the fractional part. We also a look at roots today because they are closely linked to fractional powers. When dealing with questions involving this topic, you should be confident in knowing your square and cube numbers.	
N.9.	**Fractions – Simplifying, Improper, Mixed** It is important to remember that fractions are 'part' of the 'whole'. The numerator is the top number (number of parts you are focusing on) and the denominator is the bottom number (total number of parts). To secure full marks you will have to make sure that your answers are in their simplest form and this is achieved by dividing the fraction to create an equivalent fraction with smaller numbers. When you start calculating with fractions you will end up with combinations of improper fractions and mixed numbers. Being able to convert between these two formats will make calculations a lot easier.	

N.10.

Adding and Subtracting Fractions

The focus here will be Addition and Subtraction of fractions. In order to carry out these calculations, the denominators of your fractions need to be the same. This means that you will have to multiply one or both of the fractions to make equivalent fractions that have the same denominator.

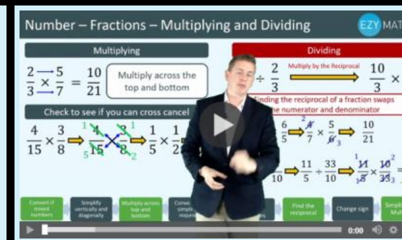
Remember to simplify your answers where possible to secure full marks and remember how to convert between mixed and improper fractions.



N.11.

Multiplying and Dividing Fractions

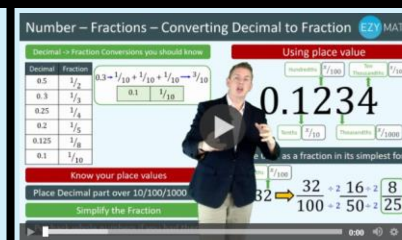
Unlike addition and subtraction there is no need to have a common denominator if we are asked to multiply/ divide fractions. All you need to do is multiply numerators, multiply denominators, simplify your answer. When dividing fractions, you need to flip the second fraction and multiply. (Keep Change Flip). Always look to see if you can cross cancel first. This will mean that you don't have to multiply large complicated numbers. When faced with mixed numbers, look to convert to improper fractions first.



N.12.

Converting Decimals to Fractions

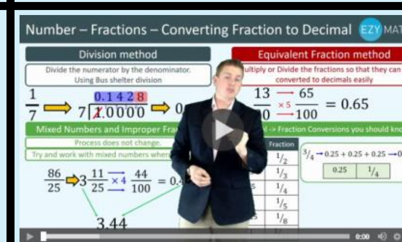
Having a look at the table, there are some simple decimal to fraction conversions you should know. If in doubt, use place value to place your number over 10/100/1000 etc. and then look to simplify your answer.



N.13.

Converting Fractions to Decimals

Having a look at the table, there are some simple fraction to decimal conversions you should know. For more complex fractions, there are two methods to consider; the first is using a division method and the other is using an equivalent fraction method.

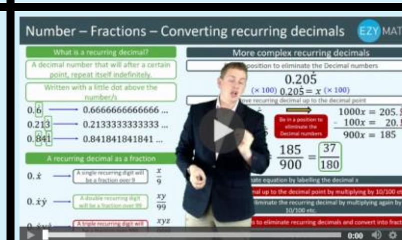


N.14.

Converting Recurring Decimals to Fractions

Here we look at converting simple recurring decimals into fractions with denominators of 9/99/999 etc. We then extend onto more complex recurring decimals. The best approach to these questions is to take an algebraic approach and multiply the decimal to get yourself into a position where the recurring element can be eliminated.

Important to remember that a recurring decimal is a decimal number that will have a pattern of number/s repeating infinitely. The whole point of converting the recurring decimal into a fraction is so that it is easier to calculate with.

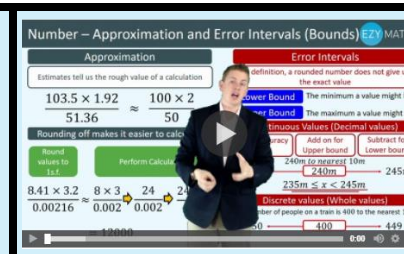


N.15.

Approximations and Error Intervals - Bounds

When approximating calculations, we tend to round each of the numbers to one significant figure. This should then leave us with a simpler calculation to carry out. Approximating your answers is good practice (not just when asked to) so you know if your answer is in the right region and you haven't made any big mistakes.

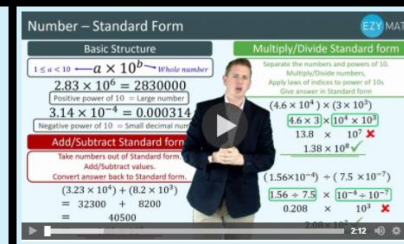
With error intervals, we are looking to find out what the maximum and minimum value of a rounded number might be. For continuous values, we halve the accuracy level (rounded to) and add it on for the Upper bound and subtract for the Lower bound. You will need to be a bit more careful with discrete values (people on a bus for example)



N.16.

Standard Form

Standard form is a system of writing very large or very small numbers as a power of ten. Make sure you understand the basic structure of standard form (a number between 1 and 10 then times ten to a power --> a×10b). You will be asked to write numbers in standard form as well as carry out operations using standard form. If you are asked to add or subtract Standard form; take the numbers out of standard form, add/subtract them, convert back to standard form. When asked to multiply/divide standard form; calculate the numbers first, apply the laws of indices to the powers of ten. combine and convert to standard from if necessary.

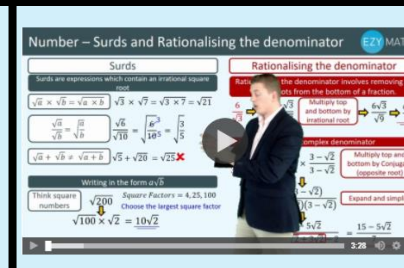


N.17.

Surds and Denominator Rationalizing

You need to understand that Surds are expressions that contain an irrational square root (meaning, if you square rooted the number, you would get a never-ending decimal). There are some laws of Surds that you need to be aware of (much like the laws of indices). Some questions will ask you to change a root to the form a√b, to do this you need to find the largest square number that will go into the number and simplify form there.

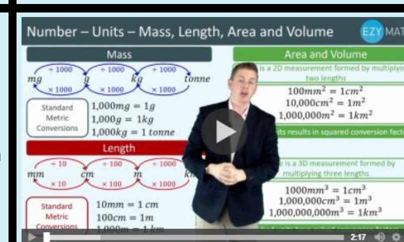
When it comes to rationalising the denominator, the key principle here is removing the square root from the denominator so that we are left with a whole number. This is achieved by multiplying. Take care to notice the different methods used when dealing with simple and more complex problems.



N.18.

Units - Mass, Length, Area and Volume

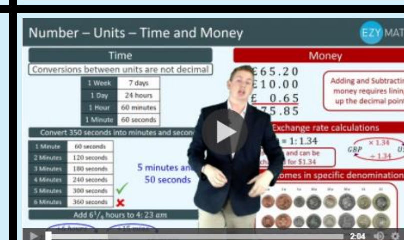
Many of the questions you will face will include units of some descriptions so it important that you are able to convert between the different types of units (metric). This will involve multiplying or dividing your value by a power of 10 (10, 100, 1000 etc). When it comes to Area and Volume the conversion factors are squared and cubed respectively.



N.19.

Units – Time and Money

You can be faced with questions involving time and converting time is an important skill to have when faced with some of the more obscure problem-solving questions. We also have a look at money as there have been money problems linked to probability and possible combination problems. Other common questions involve currency conversion where you either multiply or dived by the exchange rate.



ALGEBRA – 14 RECAP VIDEOS

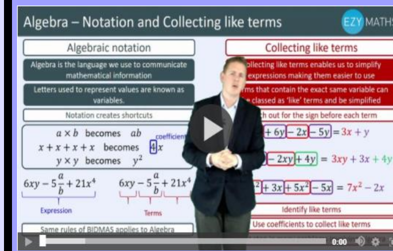
A.1.

Notation and Collecting Terms

Here we take an introductory look into Algebra and this will form the basis of all future algebraic manipulation. It will be important to know and understand the 'shortcuts' in algebraic notation. Using this knowledge, we can simplify expressions by collecting like terms together.

It is important in this topic to pay attention to signs. Are you dealing with positives or negatives? If you gain a solid understanding of this topic it will help to enhance your Algebra skills and tackle more complex problems.

In this video, Matt will go through the types of algebraic notation and the key processes behind simplifying expressions by collecting like terms.



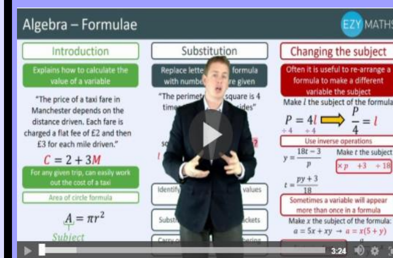
A.2.

Formulae

There are many strands to Formulae that you need to be comfortable with. We look at creating a formula from some information given, paying particular attention to the operations that are involved.

You will be required to memorise formulae to help you solve problems and being able to substitute into a formula accurately is important in order to secure the right answer and marks.

There will be times that you will have to manipulate and rearrange the formula in order to work something else out. This is called changing the subject and is also the last thing we cover in this topic.



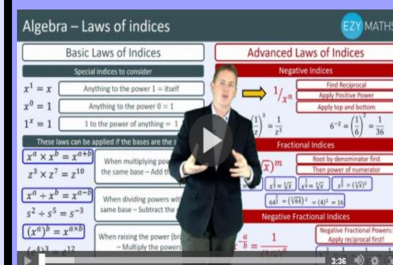
A.3.

Laws of Indices

It is important to understand that an index might be referred to as a power (the little number in the upper right corner) and that the base is your key component. We take a look at the three basic laws of indices involving the multiplying, dividing and raising of the powers.

We then start to explore the advanced laws of indices which share close similarities with negative and fractional powers that were covered earlier.

In this video, Matt guides you through the basic laws of indices before spending some time talking through the more advanced laws of indices.

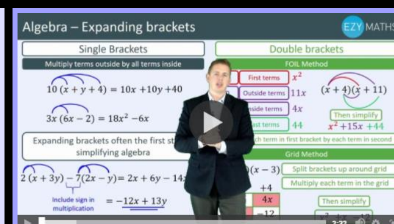


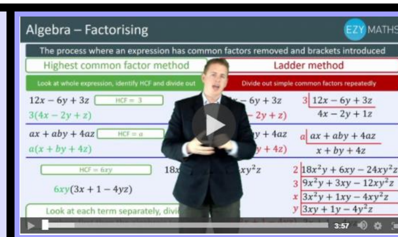
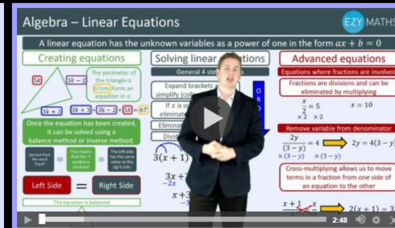
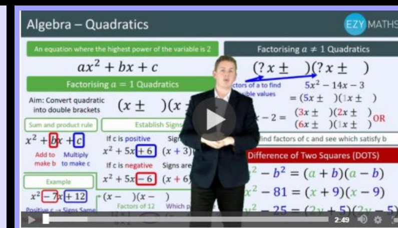
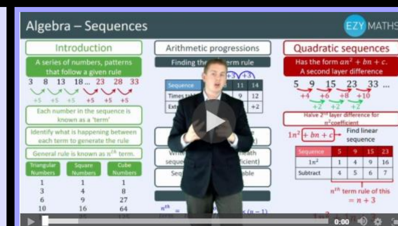
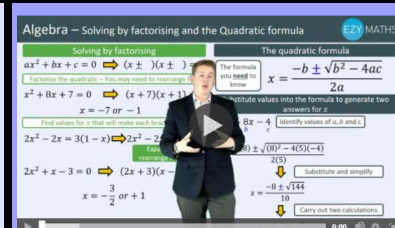
A.4.

Expanding Brackets

It is important to state that this is the inverse of factorising, and we take you through the process of expanding brackets by multiplication! Once the brackets have been expanded, it is essential to collect like terms and simplify your answer otherwise you will lose marks in a test.

Here we cover expanding single brackets and move onto double brackets. Note there is more than one method so make sure you get comfortably with a method and get those marks!



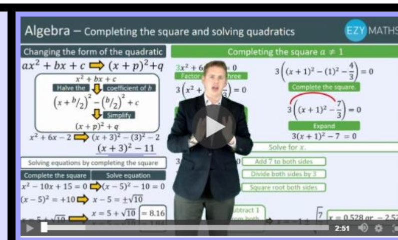
A.5.	**Factorising** Whenever you see this in a question, it means that you must write the expression with brackets. Here we look at how to factorise expressions by factoring out common factors (by dividing). We take you through two possible methods to do this.	
A.6.	**Linear Equations** Here we start with creating linear equations that will enable you to calculate the value of the unknown. Here you will need to utilise all your algebraic skills as you may be required to expand, factorise, collect like terms before attempting to solve the equation. Pay attention to the general order that you solve equations. The difference between an expression and equation is that an equation has an equal sign!	
A.7.	**Quadratics** Remember, factorising is putting into brackets! It is important to remember the general structure of a quadratic as you may need to rearrange your expression/equation to create the general structure. We start off by looking at simple quadratic expressions where the a value is equal to one. The key point to remember here is the 'Sum and Product rule' We finish off by looking to factorise quadratics where the a value is not equal to 1.	
A.8.	**Sequences** With sequences you will be required to know what is happening between each term in a sequence, using that information to carry on the sequence as well as find a general rule to find the value of any term in the sequence. We start off with simple sequences and the processes required to find the general rule (known as the n^{th} term) and move onto the more advanced quadratic sequences.	
A.9.	**Factorising and the Quadratic Formula** The first method to explore is solving by factorising. This means that we need to put the quadratic into double brackets and then solve to find values for x. If you end up with a quadratic that cannot be factorised then you will need to use the Quadratic formula method. It is important to establish the values of a, b and c that are needed to substitute into the formula. You will need to memorise the formula as you will not be given this in the exam. Remember that when using the quadratic formula, you will need to do two calculations one where you ADD the square root and one where you SUBTRACT the square root.	

A.10.

Completing the Square and Solving Quadratics

To complete the square, you need to think about halving the coefficient of b, this will form the main part of your completed square. There will be another amount (half the coefficient of b then squared). This will need to be combined with your c value to create a number. From there you have a relatively straightforward equation to solve (remember you are looking for two answers).

Completing the square will also reveal the turning point of the quadratic graph if you were to plot it.

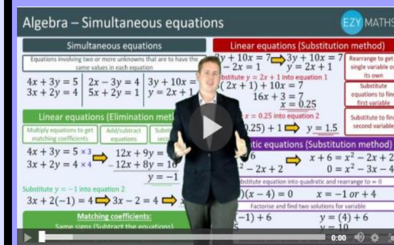


A.11.

Simultaneous Equations

A simultaneous equation is where we have two equations containing different unknowns (normally x's and y's) and our job is to find the value of both letters. There are two ways to solve simultaneous equations; the first method is the elimination method. In this method the aim is to get one of your variables to have matching coefficients, we achieve this by multiplying one or both equations. When they are the same, we simply add or subtract the equations to eliminate a variable. Solve the resultant equation to find the value of one variable. Remember to substitute this value into an equation to find the value of the second variable to get full marks.

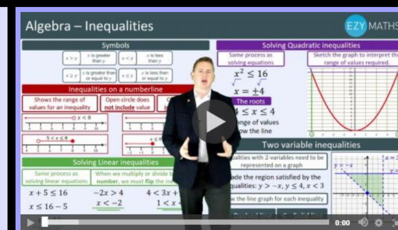
The second method is the substitution method. In this method, the aim is to rearrange one of the equations so that a variable is equal to something. This something is then substituted into the other equation (this leaves one equation with one variable in it). Solve the resultant equation to find the value of one variable. Remember to substitute this value into an equation to find the value of the second variable to get full marks.



A.12.

Inequalities

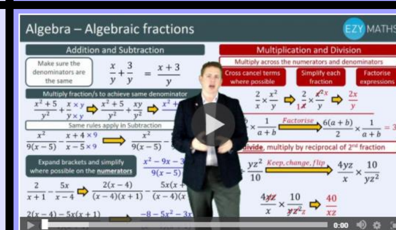
Many of the processes involving inequalities you should recognise from equations. In the case of inequalities, the = sign is replaced with four different symbols (<, >, ≤, ≥). You need to remember that inequalities show a range of values that your unknown might be (x) not just one specific value. You need to be able to represent inequalities on a number line deciding whether or not to fill the circle in. You solve and graph inequalities in the same way as an equation.



A.13.

Algebraic Fractions

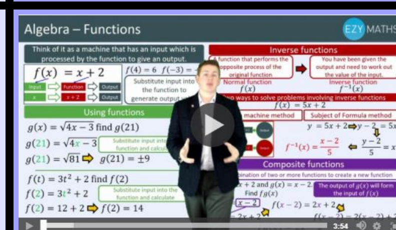
In this higher-level topic, it is important to remember the fundamentals of the operations involving fractions. If adding/subtracting, remember you need a common denominator so may have to multiply your fractions (with numbers or algebraic terms). When multiplying multiply across the numerators then multiply across the denominators (cross cancel where possible). When dividing remember to multiply by the reciprocal of the second fraction (keep change flip).



A.14.

Functions

It is important to think of functions as a machine where a value is put into the function f(x) and an output is calculated. When using functions, the key process is substituting the value into the function and yielding an output (imagine completing a table of values for a quadratic). You may be asked to calculate inverse functions which is the process of working backwards from the output to find the value of the number that has been put into the function. Composite functions are where you combine two or more functions to create a new (super) function.



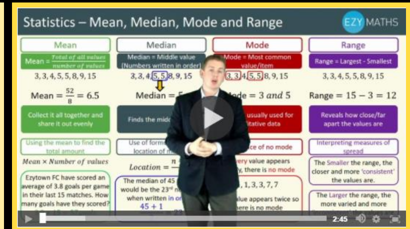
Statistics and Probability – 12 recap videos

S.1.

Mean, Median, Mode and Range

We take a look at how to calculate the three averages and when it might be necessary to calculate each average.

Mean - When you want to include all the data. Median - When you want to eliminate extreme values (outliers) from the data set. Mode - When you are dealing with categorical data (either Quantitative or Qualitative). Range - Is not an average but a measure of spread.

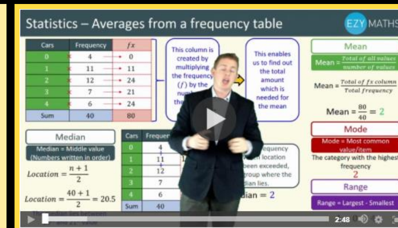


S.2.

Averages from a Frequency Table

There will be times where you will need to create the fx column so that the total amount can be worked out. Remember the formula for the median shows you where the median is located.

It will be important to look and check your answers to see if they are reasonable answers and fit within the data set.

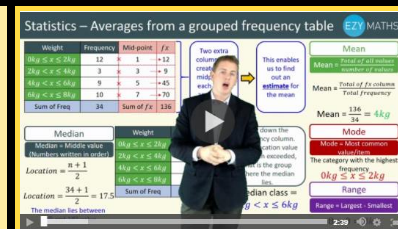


S.3.

Averages from a Grouped Frequency Table

Here you will find that your data has been grouped into categories. It is important to note a change in the vocabulary for the questions. Because the data is grouped, you will be unable to use specific values as you don't know what they are hence you will be asked to find an estimate for the mean or an estimate for the median.

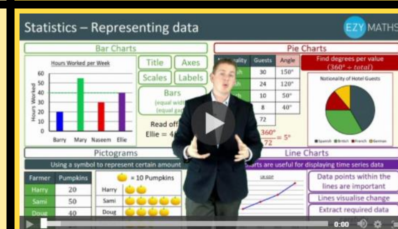
You will often have to create two extra columns, one for the midpoints of each group and one for your fx column.



S.4.

Representing Data

Once data has been collected, diagrams are used to represent the data so that it is easier to extract the key points from the data without having to look at all the numbers etc. The most common diagrams that are used are Pie charts, Bar charts, Line graphs and Pictograms. It is important that you follow the rules regarding the construction of the diagrams.

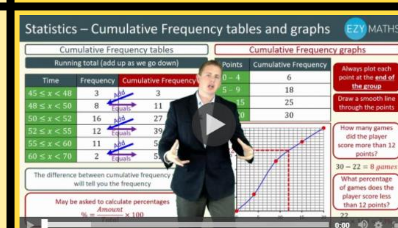


S.5.

Cumulative Frequency Tables and Graphs

This is essentially a running total where we add up the frequencies as we go along. It is important to check to see if your final value of the cumulative frequency matches the total frequency (normally given in the question).

When constructing a cumulative frequency graph, it is important to plot each point at the end of each group and join the points up with a nice smooth curve ('s' shaped). The graph is used to estimate numbers above and below certain values.

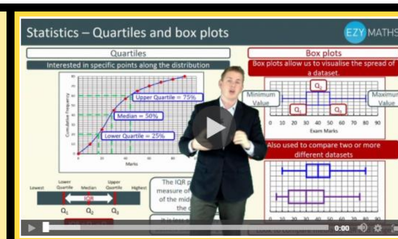


S.6.

Quartiles and Box Plots

Once the graph has been created, we tend to examine it in more detail by looking at the quartiles which are situated at 25%, 50% (the Median) and 75%. An important area we analyse is the Inter Quartile Range (IQR), this tells about the spread of data of the middle 50% of the data.

A box plot is extracted from a cumulative frequency diagram and is made up of five key elements; Highest and lowest value, Upper and lower quartile (75% and 25%) and the median. These become useful when we want to compare two or more sets of data.

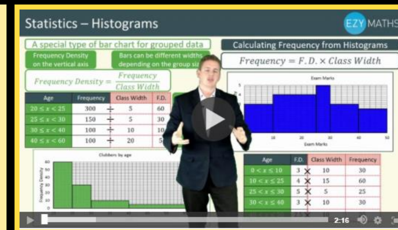


S.7.

Histograms

Histograms are special 'Bar' charts for grouped data and will often have different widths. Beware the trap that the y axis is NOT frequency but should be labelled frequency density. The formula for calculating frequency density is covered in this snapshot and you may need to create extra columns in order to calculate this.

By rearranging the formula, you can calculate the frequency of each bar by multiplying frequency density by the bar width. This will help to fill in an incomplete data table.

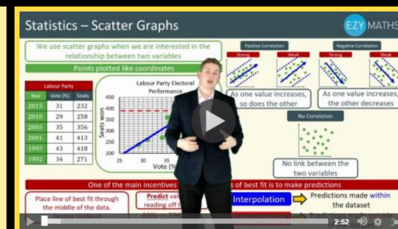


S.8.

Scatter Graphs

A scatter graph is used to show if two sets of data are related (correlated). There are three types of correlation to watch out for; Positive, Negative and No correlation. Sometimes you will be asked to plot points on a graph, be sure to plot these points like coordinates and try to do it as accurately as possible.

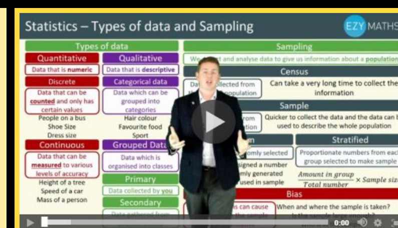
When asked to extract and estimate information from the scatter graph you will normally be marked on constructing a line of best fit so don't forget to do this.



S.9.

Types of Data and Sampling

You need to be able to recall the types of data and be able to categorise data when it is given to you. Note that there are several categories of data and your information may fit into two or more of these categories. The idea behind sampling is to get a selection of people that will accurately represent the whole population when statistical analysis is carried out. There are two types to be aware of, random (members given a number and then randomly chosen) and stratified (proportionate amount of each group is selected). When dealing with data collection it is always important to think about Bias and whether the data will be collected in a 'fair' manner.

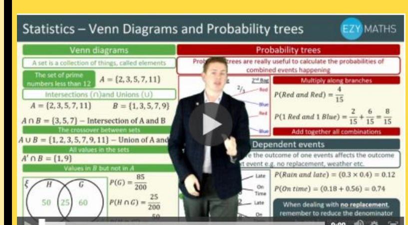


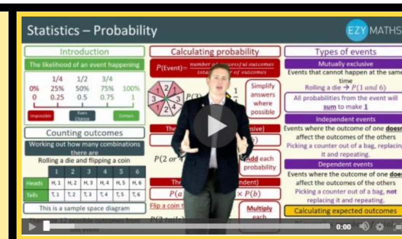
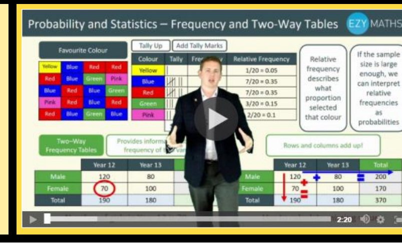
S.10.

Venn Diagrams and Probability Trees

With Venn diagrams, we organise data into Sets which are then contained within overlapping circles. Only elements of data that share two properties are situated in the overlap. If asked to fill in a Venn diagram, try and start with the overlaps where possible. It is important to understand the key terms surround Venn diagrams such as Union, Intersection and Complement.

With probability trees, you will be looking at two or more events happening. Remember that the probability of each event must add up to one. When the events are combined, we multiply along the branches (do not simplify at this point) to calculate the probability that these events will happen. When answering a question, you may need to find the combinations that satisfy the question and then add those probabilities together. Be aware of repeated events where something is NOT replaced. This will mean that the denominator will be reduced in the second event.



S.11.	**Probability** Here we take an introductory look at probability and using a sample space diagram to identify the number of outcomes. You should know that all probabilities from an event add up to make 1. Take care when calculating probabilities as your answer can be in the form of fractions (simplify them), decimals, and percentages so you may need to convert between them. We cover the 'or' rule for mutually exclusive events and the 'and' rule for independent events.	
S.12.	**Frequency and Two-Way Tables** Frequency tables are created from raw data that have categorised, tallied and then totaled. We can use frequency tables to calculate relative frequencies which can be useful to describe proportions. If the sample is large enough, it can enable us to interpret them as probabilities. Two-way tables provide information about the frequency of two variables and the key to solving problems of this type is to pay attention to the total's column. This will enable you to complete a two-way table accurately and then use the information to calculate probabilities based on the data within the table.	

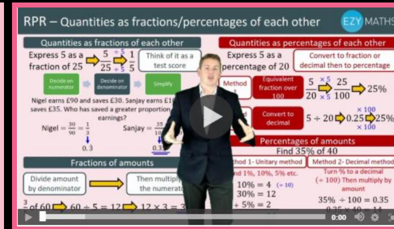
RATIO, PROPORTION AND RATES OF CHANGE – 7 RECAP VIDEOS

RPR.1.

Quantities as Fractions and Percentages of each other

Here we look at being able express quantities as fractions of each other and how to calculate a fraction of an amount. We then move onto expressing quantities as percentages of each other and how to find a percentage of an amount.

A nice way to think about these sorts of a problem is to treat it like a test score where the first value is your score (numerator) and the second value is how many marks there were.

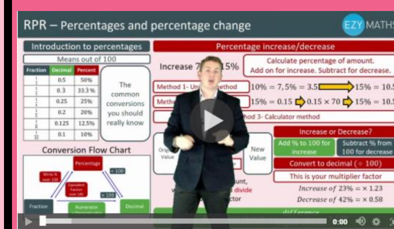


RPR.2.

Percentages and Percentage Change

You should be confident with common conversions as seen in the table as well as converting percentages into a fraction or decimal using the conversion flow chart. We then look at increasing/decreasing an amount by a percentage manually using two methods (Unitary method and Decimal method)

A calculator method is explored at the end and shows a quick way to increase and decrease an amount quickly using a multiplier factor. This method will help to work out original price problems. Finally, we recap the formula used to calculate the percentage change between two values.

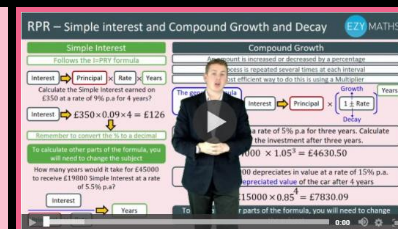


RPR.3.

Simple Interest and Compound Growth

Here we take an in depth look at the formulae required to carry Simple interest problems first (IPRY) It is important that you convert the percentage to a decimal (rate). If you were to do this manually, find the percentage of the amount then multiply by the number of years.

The second half looks at Compound Growth and Decay. Here the rate is added/subtracted from one to create a multiplier and a version of the IPRY formula is used. Remember here, years is written as a power.



RPR.4.

Ratio

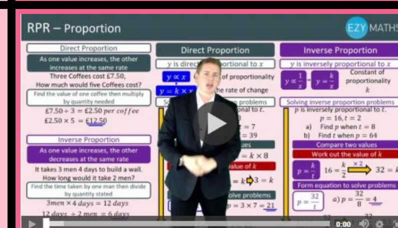
We start off with an introduction to ratio and how to write ratios (paying attention to sentence structure) and simplify them (much like fractions). We then look at sharing quantities in a given ratio (almost like sharing out profits to shareholders). Make sure you follow the three-step process here. A key thing to note here is when you have your answer, do not simplify it as it will take you back to your original ratio. Only simplify ratios when asked.

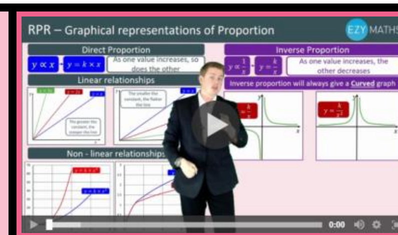
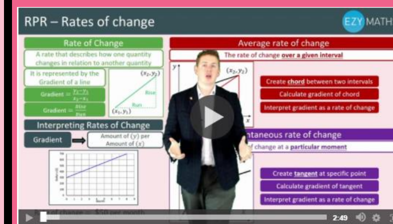
Ratio is commonly used in map and bearing questions and we cover this element as well using a scale factor multiplier.

RPR.5.

Proportion

Remember that there are two types of proportion; Direct and Inverse. As one value increases, the other increases at the same rate is an example of direct proportion (buying cups of coffee). As one value increases, the other decreases at the same rate is an example of inverse proportion (adding more people to paint a wall). When you are asked more challenging questions you will have to work out what the rate of change is (written with a k).



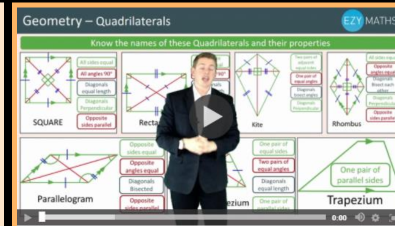
RPR.6.	**<u>Graphical Representations of Proportion</u>** Remember that there are two types of proportion; Direct and Inverse. As one value increases, the other increases at the same rate is an example of direct proportion (buying cups of coffee). As one value increases, the other decreases at the same rate is an example of inverse proportion (adding more people to paint a wall). When you are asked more challenging questions you will have to work out what the rate of change is (written with a k).	
RPR.7.	**<u>Rates of Change</u>** we look at the topic of Rates of change. With linear functions (straight line graphs) the rate of change can be interpreted from the gradient of the function. It is interpreted as an amount of y per amount of x (e.g. Dollars per hour, Metres per second). When dealing with non-linear functions there are two rates of change you could calculate. The average rate of change; here you create a chord between two intervals and then calculate the gradient of the cord and interpret as a rate of change. The disadvantage of this is that it doesn't truly reflect the nature of the graph. The other rate of change is an instantaneous rate of change; here you are working out the rate of change at a specific point. Create a tangent at the point, calculate and interpret the gradient as a rate of change. This will give a more accurate representation of what is happening, but more tangents will be required to deliver the bigger picture.	

GEOMETRY – 23 RECAP VIDEOS

GE.1.

Quadrilaterals

We are moving to the Geometry section and looking at the properties of Quadrilaterals. You will have to be able to name all the quadrilaterals according to properties that they have. The key properties you will have to look out for are Side lengths, Parallel sides, Angles, Diagonals.

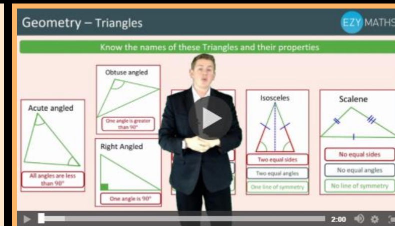


GE.2.

Triangles

We are looking at the properties of Triangles. You will have to be able to name all of the triangles according to properties that they have. The key properties you will have to look out for are Side lengths, and angles.

It is important that you can correctly identify the types of triangle you are working with as it will help with finding missing angles in more complex problems (circle theorems, bearing problems)

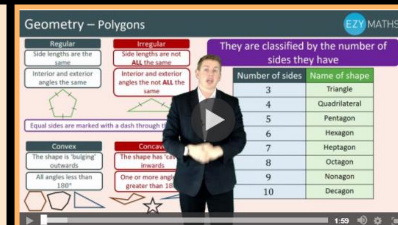


GE.3.

Polygons

You will need to be able to give the names of many-sided shapes and use this information to calculate the angles inside these more complex shapes. You may also have to state whether the shape is concave or convex as well as regular and irregular.

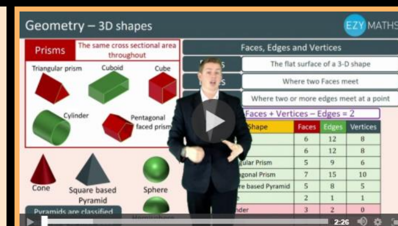
In the video below, Matt will go through the names of the polygons and the notation for regular and irregular sides. Convex and Concave shapes are covered here as well.

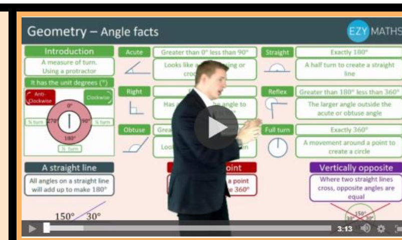
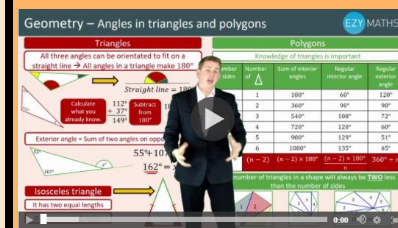
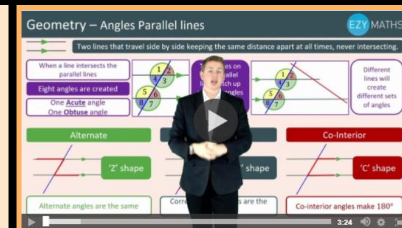
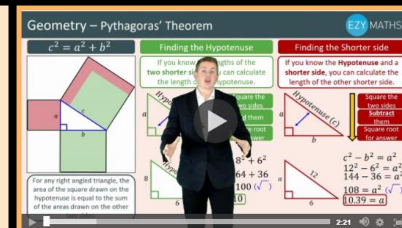
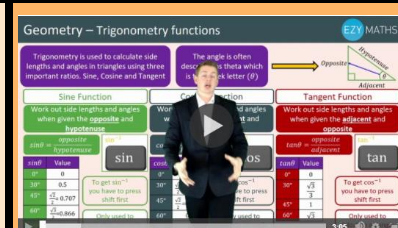


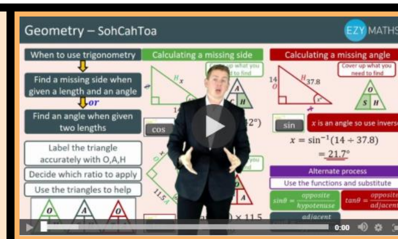
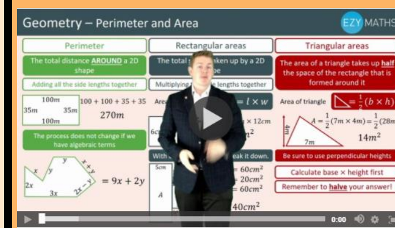
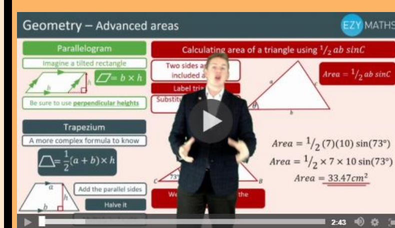
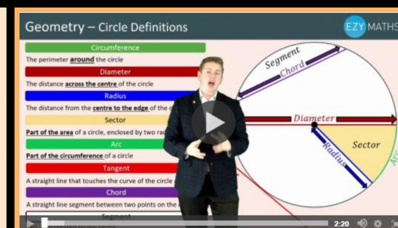
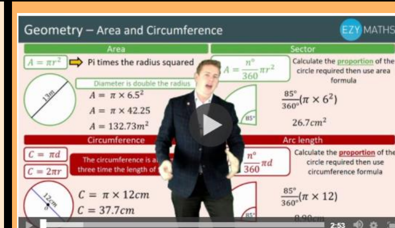
GE.4.

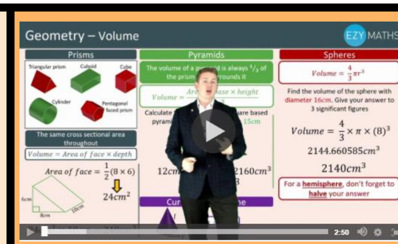
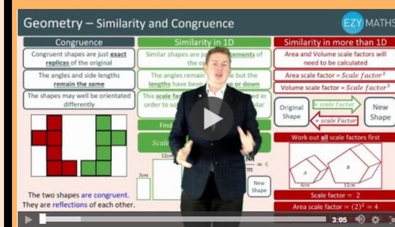
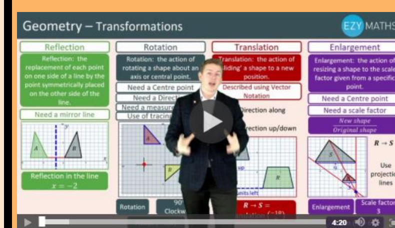
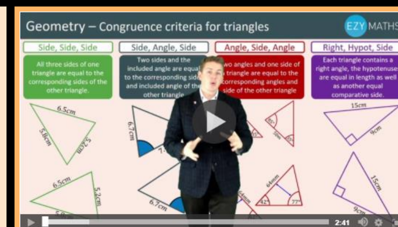
3D Shapes

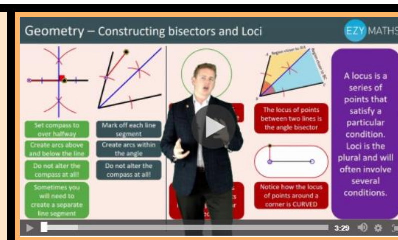
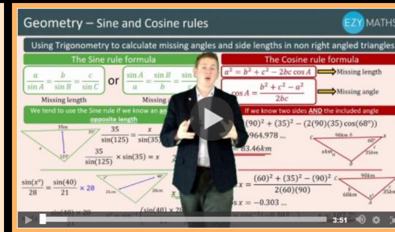
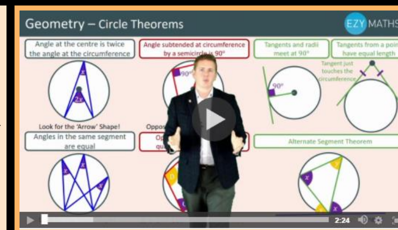
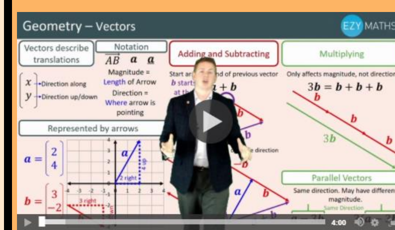
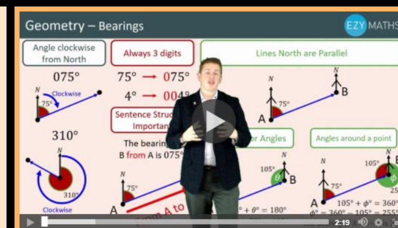
We will look at Prisms, Pyramids and Spheres. Being able to identify the 3D - Shape will help with more complex problems involving calculating the volume of the shape as well as the surface area. We can also classify these shapes according to the number of faces, edges and vertices (corners) it has.



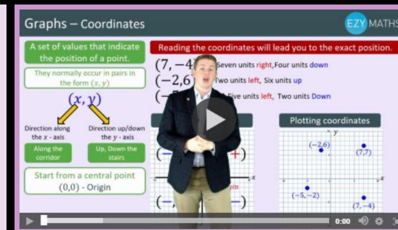
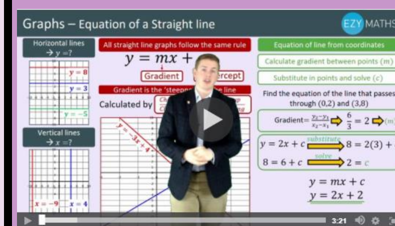
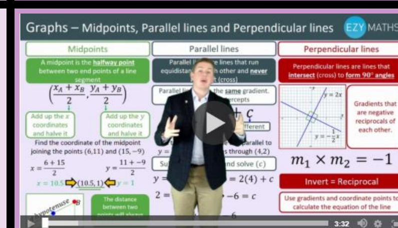
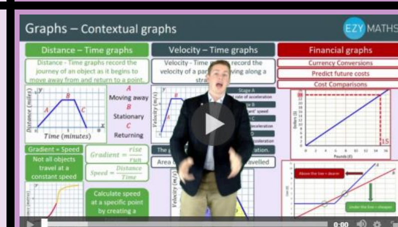
GE.5.	**Angle Facts** An angle is a measure of turn and is measured in degrees. You should be able to classify the different types of angles based on their size and use that information to be able to calculate missing angles in straight lines and around a point. Calculating missing angles is achieved by subtracting angles you already know.	
GE.6.	**Angles in Triangles and Polygons** It is important to aware of the Isosceles and Equilateral triangles as they have very specific angle properties. We then move onto angles in polygons which can be found by using a special formula. If in doubt, use the fact that the number of triangles in a shape is always two less than the number of sides. If in doubt, use the fact that the number of triangles in a shape is always two less than the number of sides. You will have to be able to calculate the exterior angle of a shape as well (all exterior angles make 360 degrees, Interior + Exterior = 180 degrees)	
GE.7.	**Angles – Parallel Lines** It is fairly straight forward to calculate the angles on a straight line as we can use the vertically opposite angles reasoning or angles in a straight-line reasoning. When you want to compare one angle on one parallel line to another angle on a different parallel line there are three types of angle reasoning you will need to state (Alternate, Corresponding, Co-Interior).	
GE.8.	**Pythagoras' Theorem** When you have a right-angled triangle and you know two of the lengths, you can use Pythagoras' theorem to work out the third and final side. Important to note that it ONLY works for a right-angled triangle. Solving questions using Pythagoras' theorem is a three-stage process that may alter slightly depending if you need to find the hypotenuse or a shorter side. There will some questions where Pythagoras' theorem will be required as well as trigonometry in more complex questions.	
GE.9.	**Trigonometry Functions** Trigonometry is usually used to calculate missing side lengths and angles in right-angled triangles. There are three functions you need to aware of; the Sine, Cosine and Tangent Functions and these are related to the lengths of the key terms of the right-angled triangle (Opposite, Adjacent and Hypotenuse). They are simply one side of a right-angled triangle divided by another and will have a specific value dependent upon the angle marked theta (or x). You are required to know the specific values for each function when given an angle. It will be important to remember the three tables provided in this snapshot.	

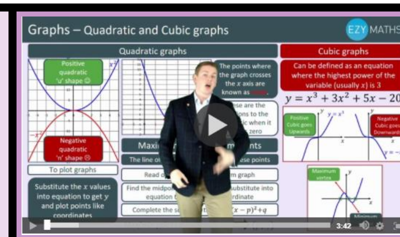
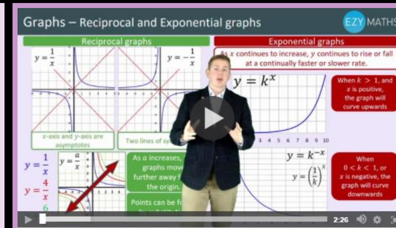
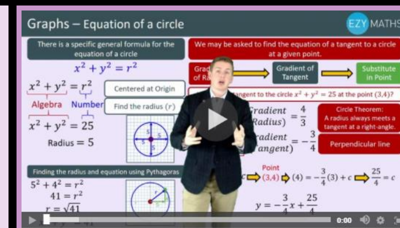
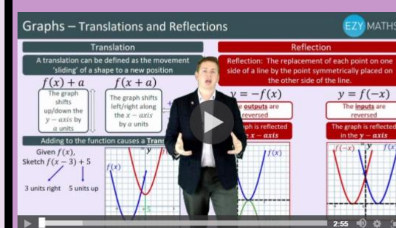
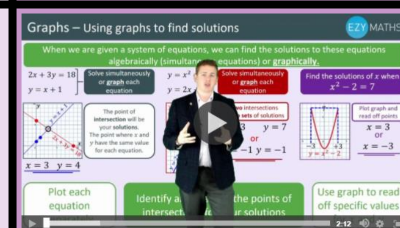
GE.10.	**SohCahToa** we delve a little deeper into the topic of trigonometry, focusing on SohCahToa (mnemonic for the trig functions). You will use this when finding missing angles or side lengths in right angled triangles. The first step will be to accurately label the triangle with Opposite, Adjacent and Hypotenuse. We then have to decide which trig ratio to use to solve the problem. You could use the formula triangles to instruct you or you could substitute values into the function and rearrange to solve.	
GE.11.	**Perimeter and Area** The Perimeter of a shape is the distance around a shape and will require you to add up all of the side lengths together. You may have to deal with numbers and algebraic terms so make sure you are confident in collecting like terms. You also need to be aware of the properties of shapes so you can fill in missing lengths because they are equal etc. Area is the space inside a 2D-shape. It is normally calculated by multiplying two lengths together (a horizontal and a vertical length). You must take care of the units you have been given in the question and convert them all to the same if required. You are not given any formula for an area so make sure memorise them all.	
GE.12.	**Advanced Areas** We look at the more Advanced areas that you will come across. We start off with a Parallelogram which is base times height (perpendicular). Just imagine a 'tilted' rectangle. The formula for the trapezium is more complex but just follow the three steps of 1) Add the parallel sides, 2) Halve it, 3) Multiply by height (perpendicular). You might be required to use this formula to find the area under a graph as well as just a shape. We finish off with the sine rule to find the area of a triangle when you have two sides and the included angle (no height). All area formulae need to be memorised so make sure you can recall them all.	
GE.13.	**Circle Definitions** These will become useful when dealing with circle theorems, area problems involving circles and the equation of a circle. Make sure you are confident in the terms and where they are situated on a circle.	
GE.14.	**Area and Circumference** We focus on the topic of area and circumference of circles. As with all area formulae, you will need to memorise these for the area and circumference of a circle. Make sure you are dealing with the element of the circle (diameter or radius) before you substitute into the formula. Always double check your calculations to see if your answer is reasonable (circumference is about three times the length of the diameter). When calculating sector areas and arc lengths remember to work out the proportion of the circle you are dealing with (amount of degrees given over 360). Then it is a case of using the original formulae to calculate your answer.	

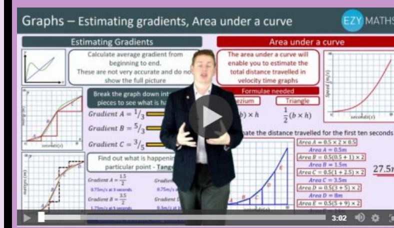
GE.15.	**Volume** Volume is the space taken up by a 3D object and there are a few 3D-shapes you should be aware of. When it comes to calculating volume, you will need to establish if the shape is a prism (the same area running the length of the shape) or a pyramid (faces meeting at a point). To calculate the volume of a prism you need to calculate the area of the face (that extends the whole depth of the shape) and multiply it by the depth. To calculate the volume of a pyramid, multiply the area of the base by the height then divide it by 3. That last thing we look at is Spheres. You will be given the formula for this so there is no need to memorise it. Just remember to substitute the radius into the formula to get your answer.	
GE.16.	**Similarity and Congruence** Starting with congruence, the key thing to remember is that congruent shapes are IDENTICAL all sides are the same length and all angles are the same. The shapes may have been altered slightly so you might have to rotate, flip them so that they match up. With similar shapes, it is important to understand that all angles remain the same and it is the side lengths that have been altered (essentially, similar shapes are ENLARGEMENTS of each other). You will have to calculate the scale factor in order to find missing values between the shapes. When confronted with area and volume problems of similar shapes you must square or cube the scale factor to get the correct answer.	
GE.17.	**Transformations** There are four types of transformations to be aware of 1) Reflections (flipping a shape) 2) Rotations (turning a shape) 3) Translations (sliding a shape) and 4) Enlargements (altering the lengths of a shape). With each type of transformation, there are certain statements that need to be mentioned in order to secure full marks. A good indicator of how many things you need to state can be seen by the number of marks on offer. A little tip: Ask for tracing paper with any transformation question so you can double check by tracing the shape and seeing if it matches up!	
GE.18.	**Congruence Criteria for Triangles** There will be questions that ask you to state why two triangles are identical. Here you will need to examine the side lengths and angles of the triangle and see which of the four categories they fit into. Side, Side, Side (SSS), Side, Angle, Side (SAS), Angle, Side, Angle (ASA), Right Angle, Hypotenuse, Side (RHS). You may have to flip/rotate the triangles in your head (or use tracing paper) to see if they match up and identify which criterion to use.	

GE.19.	**Constructing Bisectors and Loci** You will sometimes be asked to construct perpendicular bisectors; either through a line segment, from a point or through a point. In each case, you will need to have a line segment to bisect. Remember you need to keep all your construction markings in. We also look at bisecting an angle where a set of intersecting arcs need to be created inside the angle. Loci are a series of points that satisfy a condition (a set distance from a point/line). In some questions, you will be asked to shade in regions based on the loci you have constructed.	
GE.20.	**Sine and Cosine Rules** These rules are used when we are asked to find missing lengths or angles in non-right-angled triangles. The Sine rule is best used when you have an angle and its opposite length and the Cosine rule when you have two sides and the included angle. It is then a case of substituting known values into the formulae and rearranging to generate your answer. You will not be given these formulae in the exam so makes sure you commit them to memory.	
GE.21.	**Circle Theorems** We look at the topic of Circle theorems. There are 7 key circle theorems you need to be able to recall when faced with questions involving missing angles in circles. In order to secure full marks, you will need to justify your reasoning by stating one or more of the circle theorems (not just the shape) along with other angle facts you know (straight line, triangle, around point etc.).	
GE.22.	**Vectors** Vectors describe a translation (a movement from one place to another) and can be written using vector notation (used to describe a translation). as we get more advanced, the coordinate grid is removed and the notation is given by bold letters (a, b, c) To go from one point to another, you will have to travel along vectors that you already know. If you travel with a vector it will be positive, if you travel against a vector, it will be negative. In more advanced questions midpoints and ratios will be introduced and you may have to factorise your answers to prove that two vectors are parallel or collinear.	
GE.23.	**Bearings** Bearings are used in navigation to identify (as a measure of turn) where the direction of one object is in relation to another. You need to remember that bearings are calculated from North, in a clockwise direction and given as a three-digit value. Be careful with sentence structure as bearings are measured FROM the object (normally the second point in the question). When calculating more complex bearings knowledge of angles in parallel lines is useful (particularly co-interior angles). The harder questions will involve speed, time, perpendicular lines and maybe the use of Pythagoras' theorem and trigonometry.	

GRAPHS – 11 RECAP VIDEOS

GR.1.	**Coordinates** A set of coordinates provides us with a set of instructions that indicate the position of a point or object. They normally occur in pairs (x,y) where the first number is your direction along and the second value is your direction up/down. You will need to be able to plot coordinate points accurately for many types of question as well as being able to read the points off a graph as well.	
GR.2.	**Equation of a Straight Line** Before we move onto the more complex straight-line graphs, we must understand the equations of horizontal and vertical lines. A horizontal line has the equation y =? where ? is the point the line crosses the y-axis. A vertical line has the equation x =? where ? is the point where the line crosses the x-axis. All straight-line graphs follow the general rule y = mx+c where m is the gradient (steepness) of the line and c is the y-intercept. You will need to be able to calculate gradients effectively and substitute into the general rule to find the y-intercept if you are given some coordinate points.	
GR.3.	**Midpoints, Parallel Lines and Perpendicular Lines** We look at finding the midpoint between two coordinate points by taking the average of the x values and an average of the y values. We then look at parallel lines (two or more lines that always remain the same distance apart) and establish that parallel lines share the same gradient but will have a different y-intercept. Finally, we finish off with perpendicular lines (two lines intersect to create a right angle) and establish that the gradients of perpendicular lines are negative reciprocals of each other (their products = -1).	
GR.4.	**Contextual Graphs** We look at everyday Contextual graphs and how to interpret the data within them. We look at Distance-time graphs initially where the gradient of the graph is calculated to be the speed. If your graph is non-linear then you may have to use a tangent to work out the speed of an object at a specific point. You will also need to use the Speed/Distance/Time formula triangle to help with calculations. We then move onto Velocity-time graphs where the same principles occur except the gradient of the line is now acceleration and the area under the graph can be calculated to give the distance traveled. Finally, we finish off on financial graphs where we can do cost comparison or currency conversions by reading off the graph.	

GR.5.	**<u>Quadratic and Cubic Graphs</u>** It is important to understand the shape of these graphs and identify where they cross the x and y axes as you will be asked questions about this. Sometimes you will be required to fill in a table of values and then plot the graph. Take care plotting the points and always check the shape of your graph. If it is a quadratic, is it symmetrical? It is always worthwhile double/triple checking your work here to ensure accuracy.	
GR.6.	**<u>Reciprocal and Exponential Graphs</u>** It is very important that you are able to distinguish between the shapes of the two graphs as you may be asked to fill in a table of values and plot the graph. If you know the shape, then you can check if your calculations are correct. Make sure you know the key points of each graph and in an exam, check your answers so you do not lose simple marks.	
GR.7.	**<u>Equation of a Circle</u>** There are a few areas of prior knowledge required to tackle the whole topic completely. You will need to be confident in calculating missing sides using Pythagoras' theorem (to find the radius), calculating the gradient (to find the equation of the radius and then the tangent). Knowledge of perpendicular lines will be required as well as memorising the general rule for the equation of a circle ($x^2+y^2=r^2$).	
GR.8.	**<u>Translations and Reflections of Graphs</u>** You will be given a function (graph) and be asked to manipulate the function and sketch a new graph sometimes labelling the key points on the graphs. Starting with translations, when you add to the function f(x)+a or f(x+a), this causes the graph to move up/down or left/right. f(x)+a is a movement up/down by a units. f(x+a) is a movement left/right by a units (+=left, -=right). Reflections are caused by making the function negative or the variable negative. -f(x) is a reflection in the x axis (the outputs are reversed). f(-x) is a reflection in the y axis (the inputs are reversed)	
GR.9.	**<u>Using Graphs to Find Solutions</u>** You will normally come across this topic when you need to solve simultaneous equations graphically. With this topic it will be important to construct the graphs accurately to get the correct information (if they are already done for you, no problems!) You should be looking for the point of intersection as this will the point where x and y have the same value for each equation.	

GR.10.	**<u>Estimating Gradients and Area Under the Curve</u>** Firstly, we look at Estimating gradients. Calculating the average gradient from beginning to end does not give a good representation of what is happening in the graph. What can be done is to break the graph down into smaller sections and the average gradient of those are calculated to give a better idea of what is happening. Another method is to find the gradient at specific points on the graph, this involves constructing a series of tangents by eye and calculating the gradient at each point. This is where an estimate comes in because each tangent may vary slightly. Secondly, we take a look at the area under a curve. The area under a velocity-time graph (most common question) will give you the distance that the object/particle has travelled. You will have to break the graph up into equal widths to give you a triangle and a series of trapezia. Calculate the area of each shape and that will tell the distance travelled.	
GR.11	**<u>Trigonometric Graphs</u>** You will be expected to recall the shapes of the three trigonometric functions and be able to highlight the key points (x-axis intercepts, Maximum and minimum turning points.). Note that the x-axis is measured in degrees and that the trigonometric graphs are periodical (they repeat every 360 degrees). You should then be able to read off the graphs to give the angles for specific sin/cos/tan values (notice the symmetry and that there will be more than one angle).