Algebra

Introduction to Algebra

Introduction to Basic Algebra Part 1	In this lesson we will introduce basic algebra. We will be using the examples of $2x$, $5t$, ab, bc to introduce algebra to you.
Introduction to Basic Algebra Part 2	In this lesson we learn the basic ways of writing algebra terms. We will be using the examples of i) $y \times y$ ii) $1y$ and -1 y iii) $4ac$, $2x$, y^2 and $3x^2$ to introduce algebra to you.

Simplifying Expressions

Simplifying Expressions Part 1	In this lesson we will learn how to simplify basic algebra. The questions that are covered in this lesson is, simplify the following expression i) a+a+a+a+a+a+b+b+b+b, after simplifying this we then add a further a+a+a+b+b to the expression and simplify this.
Simplifying Expressions Part 2	In this lesson we will learn how to simplify slightly more complicated expressions. The questions that are covered in this lesson are, i) simplify the expression $4y + 7x + y - 3x$ ii) simplify the expression $3x + 2y + 5x - 5y$ iii) simplify the expression $5x + 3$.
Simplifying Expressions Part 3	In this lesson we will learn how to simplify more complicated expressions containing x^2terms. The questions that are covered in this lesson are, i) simplify the expression $2x^2 + 3x + 6 + 5x^2 - 2$ ii) simplify the expression $4xy - 2x + 2xy + 3x$

Simplifying Powers

Multiplying Powers	In this lesson we will learn the rules for multiplying algebraic expressions with positive powers. We will also cover examples with expressions containing more than 1 letter. The questions we will cover in this lesson are: Simplifying the following expressions: i) y^2 x y^3 ii) y^4 x y^3 iii) x^9 x x^5 iv) x^4 x y^7 v) a^3b^4 x ab^2 vi) x^8y^4 x x^3y
Multiplying Powers with numbers and letters	In this lesson we will learn how to multiply algebraic expressions where the letter terms have a number in front e.g $3x^2$ x $5x^6$ You should be able to multiply algebraic expressions with positive powers before trying this lesson. If not then watch the following lesson: Multiplying powers. The questions we will cover in this lesson are, simplify the following expressions i) $3x^2$ x $5x^6$ ii) $6xy^5$ x $2y^4$
Multiplying negative powers	In this lesson we will learn the rules for multiplying algebraic expressions with negative powers. You should be able to multiply algebraic expressions with positive powers and be able to add negative numbers before trying this lesson. If not then watch the following lessons: Multiplying powers and/or: In the Number section: Adding negative numbers. The questions covered in this lesson are, simplify the following expressions i) y^5 x y^{-3} ii) a^4b^{-3} x $a^{-3}b$
Dividing powers	In this lesson we will learn the rules for dividing algebraic expressions with positive powers. The questions covered in this lesson are to simplify the following expressions i) $y^5 \div y^3$ ii) $\frac{t^6}{t^2}$ iii) $\frac{x^8}{x^3}$ iv) $\frac{a^8}{b^2}$ v) $\frac{a^7b^4}{a^2b^3}$ vi) $y^8 \div y^6$
Dividing powers with negative numbers	In this lesson we will learn the rules for dividing algebraic expressions with negative powers. You should be able to divide algebraic expressions with positive powers and be able to subtract

	negative numbers before trying this lesson. If not then watch the following lessons: Dividing powers and/or: In the Number section: Subtracting negative numbers. The questions covered in this lesson are, simplify the following expressions i) $y^3 \div y^5$ ii) $\frac{y^{-3}}{y^5}$ iii) $\frac{x^2}{x^{-5}}$
Dividing powers, with a number in front	In this lesson we will learn how to divide algebraic expressions where the letter terms have a number in front e.g $6y^5 \div 15y^3$. You should be able to divide algebraic expressions with positive powers before trying this lesson. If not then watch the following lesson: Dividing powers. This questions covered in this lesson are, simplify the following expressions i) $8x^7 \div 2x^3$ ii) $\frac{12x^4y^2}{4x^7y}$ iii) $6y^5 \div 15y^3$
Simplifying Powers inside brackets	In this lesson we will learn how to simplify algebraic expressions with powers inside a bracket raised to another power e.g $(x^4)^3$ We will also cover common mistakes that students always make when simplifying expressions involving a number and a power inside the bracket e.g $(2x^3)^2$ The questions covered in this lesson are, simplify the following expressions i) $(y^3)^2$ ii) $(x^4)^3$ iii) $(x^7)^4$ iv) $(2x^3)^2$ v) $(5y^4)^3$

Multiplying Out Brackets

Multiplying out brackets	In this lesson you will learn how to multiply out single brackets (another way this question can be worded is: expand the brackets) this means exactly the same thing. This is the first lesson in this topic and it will only cover questions containing positive numbers and letters (positive terms). If you have any problems with writing terms in algebra then review the lesson: Introduction to Algebra.

	The questions covered in this lesson are, multiply out the following brackets i) $3(x + 2)$ ii) $a(a + 2)$ iii) $3y(2 + y)$ iv) $6y(2x + 4y)$
Multiplying out brackets with negative numbers or letters	In this lesson you will learn how to multiply out single brackets containing negative terms. You must be able to multiply out brackets containing positive numbers and multiply negative numbers before trying this lesson. If not then watch the lessons on: Multiplying out brackets and/or From the Number section: Multiplying negative numbers The questions covered in this lesson are, multiply out the following brackets i) $5(y - 8)$ ii) $-2(x - 3y)$ iii) $-4a\ (3a - 2c)$
Expand and Simplify Common Mistake (Higher Only)	The question that is covered in this lesson is, expand and simplify the expression $2(x + 4) - 3(4 - x)$.
Expand and Simplify Common Mistakes – Exam Question (Higher Only)	In this lesson we will learn the common mistakes that students make when expanding brackets in exam questions and how to avoid making these mistakes. You must be able to expand single brackets containing negative terms and be confident multiplying negative numbers before trying this lesson. If not then watch the following lessons: Multiplying out brackets with negative numbers or letters and/or in the Number section: multiplying negative numbers. The question that is covered in this lesson is, expand and simplify the expression $3(2x + 7) - (x + 3)$

Multiplying out Brackets (Higher Only)

Multiplying out double brackets (F and H 2017 TBC)	In this lesson you will learn how to multiply out or expand double brackets that contain positive terms only. You will also learn a very common mistake that students always make when they are given an expression like this to expand, $(x + 3)^2$ You must be able to multiply out single brackets

	and simplify Algebraic terms before trying this lesson. If not then watch the lesson: Multiplying out brackets and/or Simplifying Algebraic terms. The questions covered in this lesson are multiple out the following brackets and simplify i) $(x$ $+3)(x + 5)$ ii) $(2x + 3)(4x + 7)$ iii) $(x + 3)^2$ iv) $(2y + 3x)(4y + 2x)$
Multiplying out double brackets with negative numbers or letters (F and H 2017 TBC)	In this lesson you will learn how to expand double brackets that contain negative terms. You must be able to multiply out double brackets containing positive terms and multiply negative numbers before tying this lesson. If not then watch the lessons on: Multiplying out double brackets and/or From the Number section: Multiplying negative numbers. The questions covered in this lesson are Multiply out/expand the following i) $(x - 3)(x + 2)$ ii) $(y - 4)(2 - y)$
Expand and Simplify brackets that are squared	In this lesson we will learn how to expand and simplify a bracket that is squared. Many students make a common mistake with this type of question so this is a really important lesson to understand. The question that is covered in this lesson is, expand and simplify the expression $(x + 2y)^2 + (y + 3x)^2$.
Expand and Simplify brackets that are squared - Exam Question	The question that is covered in this lesson is, expand and simplify the expression $2(x + 3) - (x - 3)^2$

Factorising into Single Brackets

Factorising expressions into single brackets part 1	In this lesson you will learn how to factorise simple expressions. Although these types of questions are always found on the foundation level exam paper, all students must learn how to factorise these expressions before they can learn more complicated ones. It would help if you fully

	understand multiplying out brackets before you try this lesson as factorising is the reverse of this. We will also learn some useful tips to avoid common mistakes that most students make with these questions. The questions covered in this lesson are, factorise the following expressions i) $4x + 20$ ii) $6x + 21$ iii) $12y - 30$ iv) $12x + 18$
Factorising expressions into single brackets part 2	In this lesson you will learn how to factorise more complicated expressions with terms containing powers. These still factorise into single brackets which many students do not realise! We will also learn some useful tips on how to avoid common mistakes that most students make with these types of questions. You must be able to factorise all the examples from part 1 before trying this lesson. The questions covered in this lesson are to factorise the following expressions i) $10x^2 + 14x$ ii) $4y^3 - 20y^2$ iii) $x^2 - 8x$ iv) $x^2 + x$
Factorising with mixed letters in the terms	In this lesson we will learn how to factorise expressions with more than 1 letter in some of the terms e.g $12xy + 20ty$ These types of questions always confuses students. You should be able to factorise expressions into single brackets before trying this lesson. If not then watch the lesson: Factorising expressions into single brackets part 1 and/or part 2. The questions covered in this lesson are to factorise the following expressions i) $12xy + 20ty$ ii) $12ab + 8bc + 16bf$ iii) $12x^2y^3 + 28xy^2$

Substituting Numbers into Formula

Substituting numbers into formula, part 1	In this lesson we will learn how to substitute numbers into basic formulas. The questions covered in this lesson are i) using the formula of $y = mx + c$, find the value of y when $m = 2$, $x = 5$ and $c = 8$ ii) Using the formula $A = t(r + q)$, find the value of A when $t = -2$, $r = 10$, $q = 4$
Substituting numbers into formula,	In this lesson we will learn how to substitute numbers into more complicated formulas. You must

part 2	be able to complete the examples from part 1 before trying this lesson. You must also be able to add and subtract negative numbers and multiply negative numbers. If not then watch the following lessons from the Number section: Multiplying negative numbers and/or Adding and subtracting negative numbers. The questions covered in this lesson are i) Using the formula of $t = ab + c$, find the value of t when $a = 5$, $b = 3$ and $c = -7$ ii) Using the formula $A = \frac{v-u}{t}$ find the value of A when $v = 22$, $u = -6$, $t = 4$ iii) Using the formula $P = 2x + xy$, find the value of P when $x = 5$, $y = -3$
Substituting numbers into formula, part 3	In this lesson we will learn how to substitute numbers into more complicated formulas. Rob uses real formulas and real examples from Science in this lesson. This lesson takes you to New Zealand where you will see Dolphins chasing boats and jumping out of the water, Mt Everest on a very cold day and to the Eiffel Tower in France. The questions covered in this lesson are all real equations and real life examples: i) Using the formula $KE = \frac{mv^2}{2}$, find the kinetic energy, KE, of a dolphin with a mass of 300kg and velocity of 15m/s. ii) Using the formula $F = \frac{9}{5}\ C + 32$, a warm day on Mt. Everest is $-10C$, convert this temperature into Fahrenheit. iii) Using the formula $t = \sqrt{\frac{2h}{g}}$, calculate the time it takes a 2 pence to fall from the Eiffel Tower, $h = 325$ and $g = 9.8$

Rearranging Formula

Rearranging formula part 1	In this lesson you will learn how to rearrange simple formula to make a letter the subject and we will also learn the 2 different ways that these types of questions can be worded. You will learn the rules for rearranging formulas and when there are exceptions to these rules. Rob has a really great way of teaching this topic that makes it easy to understand and follow.

	The questions covered in this lesson are i) rearrange the formula to make x the subject, $t = 3x + 7$ ii) find t in terms of x, $x = \frac{t}{3}$ iii) rearrange the formula to make m the subject, $F = \frac{5m}{r}$
Rearranging formula part 2	In this lesson you will learn how to rearrange more complicated formula to make a letter the subject. You will learn some of the common mistakes that students make and how to avoid these mistakes and you will find out how to rearrange formulas that contain π. You must be able to rearrange all the examples in part 1 before trying this lesson. If then the watch part 1 first. The questions covered in this lesson are i) rearrange to make e the subject, $b = \frac{2e}{3} - f$ ii) find r in terms of π and A, $A = \pi r^2$
Rearranging formula (Higher Only)	In this lesson you will learn how to rearrange more complicated formulas that only appear on the higher tier. You will also learn a method that will make rearranging formulas containing fractions much easier. We will also be using this method with several formulas in Shape and Space too! You must be able to rearrange simple formulas before trying this lesson. If not then watch the following lessons: Rearranging formula part 1, 2 and/or Rearranging formula when the subject is on the bottom of a divide line The questions covered in this lesson are i) rearrange the formula to make y the subject, $x = \sqrt{\frac{3y}{t}}$ ii) find r in terms of v and π, $v = \frac{4}{3}\pi r^3$
Rearranging formula when the subject is on the bottom of a divide line (Higher Only)	This lesson teaches you how to rearrange the formula when subject that you want is on the bottom of a divide. You will also learn tricks that can help speed up your work. This is one of the harder formulas you can be given so you must be able to rearrange formulas before you try this lesson. If not then watch the lessons: Rearranging formula part 1 and 2

	The questions covered in this lesson are i) rearrange the formula to make t the subject, $y = \frac{x^2}{t}$ ii), find x in terms of r, w and y, $y = \frac{w}{x-t} + r$

Rearranging Formula when the Subject Appears Twice (Higher Only)

Rearranging Formula when the Subject Appears Twice Part 1	In this lesson we will learn how to rearrange simple formulae when the subject that we want appears twice in the formula. You must be able to rearrange formulae before you try this lesson. If not then watch the following lesson: Rearranging formula part 1/2 The question covered in this lesson is, rearrange the formula to make $x$the subject. $6x - 4y = 2x + 12$.
Rearranging Formula when the Subject Appears Twice Part 2	In this lesson we will learn how to rearrange simple formulae when the subject that we want appears twice in the formula and the formula contains brackets. You must be able to rearrange formulae before you try this lesson. If not then watch the following lesson: Rearranging formula part 1/2. The question covered in this lesson is, rearrange the formula to make x the subject. $3(4 - x) = 5x + 7y$.
Rearranging Formula when the Subject Appears Twice Part 3	In this lesson we will learn how to rearrange more complicated formulae when the subject that we want appears twice. You must be able to complete the examples in part 1 and 2 before trying this lesson. If not then watch these lessons first.

	The question covered in this lesson is, rearrange the formula to make x the subject. $xy + xz = T$.
Rearranging Formula when the Subject Appears Twice Part 4	In this lesson we will learn how to rearrange more complicated formulae when the subject that we want appears twice. You must be able to complete the example in part 3 before trying this lesson. If not then watch this lesson first. The question covered in this lesson is, rearrange the formula to make x the subject. $ax + cy = b(x + 2)$.
Rearranging Formula when the Subject Appears Twice Exam Question	The question covered in this lesson is, rearrange the formula to make $x$the subject. $\sqrt{\frac{x}{y-x}} = 2y$.

Sequences

Introduction to sequences	In this lesson you will learn the meaning of the following terms "common difference" "n^{th} term" and "sequence" You will also learn a really simple way of setting out sequences questions which will make completing these types of questions much easier. Finally you will learn the letters that are normally used to label the headings in a sequences table.
Finding the Terms of a Sequence when you're given the n^{th} term rule	In this lesson we will learn how to use the n^{th} term rule to find the first 5 terms of a sequence. You must be able to substitute numbers into formula before you try this lesson. If not then watch the following lesson: Substituting Numbers into Formula part 1/2. The question covered in this lesson is, the rule to find the n^{th} term of a sequence is $3n-2$. Find the first 5 terms of the sequence.
Finding the n^{th} term	In this lesson you will learn how to find the n^{h} term rule for any sequence with a constant common difference. Rob has a really easy way of teaching this topic and in 3 easy steps you will be able to

	complete any question like this. You must know the meaning of the terms "common difference" "nth term" and "sequence" and the meaning of the symbols "n" and "s" used in the table of sequences before you try this lesson. If not then watch the lesson: Introduction to sequences. The questions covered in this lesson are to find the n^{th} term of the following sequences i) **11, 14, 17, 20** ii) **3, 9, 15, 21, 27** iii) **41, 37, 33, 29, 25**
Finding a number in the sequence using the nth term rule	In this lesson we will learn how to use the nth term rule to find any number in a sequence. You must be able to find the nth term rule of any sequence before trying this lesson and be confident with substituting numbers into formula and using negative numbers. If not then watch the following lessons: finding the nth term and/or substituting numbers into formula, part 1 and in the Number section: Multiplying negative numbers and/or Adding negative numbers The questions covered in this lesson are i) find the 40th term of the following sequence **5, 9, 13, 17, 21, 25, 29** ii) find the value of the following sequence when n=25, **56, 53, 50, 47, 44**
Finding the Next Term in a Sequence that has a Changing Difference	In this lesson we will learn how to find the next term in a sequence when the sequence does not increase or decrease by the same amount each time. We will also learn the meaning of the terms changing difference and the common difference between the changing difference.

Sequences (Higher Only) (F and H 2017 TBC)

Quadratic Sequences – Find the nth Term Rule Part 1	In this lesson we will learn a simple method for finding the nth term rule of a quadratic sequence, which is a sequence that contains an x^2 in the nth term rule. The questions covered in this lesson are, i) the first 5 terms of a sequence is given below. Find the next 2 terms and the nth term rule. 1, 4, 9, 16, 25 ii) the first 5 terms of a sequence is given below. Find the nth term rule. 3, 6, 11, 18, 27.
Quadratic Sequences – Find the nth Term Rule Part 2	In this lesson we will use the simple method learnt in part 1 of this lesson to find the nth term rule of a slightly harder quadratic sequence.

	You must be able to complete the examples from part 1 of this lesson before trying this lesson. If not then watch part 1 first. The question covered in this lesson is, the first 5 terms of a sequence is given below. Find the nth term rule. -3, 0, 5, 12, 21.
Quadratic Sequences – Find the n^{th} Term Rule Exam Tip	In this lesson we will learn an exam tip for easily recognizing quadratic sequences and finding their n^{th} term rule. We will be looking at the sequences and the n^{th} term rules that we worked out from the examples in part 1 and 2 to show you this exam tip so you must be able to complete the examples from these lessons. If not then watch these lessons first.
Finding the n^{th} term in a Sequence that has a Changing Difference (not on UK exams yet)	In this lesson we will learn how to find the n^{th} term rule for a sequence that does not increase or decrease by the same amount so one that has a changing difference. You will also learn a formula that makes finding the n^{th} term rule for these types of sequences much easier. The question covered in this lesson is, the first 5 terms of a sequence is given below. Find the nth term rule. 2, 6, 12, 20, 30.

Solving Equations

Solving equations, part 1	In this lesson we will learn how to solve basic equations. Rob has a really great way of teaching this topic that makes it easy to understand and follow. The questions covered in this lesson are, solve the following equations i) $2x + 3 = 15$ ii) $3x - 5 = 16$
Solving equations, part 2	In this lesson we will learn how to solve more complicated equations that are wrote in a different

	way to how they are normally written in easier examples. You must be able to solve the examples in part 1 of this topic before trying this lesson. The questions covered in this lesson are, solve the following equations i) 17 = 2 + 3x ii) 20 = -4 + 6x
Solving equations, part 3	In this lesson we will learn how to solve more complicated equations that are wrote in a different way to how they are normally written in easier examples. These equations also contain a negative x term which sometimes confuses students. You must be able to solve the examples in part 2 of this topic before trying this lesson. The questions covered in this lesson are, solve the following equations i) 6 – 3x = -15 ii) 4 = 28 – 6x
Solving equations with brackets	In this lesson we will learn how to solve equations that contain brackets. You must be able to multiply out (expand) single brackets and multiply negative numbers before trying this lesson. If not then watch the following lessons: Multiplying out brackets and/or Multiplying negative numbers, from the Number section. The questions covered in this lesson are, solve the following equations i) 3(x + 2)= 24 ii) 2(x + 7) = 21 iii) -18 = 3(2 – x).
Solving equations with a divide or fraction	In this lesson we will learn how to solve equations containing a divide or a fraction. We will also learn some of the exceptions to the normal rules of solving equations. You must be able to solve equations before trying this lesson. If not then watch the lessons: Solving equations, part 1, 2 or 3 The questions covered in this lesson are, solve the following equations i) $\frac{1}{2}x + 3 = 9$ ii) $\frac{2x}{3} - 4 = 2$ iii) $\frac{2x-5}{3} = 7$
Solving equations with x's on both sides	In this lesson we will learn how to solve equations that contain x's (or letters) on both sides of the = sign. (Note it doesn't have to be the letter x questions can use any letter). You must be able to

	solve equations before trying this lesson. If not then watch the lessons: Solving equations, part 1, 2 or 3 The questions covered in this lesson are, solve the following equations i) $7x - 9 = 4x + 3$ ii) $2x - 4 = 10 - 5x$ iii) $4(x - 3) = 2(9 - x)$

Solving Equations using Number Machines

Solving equations, using number machines	In this lesson we will learn how to solve basic equations using number machines. This method is great for any foundation level students who are finding solving equations by other methods too confusing. The questions covered in this lesson are, solve the following equations i) $3x + 8 = 29$ ii) $5y - 3 = 31$ iii) $47 - 3x = 32$
Solving equations with brackets, using number machines	In this lesson we will learn how to solve equations that contain brackets using number machines. You must be able to multiply out (expand) single brackets and multiply negative numbers before trying this lesson. If not then watch the following lessons: Multiplying out brackets and/or From the Number section: Multiplying negative numbers. The questions covered in this lesson are, solve the following equations i) $7(x - 3) = 56$ ii) $5(x - 3) - 2(3 - x) = 35$.
Solving equations with a divide in, using a number machine	In this lesson we will learn how to solve equations containing a divide or a fraction using number machines. We will also learn some of the exceptions to the normal rules of solving equations. You must be able to solve equations using number machines before trying this lesson. If not then watch the lesson: Solving equations, using number machines The questions covered in this lesson are, solve the following equations i) $\frac{x}{2} + 4 = 15$ ii) $\frac{y}{5} = 60$ iii)

	$\frac{x-2}{4} = 3$
Solving equations with x's on both sides using number machines	In this lesson we will learn how to solve equations that contain x's (or letters) on both sides of the = sign using number machines. (Note it doesn't have to be the letter x questions can use any letter) You must be able to solve equations using number machines and multiply out brackets before trying this lesson. If not watch the following lesson: Solving equations, using number machines and/or Multiplying out brackets. The questions covered in this lesson are, solve the following equations i) $5x - 4 = 2x + 8$ ii) $15 - 4x = 2x - 9$ iii) $2(x - 2) = 4(5 - x)$

Forming and Solving Linear Equations

Forming and Solving Linear Equations Part 1	In this lesson we will learn how to make an equation from information that we are given in a question. We then solve the equation that we have made to complete the question. You must be able to solve equations before you try this lesson. If not then watch the following lessons: Solving Equations Part 1/2 or Solving equations using number machines Part 1/2. The question that is covered in this lesson is, the perimeter of the field shown is 50m. Calculate the value of x.
Forming and Solving Linear Equations Part 2	In this lesson we will learn how to make an equation from information that we are given in a question. We then solve the equation that we have made to complete the question. You must understand the example covered in part 1 of this lesson before you try this lesson. If not then watch this lesson. The question that is covered in this lesson is, find the size of angle A, B and C in the triangle.
Forming and Solving Linear	The question that is covered in this lesson is, the length of a field is given below. The perimeter of

Equations Exam Question	the field is 122m. Find the length BC. AB is $2x$ BC is 3m shorter than AB CD is twice as long as AB DA is 5m longer than AB

Trial and Improvement

Trial and Improvement – Solving Equations Correct to the Nearest Whole Number	In this lesson we will learn how to solve simple equations to the nearest whole number. The question covered in this lesson is, solve x^3=54, correct to the nearest whole number.
Trial and Improvement – Solving Equations Correct to 1 d.p	In this lesson we will learn how to solve simple equations to 1 d.p using the method of trial and improvement. The question covered in this lesson is, solve x^3=54, correct to 1 d.p.
Trial and Improvement – Solving Equations Correct to 2 d.p	In this lesson we will learn how to solve equations to 2 d.p using the method of trial and improvement. The question covered in this lesson is, solve x^3=54, correct to 2 d.p.
Trial and Improvement – Solving Equations Exam Question Higher	The question covered in this lesson is, solve the following equation correct to 1 d.p, $x^3 - 4x + 6$=224
Trial and Improvement Exam Tip – Choosing a Good Guess	In this lesson we will learn how to choose a good guess. This will save lots of time in an exam as you will need to do less trials (guesses) The question covered in this lesson is, solve x^3=54, correct to 1 d.p.
Trial and Improvement Exam Tip	In this lesson we will learn how to use the back button on your calculator to help you quickly answer trial and improvement questions. The example used in this lesson is $x^3 - 4x + 6$.

Inequalities

Introduction to inequalities	In this lesson we will learn what the following inequality signs mean $\geq, <, \leq, >$ We will also learn what the inequality signs mean when they are wrote backwards e.g $4 \leq x$ as this often confuses students as the inequality sign does mean what most students think it means! The exam board love to write inequalities backwards to try to confuse you.
Writing a list of integers from inequalities	In this lesson we will learn what the term "integer" means and how to write a list of integers from an inequality. The questions covered in this lesson are, write the list of integers that satisfy the following inequalities i) $3 \leq x < 10$ ii) $-2 < x \leq 5$ iii) $2 < x \leq 7$.
Showing inequalities on number lines part 1	In this lesson we will learn how to show simple inequalities on a number line. You must understand the different ways that inequalities can be written before you try this lesson. If not then watch the lesson: Introduction to inequalities The questions covered in this lesson are, show the following inequalities on a number line i) $x \geq 3$ ii) $x \leq 1$ iii) $x > 3$ iv) $x < -4$ v) Draw a number line to show the inequality $x \leq 2$
Writing inequalities from number lines	In this lesson we will learn how to write inequalities that are shown on a number line. You must be able to draw inequalities on a number line before trying this lesson: If not then watch the following lesson: Showing inequalities on number lines. The questions covered in this lesson are i) write down the inequality that is shown on the number line on the BBM website ii) write down the inequality that is shown on the number line on the BBM website iii) write down the inequalities that is shown on the number line on the BBM website iv) write down the inequalities that is shown on the number line on the BBM website

Showing inequalities on number lines, part 2	In this lesson we will learn how to show inequalities on a number line. The questions covered in this lesson are, show the following inequalities on a number line i) $2 < x < 7$ ii) $-2 \leq x < 3$ iii) $-1 > x \geq 3$
Showing inequalities on number lines, part 3	In this lesson we will learn how to show complicated inequalities on a number line. This lesson is only suitable for higher tier students. You must be able to show simple inequalities on number lines, solve inequalities and solve 2 inequalities at the same time before trying this lesson. If not then watch the following lessons: Showing inequalities on number lines, part 1 and/or Solving inequalities part 1 and 2 and/or Solving 2 inequalities at the same time. The questions covered in this lesson are, show the following inequalities on a number line i) $x + 1 \leq 8$ ii) $2x \geq 6$ iii) $1 < x - 3 < 6$ iv) $4 \leq 2x < 18$

Solving Inequalities

Solving inequalities, part 1	In this lesson we will learn how to solve simple inequalities. You must be able to solve simple equations before trying this lesson as there are a lot of similarities between these 2 topics. If not then watch the following lesson: Solving equations, part 1 The questions covered in this lesson are, solve the inequality i) $2x - 3 < 9$ ii) $12 \leq 8 + 2x$
Solving inequalities, part 2	In this lesson we will learn how to solve more complicated inequalities. You must be able to equations before trying this lesson as there are a lot of similarities between these 2 topics. You must also be able to solve the examples in part 1 of this topic. If not then watch the following lessons: Solving inequalities, part 1 and/or Solving equations, part 2 and 3 The questions covered in this lesson are, solve the following inequalities i) $30 - 4x \geq 18$ ii) $6 < 41 - 7x$
Solving inequalities with brackets	In this lesson we will learn how to solve inequalities that contain brackets. You must be able to solve equations containing brackets before trying this lesson as there are a lot of similarities

	between these 2 topics. You must also be able to solve simple inequalities. If not then watch the following lessons: Solving equations with brackets and/or Solving inequalities, part 1 and 2 The questions covered in this lesson are, solve the following inequalities i) $3(x + 2) \leq 21$ ii) $22 > 2(4 + x)$
Solving inequalities with a divide or fraction	In this lesson we will learn how to solve inequalities containing a divide or a fraction. We will also learn some of the exceptions to the normal rules of solving inequalities. You must be able to solve equations with a divide or fraction before trying this lesson as there are a lot of similarities between these 2 topics. You must also be able to solve simple inequalities. If not then watch the lessons: Solving equations with a divide or fraction and/or Solving inequalities, part 1 and 2 The questions covered in this lesson are, solve the following inequalities i) $\frac{1}{2}x + 3 < 9$ ii) $\frac{3x-4}{2} \geq 10$
Solving inequalities with x's on both sides	In this lesson we will learn how to solve inequalities that contain x's (or letters) on both sides of the = sign. (Note it doesn't have to be the letter x questions can use any letter). You must be able to solve equations with x's on both sides before trying this lesson as there are a lot of similarities between these 2 topics. You must also be able to solve simple inequalities. If not then watch the following lessons: Solving equations with x's on both sides and/or Solving inequalities, part 1 and 2 The questions covered in this lesson are, solve the following inequalities i) $7x - 9 > 4x + 3$ ii) $10 - 5x \leq 2x - 4$
Solving 2 inequalities at the same time	In this lesson we will learn how to solve two inequalities at the same time. Rob has a great way of teaching this topic. You must be able to solve other inequalities before trying this lesson. If not then watch the following lessons: Solving inequalities, part 1 and 2 The questions covered in this lesson is, solve the following inequality $9 \leq 2x + 3 < 29$

Direct Proportion (Higher Only) (F and H 2017 TBC)

Direct Proportion m is proportional to p	In this lesson we will learn how to complete direct proportion questions. We will learn how to make a formula for 2 variables that are directly proportional to each other and how to find other values using this formula. The question that is covered in this lesson is, m is proportional to p and m=15.2 when p=8 i) Find m when p=20 and ii) Find p when m=76.
Direct Proportion y is proportional to x^2	In this lesson we will learn how to complete direct proportion questions when one variable is directly proportional to the square of the other. You must be able to complete direct proportion questions before trying this lesson. If not then watch the following lesson first: Direct Proportion m is proportional to p. The question that is covered in this lesson is, y is proportional to x^2 and y=8 when x=4 i) Find y when x=6 and ii) Find $x$when y=50.
Using Formula Triangles in Direct Proportion Questions	In this lesson we learn how to use formula triangles to rearrange formula when completing direct proportion questions. This is a useful method for any students struggling with rearranging formulas as using formula triangles can make this subject very easy. We use the examples of $y = kx$ and $y = kx^2$ in this lesson to show how to use formula triangles.

Inverse Proportion (Higher Only) (F and H 2017 TBC)

Inverse Proportion y is Inversely Proportional to x	In this lesson we will learn how to complete inverse proportion questions. We will learn how to make a formula for 2 variables that are inversely proportional to each other and how to find other values using this formula.

	It would help if you can complete direct proportional questions before trying this lesson. If not then watch the following lesson: Direct Proportion m is proportional to p The question that is covered in this lesson is, m is inversely proportional to p and m=5 when p=12.5 i) Find m when p=2.5 and ii) Find p when m=1.25
Inverse Proportion y is Inversely Proportional to x^2	In this lesson we will learn how to complete inverse proportion questions when one variable is inversely proportional to the square of the other. You must be able to complete inverse proportion questions before trying this lesson. If not then watch the following lesson: Inverse Proportion y is Inversely Proportional to x The question that is covered in this lesson is, y is inversely proportional to x^2 and y=2 when x=10 i) Find y when x=20 and ii) Find $x$when y=8
Using Formula Triangles in Inverse Proportion Questions	In this lesson we learn how to use formula triangles to rearrange formula when completing inverse proportion questions. This is a useful method for any students struggling with rearranging formulas as using formula triangles can make this subject very easy. We use the examples of $y = \frac{k}{x}$ and $y = \frac{k}{x^2}$ in this lesson to show how to use formula triangles.

Straight Line Graphs

Introduction to straight line graphs	In this lesson we will learn the general equation of a straight line graph and the meaning of the all the terms in this equation. You will learn all about positive and negative gradients, the point of intercept and how to find the values of the gradient and point of intercept when given any equation of a straight line graph. The examples that this lesson uses are the following graphs: $y = 2x + 3$, $y = 3x$, $y = x + 2$ and $y =$ -

	$2x - 1$
Exam tip – completing a table of values	In this lesson we will learn a really quick and extremely easy way of completing a table of values for any straight line graph in the form of y = mx + c The questions covered in this lesson are, make a table of values for the following straight line graphs i) $y = 2x + 1$ ii) $y = -3x + 8$ iii) $y = 3x - 2$ iv) $y = -2x + 7$
Rearranging equations in the form of $y = mx + c$	In this lesson we will learn how to rearrange any equation of straight line graph in the form of $y = mc + c$ and you will learn why and when you need to be able to do this. You must be able to rearrange formula before you try this lesson. If not then watch the following lesson. Rearranging formula part 1. The questions covered in this lesson are, rearrange the following equations in the form of $y = mc + c$ i) $2y = 6x - 4$ ii) $2y - 4x = 3$ iii) $4y + 3x = 8$
Plotting straight line graphs from a table of values	In this lesson we will learn how to plot any straight-line graph from a table of values. You will learn tips on accurately plotting your points and how to avoid common mistakes often made by students when drawing graphs. The questions covered in this lesson are i) plot the graph of $y = 2x + 1$ ii) plot the graph of $y = -3x + 5$
Plotting straight line graphs of x= number and y= number	In this lesson we will learn how to draw the graphs of x= number e.g $x = 2$ and y= number e.g $y = -2$ Many students struggle drawing these types of straight line graphs but they are the easiest types of graphs to draw. You will also need to be able to draw these graphs in refection questions in the subject of Shape and space. The questions covered in this lesson are i) draw the graph $x = 2$ ii) draw the graph $x = -3$ iii) draw the graph $y = 3$ iv) draw the graph $y = -2$
Finding the gradient of a line	In this lesson we will learn how to find the gradient of any straight line graph. We will learn how to calculate positive and negative gradients with an easy formula and how to show your workings on the graph. You will also learn tips on how to choose the best points on your line to find the

	gradient. The questions covered in this lesson are, i) find the gradient of the line shown on the BBM website ii) find the gradient of the line shown on the BBM website iii) find the gradient of the line shown on the BBM website
Finding the y intercept	In this lesson we will learn how to find the y intercept of any straight line graph. The questions covered in this lesson are i) find the y intercept of the line shown on the BBM website ii) find the y intercept of the line shown on the BBM website iii) find the y intercept of the line shown on the BBM website
Finding the equation of a straight line graph	In this lesson we learn how to find the equation of any straight line graph. You must know the general equation of a straight line graph and be able to find the gradient and y intercept of any straight line graph before trying this lesson. If not then watch the following lessons: Introduction to straight line graphs and/or Finding the gradient of a line and/or Finding the y intercept The questions covered in this lesson are i) find the equation of the line ii) find the equation of the line
Finding the equation of a line passing through a coordinate (Higher Only) (F and H 2017 TBC)	In this lesson we will learn how to find the equation of a straight-line passing through a coordinate. You must be able to find the equation of any straight line graph before trying this lesson. If not then watch the lesson: Finding the equation of a straight line graph. The question covered in this lesson is, find the equation of a line with a gradient of 3, that passes through the point (2,11)
Finding equations of parallel lines (Higher Only) (F and H 2017 TBC)	In this lesson we will find the equation of any line that is parallel to another line. You must be able to find the equation of any straight line graph before trying this lesson. If not then watch the following lesson: Finding the equation of a straight line graph. The questions covered in this lesson are i) find the equation of a line that is parallel to $y = 2x - 3$

	ii) find the equation of a line that is parallel to $y = 3x$
Finding equations of parallel lines that pass through a point (Higher Only)	In this lesson we will learn how to find the equation of a parallel line that passes through a point on the y-axis. You must be able to find the equation of any parallel line before trying this lesson. If not then watch the lesson: Finding equations of parallel lines The questions covered in this lesson are i) find the equation of a line that is parallel to the line $y = 2x + 1$ and passes through the point (0,4) ii) find the equation of a line that is parallel to the line $y = -5x + 7$ and passes through the point (0,11)
Equations of parallel lines passing through a coordinate (Higher Only)	In this lesson we will learn how to find the equation of a parallel line that passes through a coordinate. You must be able to find the equation of a straight line passing through a coordinate before trying this lesson as there are a lot of similarities between these 2 topics. You must also be able to find equation of any parallel line. If not then watch the following lessons: Finding the equation of a line passing through a coordinate and/or Finding equations of parallel lines and/or Finding equations of parallel lines that pass through a point The question covered in this lesson is, find the equation of a line that is parallel to the line $y = -3x - 2$ and passes through the point (4,6)
Finding equations of perpendicular lines (Higher Only)	In this lesson we will learn how to find the equation of any line that is perpendicular to another line. We will also learn the simple formula for finding the perpendicular gradient as you are not given this in your exam so you need to remember it. You must be able to find the equation of any straight line graph before trying this lesson. If not then watch the lesson: Finding the equation of a straight line graph. The questions covered in this lesson are i) find the equation of a line that is perpendicular to $y = 2x - 3$ ii) find the equation of a line that is perpendicular to $y = \frac{1}{4}x + 3$
Finding equations of perpendicular lines passing through a point (Higher Only)	In this lesson we will learn how to find the equation of a perpendicular line that passes through a point on the y-axis. You must be able to find the equation of any perpendicular line before trying this lesson. If not then watch the following lesson: Finding equations of perpendicular lines

	The questions covered in this lesson are i) find the equation of the line that is perpendicular to $y = -2x + 11$ and passes through the point (0,1) ii) find the equation of the line that is perpendicular to $y = 3x + 5$ and passes through the point (0,9)
Equations of perpendicular lines passing through a coordinate (Higher Only)	In this lesson we will learn how to find the equation of a perpendicular line that passes through a coordinate. You must be able to find the equation of a straight line passing through a coordinate before trying this lesson as there are a lot of similarities between these 2 topics. You must also be able to find equation of any perpendicular line first before trying this lesson. If not then watch the following lessons: Finding the equation of a line passing through a coordinate and/or Finding equations of a perpendicular lines and/or Finding equations of a perpendicular lines that pass through a point. The question covered in this lesson is, find the equation of a line that is perpendicular to the line $y = 2x + 3$ and passes through the point (6,11)

Finding Gradients and Equations of Lines between 2 Points (Higher Only) (F and H 2017 TBC)

Introduction to Finding the Gradient of a Line Joining 2 Points	In this lesson we will learn how to find the gradient of a line that is made when you join 2 coordinates together. You must be able to find gradients of lines before you try this lesson. If not then watch the following lesson: Finding the gradient of a line. The question covered in this lesson is, the coordinates of two points are given below. Find the gradient of the line joining these point. A=(1,3) B=(4,9).
Finding the Gradient of a Line Joining 2 Points	In this lesson we will learn how to find the gradient of a line that is made when you join 2 coordinates together.

	You must be able to find gradients of lines before you try this lesson. If not then watch the following lesson: Finding the gradient of a line. The question covered in this lesson is, the coordinates of two points are given below. Find the gradient of the line joining these point. A=(5,8) B=(9,20).
Finding the Gradient of a Line Joining 2 Points Exam Tip	In this lesson you will learn an exam tip for finding the gradient of a line that joins 2 points. You must be able to complete the example in the lesson: Finding the Gradient of a Line Joining 2 Points, before trying this lesson. The question covered in this lesson is, the coordinates of two points are given below. Find the gradient of the line joining these point. A=(2,9) B=(5,3).
Finding the Equation of a Line Joining 2 Points	In this lesson we will learn how to find the equation of a line that is made when you join 2 coordinates together. You must be able to find the gradient of a line joining 2 points and be able to find the equation of straight line graph. If not then watch the following lessons: Finding the Gradient of a Line Joining 2 Points, Finding the equation of a straight line graph. The question covered in this lesson is, the coordinates of two points are given below. Find the equation of the straight line joining these point. A=(1,7) B=(5,19).

Graphs of Inequalities (Higher Only)

Graphs of inequalities and shading regions, part 1	In this lesson we will learn how to plot graphs of inequalities and shade the regions that the inequalities show. You must be able to draw straight line graphs and understand inequalities before trying his lesson. If not then watch the following lessons: Exam tip – completing a table of values and/or Plotting straight line graphs – using a table of values and/or Introduction to

	inequalities and/or Showing inequalities on number lines. The questions covered in this lesson are i) draw a graph to show the region where the following inequality is true $y < 2x - 1$ Label the region R. ii) draw a graph to show the region where the following inequality is true $y \geq -2x + 6$ Label the region R.
Graphs of inequalities and shading regions, part 2	In this lesson we will learn how to draw graphs of inequalities and shade the region the inequalities show. You must be able to draw graphs of (x = number e.g $x = 4$) and graphs of (y = number e.g y = 3) and understand inequalities before trying this lesson. If not then watch the following lessons: Plotting straight line graphs of x = number and y = number and/or Introduction to inequalities and/or Showing inequalities on number lines The questions covered in this lesson are i) draw a graph to show the region where the following inequality is true $x > -2$ shade this region ii) draw a graph to show the region where the following inequality is true $y \leq 5$ shade this region
Graphs of inequalities and shading regions, part 3	In this lesson we will learn how to draw graphs of inequalities and shade the region the inequalities show. You must be able to rearrange equations of straight line graphs in the form of y=m x + c and be able to complete the other examples from part 1 and 2 of this topic before trying this lesson. If not then watch the following lessons: Rearranging equations in the form of y= mx + c and/or part 1 or 2 from this topic. The question covered in this lesson are, draw a graph to show the region where the following inequality is true $2y + 4x < 12$ shade this region
Graphs of inequalities and shading regions, part 4	In this lesson we will learn how to shade a region that satisfies 3 inequalities on one graph. We will also learn how to find the inequalities that satisfy a region on a graph that you are given. This second part of the lesson is basically the reverse of the first part. You must be able to complete all the examples from part 1, 2 and 3 of this topic before trying this lesson. If not then review these parts first. The questions covered in this lesson are i) shade the region that satisfies all of the following

	inequalities $x > 3$, $y \geq 2$, $y \leq -\frac{1}{2}x + 6$ ii) Find the inequalities that describes the shaded region shown on the graph on the BBM website.

Factorising Quadratics (Higher Only) (F and H 2017 TBC)

Factorising quadratics with positive terms only (F and H 2017 TBC)	In this lesson we will learn how to factorise quadratic expressions containing positive terms only. This topic: Factorising quadratics, has been specially designed to teach you how to factorise the easier types of quadratics first before moving onto to harder examples involving negative terms. The lesson starts by explaining how a quadratic is made. Rob uses the example of $(x + 2)(x + 4)$ to explain this. Understanding this part makes factorising much easier. You must be able to write all the factors of a number and multiply out double brackets before you try this lesson. If not then watch the following lesson from the number section: Finding factors and/or Multiplying out double brackets The questions that are covered in this lesson are, factorise the following quadratic expressions i) $x^2 + 7x + 12$ ii) $x^2 + 10x + 24$
Factorising quadratics with a negative number term	In this lesson you will learn how to factorise 2 types of quadratic expressions. Expressions containing a negative number term, and expressions containing a negative x term and number term. You must be able to factorise positive quadratics and be very confident multiplying and adding negative numbers before you try this lesson. If not then watch the following lessons: Factorising quadratics with positive terms only, and/or in the Number section: Adding negative numbers and/or Multiplying negative numbers. The questions covered in this lesson are, factorise the following quadratic expressions i) $x^2 + 2x - 15$ ii) $x^2 - 2x - 35$ We will also learn a top tip for fractorising equations like $x^2 - x - 30$.
Factorising quadratics with a negative x term and positive	In this lesson you will learn how to factorise quadratic expressions containing a negative x term and a positive number term. You must be able to factorise quadratics with a negative number term

number term	and multiply and add negative numbers before you try this lesson. If not then watch the following lessons: Factorising quadratics with a negative number term, and/or in the Number section: Adding negative numbers and/or Multiplying negative numbers. The questions that are covered in this lesson are, factorise the following quadratic expressions i) $x^2 - 13x + 30$ ii) $x^2 - 10x + 24$
Factorising quadratics with a number in front of the x^2 term	In this lesson we will learn how to factorise quadratic expressions where the x^2 term has a number in front of it. This lesson starts by explaining how these types of quadratic expression ends up with a number in front of the x^2 term. Rob uses the example of (3x + 2)(x + 4) to explain this. Understanding this makes factorising these quadratics much easier. You will then learn how to factorise any quadratic expression with a number in front of thex^2 term. You must be able to factorise all other types of quadratics before attempting this lesson. If not then review all the lessons in the following section: Factorising quadratics. The questions that are covered in this lesson are, factorise the following quadratic expressions i) $3x^2 + 11x + 6$ ii) $4x^2 + 16x + 15$
Factorising quadratics with a number in front of the x^2 term practice question	
Factorising quadratics – the difference of 2 squares, $x^2 - 16$ (F and H 2017 TBC)	In this lesson we will learn how to factorise the special quadratic called the difference of two squares. We will also learn tips on avoiding common mistakes many students make when they are given an expression that looks like the difference of two squares but is not. These often catch students out and the exam board will try to trick you with one of these. The questions covered in this lesson are, factorise the following quadratic expressions i) $x^2 - 16$ ii) $x^2 - 36$ iii) $x^2 - 49$ iv) $x^2 + 64$

Completing the Square (Higher Only)

Completing the Square Part 1a	In this lesson we will learn how to complete the square which is a method used on quadratic expressions or equations. The question that is covered in this lesson is, complete the square for the following quadratic expression $x^2 + 6x + 20$
Completing the Square Part 1b	In this lesson we learn how to complete the square. We will also recap the general equation of a quadratic. You must be able to complete the example from part 1 before trying this lesson. If not then watch this lesson first. The question that is covered in this lesson is, complete the square for the following quadratic expression $x^2 - 10x + 15$
Completing the Square Exam Question 1	This lesson covers a typical exam question on completing the square. Given the following expression complete the square. $x^2 - 8x$.
Completing the Square Exam Question 2	This lesson covers a typical exam question on completing the square. Given the following equation $x^2 - 6x + a = (x + b)^2 - 1$, find the value of a and b.
When the x^2 term has a number in front Part 1	In this lesson we will learn how to complete the square when the x^2 term has a number in front of it e.g $3x^2$. You must be able to complete the square before trying this lesson. If not then watch the following lessons: Completing the Square Part 1a/b The question that is covered in this lesson is, given the following equation complete the square $9x^2 + 12x + 3$.
When the x^2 term has a number in front Part 2	In this lesson we will continue to learn how to complete the square when the x^2 term has a number in front of it e.g $3x^2$. You must be able to complete the example from part 1 of this lesson before trying this lesson. If not then watch this lesson first.

	In this question we complete the square of the quadratic $25x^2 - 40x - 3$.
Finding the Vertex when Completing the Square	In this lesson we will learn the meaning of the word vertex and learn how to find the vertex of a graph by completing the square. You must be able to complete the square before trying this lesson. If not then watch the following lessons: Completing the Square Part 1a/b The question covered in this lesson is find the coordinate of the vertex of the following graph. $y = x^2 + 10x - 4$.

Solving Quadratic Equations (Higher Only)

Solving quadratic equations by factorising part 1	In this lesson we will learn how to solve quadratic equations by factorising. You must be able to factorise quadratic expressions before trying this lesson. If not then watch the following lessons: Factorising positive quadratics and/or Factorising quadratics with a negative number term and/or Factorising quadratics with a negative x term and positive number term. The questions covered in this lesson are, solve the following quadratic equations by factorising i) $x^2 + 7x + 12 = 0$ ii) $x^2 - 3x - 40 = 0$ iii) $x^2 - 6x + 9 = 0$
Solving quadratic equations by factorising part 2	In this lesson we will learn how to solve quadratic equations by factorising. You must be able to factorise quadratic equations with a number in front of the x^2 term before trying this lesson. If not then watch the following lesson: Factorising quadratics with a number in front of the x^2 term. The question covered in this lesson are, solve the following quadratic equations by factorising i) $4x^2 + 22x + 10 = 0$ ii) $10x^2 + 7x - 12 = 0$
Solving quadratics using the quadratic formula, part 1	In this lesson we learn how to solve quadratics using the quadratic formula. You will also learn about the general equation of a quadratic equation and tips on how to set out your workings to avoid simple errors.

	The question covered in this lesson is, solve the following quadratic equation using the quadratic formula $x^2 + 7x + 5 = 0$
Solving quadratics using the quadratic formula, part 2	In this lesson we learn how to solve quadratics using the quadratic formula. You will also learn the common mistakes that students always make when using this formula and tips on how to easily avoid these mistakes. I recommend you watch this lesson even if you know how to use the quadratic formula as so many students make these silly mistakes which costs them a lot of marks in their exams. The question covered in this lesson is, solve the following quadratic equation using the quadratic formula, $3x^2 + 4x - 5 = 0$
Solving Quadratics by Completing the Square Part 1	In this lesson we will learn how solve quadratic equations by completing the square. You must be able to complete the square before you try this lesson. If not then watch the following lessons: Completing the Square Part 1a/b. The question covered in this lesson is solve the following equation by completing the square, $x^2 + 2x - 8 = 0$
Solving Quadratics by Completing the Square Part 2	In this lesson we will learn how solve quadratic equations by completing the square. You must be able to complete the example from part 1 before you try this lesson. If not then watch this part first. The question covered in this lesson is, solve the following equation by completing the square, $x^2 + 6x = 27$
Solving Quadratics by Completing the Square Practice Question	The question covered in this lesson is solve the following equation by completing the square, $x^2 - 12x - 5 = 0$

Forming and Solving Quadratic Equations (Higher only)

Forming and Solving Quadratic Equations Part 1	In this lesson we will learn how to make a quadratic equation from information that we are given in a question. We then solve the quadratic equation that we have made to complete the question. You must be able to solve quadratic equations by factorising before you try this lesson. If not then watch the lessons in the following topic: Factorising Quadratics and/or Solving Quadratic Equations. The question that is covered in this lesson is, the area of the rectangle shown is 10cm^2. Find the value of x.
Forming and Solving Quadratic Equations Part 2	In this lesson we will learn how to make a quadratic equation from information that we are given in a question. We then solve the quadratic equation that we have made to complete the question. You must understand the example covered in part 1 of this lesson before you try this lesson. If not then watch this lesson. The question that is covered in this lesson is, the rectangles below have identical area's. Calculate the area of one of the rectangles.
Forming and Solving Quadratic Equations Exam Question	The question that is covered in this lesson is, the diagram shows a garden. The shaded areas show a path and a rectangular pond. The rest of the garden is grass which has an area of 66m^2. Find the value of x.

Quadratic Graphs (Higher Only)

Quadratic graphs, making a table of values	In this lesson we will learn how to make a table of values for a quadratic graph. You will learn tips on how to correctly use your calculator to complete a table of values as most students make a big mistake when entering negative numbers into the calculator. You will also

	learn how to make a table of values without using a calculator. The questions covered in this lesson are make a table of values for the following graphs i) $y = x^2$ ii) $y = x^2 + 2x - 3$
Plotting quadratic graphs and finding the minimum value	In this lesson we will learn the meaning of the term "minimum value" and how to find the coordinate of the minimum value so all points on a quadratic graph can be accurately plotted. We will also learn the meaning of the term "maximum value" and how to find the coordinate of its locations. The question covered in this lesson is plot the graph of $y = x^2 + 3x - 2$

Further Graphs (Higher Only) (F and H 2017 TBC)

The 4 Types of Further Graphs	In this lesson we will learn the names, shapes and general equations of a cubic graph, reciprocal function, exponential graph and circle graph.
Introduction to Cubic Graphs	In this lesson we will learn the general equation of a simple cubic graph and a more complicated cubic graph and learn about the turning points of a cubic graph.
Plotting Cubic Graphs	In this lesson we will learn how to plot a cubic graph by first making a table of values. The question that is covered in this lesson is, plot the graph of $y = x^3 - 3x + 2$ for the following value of x. $-3 \leq x \leq 3$.
Introduction to the Graph of the Reciprocal Function	In this lesson we will learn the general equation and shape of the reciprocal function graph and the meaning of this symbol $\neq$
Plotting the Reciprocal Function	In this lesson we will learn how to plot a reciprocal function graph by first making a table of values. The question that is covered in this lesson is, plot the graph of $y = \frac{4}{x}$ for $-5 \leq x \leq 5, x \neq 0$.
Plotting Circle Graphs	In this lesson we will learn the general equation of a circle graph and how to find the radius of the circle from the equation. We will also learn where the centre of the circle will be and how to plot

	any circle graph. The question that is covered in this lesson is, plot the graph of $x^2+y^2=16$.
Plotting Circle Graphs Exam Question	The question that is covered in this lesson is, plot the graph of $x^2+y^2=4^2$.
Plotting Exponential Graphs	In this lesson we will learn how to plot an exponential graph by first making a table of values. We will also learn that all exponential graphs cross the y axis at the same point. The question that is covered in this lesson is, plot the graph $y = x^2$ for values of x from -3 to 3.

Solving Equations using Graphs (Higher Only)

Solving Equations using Graphs Part 1	In this lesson we will learn how to solve equations from graphs. This is a popular exam question which usually follows part of a question where you are asked to plot a graph. You then use the graph that you have plotted to solve the equation. The question covered in this lesson is, the graph of $y = x^2 - 3x$ is shown. Use the graph to solve the equation $x^2 - 3x = 0$.
Solving Equations using Graphs Part 2	In this lesson we will learn how to use a graph to solve an equation. You must be able to complete this example from part 1 and be able to plot straight line graphs before you try this lesson. If not then watch the following lessons: Solving Equations using Graphs Part 1 and/or Plotting straight line graphs from a table of values. The question covered in this lesson is, the graph of $y = x^2 - 3x$ is shown. Use the graph to solve the equation $x^2 - 3x = 2x - 4$.
Solving Equations using Graphs Part 3	In this lesson we will learn how to use a graph to solve a cubic equation.

	The question covered in this lesson is, the graph of $y = x^3 - 3x^2 + 2$ is shown. Use the graph to solve the equation $x^3 - 3x^2 + 2 = 0$.
Solving Equations using Graphs Part 4	In this lesson we will learn how to solve more complicated cubic equations using the graph of part of the equation that we are asked to solve. The question covered in this lesson is, the graph of $y = x^3 - 3x$ is shown. Use the graph to solve the equation $x^3 - 3x + 2 = 0$.

Simultaneous Equations (Higher Only)

Solving simultaneous equations graphically	In this lesson we learn how to solve simultaneous equations graphically. You must be able to make a table of values for a straight line graph, plot a straight line graph and rearrange equations in the form of $y = mx + c$ before trying this lesson. If not then watch the following lessons: Exam tip – completing a table of values and/or Plotting straight line graphs from a table of values and/or Rearranging equations in the form of $y = mx + c$ The questions covered in this lesson are, solve the following pairs of simultaneous equations graphically i) $y = x + 1$ and y = $-2x + 10$ ii) $3y + 6x = 33$ and $2y - 6x = 2$
Solving simultaneous equations, part 1	In this lesson we will learn how to solve basic simultaneous equations. It is important to start this topic by learning how to solve basic simultaneous equations before moving onto harder questions. This topic has been carefully designed so that the examples get harder in each lesson. By the time you get to part 5 of this topic you will be able to solve all linear simultaneous equations. You must be able to solve normal equations before trying this lesson. If not then watch the following lesson: Solving equations, part 1, 2 or 3 The question covered in this lesson is, solve the following simultaneous equations $2x + 2y = 30$ and $5x + 2y = 54$
Solving simultaneous equations,	In this lesson we will learn how to solve simultaneous equations. It is important that you can solve

part 2	all the examples in part 1 of this topic before trying this lesson. The question covered in this lesson ise, solve the simultaneous equations $6y + 2x = 17$ and $5y + 4x = 20$
Solving simultaneous equations, part 3	In this lesson we will learn how to solve simultaneous equations. You must be able to add negative numbers and be able to solve all the examples from part 1 and 2 of this topic before trying this lesson. If not then watch the following lessons: Part 1 and 2 from this topic and/or In the Number section: Adding negative numbers. The question covered in this lesson is, solve the simultaneous equations $-2y + 7x = 9$ and $2y - 5x = 5$
Solving simultaneous equations, part 4	In this lesson we will learn how to solve simultaneous equations. You must also be able to solve all the examples from part 1, 2 and 3 of this topic and be able to subtract negative numbers before you try this lesson. If not then watch the following lessons: Part 1, 2 or 3 from this topic and/or In the Number section: Subtracting negative numbers. The question covered in this lesson is, solve the simultaneous equation $5x - 2y = 22$ and $-4x - 2y = -32$
Solving simultaneous equations, part 5	In this lesson we will learn how to solve simultaneous equations that do not look the same. These types of questions often confuse students. You must also be able to rearrange formula and be able to solve all the examples from part 1, 2, 3 and 4 of this topic before trying this lesson. If not then watch the following lessons: Part 1, 2, 3 or 4 from this topic and/or rearranging formula part 1. The question covered in this lesson is, solve the simultaneous equation $6x = 2 + 2y$ and $3x + 3y = 9$.
Solving quadratic simultaneous equations, part 1	In this lesson we will learn how to solve simultaneous equations when one of the equations is a quadratic equation. You must be able to factorise and solve positive quadratic equations and rearrange formula before trying this lesson. If not then watch the following lesson: Factorising quadratics with positive terms only and/or Solving quadratic equations by factorising part 1 and/or Rearranging formula part1 and 2

	The question covered in this lesson are, solve the following simultaneous equations $y = 4x + 8$ and $y = x^2 + 3x - 4$
Solving quadratic simultaneous equations, part 2	In this lesson we will learn how to solve simultaneous equations when one of the equations is a quadratic equation. You must be able to factorise and solve quadratic equations with a negative number term and rearrange formula before trying this lesson. If not then watch the following lesson: Factorising quadratics with a negative number term and/or Solving quadratic equations by factorising part 1 and/or Rearranging formula part 1 and 2 The question covered in this lesson are, solve the following simultaneous equations $x^2 + 3y = 12$ and $y - x = -2$
Solving simultaneous equations, with a circle equation	In this lesson we will learn how to solve simultaneous equations when one of the equations is the equation of a circle. You will also learn the general form of a circle equation. The question covered in this lesson is, solve the following simultaneous equations $x^2 + y^2 = 17$ and $y = x - 5$
Simultaneous equations, exam tip	In this lesson you will learn a quick and easy exam tip that will help you solve simultaneous equations. You should be able to solve simultaneous equations before watching this lesson.

Simplifying Algebraic Fractions (Higher Only)

Introduction to Simplifying Algebraic Fractions	In this lesson we will learn an algebraic way of simplifying fractions. To make it easier to understand this method for the first time Rob uses a numerical fraction to show you how algebraic fractions will be simplified. The question covered in this lesson is, simplify the fraction $\frac{15}{25}$.
Simplifying Algebraic Fractions Part	In this lesson we will learn how to simplify algebraic fractions. We will learn common mistakes

1	that students make in this topic and how to avoid them. The questions covered in this lesson are, i) simplify the algebraic fraction $\frac{3x-6}{3}$ ii) simplify the algebraic fraction $\frac{18}{6x-3}$ iii) simplify the algebraic fraction $\frac{xy-xw}{x}$.
Simplifying Algebraic Fractions Part 2	In this lesson we will learn how to simplify more complicated algebraic fractions. You must be able to simplify the examples covered in part 1 of this lesson before you try this lesson. If not then watch this lesson first. The questions covered in this lesson are, i) simplify the algebraic fraction $\frac{3x+9}{x^2+3x}$ ii) simplify the algebraic fraction $\frac{4x^2+12x}{3x+9}$.
Simplifying Algebraic Fractions Part 3	In this lesson you will learn how to simplify more complicated algebraic fractions. You must be able to simplify the examples covered in part 2 of this lesson before you try this lesson. If not then watch this lesson first. The questions covered in this lesson are, i) simplify the algebraic fraction $\frac{x^2+5x+6}{x^2-2x-8}$ ii) simplify the algebraic fraction $\frac{x^2-1}{x^2-2x-3}$ iii) simplify the algebraic fraction $\frac{x^2y+5xy^2}{3xy+4x^2y^2}$.
Simplifying Algebraic Fractions Practice Question	The question covered in this lesson is simplify the algebraic fraction $\frac{4x+10}{26}$.
Multiplying Algebraic Fractions and Simplifying Part 1	In this lesson we will learn how to multiply algebraic fractions and simplify. We start off by recapping how to multiply normal fractions together and then apply this method to algebraic fractions. You must be able to simplify algebraic fractions before trying this lesson. If not then watch the following lessons: Simplifying Algebraic Fractions Part 1and/or Part 2.

	The questions covered in this lesson are, i) simplify the fraction $\frac{3}{5} \times \frac{2}{3}$ ii) simplify the algebraic fraction $\frac{6}{x} \times \frac{x^2}{2}$ iii) simplify the algebraic fraction $\frac{16y^3}{6x} \times \frac{2x}{y^2}$.
Multiplying Algebraic Fractions and Simplifying Part 2	In this lesson we will learn how to multiply more complicated algebraic fractions together and simplify. You must be able to expand double brackets and complete the examples from part 1 of this lesson before you try this lesson. If not then watch the following lessons first: Multiplying out double brackets and Multiplying Algebraic Fractions and Simplifying Part 1. The question covered in this lesson is simplify the algebraic fraction $\frac{2x+2}{5x15} \times \frac{3x-9}{4x+4}$
Dividing Algebraic Fractions and Simplifying	In this lesson we will learn how to divide algebraic fractions and simplify. We start off by recapping how to divide normal fractions together and then apply this method to algebraic fractions. You must be able to simplify algebraic fractions before trying this lesson. If not then watch the following lessons: Simplifying Algebraic Fractions Part 1and/or 2. The questions covered in this lesson are, i) simplify the fraction $\frac{5}{7} \div \frac{2}{3}$ ii) simplify the algebraic fraction $\frac{7x-7}{3x} \div \frac{4x-4}{x}$.
Adding Algebraic Fractions and Simplifying Part 1	In this lesson we will learn how to add algebraic fractions together and simplify. We start off by learning a different method to add normal fractions together and then apply this method to algebraic fractions. You must be able to simplify algebraic fractions before trying this lesson. If not then watch the

	following lessons: Simplifying Algebraic Fractions Part 1and/or Part 2. The questions covered in this lesson are, i) simplify the fraction $\frac{3}{5}+\frac{2}{3}$ ii) simplify the algebraic fraction $\frac{x}{6}+\frac{3x}{4}$.
Adding Algebraic Fractions and Simplifying Part 2	In this lesson we will learn how to add more complicated algebraic fractions together and simplify. You must be able to complete the examples from part 1 of this lesson before you try this lesson. If not then watch this lesson first. The question covered in this lesson is, simplify the algebraic fraction $\frac{3x-2}{2}+\frac{x}{5}$.
Adding Algebraic Fractions and Simplifying Exam Question	The question covered in this lesson is, simplify the algebraic fraction $\frac{4}{x-3}+\frac{2}{x+2}$.
Subtracting Algebraic Fractions and Simplifying	In this lesson we will learn how to subtract algebraic fractions and simplify. You must be able to add algebraic fractions before trying this lesson. If not then watch the following lessons: Adding Algebraic Fractions and Simplifying Part 1 and/or Part 2. The question covered in this lesson is, simplify the algebraic fraction $\frac{4}{x-3}-\frac{2}{2x+1}$

Solving Equations containing Algebraic Fractions

Solving Linear Equations Containing Algebraic Fractions Part 1	In this lesson we will learn how to solve equations containing algebraic fractions. You must be able to add algebraic fractions and simplify and solve equations before trying this lesson. If not then watch the following lessons: Adding Algebraic Fractions and Simplifying Part 2 and/Solving equations with a divide or fraction.

	The question covered in this lesson is, solve the following equation containing algebraic fractions $\frac{3x+1}{2}+\frac{x}{4}=6$.
Solving Linear Equations Containing Algebraic Fractions Part 2	In this lesson we will learn how to solve equations containing algebraic fractions. You must be able to subtract algebraic fractions and simplify and solve equations before trying this lesson. If not then watch the following lessons: Subtracting Algebraic Fractions and Simplifying Part 2 and/Solving equations with a divide or fraction. The question covered in this lesson is, solve the following equation containing algebraic fractions $\frac{5x}{6}-\frac{2x+1}{3}=2$.
Forming and Solving Quadratic Equations from Algebraic Fractions	In this lesson we will learn how to make a quadratic equation from algebraic fractions and then solve the quadratic equation that is made. You must be able to add algebraic fractions and simplify and solve quadratic equations by factorising before trying this lesson. If not then watch the following lessons: Adding Algebraic Fractions and solving quadratic equations by factorizing part 1/2. The question covered in this lesson is simplify the algebraic fraction $\frac{6}{x+5}+\frac{7}{x}=2$ and solve the quadratic equation.
Forming and Solving Quadratic Equations from Algebraic Fractions Exam Question	The question covered in this lesson is, simplify the algebraic fraction $\frac{6}{x+1}-\frac{5}{x+2}=2$ and solve the quadratic equation.

Transformations of Graphs (Higher Only)

Transforming Graphs Up or Down	In this lesson we learn how to move (transform) graphs up or down. We will start with the graph

	of $y = x^2$ and explain how the original equation of this graph changes when you move the graph up or down by 4. We will also learn that the same rules apply when moving any graph up or down.
Transforming Graphs Up and Down using $f(x)$notation	In this lesson we will learn how function notation is used to show that a graph is being moved (transformed) up or down. You must understand the examples covered in the following lesson before trying this lesson: Transforming Graphs Up or Down. If not then watch this lesson first. The examples covered in this lesson is how to sketch the graph of $f(x) + 4$ when $f(x) = x^2$ and how to sketch the graph of $f(x) - 4$ when $f(x) = x^2$.
Transforming Graphs Up or Down – Exam Question	The question that is covered in this lesson is, the graph of $y = x^2 - 2x$ is transformed by $\binom{0}{3}$. i) Sketch the transformed graph, ii) Find the equation of the transformed graph.
Transforming Graphs Up and Down using $f(x)$notation – Exam Question	The question covered in this lesson is, the graph of $y = f(x)$ is shown. Find the coordinates of the minimum point when i) $y = f(x) - 5$ and ii) $y = f(x) + 3$.
Transforming Graphs Left or Right	In this lesson we will learn how to move (transform) graphs sideways, left or right. We will start with the graph of $y = x^2$ and explain how the original equation of this graph changes when you move the graph sideways. We will also learn that the same rules apply when moving any graph up or down. The examples covered in this lesson are i) how to the graph $y = x^2$ to the right by 3 and ii) how to move the graph $y = x^2$ to the left by 3.
Transforming Graphs Left or Right using $f(x)$notation	In this lesson we will learn how function notation is used to show that a graph is being moved (transformed) left or right. You must understand the examples covered in the following lesson before trying this lesson: Transforming Graphs Left or Right. If not then watch this lesson first.

	The examples covered in this lesson is, Sketch the graph of $f(x-3)$ when $f(x)=x^2$ and Sketch the graph of $f(x+2)$ when $f(x)=x^2$.
Transforming Graphs Left – Exam Question	The question covered in this lesson is, the graph of $y=x^2-2x$ is transformed by $\begin{pmatrix}-3\\0\end{pmatrix}$ i) Sketch the transformed graph, ii) Find the equation of the transformed graph.
Transforming Graphs Sideways using $f(x)$notation – Exam Question	The question covered in this lesson is, the graph of $y=f(x)$ is shown. Find the coordinates of the maximum point when i) $y=f(x+2)$ and ii) $y=f(x-5)$.
Stretching Graphs in the x direction	This lesson explains how to stretch graphs in the horizontal direction which is the x direction. We will start with the graph of $y=x^2$ and explain how the original equation of this graph changes when you stretch the graph in the x direction. We will also learn that the same rules apply when stretching any graph in the x direction. The example covered in this lesson is, stretch the graph $y=x^2$ in the x direction of a scale factor of $\frac{1}{2}$.
Stretching Graphs in x direction using $f(x)$notation	In this lesson we will learn how function notation is used to show that a graph is being stretched in the x direction. You must understand the examples covered in the following lesson before trying this lesson: Stretching Graphs in the x direction. If not then watch this lesson first. The example covered in this lesson is sketch the graph of $f(2x)$ when $f(x)=x^2$.
Stretching Graphs in x direction – Exam Question	The question covered in this lesson is, the graph of $y=x^2-4$ is stretched from the y axis, parallel to the $x$axis by the scale factor of $\frac{1}{2}$ i) Sketch the transformed graph and ii) find the equation of the transformed graph.
Stretching Graphs in the y direction	This lesson explains how to stretch graphs in the vertical direction which is the y direction. We will start with the graph of $y=x^2$ and explain how the original equation of this graph changes when you stretch the graph in the y direction. We will also learn that the same rules apply when

	stretching any graph in the y direction. The example covered in this lesson is how to stretch the graph $y = x^2$ in the y direction by a scale factor of 2.
Stretching Graphs in y direction using $f(x)$notation	In this lesson we will learn how function notation is used to show that a graph is being stretched in the y direction. You must understand the examples covered in the following lesson before trying this lesson: Stretching Graphs in the y direction. If not then watch this lesson first. The example covered in this lesson is, sketch the graph of $2f(x)$ when $f(x) = x^2$.
Stretching Graphs in y direction – Exam Question	The question covered in this lesson is, the graph of $y = x^2 - 4$ is stretched from the x axis, parallel to the y axis by the scale factor of 2 i) Sketch the transformed graph and ii) find the equation of the transformed graph.
Reflecting Graphs in the x axis	This lesson explains how to reflect graphs in the x axis. We will start with the graph of $y = x^2$ and explain how the original equation of this graph changes when you reflect the graph in the x axis. We will also learn that the same rules apply when reflecting any graph in the x axis. The example covered in this lesson is, reflect the graph of $y = x^2$ in the x axis.
Reflecting graphs in the x axis using $f(x)$notation	In this lesson we will learn how function notation is used to show that a graph is being reflected in the x axis. You must understand the examples covered in the following lesson before trying this lesson: Reflecting Graphs in the x axis. If not then watch this lesson first. The example covered in this lesson is sketch the graph of $-f(x)$ when $f(x) = x^2$.
Reflecting graphs in the y axis	This lesson explains how to reflect graphs in the y axis. We will start with the graph of $y = x^3$ and explain how the original equation of this graph changes when you reflect the graph in the y axis. We will also learn that the same rules apply when reflecting any graph in the y axis.

	The example covered in this lesson is, reflect the graph of $y = x^3$ in the y axis.
Reflecting graphs in the y axis using $f(x)$notation	In this lesson we will learn how function notation is used to show that a graph is being reflected in the y axis. You must understand the examples covered in the following lesson before trying this lesson: Reflecting graphs in the y axis. If not then watch this lesson first. The example covered in this lesson is, Sketch the graph of $f(-x)$ when $f(x) = x^3$.
Transforming Graphs using $f(x)$notation – Exam Question	The question covered in this lesson is, the graph of $y = f(x)$ is translated by $\binom{2}{-3}$, find the equation of the translated graph.

Trigonometric Graphs (Higher Only)

The Graph of Cos x	In this lesson we will learn about the graph of $y = cosx$ for the following range of x values $0 \leq x \leq 360$. We learn the main coordinates of this graph and how to sketch this graph.
The Graph of Sin x	In this lesson we will learn about the graph of $y = sinx$ for the following range of x values $0 \leq x \leq 360$. We learn the main coordinates of this graph and how to sketch this graph.

Transformations of Trigonometric Graphs (Higher Only)

Transforming Trigonometric Graphs Up and Down	In this lesson we learn how to move (transform) trigonometric graphs up or down. We will start with the graph of $y = sinx$ and explain how the original equation of this graph changes when you move the graph up by 2. Then we will start with the graph of $y = cosx$ and explain how the original equation of this graph changes when you move the graph down by 1.

	The example covered in this lesson is, move the graph $y = sinx$ up by 2 and move the graph $y = cosx$ down by -1
Transforming Trigonometric Graphs Up and Down using $f(x)$notation	In this lesson we will learn how function notation is used to show that a trigonometric graph is being moved (transformed) up or down. You must be able to use function notation to show that normal graphs are being moved up or down. You also need to understand the examples covered in the following lesson before trying this lesson: Transforming Trigonometric Graphs Up and Down. If not then watch this lesson first. The examples covered in this lesson is sketch the graph $f(x) + 2$ $f(x) = sinx$ and sketch the graph $f(x) - 1$ when $f(x) = cosx$
Transforming Trigonometric Graphs Sideways	In this lesson we will learn how to move (transform) trigonometric graphs sideways, left or right. We will start with the graph of $y = sinx$ and explain how the original equation of this graph changes when you move the graph sideways. We will also learn that the same rules apply when moving any graph up or down. The example covered in this lesson is, move the graph $y = sinx$ to the right by 90.
Transforming Trigonometric Graphs Sideways using $f(x)$notation	In this lesson we will learn how function notation is used to show that a trigonometric graph is being moved (transformed) sideways, left or right. You must be able to use function notation to show that normal graphs are being left or right. You also need to understand the examples covered in the following lesson before trying this lesson: Transforming Trigonometric Graphs Sideways. If not then watch this lesson first. The examples covered in this lesson is, sketch the graph $f(x - 90)$ when $f(x) = sinx$ and sketch $f(x + 90)$ when $f(x) = sinx$.
Stretching Trigonometric Graphs in the x direction	This lesson explains how to stretch trigonometric graphs in the horizontal direction which is the x direction. We will start with the graph $y = cosx$ and explain how the original equation of this graph changes when you stretch the graph in the x direction. We will also learn that the same

	rules apply when stretching any graph in the x direction. The example covered in this lesson is, stretch the graph $y = cosx$ in the x direction by a scale factor of $\frac{1}{2}$.
Stretching Trigonometric Graphs in the x direction using $f(x)$notation	In this lesson we will learn how function notation is used to show that a trigonometric graph is being stretched in the x direction. You must be able to use function notation to show that normal graphs are being stretched in the in the x direction. You also need to understand the examples covered in the following lesson before trying this lesson: Stretching Trigonometric Graphs in the x direction. If not then watch this lesson first. The example covered in this lesson is sketch the graph of $f(2x)$ when $f(x) = cosx$.
Stretching Trigonometric Graphs in the y direction	This lesson explains how to stretch trigonometric graphs in the vertical direction which is the y direction. We will start with the graph of $y = sinx$ and explain how the original equation of this graph changes when you stretch the graph in the y direction. We will also learn that the same rules apply when stretching any graph in the y direction. The example covered in this lesson is, Stretch the graph $y = sinx$ in the y direction by a scale factor of 2.
Stretching Trigonometric Graphs in the y direction using $f(x)$notation	In this lesson we will learn how function notation is used to show that a trigonometric graph is being stretched in the y direction. You must be able to use function notation to show that normal graphs are being stretched in the in the y direction. You also need to understand the examples covered in the following lesson before trying this lesson: Stretching Trigonometric Graphs in the y direction. If not then watch this lesson first.

	The example covered in this lesson is, sketch the graph of $2f(x)$ when $f(x) = sinx$.
Reflecting Trigonometric Graphs in the x axis	This lesson explains how to reflect trigonometric graphs in the x axis. We will start with the graph of $y = sinx$ and explain how the original equation of this graph changes when you reflect the graph in the x axis. We will also learn that the same rules apply when reflecting any graph in the x axis. The example covered in this lesson is, reflect the graph of $y = sinx$ in the x axis.
Reflecting Trigonometric Graphs in the x axis using $f(x)$notation	In this lesson we will learn how function notation is used to show that a trigonometric graph is being reflected in the x axis. You must be able to use function notation to show that normal graphs are being reflected in the in the x axis. You also need to understand the examples covered in the following lesson before trying this lesson: Reflecting Trigonometric Graphs in the x axis. If not then watch this lesson first. The example covered in this lesson is, sketch the graph of $-f(x)$ when $f(x) = sinx$.
Transforming Trigonometric Graphs Exam Tip	In this lesson we will learn the pattern between the number in front of x in a trigonometric equation and the number of complete graphs between 0 and 360.
Transforming Trigonometric Graphs – Exam Question 1	In this question we are told the graph of $y = af(bx) + c$ is shown. If $f(x) = cosx$, find the value of a, b and c.
Transforming Trigonometric Graphs – Exam Question 2	In this question we are told the graph of $y = sinx$ is shown for the values of $0 \leq x \leq 360$. Sketch the graph of $y = sin3x$.

Number

Long Addition and Subtraction

Long addition	In this lesson we will learn how to add numbers without using a calculator, using the method of long addition. The questions covered in this lesson are i) 235 + 143 ii) 457 + 219
Long subtraction	In this lesson we will learn how to subtract numbers without using a calculator, using the method of long subtraction. The questions covered in this lesson are i) 458 – 123 ii) 375 – 159 iii) 624 – 459 iv) 927 – 53

Long Multiplication and Division

Long multiplication part 1	In this lesson we will learn how to multiply numbers without using a calculator, using the method of long multiplication. This lesson is for anyone that does not know how to multiply numbers using this method. It teaches the basic steps of this topic first starting with small numbers before moving on to harder/bigger numbers in part 2 and part 3. The questions covered in this lesson are i) 43 x 2 ii)26 x 3 iii) 74 x 3 iv) 64 x 5
2 Long multiplication part 2	In this lesson we will learn how to multiply numbers without using a calculator, using the method of long multiplication. This lesson multiplies double digit numbers only. If you are finding this lesson hard then watch part 1 first. The questions covered in this lesson are i) 38 x 12 ii) 57 x 24
Long multiplication part 2 practice question	
Long multiplication part 3	In this lesson we will learn how to multiply numbers without using a calculator using, the method of long multiplication. This lesson multiplies triple digit numbers only. You should be able to confidently multiply smaller numbers before attempting this lesson. If not then watch part 2 or

	part 1. The question covered in this lesson is 235 x 124
Long multiplication part 3 practice question	
Long multiplication of decimals	In this lesson we will learn how to multiply decimal numbers without using a calculator, using the method of long multiplication. Rob has a very easy method that makes this topic easy to learn. You must be able to multiply whole numbers before attempting this lesson. If not then watch: Long multiplication part 1, 2 or 3. The questions covered in this lesson are i) 2.3 x 0.12 ii) 24.5 x 0.15
Long division	In this lesson we will learn how to divide numbers without a calculator, using the method of long division. Only questions that give a whole number answer will be covered. For questions that have decimal answers watch the lesson: Long division with decimal answers. The questions covered in this lesson are i) 928 ÷ 4 ii) 236 ÷ 4 iii) 441 ÷ 7 iv) 598 ÷ 13
Long division with decimal answers	In this lesson we will learn how to divide numbers without a calculator, using the method of long division. Only questions that give a decimal answer will be covered. Students must be able to divide whole numbers using long division before attempting this lesson. If not then then watch the lesson: Long division. The questions covered in this lesson are i) 278 ÷ 8 ii) 232 ÷ 7

Multiplying and Dividing by 10, 100, 1000

Multiplying by 10, 100, 1000	In this lesson we will learn how to multiply numbers by 10, 100 and 1000. The questions covered in this lesson are 1) Multiply the following numbers by 10 i) 25.6 ii) 1.438 iii) 117 2) Multiply the following numbers by 100 i) 10.349 ii) 81 3) Multiply the following numbers by 1000 i) 62.5 ii) 172
Dividing by 10, 100, 1000	In this lesson we will learn how to divide numbers by 10, 100 and 1000. The questions covered in

	this lesson are 1) Divide the following numbers by 10 i) 25.6 ii) 7.8 iii) 108 2) Divide the following number by i) 295.6 ii) 1.28 3) Divide the following number by 1000 i) 2.7 ii) 0.08

Rounding

Rounding to decimal places (D.P)	In this lesson we will learn how to round numbers to decimal places. The questions covered in this lesson are i) round the following numbers to 2.DP i) 16.537 ii) 5.07497 iii) round 10.0283 to 1.DP, iv) round 9.17254 to 3.DP v) round 1.7964 to 2.DP
Rounding to decimal places (D.P) practice question	
Rounding to Significant Figures part 1	This this lesson we learn how to round numbers to a certain number of significant figures. Only large numbers bigger than 1 will be covered in this lesson. It would help if you are able to round to decimal places before trying this lesson as there are similar rules in both of these topics. The questions covered in this lesson are i) round 376900 to 2 significant figures (2S.F) ii) round 504120 to 3 significant figures (3S.F) iii) round 87430 to 1 significant figure (1S.F)
Rounding to Significant Figures part 1, practice question.	
Rounding to Significant Figures part 2	This this lesson we learn how to round numbers less than 1 to a certain number of significant figures. You must be able to round large numbers bigger than 1 to significant figures before trying this lesson. If not then watch part 1 first. The questions covered in this lesson are i) round 0.004062 to 2 significant figures (2S.F) ii) round 0.083401 to 1 significant figure (1S.F)

Negative Numbers

Adding negative numbers	In this lesson we learn the rules for adding negative numbers. This lesson also covers common mistakes that students make and tips to avoid these mistakes. The questions covered in this lesson are, i) 5 + -3 ii) 4 + -6 iii) -1 + -3 iv) -3 + -5
Subtracting negative numbers	In this lesson we will learn the rules for subtracting negative numbers. This lesson also covers common mistakes that students make and tips to avoid these mistakes. The questions covered in this lesson are, i) 2 – -5 ii) 1 – -3 iii) -8 – -2 iv) -3 – -4
Adding and subtracting negative numbers	In this lesson we cover a mixture adding and subtracting negative numbers. The questions covered in this lesson are, i) -4 + -6 + -3 ii) 12 – -6 – -2 iii) -4 – -10 – -3
Multiplying negative numbers	In this lesson we learn the rules for multiplying negative numbers. The questions covered in this lesson are, i) -3 x -5 ii) 3 x -4 iii) -8 x 3 iv) -2 x 5 x -4
Dividing negative numbers	In this lesson we learn the rules for dividing negative numbers. The questions covered in this lesson are, i) -12 ÷ 3 ii) -12 ÷ -3 iii) -22 ÷ 2 iv) 35 ÷ -7 v) $\frac{-11}{-2}$
Negative or subtract	A lot of students get confused between negative and subtract. This lesson will teach you when a number is negative or when a negative sign is a subtract sign.

Factors and Multiples

Finding factors	In this lesson we learn what factors are and how to find all the factors of any number. The questions covered in this lesson are, find all the factors of i) 24 ii) 54 iii) 16.
Finding the HCF – Highest Common Factor	In this lesson we learn how to find the highest common factor (HCF) of 2 numbers. This lesson covers pairs of numbers that are small and these types of questions are usually found on the foundation paper. To find the HCF with pairs of bigger numbers you will need to learn a different method. This lesson is: Finding the HCF – Highest Common Factor (Higher only). You must be able to find the factors of any number before trying this lesson. If not then watch the lesson: Finding factors. The questions covered in this lesson are, find the HCF of i) 24 and 40 ii) 18 and 42.

Finding the HCF – Highest Common Factor (higher only)	This lesson teaches you a method of finding the HCF when you have a pair of large numbers. These types of question requires a different method than if the numbers were smaller. You must be able to write any number as a product of its prime factors before attempting this lesson. If not then watch the lesson: Writing a number as a product of it Prime Factors. The questions covered in this lesson are, find the HCF, highest common factor, of i) 48 and 72 ii) 168 and 140
Finding multiples	In this lesson we learn what a multiple is and how to find the multiples of any number. It also covers a common mistake students often make. The questions covered in this lesson are i) find the first 5 multiples of 6 ii) find the first 5 multiples of 4
Finding the lowest common multiple (LCM)	In this lesson we learn how to find the lowest common multiple (LCM) of two numbers. You must be able to find multiples of a number before attempting this lesson. If not then watch the lesson: Finding multiples. This lesson covers smaller pairs of numbers that would normally appear on the foundation paper. To find the LCM with pairs of bigger numbers you will need to learn a different method. This lesson is: Finding the lowest common multiple (higher only). The questions covered in this lesson are to find the LCM, lowest common multiple, of i) 3 and 5 ii) 4 and 7
Finding the lowest common multiple (higher only)	In this lesson we learn how to find the lowest common multiples of two large numbers. These types of questions require a different method than if the numbers were smaller. You must be able to write any number as a product of its prime factors before attempting this lesson. If not then watch the lesson: Writing a number as a product of it Prime Factors. The questions covered in this lesson are to find the LCM, lowest common multiple, of i) 36 and 48 ii) 24 and 80
Writing a number as a product of it Prime Factors	In this lesson we learn how to write a number as a product of its prime factors. This lesson will also teach you what a prime number is and show you all the prime numbers from 1 to 50 which

	you need to know for your exam. The questions covered in this lesson are i) write 36 as a product of its prime factors ii) write 24 as a product of its prime factors.

Powers

Expanding Powers	In this lesson we will learn how to expand powers. This lesson uses the same method that we learnt in the lesson: Expanding powers in the Algebra section. The questions covered in this lesson are, expand the following powers i) 3^5 ii) 2^6 iii)10^4 iv) 7^3 v) 5^4 7^3 vi) 2^5 6^3
Simplifying Powers	In this lesson we will learn how to simplify powers. The questions covered in this lesson are to simplify the following as a power i) 3x3x3x3x3, ii)10x10x10x10x10x10x10 iii) 2x2x2x2 2x2x2x10x10x10x10x10 iv) 3x3x3x3x7x7x7x7x7
Simplifying powers – multiplying positive powers	In this lesson we learn how to simplify powers when multiplying positive powers together. The questions covered in this lesson are to simplify the following powers i) 2^3 x 2^5 ii) 10^3 x 10^8 iii) 3^4 x 3^8 iv) 4^5 x 4^1 v) 2^5 x 2^{10} vi) 2^5 x 7^3.
Simplifying powers – dividing positive powers	In this lesson we learn how to simplify powers when dividing positive powers. We also learn what the power of a number is when it appears not to have a power. The questions covered in this lesson are, simplify the following powers i) $\frac{2^5}{2^3}$ ii) $\frac{5^8}{5^2}$ iii) $8^{11} \div 8^7$ iv) $7^8 \div 7$ v) $10^7 \div 10^3$
Simplifying powers raised to another power	In this lesson we will learn how to simplify powers that are raised to another power. You should be able to multiply negative numbers before trying this lesson. If not then watch the flowing lesson: Multiplying negative numbers.

	The questions covered in this lesson are, simplify the following powers i) $(2^5)^3$ ii) $(3^6)^4$ iii) $(10^3)^7$ iv) $(5^4)^{-3}$ v) $(7^{-5})^{-3}$ vi) $(2^{-4})^5$.
Simplifying powers – multiplying negative powers	In this lesson we learn how to simplify powers when multiplying negative powers together. You should be able to multiply positive powers and be able to add negative numbers before trying this lesson. If not then watch the following lessons: Simplifying powers – multiplying positive powers and/or: Adding negative numbers. The questions covered in this lesson are to simplify the following powers of i) $2^5 \times 2^{-3}$ ii) $4^{-2} \times 4^{-5}$ iii) $5^3 \times 5^{-7}$
Simplifying powers – dividing negative powers	In this lesson we learn how to simplify powers when dividing negative powers. You should be able to divide positive powers and be able to subtract negative numbers before trying this lesson. If not then watch the following lessons: Simplifying powers – dividing positive powers and/or: Subtracting negative numbers. The questions covered in this lesson are to simplify the following powers i) $7^5 \div 7^{-3}$ ii) $2^{-5} \div 2^{-3}$ iii) $10^{-4} \div 10^{-7}$
The power of zero – exam tip	A lot of students get confused when they see a question that has the power of zero, for example, 7^0. This very short lesson teaches you everything you need to know about the power of Zero.

Powers (Higher Only)

Negative powers, part 1	In this lesson we learn what a negative power actually means. We learn how to write index form numbers as a positive power (positive indices). The questions covered in this lesson are, 1) Write the following as a positive indices i) 4^{-3} ii) 8^{-4} iii) 5^{-1}. 2) Write the following number in index form i) $\frac{1}{2^6}$ ii) $\frac{1}{7^{11}}$ iii) $\frac{1}{4}$ iv) $\frac{1}{8}$.

Negative powers, part 2	In this lesson we learn how to find the number (the actual value) of negative powers. You should be confident with all the examples in part 1 before trying this lesson. The questions covered in this lesson are, find the value of the following i) 5^{-2} ii) 2^{-3} iii) 5^{-3}.
Negative powers, part 3	In this lesson we learn how to find missing powers. This lesson tests your understanding of negative powers and you should be very confident with all the examples in part 1and 2 of this section before trying this lesson. The questions covered in this lesson are to find the value of x for i) $5^x = \frac{1}{125}$ ii) $4^x = \frac{1}{256}$ iii) $5^x = 0.04$ iv) $2^x = 0.5$.
4 Negative powers, part 4	In this lesson we learn how to simplify fractions that have a negative power. This lesson tests your understanding of negative powers and you should be very confident with all the examples in part 1, 2 and 3 of this section before trying this lesson. The questions covered in this lesson are i) simplify the following $(\frac{1}{5})^{-7}$ ii) find the value of the following $(\frac{1}{3})^{-5}$ iii) find the missing value of x of $\left(\frac{1}{2}\right)^x = 32$ iv) find the missing value of x $\left(\frac{1}{5}\right)^x = 25$
Fractional powers and roots, part 1	In this lesson we learn how to simplify numbers that have a fractional power. These simplify into the roots and often into whole numbers. We learn the general rules for this topic in letter form and apply it to numerical examples. The questions covered in this lesson are to find the value of the following i) $8^{\frac{1}{3}}$ ii) $125^{\frac{1}{3}}$ iii) $32^{\frac{1}{5}}$
Fractional powers and roots, part 2	In this lesson we learn how to simplify numbers that have a fractional power. These simplify into the roots and powers and then often into whole numbers. We learn the general rules for this topic in letter form and apply it to numerical examples.

	The questions covered in this lesson are to find the value of the following i) $27^{\frac{2}{3}}$ ii) $125^{\frac{3}{2}}$ iii)$16^{1.5}$
Negative fractional powers and roots, part 1	In this lesson we learn how to simplify numbers that have a negative fractional power. These simplify into roots and often into simple decimal numbers or fractions. We learn the general rules for this topic in letter form and apply it to numerical examples. You should be very confident with all the examples in the lessons: Negative powers part 1, 2, 3 and 4 before attempting this lessons. The questions covered in this lesson are to find the values of the following i) $64^{-\frac{1}{2}}$ ii) $125^{-\frac{1}{3}}$
Negative fractional powers and roots, part 2	In this lesson we learn how to simplify numbers that have a negative fractional power. These simplify into roots and powers which then often simplify into simple decimal numbers or fractions. We learn the general rules for this topic in letter form and apply it to numerical examples. You should be very confident with all the examples in the lessons: Negative fractional powers part 1 before attempting this lessons. The questions covered in this lesson are to find the values of the following i) $16^{-\frac{3}{2}}$ ii) $32^{-\frac{3}{5}}$

Standard Form (Higher Only) (F and H 2017 TBC)

Introduction to standard form	In this lesson we learn what a standard form number is using a mind blowing real life example from Chemistry. We also learn what type of numbers are standard form numbers and what type of numbers and how to spot numbers that are not standard form even though they may look like they are standard form numbers. This is a must see lesson before trying anything else in this topic.
Converting standard form to ordinary numbers, part 1	In this lesson we will learn how to convert any standard form numbers into an ordinary number. This lesson only covers standard form numbers that will convert into numbers that are bigger than 1. For standard form numbers that convert into decimal numbers less than 1 watch part 2. The questions covered in this lesson are, convert the following standard form numbers into an ordinary number i) 2.1×10^6 ii) 5.018×10^5 iii)3×10^8

Converting standard form to ordinary numbers, part 2	In this lesson we will learn how to convert any standard form numbers into an ordinary number. This lesson only covers standard form numbers that convert into decimal numbers that are less than 1. For standard form numbers that convert to numbers bigger than 1 watch part 1. The questions covered in this lesson are, convert the following standard form numbers into an ordinary number i) 2.5×10^{-5} ii) 5.78×10^{-3} iii)3×10^{-7}
Changing numbers into standard form	In this lesson we learn how to change ordinary numbers that are bigger than 1, into standard form numbers. The questions covered in this lesson are, convert the following ordinary numbers into standard form i) 56000000 ii) 127000 iii) 700000000
Changing numbers into standard form practice question	
Changing numbers less than 1 into standard form	In this lesson we learn how to change decimal numbers that are less than 1 into standard form. The questions covered in this lesson are, convert these ordinary numbers into standard form i) 0.00043 ii) 0.0000583 iii) 0.0003
Changing numbers less than 1 into standard form practice question	
Converting non-standard form numbers into standard form	Many students think that the numbers covered in this lesson are standard form numbers because they look like standard form numbers. In this lesson we will learn how to spot these fake standard form numbers and how to convert them back into true standard form. This questions covered in this lesson are, convert the following numbers into true standard form i) 15×10^4 ii) 25×10^7 iii) 0.32×10^8 iv) 0.27×10^5
Entering standard form into a calculator	In this lesson we learn how to enter standard form numbers into a calculator. We will also cover how to do this on different calculators as the buttons are different on some models. We start by showing you how to enter 4×10^7 into your calculator and then we will show you how to enter other calculations into your calculator. The questions covered in this lesson are, i) $2.8 \times 10^4 \times 1.2 \times 10^9$ ii) $1.8 \times 10^{-4} + 3.5 \times 10^{-3}$
Adding and subtracting standard	In this lesson we learn how to add and subtract standard form numbers. Every year many students

form numbers	get these questions wrong. The questions covered are to add the following standard form numbers i) $6 \times 10^5 + 3 \times 10^4$ ii) $7.2 \times 10^6 + 4.2 \times 10^5$ iii) $7 \times 10^5 - 4 \times 10^3$ iv) $6.8 \times 10^5 - 4.3 \times 10^4$
Multiplying standard form numbers (non-calculator)	In this lesson we learn how to multiply standard form numbers without using a calculator. You must be able to multiply powers with the same base number before trying this lesson. If not then watch the lesson: Simplifying powers – multiplying positive powers. The questions covered in this lesson are to calculate the following and give your answers in standard form i) $3 \times 10^4 \times 2 \times 10^5$ ii) $4 \times 10^7 \times 2 \times 10^4$ iii) $(1.5 \times 10^4) \times (2 \times 10^8)$
Multiplying standard form numbers practice question	
Multiplying standard form numbers exam question	In this lesson we learn how to multiply standard form numbers. It is a bit harder than it looks so this lesson is definitely worth a watch. The question covered in this lesson is to calculate $7 \times 10^6 \times 3 \times 10^5$ Give your answer in standard form
Dividing standard form numbers (non-calculator)	In this lesson we learn how to divide standard form numbers without using a calculator. You must be able to divide powers with the same base number before trying this lesson. If not then watch the lesson: Simplifying powers – dividing positive powers. The questions covered in this lesson are, calculate the following and give your answers in standard form i) $8 \times 10^6 \div 2 \times 10^2$ ii) $9 \times 10^7 \div 3 \times 10^5$ iii) $(3.2 \times 10^{11}) \div (1.6 \times 10^3)$

Factions

Simplifying fractions	In this lesson we will learn how to simplify fractions. Rob uses slices of pizza to help picture different fractions and then teaches you how to simplify any fraction into its simplest form. The questions covered in this lesson are to find the simplest form of this fraction by simplifying i) $\frac{6}{8}$

	ii) $\frac{10}{30}$ iii) $\frac{12}{18}$ iv) $\frac{45}{60}$
Adding fractions, part 1	In this lesson we will learn how to add simple fractions. Rob uses slices of pizza to show different fractions which helps you picture the question in your head better. This lesson is suitable for anyone struggling with basic fractions on the foundation paper or lower KS3 levels. You must also be able to simplify fractions in this lesson. If not then watch the lesson: Simplifying fractions. The questions covered in this lesson are, add the following fractions i) $\frac{1}{4}+\frac{1}{4}$ ii) $\frac{2}{10}+\frac{4}{10}$ iii) $\frac{3}{6}+\frac{1}{3}$
Adding fractions, part 2	In this lesson we will learn how to add more difficult fractions where one of the denominators will need to be changed before the fractions can be added. This lesson is suitable for anyone studying foundation level or anyone that is finding adding fractions hard. You must also be able to simplify fractions in this lesson. If not then watch the lesson: Simplifying fractions. The questions covered in this lesson are, add the following fractions i) $\frac{5}{12}+\frac{1}{6}$ ii) $\frac{4}{15}+\frac{2}{5}$ iii) $\frac{5}{12}+\frac{1}{4}$
Adding fractions, part 3	In this lesson we will learn how to add more difficult fractions where both of the denominators will need to be changed before the fractions can be added. You must be able to add simpler fractions before attempting this lesson. If not then watch part 2 or part 1. You must also be able to simplify fractions in this lesson. If not then watch the lesson: Simplifying fractions. The questions covered in this lesson are, add the following fractions i) $\frac{1}{4}+\frac{1}{3}$ ii) $\frac{1}{5}+\frac{2}{3}$ iii) $\frac{2}{6}+\frac{1}{9}$
Subtracting fractions, part 1	In this lesson we will learn how to subtract fractions. You must be able to add simple fractions before attempting this lesson as the method is similar for adding and subtracting fractions. You must also be able to simplify fractions in this lesson. If not then watch the lesson: Simplifying fractions. The questions covered in this lesson are to subtract the following fractions i) $\frac{7}{8}-\frac{3}{8}$ ii) $\frac{5}{7}-\frac{2}{7}$ iii) $\frac{3}{5}-\frac{1}{10}$ iv) $\frac{3}{7}-\frac{4}{21}$

Subtracting fractions, part 2	In this lesson we will learn how to subtract more difficult fractions where one or two of the denominators will need to be changed before the fractions can be subtracted. You must be able to add fractions before attempting this lesson as the method is similar for adding and subtracting fractions. If not then watch the lesson: Adding fractions, part 2 or 3. You must also be able to simplify fractions in this lesson. If not then watch the lesson: Simplifying fractions. The questions covered in this lesson are to subtract the following fractions i) $\frac{3}{5}-\frac{1}{2}$ ii) $\frac{3}{4}-\frac{2}{5}$ iii) $\frac{4}{5}-\frac{5}{12}$
Multiplying fractions	In this lesson we learn how to multiply fractions. You must also be able to simplify fractions in this lesson. If not then watch the lesson: Simplifying fractions. The questions covered in this lesson are multiply the following fractions i) $\frac{2}{3}\text{x}\frac{4}{6}$ ii) $\frac{3}{8}\text{x}\frac{5}{6}$
Dividing fractions	In this lesson we learn how to divide fractions. You must also be able to simplify fractions in this lesson. If not then watch the lesson: Simplifying fractions. The questions covered in this lesson are, divide the following fractions i) $\frac{3}{4}\div\frac{5}{2}$ ii) $\frac{4}{5}\div\frac{2}{3}$ iii) $\frac{3}{4}\div\frac{2}{5}$
Equivalent fractions, part 1	In this lesson we will learn what an equivalent fraction is and how to find equivalent fractions. The questions covered in this lesson are, find 2 equivalent fractions of i) $\frac{3}{4}$ ii) $\frac{4}{7}$ iii) $\frac{2}{5}$
Equivalent fractions, part 2	In this lesson we will learn how to find the missing number to make two fractions equivalent. This is a common question and tests your understanding of equivalent fractions. Watch part 1 first if you're unsure about equivalent fractions. The questions covered in this lesson are, find the missing number to make the following fractions equivalent i) $\frac{2}{5}=\frac{?}{15}$ ii) $\frac{?}{7}=\frac{12}{28}$ iii) $\frac{4}{?}=\frac{20}{35}$
Finding a fraction of an amount	In this lesson we learn how to find a fraction of any amount or number. Rob makes this topic really easy by using pizza's to picture finding a fraction of an amount.

	The questions covered in this lesson are, find i) $\frac{1}{5}$ of 35 ii) $\frac{1}{7}$ of 56 iii) $\frac{5}{8}$ of 72 iv) $\frac{4}{11}$ of 110.
Ordering fractions	In this lesson we learn two different methods to order fractions. You must be able to change a fraction into a decimal before attempting this lesson. If not then watch the lesson: Changing between fractions, decimals and percentages. The questions covered in the lesson are, put the following fractions in order of size, starting with the smallest first i) $\frac{3}{4}, \frac{2}{3}, \frac{5}{8}$ ii) $\frac{9}{13}, \frac{8}{11}, \frac{2}{3} \frac{15}{21}, \frac{14}{23}$.
Ordering fractions practice question	

Mixed Numbers

Simplifying top heavy fractions into mixed numbers	In this lesson we will learn how to simplify top heavy fractions into a mixed number. Rob uses a lot of slices of his favorite cake in this lesson to help you picture these questions which makes it much easier for you to fully understand this topic. The questions covered in this lesson are, simplify the following top heavy fractions into a mixed number i) $\frac{7}{4}$ ii) $\frac{8}{3}$ iii) $\frac{11}{4}$ iv) $\frac{21}{6}$ v) $\frac{22}{10}$
Changing mixed numbers into top heavy fractions	In this lesson we will learn how to change mixed numbers into top heavy fractions. Rob uses a lot of cake in this lesson to help you picture these questions which makes it much easier for you to fully understand this topic. The questions covered in this lesson are, change the following mixed numbers into a top heavy fraction i) $2\frac{1}{4}$ ii) $1\frac{2}{3}$ iii) $3\frac{2}{5}$ iv) $6\frac{3}{7}$
Top heavy fractions into mixed numbers, exam tip	This lesson gives you a really good tip on simplifying large top heavy fractions into a mixed numbers. This tip will not only make questions like this much easier but save you heaps of time in

	your exam. The question covered in this lesson is, simplify $\frac{120}{44}$ into a mixed number.
Adding mixed numbers	In this lesson we learn how to add mixed numbers. The questions covered in this lesson are to add the following mixed numbers of i) $2\frac{1}{5} + 7\frac{2}{5}$ ii) $3\frac{1}{4} + 5\frac{2}{3}$ iii) $3\frac{4}{5} + 2\frac{2}{3}$
Subtracting mixed numbers	In this lesson we learn how to subtract mixed numbers. We also learn tips on how to avoid common mistakes students make. The questions covered in this lesson are to subtract the following mixed numbers of i) $7\frac{3}{5} - 2\frac{1}{5}$ ii) $7\frac{3}{5} - 2\frac{4}{5}$ iii) $2\frac{5}{8} - 1\frac{3}{4}$
Multiplying mixed numbers and fractions	In this lesson we learn how to multiply mixed numbers by other mixed numbers and fractions. We will also learn how to multiply a whole number by a fraction, which often confuses students. Many students get this topic wrong so watch this lesson if you're unsure how to do any of this. The questions covered in this lesson are, multiply the following mixed numbers i) $1\frac{1}{3} \times 2\frac{1}{2}$ ii) $4 \times \frac{2}{5}$ iii) $2\frac{5}{8} \times \frac{1}{6}$
Dividing mixed numbers and fractions	In this lesson we learn how to divide mixed numbers by other mixed numbers and fractions. We will also learn how to divide a whole number by a fraction, which often confuses students. The questions covered in this lesson are, divide the following mixed numbers i) $2\frac{3}{4} \div 4\frac{1}{8}$ ii) $5 \div \frac{3}{7}$ iii) $2\frac{1}{2} \div \frac{3}{7}$

Factions, Percentages and Decimals

Changing between fractions, decimals and percentages	In this lesson we will learn how to change between fractions, decimals and percentages. Several different questions are covered in this lesson. 1) Change the following fractions into a

	decimal and then into a percentage i) $\frac{2}{5}$ ii) $\frac{3}{8}$ 2) Convert the following percentages into a decimal and then into a fraction i) 60% ii) 20% 3) Convert the following decimals into a fraction i) 0.3 ii) 0.82 iii) 0.162 Finally we look at a table of common fractions that students should know the decimals and percentages of, these are i) $\frac{1}{3}$ ii) $\frac{2}{3}$ iii) $\frac{1}{4}$ iv) $\frac{1}{5}$

Recurring Decimals and Fractions (Higher Only) (Not in 2017 Exams)

Changing recurring decimals into fractions, part 1	In this lesson we will learn how to change recurring decimals into fractions. Rob has a simple method to complete these questions and shows you a great way of setting out the problem to make it easier. The questions covered in this lesson are to write the following as a fraction i) $0.\dot{2}$ ii) $0.\dot{1}\dot{2}$
Changing recurring decimals into fractions, part 2	In this lesson we will continue to learn how to change recurring decimals into fractions. The recurring numbers covered in this lesson are harder/longer than those covered in part 1. You should understand everything in part 1's lesson before trying this lesson. The question covered in this lesson is to write $0.\dot{1}1\dot{3}$ as a fraction.
Changing recurring decimals into fractions, part 3	In this lesson we will learn how to change recurring decimals into fractions. This is the hardest example you can ever be given on this topic as this question is slightly different to the other examples in part 1 and 2 which confuses most students and even some teachers! But not Rob. This question uses the exact same method that we have learnt in part 1 and 2 so you should be very confident with the examples covered in part 1 and 2 before trying this lesson. The questions covered in this lesson are to write the following as a fraction i) $0.2\dot{5}$ ii) $0.1\dot{2}\dot{4}$

Percentages

Finding percentages – non calculator, part 1	In this lesson we will learn how to find basic percentages of any number without using a calculator. You must be able to divide any number by 10 and 100 before attempting this lesson. If not the watch the lesson: Dividing by 10, 100, 1000. The questions covered in this lesson are, calculate i) 10% of 120 ii) 5% of 240 iii) 1% of 320 iv) 25% of 180 v) 50% of 15.
Finding percentages – non calculator, part 2	In this lesson we will learn how to find any percentage of a number without using a calculator. You must be able to find 10%, 5% and 1 % before attempting this lesson. If not then watch part 1 first. The questions covered in this lesson are, calculate i) 20% of 80 ii) 15% of 240 iii) 27% of 120 iv) 21% of £160.
Finding decimal percentages, non-calculators	In this lesson we will learn how to find decimal percentages without using a calculator. You must be able to confidently find any percentage of a number before attempting this question. If not then watch the lesson: Finding percentages – non calculator, part 1 or 2. The questions covered in this lesson are, calculate i) 17.5% of 60 ii) 6.25% of £180.
Finding percentages using a calculator	In this lesson we learn a superfast and easy way of finding percentages using a calculator. You must be able to divide numbers by 100 before trying this lesson. If not the watch the lesson: Dividing by 10, 100, 1000. The questions covered in this lesson are i) find 15% of 168 ii) find 63% of 292 iii)find 7% of 1200 iv) find 22.5% of 550
Increasing a number by a percentage (non-calculator)	In this lesson we learn how to increase a number by any percentage without using a calculator. You must be able to find percentages of any number without a calculator before trying this lesson. If not then watch the lesson: Finding percentages – non calculator, part 1 or 2. The questions covered in this lesson are i) increase 70 by 30% ii) a mobile phone bill increases by

	7.5%. The bill was £30 p/m. Calculate the new cost p/m (per month)
Increasing a number by a percentage (calculator)	In this lesson we learn a really quick and easy was of using a calculator to increase a number by any percentage in only one calculation! You must be able to change percentages into a decimal before trying this lesson. If not then watch the lesson: Changing between fractions, decimals and percentages. The questions covered in this lesson are, increase i) 128 by 35% ii) 535 by 23%. In the final question we use a real life example of skydiving. The question is, a skydiver normally falls at 120mph. This speed increases by 65% if you skydive on a skysurf board. Calculate the new speed. About Rob: This last question was inspired by Rob who won a gold medal for skysurfing at the British national championships. Watch these skydive videos and more on BBM's youtube channel.
Decreasing a number by a percentage (non-calculator)	In this lesson we will learn how to decrease any number by a percentage without using a calculator. You must be able to find percentages of any number without a calculator before trying this lesson. If not then watch the lesson: Finding percentages – non calculator, part 1 or 2. The questions covered in this lesson are i)decrease £600 by 20% ii) a 8gb iPod costs £140, calculate the sale price when there is 15% off
Decreasing a number by a percentage (calculator)	In this lesson we will learn how to use a calculator to decrease any number by a percentage. You must be able to change percentages into a decimal before trying this lesson. If not then watch the lesson: Changing between fractions, decimals and percentages. The questions covered in this lesson are, decrease i) 460 by 20% ii) 192 by 35% In the final question we use a real life example of how much a person's lung shrinks when scuba diving, a shocking real life answer. The question is, adult lungs have a volume of a 6000cm^3 when

	scuba diving this volume decreases by 71%. Calculate the new volume. About Rob: Rob has Scuba dived all over the world, and swam with whales, sharks and dolphins. Check out some of his amazing diving videos on BBM's youtube channel.
Writing a number as a percentage of another number	In this lesson we will learn how to write a number as a percentage of another number. The questions covered in this lesson are i) Paul scores 34 out of 40 on his math's test. What percentage did Paul get. ii) In a class of 32 students, 20 are girls. Calculate the percentage of girls in the class. iii) Express 14 as a percentage of 40. iv) When you buy a chocolate bar for £1.50, 30p of this money goes to the government as tax. Calculate the percentage of money that is tax. v) Express 45 minutes as a percentage of 3 hours.
Finding the percentage a number increases by	In this lesson we will learn how to find the percentage that a number has been increased by. (Don't confuse this with percentage increases) Students often get confused with this topic. The questions covered in this lesson are i) The number of Tweets Will.i.am sends in a day increases from 20 to 32. Calculate the percentage increase. ii) The price of a picture message increases from 20p to 28p. Calculate the percentage increase. iii) Paul earns £4.80 per hour. If his hourly rate increases by 60p, calculate the percentage increase in his hourly rate.
Finding the percentage a number decreases by	In this lesson we will learn how to find the percentage that a number has been decreased by. (Don't confuse this with percentage decreases) Students often get confused with this topic. The questions covered in this lesson are, i) A mobile phone is reduced from £80 to £64. Calculate the percentage that the price is reduced by. ii) The number of girls studying science at a London University decreased by 91. There are now 169 girls studying science. Calculate the percentage decrease. iii) A chocolate bar is reduced by 20p. It originally cost £1.60. Calculate the percentage decrease.

Simple and Compound Interest

Simple interest, non-calculator	In this lesson we will learn the meaning of simple interest and how to calculate it without using a calculator. You must be able to calculate percentages of any number without a calculator before trying this lesson. If not then watch the lesson: Finding percentages – non calculator, part 1 or 2. The questions covered in this lesson are i) calculate the simple interest you receive on £800 invested for 3 years with an interest rate of 5% per annum. ii) Paul deposits £1,200 into an account with a simple interest rate of 6% per annum. Calculate how much Paul has in the account after 2 years.
Compound interest part 1	In this lesson we will learn the meaning of compound interest and how to complete these questions. We also learn the different ways in which the exam board can ask these types of questions which will affect what answer you need to give. You must be able to increase any number by a percentage using a calculator before trying this question. If not then you need to watch the lesson: Increasing a number by a percentage (calculator). The question covered in this lesson is, £2200 is invested with a compound interest rate of 4% per annum. Calculate the total value of the investment after 3 years.
Compound interest part 2, using the formula.	In this lesson we will learn how to use the compound interest formula to quickly solve compound interests questions. This is a much quicker and easier method than the one we learnt in part 1. The question covered in this lesson is £3500 is invested with a compound interest rate of 5.5% per annum. Calculate the total value of the investment after 3 years.
Compound interest, depreciation formula, part 1	In this lesson we will learn how to use the compound interest formula to calculate the value of an investment that depreciates (decreases) by a certain percentage rate each year. These types of questions are basically compound interest questions in reverse. The question covered in this lesson is, a new car costs £12000. Its value depreciates by 12% per

	annum. Calculate the value of the car after 3 years.
Compound interest, depreciation formula, part 2	In this lesson we will learn how to use the compound interest formula to calculate the value of an investment that depreciates (decreases) by a certain percentage rate each year. These types of questions are basically compound interest questions in reverse. The question covered in this lesson is a new car costs £2500 If the value depreciates by 12% per annum, find the value of the car after 5 years.

Reverse Percentages (Higher Only) (H and F 2017 TBC)

Reverse Percentage, part 1	In this lesson we learn how to calculate reverse percentages problems. Students find this topic very hard but Rob breaks it down into a really easy method. You will also learn how to recognise when a percentage question is a reverse percentage question which is very important. The question covered in this lesson is, a shop has a 20% off sale. Paul buys a pair of jeans for £42 in the sale. Find the cost of the jeans before the sale.
Reverse Percentage, part 2	In this lesson we learn how to calculate reverse percentages. It would help if you have watched part 1 before trying this lesson. The question covered in this lesson is, Paul gets a 10% increase in his wages, he now receives £550 per week. Calculate Paul's wages before this increase.
Reverse Percentage, part 3	In this lesson we learn how to calculate a reverse percentage question that is worded slightly differently to the normal way you are used too. This is the hardest type of question you will be given in this topic and often comes up in exams. You definitely need to be confident in calculating reverse percentage questions before attempting this lesson. If not watch part 1 and 2 first. The question covered in this lesson is Paul sold his iPod on ebay for £16.20. This amount is 24% of the price he paid. How much did Paul buy the iPod for.
VAT percentage problems (Sales	In this lesson we learn how to calculate the two different types of VAT problems that you can be

tax in other countries)	given. Many students often get these mixed up and end up getting the question wrong. (VAT is stands for value added tax in England, which is sales tax in other countries like New Zealand and the USA. The percentage of sales tax will vary depending on what country you are from but the way to calculate these questions is the same) In this lesson we compare the following two questions the second being the main question covered in this lesson, i) a mobile phone costs £350 + VAT, calculate the total cost of the phone. ii) A computer cost £1,200 including VAT. Calculate the price of a computer before VAT was added.

Ratio

Introduction to Ratios	In this lesson we will learn all about ratios using the idea of mixing yellow and blue paint to make green paint (something most of us did in primary school or at home). We will learn what calculations you can do with a ratio and what calculations you're not allowed to do with a ratio and also how to set out ratio questions. There is loads of information in this lesson so it's a must see lesson before you try anything else in this topic.
Simplifying ratios	In this lesson we learn how to simplify ratios into its simplest form. We also cover common mistakes students make when given ratios with amounts that are in different units. If would help if you can simplify fractions as there are similarities between these two topics. The questions covered in this lesson are, give the simplest form of the following ratio i) 12:18 ii) 2m:60cm
Simplifying ratios in the form 1:n	In this lesson we learn how to simplify ratios in the form of 1:n This is a common exam question. The questions covered in this lesson are i) Paul mixed blue paint and yellow paint in the ratio 2:5 Give the ratio in the form 1:n ii) give the ratio 4:30 in the form of 1:n
Sharing amounts into ratios, part 1	In this lesson we learn how to share amounts into ratios. Part 1 covers questions that would appear on the non-calculator paper.

	The questions covered in this lesson are i)Connor, Lucy and Harry share £40 in the ratio 1:2:5 Calculate how much they each receive. ii) Connor, Lucy and Harry share some money in the ratio of 3:5:2 If Lucy receives £20, How much does Connor and Harry receive.
Sharing amounts into ratios, part 2	In this lesson we learn how to share amounts into ratios. Part 2 teaches you how to complete ratio questions when the numbers do not share evenly (so they have decimal answers). These types of questions normally appear on the calculator paper although some can be worked out without a calculator and could appear on a harder non-calculator paper. You must be able to share amounts into a ratio before trying this lesson. If not then watch part 1 first. The question covered in this lesson is, Connor, Lucy and Harry share some money in the ratio of 1:4:2 If Lucy receives £15 how much does Connor and Harry receive.
Sharing amounts into ratios, part 3	In this lesson we cover an example with harder numbers and we look at the different methods that you could complete this question. You must be able to share amounts into a ratio before trying this lesson. If not then watch part 1and 2 first. The question covered in this lesson is that Rob and Paul share money in the ratio of 8:12 if Rob receives £30 how much does Paul receive.
Sharing amounts into ratios practice question	
Ratio questions with ingredients	In this lesson we learn how to complete questions involving ingredients. This is a very common exam question and students often get it wrong. This is actually a ratio question in disguise. You must be able to share amounts into a ratio before trying this lesson. If not then watch the lesson: Sharing amounts into ratios, part 1, 2 or 3. The question covered in this lesson is, the ingredients needed to make 10 cupcakes are shown on the BBM website. How much of each ingredient is needed to make 25 cupcakes. Ingredients – Butter 400g, Flour 320g, Sugar 200g, Eggs 4
Ratio Practice Exam Question	This is a popular exam style question and many students often get this wrong. The question covered in this lesson are, Box A contains blue and green counters in the ratio of 5:3 Box B

	contains yellow and red counters in the ratio of 8:4 i) calculate the percentage of blue counters in Box A. ii) Box A and Box B contain the same number of counters. Calculate the smallest number of counters in each box.

Direct and Inverse Proportion

Direct proportion, word questions	Many students do not know that these types of questions are called direct proportion questions and students always get stuck on these types of questions. The questions covered in this lesson are i) Kerry pays £1.14 for 3L of milk. How much would 7.5L of milk cost ii) It takes Paul 20 minutes to drive 25 miles. How long would it take him to drive 40 miles
Inverse proportion, word question	Many students do not know that these types of questions are called inverse proportion questions and students always get stuck on these types of questions. The questions covered in this lesson are i) it takes 6 people 4 hours to deliver 1000 newspapers, how long would it take 8 people ii) 10 people take 1hr and 40 minutes to paint a house. How long would it take 4 people. Give your answer in hrs and minutes.
Inverse proportion practice question	

Exchange Rates

Exchange rates	In this lesson we will learn how to complete questions involving exchange rates. You will learn how to convert pounds into different foreign currencies and then how to convert them back into pounds. Don't worry if you are from another country you still need to watch this lesson as the method is exactly the same for any currency. So it doesn't matter whether you are converting pounds or dollars this lesson will teach you everything you need to know about exchange rates. The questions covered in this lesson are i) Kerry takes £150 on holiday to the USA. How many

	dollars will she get. 1 Pound = 1.65 US dollars ii) Kerry buys some perfume for $50. How much is this in pounds. £1 = US$1.65
Exchange rates practice question	

Best Buy

Best buy	In this lesson we will learn how to calculate which product is the best value for money. These questions always appear on exam papers. The questions covered in this lesson are, given the following products calculate which size product is the best value for money i) a 150ml bottle of face wash costing £3.50 or a 90ml bottle of face wash coting £1.89 ii) a 6 pack of Coke costing £2.34 or a 4 pack of coke costing £1.49
Best buy, practice question	

Rational and Irrational Numbers (Higher Only)

Rational and irrational numbers	In this lesson we will learn all the different types of numbers that are rational and irrational. After watching this lesson you will be able to recognise rational and irrational numbers and you will be able to give examples of each.

Surds (Higher Only)

Simplifying surds, part 1	In this lesson we start to learn the rules for simplifying surds. The lesson starts off with easier examples and is designed to build up to the harder questions near the end of the lesson. The questions covered in this lesson are to simplify the following surds i) $\sqrt{5} \times \sqrt{2}$ ii) $\sqrt{7} \times \sqrt{5}$ iii) $\sqrt{20}$ iv) $\sqrt{18}$ v) $\sqrt{50}$ vi) $\sqrt{45}$

Simplifying surds, part 2	In this lesson we learn more of the rules for simplifying surds. It would help if you have watched part 1 first. The lesson starts off with easier examples and is designed to build up to the harder questions near the end of the lesson. The questions covered in this lesson are to simplify the following surds i) $\sqrt{5} \times \sqrt{5}$ ii) $\sqrt{3} \times \sqrt{3}$ iii) $\sqrt{7} \times \sqrt{7}$ iv) $5\sqrt{2} \times 3\sqrt{2}$ v) $2\sqrt{5} \times \sqrt{10}$ vi) $4\sqrt{3} \times \sqrt{15}$ vii) $3\sqrt{2} \times 5\sqrt{14}$
Simplifying surds with brackets	In this lesson we learn how to simplify surds with brackets. Students must be able to multiply out (expand) brackets before attempting this lesson. If not then you need to watch the lesson in the Algebra section: Expanding brackets. The questions covered are to expand brackets and simplify i) $\sqrt{3}(2 + \sqrt{3})$ ii) $\sqrt{2}(\sqrt{2} + \sqrt{6})$ iii) $(\sqrt{5} + \sqrt{3})(\sqrt{5} + \sqrt{3})$ iv) $(\sqrt{3} + \sqrt{2})(\sqrt{3} - \sqrt{2})$
Simplifying surds – dividing surds	In this lesson we learn how to simplify surds when dividing. The questions covered are, simplify the following surd i) $\sqrt{\frac{16}{25}}$ ii) $\sqrt{\frac{4}{9}}$ iii) $\sqrt{\frac{12}{20}}$ iv) $\sqrt{\frac{12}{18}}$ v) $\sqrt{\frac{8}{14}}$
Surds – adding surds, part 1	In this lesson we will learn how to add surds together. The questions covered in this lesson are, simplify the following surds i) $\sqrt{3} + \sqrt{3}$ ii) $4\sqrt{3} + 5\sqrt{3}$ iii) $3\sqrt{7} + 2\sqrt{7}$ iv) $2\sqrt{3} + 2\sqrt{5}$ iv) $4\sqrt{5} + 3\sqrt{5}$

Surds – adding surds, part 2	In this lesson we will continue to learn how to add more complicated surds. You must be very confident simplifying surds before attempting this lesson. If not review all the lessons on simplifying surds in this section before trying this lesson. The questions covered in this lesson are to simplify the following surds i) $\sqrt{18} + \sqrt{8}$ ii) $\sqrt{50} + \sqrt{32}$ iii) $\sqrt{45} + \sqrt{80}$
Surds – rationalising the denominator	In this lesson we learn what is meant by the question "rationalise the denominator" and we learn how to complete this question. You must be able to multiply and simplify surds before trying this lesson. If not then watch the lessons on simplifying surds in this section before trying this lesson. Although you do not need to know what a rational number is, to be able to learn the method in this lesson, it is recommended. So if you need to know what a rational number is watch the lesson: Rational and irrational numbers. The questions covered in this lesson are, rationalise the denominator of the following surds, then simplify i) $\frac{1}{\sqrt{5}}$ ii) $\frac{18}{\sqrt{6}}$ iii) $\frac{3}{\sqrt{6}}$ iv) $\frac{\sqrt{12}}{\sqrt{3}}$ v) $\frac{4\sqrt{6}}{\sqrt{12}}$

Shape and Space

Area

Calculating the Area of a Rectangle	In this lesson we will learn how to calculate the Area of a rectangle or Square. The question covered in this lesson is to calculate the area of the rectangle.
Calculating the Area of a Rectangle Common Mistakes	In this lesson Rob shows you a common mistake that students often make when calculating the Area of a Rectangle when the length and width are given in different units. The question covered in this lesson is to calculate the area of the rectangle.
The formula of the Area of a Triangle	In this lesson we will showing you different ways that a Rectangle can be cut to make 2 identical Triangles. Once we have shown that we will then work out the formula for the Area of a Triangle which you need to remember as it is not given to you on your formula sheet.
Calculating the Area of a Triangle	In this lesson we will learn how to use the formula to calculate the area of a triangle. We will also learn what is meant by the term perpendicular height and base. The questions covered in this lesson is to i) calculate the area of the triangle and ii) calculate the area of the triangle.
The formula of the Area of a Parallelogram	In this lesson we will be cutting up a Parallelogram to show you that the Area of a Parallelogram is the same as the Area of a Rectangle with the same length base. Once we have shown that we will then work out the formula for the Area of a Parallelogram which you need to remember as it is not given to you on your formula sheet.
Calculating the Area of a Parallelogram	In this lesson we will learn how to use the formula to calculate the Area of a Parallelogram. The questions covered in this lesson is to i) calculate the area of the parallelogram and ii) calculate the area of the parallelogram.
Calculating the Area of a Trapezium	In this lesson we will learn how to use the formula to calculate the Area of a Trapezium.

	The question covered in this lesson is to calculate the area of the trapezium.
Calculating the Area of a Trapezium Practice Question	The question covered in this lesson is to calculate the area of the trapezium.

Compound Areas

Calculating Compound Areas	In this lesson we will learn the meaning of a compound shape and how to calculate its Area. You must be able to calculate the Area of a rectangle before trying this lesson. If not then watch the following lesson: Calculating the Area of a Rectangle. The question covered in this lesson is to calculate the area of the shape.
Compound Areas Involving Different Shapes Part 1	In this lesson we learn how to calculate the area of compound shapes which contain a triangle and a rectangle. You must be able to calculate the area of a triangle and the area of other compound shapes before trying this lesson. If not then watch the following lessons: Calculating Compound Areas and/or Calculating the Area of a Triangle. The question covered in this lesson is to calculate the area of the compound shape.
Compound Areas Involving Different Shapes Part 2	In this lesson we learn how to calculate the area of compound shapes which contain a semi-circle and a rectangle. You must be able to calculate the area of a semi-circle and the area of other compound shapes before trying this lesson. If not then watch the following lessons: Calculating Compound Areas and/or Calculating the Area of a semi-circle.

	The question covered in this lesson is to calculate the area of the compound shape.
Compound Area where you're not given all the lengths	In this lesson we will learn how to find missing lengths on a compound shape so that we can calculate the Area of the compound shape. This is a very popular exam question so it is a important lesson to understand. You must be able to calculate Areas of compound shapes before trying this lesson. If not then watch the following lesson: Calculating Compound Areas In this question we calculate the area of the shape.

Angles

Finding angles in a triangle	In this lesson you will learn what the angles in a triangle add up too and how to calculate missing angles in a triangle. Rob starts this lesson by showing you a very cool exercise that proves how many degrees there are in a triangle. You can also do this yourself at home. The questions covered in this lesson are i) find angle x, give a reason for your answer ii) find angle x, give a reason for your answer
Vertically opposite angles	In this lesson we will learn the rule for finding vertically opposite angles. This rule is often used in questions with other angle rules like Alternate and Corresponding angles. The question covered in this lesson is find the angle x and y, give a reason for your answer.
Vertically opposite angles exam question	This is a typical exam question that you could be given. To complete this question you will need to know about angles in different types of triangles as well as the rule for vertically opposite angles. The question covered in this lesson is find the angle x, give a reason for your answer.
Finding angles on a straight line	In this lesson you will learn how many degrees there are on a straight line and how to find missing angles on a straight line. You will also learn a common misunderstanding that students often make

	with this simple rule.
3 letter angle notation	In this lesson we will learn how to label any angle using 3 letter angle notation. This lesson will cover common mistakes that students often make and tips on how to choose the correct label. The questions covered in this lesson are i) label the angle using 3 letter notion. ii) label the angle using 3 letter notion.
3 letter angle notation practice question	

Angles on Parallel Lines

Alternate angles on parallel lines	In this lesson we will learn how to find angles on parallel lines using the rule of alternate angles and you will learn how to gain full marks when answering these types of questions. This lesson has specially edited using special software so that there is a section in the middle of each example where the alternate angles and the lines that make those angles are highlighted in bright red. This makes them stand out so that you can easily see where they were hiding amongst all of the other angles and lines. Because of the way this lesson is edited you will find this lesson very easy to learn. The questions covered in this lesson are i) find angle x, give a reason for your answer. ii) find angle x, give a reason for your answer
Alternate angles on parallel lines practice question	
Corresponding angles	In this lesson we will learn how to find angles on parallel lines using the rule of corresponding angles. We will learn how to gain full marks when answering these types of questions. This lesson has specially edited using special software so that there is a section in the middle of each example where the corresponding angles and the lines that make those angles are highlighted in bright red. This makes them stand out so that you can easily see where they were hiding amongst all the other angles and lines. Because of the way this lesson is edited you will find this topic very easy to learn.

	The questions covered in this lesson are i) find angle x, give a reason for your answer ii) find angle x, give a reason for your answer
Corresponding angles practice question	
Co-interior angles	In this lesson we will learn how to find angles on parallel lines using the rule of Co-interior angles. You will also learn how to gain full marks when answering these types of questions. We will look at how the other rules for finding angles on parallel lines can used with this rule when solving angle problems. It would help if you can find alternate and corresponding angles before you try this lesson. Also you must know how to find angles on a straight line before you try this lesson. If not then watch the following lessons: Finding angles on a straight line and/or Alternate angles on parallel lines and/or Corresponding angles The questions covered in this lesson are i) find angle x, give reason for your answer. ii) find angle x, give reason for your answer.
Finding angles on parallel lines exam question	This is a typical exam style question that tests your knowledge of angle rules. The questions covered in this lesson are i) find angle x, give a reason for your answer ii) find the missing angles, give a reason for your answer

Properties of Shapes

Kites	In this lesson we will learn about the properties of a Kite which is one of the special quadrilateral you need to know about.
Parallelograms and Rhombuses	In this lesson we will learn about the properties of a Parallelogram and a Rhombus which are 2 of the special quadrilaterals you need to know about.
Trapeziums	In this lesson we will learn about the properties of a Trapezium and an Isosceles Trapezium which

	are 2 of the special quadrilaterals you need to know about.
Congruent Shapes	In this lesson we learn the meaning of the word congruent and how to identify congruent shapes when you are given a number of similar looking shapes.

Polygons

Introduction to polygons	In this lesson we visit Giant's Causeway in Northern Ireland and look at a bird's eye view of the pentagon building in Washington D.c to learn about polygons. We will learn all the names of the polygons up to a 10 sided shape and learn the differences between a regular and irregular polygon.
Introduction to interior angles and notation	In this lesson we learn what an interior angle is and we learn the meaning of the following symbol. ∑. The examples used in this lesson are, a 3-sided and 4-sided polygon.
Finding interior angles	In this lesson we learn how to calculate the interior angles of any polygon. We will also learn the formula to calculate the sum of the internal angles for any polygon. You must be able to substitute numbers into a formula before you try this lesson. If not then watch the following lesson in the Algebra section: Substituting numbers into formula part 1. The question covered in this lesson is calculate the size of angle x, in this regular polygon.
Finding interior angles practice question	
Finding external angles	In this lesson we will learn how to find the external angles of any polygon and the rule for the sum of the external angles. We will also learn how to draw and label the external angles. The question covered in this lesson is, calculate the size of the external angles of this regular polygon.
Polygons exam question	In this lesson we will learn how to find the number of sides a polygon has when you are only given

	part of the diagram and an angle. This is a very popular exam question that often appears in exams every year. The question covered in this lesson is, the diagram shows part of a regular polygon, calculate the number of sides this polygon has.

Midpoints of Lines

Finding the Midpoint of a Line Joining 2 Points	In this lesson we will learn how to find the midpoint of a line that joins 2 coordinates. This is a very popular exam question. The questions covered in this lesson are, i) find the midpoint of the line that joins these points. A=(1,3) B=(5,7) ii) find the midpoint of the line that joins these points. A=(2,5) B=(6,10).
Finding the Midpoint of a Line Joining 2 Points Exam Question	The question covered in this lesson is, find the midpoint of the line that joins these points. A=(-4,3) B=(10,7).

3D Coordinates (Higher Only)

x, y, z coordinates	In this lesson we will learn about 3D coordinates which are (x, y, z) coordinates. We will also learn how to find the (x, y, z) coordinates of vertices (corners) of 3D shapes. The question that is covered in this lesson is, find the coordinates of the vertices (x, y, z).
Finding the Midpoint of a Line Joining 2 3D Coordinates	In this lesson we will learn how to find the midpoint of a line that joins two 3D (x, y, z) coordinates. You must be able to find the midpoint of a line when given two normal (x, y) coordinates, before you try this lesson. If not then watch the following lesson: Finding the Midpoint of a Line Joining 2 Points

	The question covered in this lesson is, find the midpoint of the line joining these points. A=(2,4,1) B=(5,2,7).

Similar Triangles and Similar Shapes (Higher Only)

Similar triangles introduction	In this lesson we will learn the conditions required for triangles to be mathematically similar, and these are the same conditions for any shapes to be mathematically similar. You will learn tips on how to complete questions when similar triangles are not drawn in the same orientation and finally you will learn how to identify lengths that are the same on each triangle.
Similar triangles part 1 (F and H 2017 TBC)	In this lesson you will learn how to calculate the missing length on a pair of similar triangles. There are actually 3 different ways of drawing 2 similar triangles. You will learn the first way in part 1. Watch part 2 and 3 to learn the other ways. The questions covered in this lesson are i) the two triangles shown in the BBM website are similar, calculate the missing length ii) the two triangles shown in the BBM website are similar, calculate the missing length
Similar triangles part 1 practice question (F and H 2017 TBC)	
Similar triangles part 2 (F and H 2017 TBC)	In this lesson you will learn how to calculate the missing length on a pair of similar triangles and you will also learn the 2nd way that 2 triangles in these types of questions can be drawn. You must be able to complete the examples from part 1 before trying this lesson. The question covered in this lesson is triangle ACE and BCD are similar, calculate length BD
Similar triangles part 2 practice question (F and H 2017 TBC)	
Similar triangles part 3 (F and H 2017 TBC)	In this lesson you will learn how to calculate the missing length on a pair of similar triangles and you will also learn the 3rd way that 2 triangles in these types of questions can be drawn. You must be able to complete the examples from part 1 before trying this lesson.

	The question covered in this lesson is triangle ABE and BCD are similar, calculate length AB
Similar triangles part 3 practice question (F and H 2017 TBC)	
Proving that triangles are similar using lengths	In this lesson we will learn how to prove that triangles are similar using the lengths on both triangles. You must be able to solve similar triangle questions and know the conditions needed for triangles to be mathematically similar before you try this lesson. If not then watch the following lessons: Similar triangles part 1 and/or Similar triangles introduction The question covered in this lesson is, prove that triangles ABC and BCD are similar.
Proving that triangles are similar using angles	In this lesson we will learn how to prove that triangles are mathematically similar using the angles from both triangles. You will also learn how to label several sets of identical angles in the same shape. You must know the following angle rules before trying this lesson, Alternate angles and vertically opposite angles. You must also know the conditions needed for triangles to be mathematically similar before trying this lesson. If not then watch the following lessons: Alternate angles on parallel lines and/or Vertically opposite angles and/or Similar triangles introduction The question covered in this lesson is prove that triangle ABC and BDE are similar.
Scale factors for area's of similar shapes	In this lesson we will learn how to find the area of similar shapes when you are given the lengths on those 2 similar shapes. We will also learn how to find the length of a similar shape when you are given the areas of both shapes. Many students get this topic completely wrong as they believe that all they have to do to complete the question is find the scale factor that the lengths use, and enlarge the area's using that same scale factor. This will not get you the correct answer. So if you are one of those students that thought that, then watch this lesson. You must be able to find lengths on similar shapes/triangles before trying this lesson. If not then watch the following lesson: Similar triangles part 1

	The questions covered in this lesson are i) the two shapes shown on the BBM website are similar calculate the area of the biggest shape ii) the two shapes shown on the BBM website are similar calculate the missing length
Scale factors for volume's of similar shapes	In this lesson we will learn how to calculate the volume of similar shapes when you are given the lengths on those 2 similar shapes. You will also learn how to find the length of a similar shape when you are given the volumes of both shapes. Many students get this topic completely wrong as they believe that all they have to do to complete the question is find the scale factor that the lengths use, and enlarge the volume's using that same scale factor. This will not get you the correct answer. So if you are one of those students that thought that, then watch this lesson. You must be able to find lengths on similar shapes/triangles before trying this lesson. If not then watch the following lesson: Similar triangles part 1. It would also help if you are able to understand the examples in the following lesson as there are similarities between these two lessons: Scale factors for area's of similar shapes The questions covered in this lesson are i) the two shapes shown on the BBM website are similar, calculate the volume of the largest shape ii) the two shapes shown on the BBM website are similar, calculate the missing length
Scale factors for volume's of similar shapes practice question	
Similar Shapes exam question	This question is a typical exam question which uses the same method that you learned in similar triangles. The question covered in this lesson is, the two shapes shown on the BBM website are similar, calculate the missing length

Circles

Circumference of a circle	In this lesson we will learn how to find the circumference of a circle. We will learn the 2 formulas that can be used to find the circumference. We will also learn about the special number π and how to enter π into your calculator. You must be able to substitute numbers into formula before you try this lesson. If not then watch then following lesson from the Algebra section: Substituting numbers into formula part 1 The questions covered in this lesson are i) calculate the circumference of the circle ii) calculate the circumference of the circle
Circumference of a circle leaving your answer in terms of Pi (Higher Only) (F and H 2017 TBC)	In this lesson we will learn how to leave your answer, for the circumference of a circle, in terms of Pi (π). Being asked to leave your answer in terms of π often appears on the non-calculator paper and can also appear in any topic that uses π in the formula, for example: Area of a circle, the volume of a cone, cylinder and sphere and also the surface area of a cone, cylinder and sphere. The question covered in this lesson is calculate the circumference of the circle, leave your answer in terms of π
Perimeter of a semi-circle	In this lesson we will learn how to calculate the perimeter of a semi-circle. A lot of students forget to do an important part of this question and lose marks silly marks because of this. You must be able to calculate the circumference of a circle as there are a lot of similarities between these 2 topics. If not then watch the following lesson: Circumference of a circle The question covered in this lesson is, calculate the perimeter of the semi-circle.
Length of an arc (Higher Only)	In this lesson we will learn how to calculate the length or an arc. You must be able to calculate the circumference of a circle as there are a lot of similarities between these 2 topics. If not then watch the following lesson: Circumference of a circle The question covered in this lesson is, calculate the length of the arc
Area of a circle	In this lesson we will learn how to find the area of a circle. We will also learn about the special

	number π and how to enter π into your calculator. We will also recap the following circle properties: Radius and Diameter. You must be able to substitute numbers into formula before you try this lesson. If not then watch the following lessons from the Algebra section: Substituting numbers into formula part 1 and 2. The questions covered in this lesson are i) calculate the area of the circle ii) calculate the area of the circle
Area of a semi-circle	In this lesson we will learn how to find the area of a semi-circle. You must be able to find the area of a circle before you try this lesson. If not watch the following lesson: Area of a circle. The question covered in this lesson is calculate the area of the semi-circle
Area of a circle, leaving your answer in terms of Pi (Higher Only)	In this lesson we will learn how to leave your answer, for the area of a circle, in terms of Pi (π). Being asked to leave your answer in terms of π often appears on the non-calculator paper and can also appear in any topic that uses π in the formula for example: Circumference of a circle, the volume of a cone, cylinder and sphere and also the surface area of a cone, cylinder and sphere. The question covered in this lesson is calculate the area of the circle, leave your answer in terms of π
Area of a sector (Higher Only)	In this lesson we will learn how to find the area of a sector. You must be able to find the area of a circle before you try this lesson. If not then watch the following lesson: Area of a circle. The question covered in this lesson is calculate the area of the sector

Circle Geometry (Higher Only)

Angle in a semi-circle is 90 degrees	In this lesson we will learn how to find angles in circles using the rule - Angle in a semi-circle is 90°. This lesson has been specially edited to show to how this 90° angle never changes no matter where the lines that make the angle are moved in the semi-circle.

	The questions covered in this lesson are i) find angle x, give a reason for your answer ii) find angle x, give a reason for your answer
Sneaky isosceles	In this lesson we will learn how to find angles in circles by looking for isosceles triangles. This is not a circle geometry rule but a triangle rule, but the isosceles triangle is usually very hard to spot in a circle geometry questions which is why it is called a sneaky isosceles. You will learn tips on how to spot these isosceles triangles and when to look out for them. The question covered in this lesson is find the angles x and y, give a reason for your answer.
Angle at centre is twice angle at circumference part 1	In this lesson we will learn how to find angles in circles using the rule - Angle at the centre is twice the angle at the circumference. There are actually 3 different shapes inside a circle that use this rule so make sure you watch part 2 and 3 to learn these as well. You will also learn the exact wording that must be used when giving reasons for your answers. The questions covered in this lesson are i) find angle x, give a reason for your answer ii) find angle x, give a reason for your answer
Angle at centre is twice angle at circumference part 2	In this lesson we will learn how to find angles in circles using the rule - Angle at the centre is twice the angle at the circumference. In this lesson we will learn the 2nd type of shape that that uses this rule. This shape often catches many students out. There are actually 3 different shapes inside a circle that use this rule so make sure you watch part 1 and 3 to learn these as well. This lesson also uses a special angle board to show you how the shape from part 1 is made into the shape from this lesson. This angle board also helps you understand how the angles change when points and lines are moved around the circle. This makes learning this rule very easy. The questions covered in this lesson are i) find angle x, give a reason for your answer ii) find angle x, give a reason for your answer
Angle at centre is twice angle at circumference part 3	In this lesson we will learn how to find angles in circles using the rule - Angle at the centre is twice the angle at the circumference. In this lesson we will learn the 3rd type of shape that uses this rule. This shape also catches many students out.

	There are actually 3 different shapes inside a circle that use this rule so make sure you watch part 1 and 2 to learn these as well. This lesson also uses a special angle board to show you how the shape from part 1 is made into the shape from this lesson. This angle board also helps you understand how the angles change when points and lines are moved around the circle. This makes learning this rule very easy. The question covered in this lesson is find angle x, give a reason for your answer for the example shown on the BBM website.
Cyclic quadrilateral	In this lesson we will learn how to find angles in circles using the Cyclic quadrilateral rule. You will also learn the common mistakes that students sometimes make when they confuse this rule with another rule that has a similar looking shape inside the circle. The questions covered in this lesson are i) find angle x and y, give a reason for your answer. ii) find angle x, give a reason for your answer.
Angles in the same segment are equal	In this lesson we will learn how to find angles in circles using the rule – Angles in the same segment are equal. This lesson has been specially edited using special software to highlight the different segments and angles involved in this rule and because of the way this lesson is edited you will find learning this rule very easy. You must know what a segment of a circle is before trying this lesson. If not then watch the following lesson: Circle properties. The question covered in this lesson is, find angle x, give a reason for your answer
Angles in the same segment are equal practice question	
Tangent meets radius at 90 degrees	In this lesson we will learn how to find angles in circles using the rule –Tangent meets radius at 90° You will learn what a tangent is and how you can use this rule to find angles in circles. The question covered in this lesson is find angle x, give a reason for your answer.
Tangents that meet at a point are equal in length	In this lesson we will learn how to find angles in circles using the rule –Tangents that meet at a point are equal in length. You will learn all the different types of questions that use this rule and

	tips on what to look out for. The question covered in this lesson is find angle x, give a reason for your answer.
Tangents that meet at a point are equal in length practice question	
Alternate segment theorem part 1	In this lesson we will learn how to find angles in circles using the rule -Alternate segment theorem. Students and even some teachers find this rule one of the hardest to learn but Rob has a very easy way of teaching this rule which will allows you to easily identify the correct angles involved. You will also learn the exact wording that must be used when giving reasons for your answers. This lesson has been specially edited using special software to highlight the different segments and angles involved in this rule and because of the way this lesson is edited you will find this lesson very easy to learn. You must know what a segment and a chord is before trying this lesson. If not then watch the following lesson: Circle properties The questions covered in this lesson are i) find angle x, give a reason for your answer ii) find angle x and y, give a reason for your answer
Alternate segment theorem practice question	
Alternate segment theorem part 2	In this lesson we will use the Alternate segment theorem rule that we learned in part 1 to complete the following question. Find angle x, give a reason for your answer

Loci and Construction

Perpendicular Bisector	In this lesson we will learn how to find the perpendicular bisector of any line, using only a compass and ruler. We will also learn what a perpendicular bisector means and when you would use it. Finally we learn how to gain full marks in these types of questions as many students often lose

	easy marks. The questions covered in this lesson are i) draw the perpendicular bisector of the line AB. Show all construction lines. ii) draw the perpendicular bisector of the line AB. Show all construction lines.
Perpendicular line from a point on a line	In this lesson we will learn how to draw a perpendicular line from a point on a line, using only a ruler and compass. Many students just draw a line going up from the point with a set square or ruler but this will get you Zero marks! The question covered in this lesson is, draw a perpendicular line from point A, show all your construction lines.
Perpendicular line from a point to a line	In this lesson we will learn how to draw the perpendicular line from a point to a line using only a ruler and a compass. The question covered in this lesson is, draw a perpendicular line from point A to line xy, show all your construction lines.
Angle bisector	In this lesson you will learn how to use a compass to bisect an angle. You will learn what the term "bisect" means and how to gain full marks in these types of questions. The questions covered in this lesson are i) draw the bisector of the angle, show all your construction lines ii) draw the bisector of the angle, show all your construction lines
Drawing an equilateral triangle	In this lesson you will learn how to draw an equilateral triangle of any size using only a ruler and compass. You will also learn how to gain full marks in these types of questions as many students often lose silly marks. The question covered in this lesson is using only a ruler and a compass construct an equilateral triangle with sides of 8cm. Show all your construction lines.
Drawing an isosceles triangle	In this lesson you will learn how to draw an isosceles triangle using only a ruler and compass. You

	will also learn how to gain full marks in these types of questions as many students often lose silly marks. The question covered in this lesson is, construct an isosceles triangle with a base of 6cm and sides 8cm using a ruler and compass. Show all construction lines.
Drawing a scalene triangle	In this lesson you will learn how to draw any scalene triangle using only a ruler and compass. You will also learn how to gain full marks in these types of questions as many students often lose silly marks. The question covered in this lesson is, construct a triangle with sides 8cm, 5cm and 6cm using only a ruler and a compass. Show all construction lines.
Drawing a 60° angle	In this lesson you will learn how to draw a perfect 60° angle using only a ruler and compass. You will also learn how to gain full marks in these types of questions as many students often lose silly marks. You must be able to draw an equilateral triangle using only a ruler and compass before trying this lesson. If not then watch the following lesson: Drawing an equilateral triangle The question covered in this lesson is, construct a 60° angle using only a ruler and a compass. Show all your construction lines.
Drawing a 45° and 30° angle	In this lesson you will learn how to draw a perfect 45° and 30° angle using only a ruler and compass. You will also learn how to gain full marks in these types of questions as many students often lose silly marks. You must be able to bisect an angle and draw an equilateral triangle and draw the perpendicular bisector before trying this lesson. If not then watch the following lessons: Angle bisector and/or Drawing an equilateral triangle and/or Perpendicular Bisector The question covered in this lesson is i) construct a 45° angle using only a ruler and a compass. Show all your construction lines.
The rules of Loci	In this lesson we will learn all the rules of Loci. Rob uses an example of the security perimeter around the top secret American military base – Area 51 to explain the rules of loci and how to draw boundaries.

	The questions covered in this lesson are i) draw a 3 mile boundary (to scale) around a point ii) draw a 2cm boundary around the line AB iii) draw the line that is equal distance from point A and B iv) draw the line that is equal distance from line AB and AC
Drawing boundaries around shapes	In this lesson you will learn how to draw a boundary around any shape. You will also learn tips for drawing boundary's around different types of corners which is something many students often get wrong. You must be know all the rules o f Loci before trying this lesson. If not then watch the following lesson: The rules of Loci The question covered in this lesson are i) draw a 3 cm boundary about this shape ii) draw a 2cm boundary around this shape
Shading boundaries inside shapes	In this lesson we will learn how to use the rules of Loci to identify and shade boundaries or areas inside shapes. You must know all the rules of Loci and be able to draw boundaries around shapes, points, lines and angles. If not then watch the following lessons: The rules of Loci and/or Drawing boundaries around shapes. You will require a compass and ruler for this lesson. The questions covered in this lesson are i) shade the area inside ABCD, that is closer to AB than AD ii) shade the area inside ABCD, that is further than 3m from point B iii) shade the area inside ABCD, that is closer to AB than CD

Bounds (Higher Only)

Upper and lower bounds of discrete numbers	In this lesson we learn how to fine the upper and lower bounds of discrete numbers. You must know the difference between discrete and continuous numbers before trying this lesson. If not watch the following lesson in the Data handling section: Discrete or continuous data. The question covered in this lesson is, the number of people waiting for a train is 180 to the nearest 10 people. Find the upper and lower bounds of the number or people.
Upper and lower bounds of	In this lesson we will learn how to find the upper and lower bounds of a continuous number. You

continuous numbers	must know the difference between discrete and continuous numbers before trying this lesson. If not watch the following lesson in the Data handling section: Discrete or continuous data. The question covered in this lesson is Paul's height is 180cm to the nearest 10cm. Find the upper and lower bounds of Paul's height.
Calculations with bounds adding bounds	In this lesson you will learn the rules for finding the maximum and minimum values of an answer when you have to add two numbers together to get that answer. You must be able to find the upper and lower bounds of continuous numbers before trying this lesson. If not then watch the following lesson: Upper and lower bounds of continuous numbers The question covered in this lesson is, a ladder is 3.5m tall and Paul is 1.6m tall, to the nearest 0.1m. Calculate the maximum and minimum total height of Paul and the ladder
Calculations with bounds subtracting bounds	In this lesson you will learn the rules for finding the maximum and minimum values of an answer when you have to subtract two numbers to get that answer. You must be able to find the upper and lower bounds of continuous numbers before trying this lesson. If not then watch the following lesson: Upper and lower bounds of continuous numbers The question covered in this lesson is two trees have a height of 2.6m and 4.2m to the nearest 0.1m. Calculate the maximum and minimum difference in the heights of the two trees.
Calculations with bounds multiplying bounds	In this lesson you will learn the rules for finding the maximum and minimum values of an answer when you have to multiply two numbers together to get that answer. You must be able to find the upper and lower bounds of continuous numbers before trying this lesson. If not then watch the following lesson: Upper and lower bounds of continuous numbers The question covered in this lesson is, a rectangle has a length of 24cm and width of 16cm, to the nearest 1cm. Calculate the maximum and minimum area.
Calculations with bounds dividing bounds	In this lesson you will learn the rules for finding the maximum and minimum values of an answer when you have to divide two numbers to get that answer. You must be able to find the upper and lower bounds of continuous numbers before trying this lesson. If not then watch the following

	lesson: Upper and lower bounds of continuous numbers. The question covered in this lesson is Paul travels 110 miles in 4 hours. The distance is to the nearest 10 miles, the time is to the nearest hour. Calculate his maximum and minimum speed.

Converting Metric Units

Converting metric units of length part 1	In this lesson we will learn all the conversion factors for changing between different metric units of length. Rob takes you to Mt Everest where he will compare the height of the mountain in different metric units. You will then learn how to use these conversion factors to change from one metric unit to another metric unit and vice versa. In this lesson we will learn the conversion factors for the following units: Km and meters, meters and centimeters, centimeters and millimeters.
Converting metric units of length part 2	In this lesson we will learn how to use the conversion factors that we learned in part 1, to convert a metric unit of length into a different metric unit of length. You must know all the conversion factors for metric units of length from part 1 before you try this lesson. The questions covered in this lesson are i) convert 5.2km into meters ii) 760mm into cm's iii) convert 870m into km iv) convert 24cm into mm's v) convert 2.8m into cm's.
Converting metric units of length part 2 practice question	
Converting units exam question (length)	This is a typical exam question involving a 2 step calculation. You must be able to convert metric units of length before trying this question. The question covered in this lesson is, convert 160cm into feet and inches.
Converting metric units of mass part 1	In this lesson we will learn all the conversion factors for changing between different metric units of mass. We will also learn how to use these conversion factors to change from one metric unit to

	another metric unit and vice versa. Rob takes you on safari to the Ngorongoro crater in Tanzania where he will compare the mass of a person and a wild elephant in different metric units. In this lesson we learn the conversion factors for the following units: tonnes and kilograms, kilograms and grams
Converting metric units of mass part 2	In this lesson we will learn how to use the conversion factors that we learned in part 1, to convert a metric unit of mass into a different metric unit of mass. You must know all the conversion factors for metric units of mass from part 1 before you try this lesson. The questions covered in this lesson are i) convert 3.5 tonnes into kg ii) convert 124g into kg iii) convert 540 kg into tonnes iv) convert 0.7kg into grams.
Converting metric units of volume and capacity part 1	In this lesson we will learn all the conversion factors for changing between different metric units of volume and capacity. We will also learn how to use these conversion factors to change from one metric unit to another metric unit and vice versa. In this lesson we learn the conversion factors for the following units: liters (L) and milliliters (ml), cm^3 and ml
Converting metric units of volume and capacity part 2	In this lesson we will learn how to use the conversion factors that we learned in part 1, to convert a metric unit of volume or capacity into a different metric unit of volume or capacity. You must know all the conversion factors for metric units of volume and capacity from part 1 before you try this lesson. The questions covered in this lesson are i) convert 3.2L into ml ii) convert 750ml into L.
Converting metric units of volume and capacity part 2 practice question	
Converting units exam question	This is a typical exam question involving a 2 step calculation. In this question you are given a

(capacity)	conversion factor that you are not used to seeing and you must use that conversion factor to complete the question. You must be able to convert imperial units of capacity before trying this question. The questions covered in this lesson is convert 20 UK gallons to USA gallons, where 1 gallon (USA) ≏ 3.75 L
Converting speeds 1 step problems	In this question we will learn how to convert a unit of speed into different unit of speed. These questions will only require only 1 step of calculations. . You must know all the conversion factors for imperial units of length and understand how to convert between them before you try this lesson. If not then watch the following lesson: Converting imperial units of length. The questions covered in this lesson are i) convert 40 mph to km/h ii) convert 100 km/h into mph.
Converting speeds 2 step problems	In this lesson we will learn how to convert between more complicated units of speed requiring 2 steps of calculations to get to the answer. You will also learn how to convert seconds into hours. You must know all the conversion factors for metric units of length before you try this lesson. If not then watch the following lessons: Converting metric units of length part 1 The question covered in this lesson is convert 30m/s into km/h
Converting speeds 2 step problems practice question	

Converting Imperial Units

Converting imperial units of length	In this lesson we will learn all the conversion factors for changing imperial units of length into metric units of length. We will also learn how to use these conversion factors to change from imperial units to metric units and vice versa. We will learn the conversion factors for the following units i) miles and km ii) feet and inches iii)

	yards and feet iv) inches and centimeters v) feet and centimeters.
Converting lengths 1 step problems	In this lesson we will learn how to convert simple imperial units of length requiring only 1 step of calculations. You must know all the conversion factors for imperial units of length and understand how to convert between them before you try this lesson. If not then watch the following lesson: Converting imperial units of length. The questions covered in this lesson are i) convert 7.5 miles into km ii) convert 40km into miles
Converting lengths 2 step problems	In this lesson we will learn how to convert more complicated imperial units of length. These questions require 2 steps of calculations to get to the answer. You must know all the conversion factors for imperial units of length and be able to complete 1 step problems before you try this lesson. If not then watch the following lessons: Converting imperial units of length and/or Converting lengths 1 step problems The questions covered in this lesson are i) convert 2.4 miles into meters ii) convert 6 feet into cm's.
Converting imperial units of mass	In this lesson we will learn all the conversion factors for changing imperial units of mass into metric units of mass. We will also learn how to use these conversion factors to change from imperial units to metric units and vice versa. We will learn the conversion factors for the following units i) stone and pounds ii) pounds and ounces iii) kilograms and pounds.
Converting mass 1 step problems	In this lesson we will learn how to convert simple imperial units of mass requiring only 1 step of calculations. You must know all the conversion factors for imperial units of mass and understand how to convert between them before you try this lesson. If not then watch the following lesson: Converting imperial units of mass. The questions covered in this lesson are i) convert 12 stone into lb's ii) convert 119lb's into stone.
Converting mass 1 step problems practice question	
Converting mass 2 step problems	In this lesson we will learn how to convert more complicated imperial units of mass. These

	questions require 2 steps of calculations to get to the answer. You must know all the conversion factors for imperial units of mass and be able to complete 1 step problems before trying this lesson. If not then watch the following lessons: Converting imperial units of mass and/or Converting mass 1 step problems The question covered in this lesson is, convert 70kg into stone.
Converting mass 2 step problems practice question	
Converting imperial units of capacity	In this lesson we will learn all the conversion factors for changing imperial units of capacity into metric units of capacity. We will also learn how to use these conversion factors to change from imperial units to metric units and vice versa. We will learn the conversion factors for the following units i) gallons and pints ii) liters and pints iii) gallon and liters
Converting capacity 1 step problems	In this lesson we will learn how to convert simple imperial units of capacity requiring only 1 step of calculations. You must know all the conversion factors for imperial units of capacity and understand how to convert between them before you try this lesson. If not then watch the following lesson: Converting imperial units of capacity The questions covered in this lesson are i) convert 3 gallons into L ii) convert 20 pints into gallons
Converting capacity 1 step problems practice question	
Converting volume and capacity 2 step problems	The question covered in this lesson is convert 0.6 gallons into ml.

Pythagoras Theorem

Pythagoras theorem finding the longest side	In this lesson you will learn how to use Pythagoras theorem to calculate the length of the longest side of a right angled triangle. You will learn the formula for Pythagoras theorem and how to

	correctly label the triangle. You must be able to substitute numbers into formula before trying this question. If not then watch the following lesson: Substituting numbers into formula part 1. The questions covered in this lesson are i) calculate the missing length. ii) calculate the missing length.
Pythagoras theorem finding the shorter side	In this lesson you will learn how to use Pythagoras theorem to calculate the length of either of the shorter sides on a right angled triangle. You must be able to calculate the length of the longest side of a triangle using Pythagoras and be able to rearrange formula before trying this lesson. If not then watch the following lessons: Pythagoras theorem finding the longest side and/or In the algebra section: Rearranging formula part 1 The questions covered in this lesson are i) calculate the missing length. ii) calculate the missing length.
Pythagoras theorem problems (exam question)	This is a typical exam question involving 2 topics. The area of a triangle and Pythagoras theorem. The question covered in this lesson is, calculate the area of the triangle.

Right-angled Trigonometry (Higher Only) (F and H 2017 TBC)

How to label a triangle	In this lesson you will learn how to label all the sides of a right angled triangle when completing trigonometry questions. You will also learn the Greek name and symbol for angle which is used by text books, schools and exams. Finally we cover common mistakes made by many students when labelling a triangle that has all of the angles marked in the triangle. Exams love to use this simple trick which confuses many students causing them to get the wrong answer.
Finding a length	In this lesson you will learn how to calculate any length on a right-angled triangle using trigonometry. Rob takes you to the North London skydive centre where he jumps out of a plane at 15000ft in a special wingsuit. Then you will calculate the length of Rob's flight path using

	trigonometry. This is possibly the most extreme math's lesson you will ever see. You will also learn how you can use formula triangles to make this lesson even easier. You must be able to correctly label a triangle in trigonometry before you try this lesson. If not then watch the following lesson: How to label the triangle. The question covered in this lesson is, find the length marked x
Finding an angle	In this lesson we will learn how to calculate any angle in a right angled triangle using trigonometry. Rob takes you to the famous leaning tower of Pisa in Italy where you will calculate the angle of the leaning tower of Pisa using trigonometry. You will also learn how to use your calculator in these types of questions and how to use formula triangles to make this lesson even easier. You must be able to correctly label a triangle in trigonometry for you try this lesson. If not then watch the following lesson: How to label the triangle. The question covered in this lesson is to calculate the missing angle $\ominus$

Non-right Angled Trigonometry (Higher Only)

Choosing which rule to use and labelling the triangle	In this lesson we will learn how to choose which rule to use, the Cosine Rule or Sine rule, when calculating lengths and angles in non-right angled triangles. We will also learn how to correctly label the triangle when using each of these rules. Students often get confused between which 2 rules to use but Rob has a great way of teaching this lesson that makes choosing which rule to use very easy.
Sine rule finding a length	In this lesson we will learn how to find any length in a non-right angled triangle using the Sine rule. You will also learn how to choose which parts of the formula to use for each type of question and how to use formula triangles to make this topic easier. You must be able to choose the correct rule to use and be able to label the triangle correctly before you try this lesson. If not then watch the following lesson: Choosing which rule to use and labelling the triangle

	The question covered in this lesson is, find the missing length.
Sine rule finding an angle	In this lesson we will learn how to find any angle in a non-right angled triangle using the Sine rule. You will also learn how to use formula triangles to make this topic easier. You must be able to choose the correct rule to use and be able to label the triangle correctly and be able to find an angle using normal trigonometry before trying this lesson. If not then watch the following lessons: Choosing which rule to use and labelling the triangle and/or Trigonometry finding an angle. The question covered in this lesson is, find the missing angle
Cosine rule finding a length	In this lesson we will learn how to find any length in a non-right angled triangle using the Cosine rule. You will learn how to enter this calculation into your calculator and you will learn the common mistakes made by students when the exam board purposely tries to trick you by labeling the triangle in a confusing way. You must be able to choose the correct rule to use for each triangle and be able to label the triangle correctly before you try this lesson. If not then watch the following lesson: Choosing which rule to use and labelling the triangle The questions covered in this lesson are i) calculate the missing length ii) calculate the missing length
Cosine rule finding an angle	In this lesson we will learn how to find any angle in a non-right angled triangle using the cosine rule. We will also learn how to enter this calculation into your calculator and how to rearrange the Cosine rule so find the angle. You must be able to choose the correct rule to use, be able to label the triangle correctly, be able to find an angle using normal trigonometry and be able to rearrange formula before trying this lesson. If not then watch the following lessons: Choosing which rule to use and labelling the triangle and/or Finding an angle using trigonometry and/or from the Algebra section: Rearranging formula part 1, 2 and 3. The question covered in this lesson is, find the missing angle
Area of non-right angled triangle	In this lesson we will learn how find the area of a non-right angled triangle when you are given an angle and the lengths of 2 sides. This uses a special formula which you will also learn how to use.

	You must be able to substitute numbers into formula before trying this lesson. If not then watch the following lessons from the Algebra section: Substituting numbers into formula part 1 and 2. The questions covered in this lesson are i) calculate the area of the triangle ii) calculate the area of the triangle
Sine Rule Finding an Angle Part 1	In this lesson we will learn why there are always 2 angles under 180° that has the same answer to Sinθ. We learn how to find the Acute or Obtuse angle in a triangle when using the Sine rule to find angles in a Non-right angled triangle. We will also learn how exam questions will be worded so that you know whether or not the angle that you are being asked to find is an Acute or Obtuse angle. This lesson is extremely important as you could do everything correct in your solution but still get the final answer wrong unless you follow the method taught in this lesson. The question covered in this lesson is, find the angle A and angle B.
Sine Rule Finding an Angle Part 2	In this lesson we will learn how to find any angle in a Non-right angles triangle using the Sine rule. We will also learn how to use formula triangles to make this topic easier. You must be able to choose the correct rule to use and be able to label the triangle correctly and be able to find angles using normal trigonometry before trying this lesson. If not then watch the following lesson: Choosing which rule to use/ Labelling the triangle and/or Trigonometry finding an angle The question covered in this lesson is, find the missing angle.

Translations

Translations	In this lesson we will learn how to translate a shape. We will learn what a vector is and how they are written. We will also explain the differences between a vector and a coordinate which students

	often get mixed up. Finally you will learn how text books and exams word these types of questions as many students do not understand the language exam questions use. The question covered in this lesson is, the translation $\binom{5}{-2}$ maps A to B. Draw B.
Translations practice question	
Translations exam question	This is a typical exam question that you could be given in your exam. The question covered in this lesson is write down the translation that maps A onto A'

Reflection

Reflecting shapes in the x and y axis	In this lesson we will learn how to reflect any shape when the line of reflection is the x or y axis. These types of reflection questions usually appear in the foundation level. The questions covered in this lesson are i) reflect shape P in the y axis The questions covered in this lesson are i) reflect shape P in the x axis
Reflecting shapes in the line $y = 5$ $x = 6$	In this lesson we will learn how to draw a line of refection from the equation of a straight line and reflect a shape in this line. You must be able to draw straight line graphs of x= number (e.g x = 4) and y= number (e.g y= 2) before trying this lesson. If not then watch the following lesson from the Algebra section: Plotting straight line graphs of x= number and y= number. The questions covered in this lesson are i) reflect shape A in the line $y = 5$ ii) reflect shape A in the line $x = 6$
Reflecting shapes in the line $y = x$	In this lesson we will learn how to draw a line of refection from the equation of a straight line and then reflect a shape in this line. You will learn tips on reflecting shapes when the line of reflection is a diagonal line and tips on plotting the straight line graph of $y = x$ The question covered in this lesson is, reflect shape A in the line $y = x$

Reflecting shapes in the line $y = x$ practice question	

Rotation

Rotation about a centre part 1	In this lesson we will learn how to rotate any shape about a centre of rotation that has already been marked on the diagram for you. You will learn the names of the different directions of rotation and also the most common angles that rotation questions use. You will also learn tips on how to do this with tracing paper but don't worry if you don't have any tracing paper at home you can use baking paper. The question covered in this lesson is, rotate the shape 90° clockwise about centre O.
Rotation about a centre part 2	In this lesson we will learn how to rotate any shape about a centre of rotation (COR) which is given as a coordinate. You will learn the names of the different directions of rotation and also the most common angles that rotation questions use. You will also learn tips on how to do this with tracing paper but don't worry if you don't have any tracing paper at home you can use baking paper. You must know how to plot coordinates before you try this lesson. If not then watch the following lesson in the Algebra section: Plotting coordinates. The question covered in this lesson is rotate shape A 270° clockwise about (8,5)
Finding the direction and angle of rotation	In this lesson you will learn how to find the direction of rotation and how to calculate the angle of rotation. You will also learn the most common angles normally used in rotation questions. The question covered in this lesson is, find the direction and angle of rotation with a COR of (10,4)
Finding the COR (centre of rotation) (Higher Only)	In this lesson you will learn a method to find the centre of rotation (COR) when given the original shape and rotated shape. Many students end up guessing the COR but guessing can take a lot of time and can be unsuccessful. This lesson is also full of tips on how you can check that you have found the right answer if you do end up guessing. You will need the following equipment to complete these types of questions: A Set Square, ruler and tracing paper (you can use baking

	paper for tracing paper) You must be able to write down the coordinate of a point before you try this lesson. If not then watch the following lesson in the Algebra section: Plotting Coordinates. The question covered in this lesson is, find the centre of rotation.

Enlargements

Enlarging shapes	In this lesson you will learn how to enlarge a shape by a simple scale factor (S.f) You will learn useful tips on completing these questions and how to draw a diagonal line after it has been enlarged. This lesson covers questions that would appear usually appear on the foundation level paper only The questions covered in this lesson are i) enlarge the shape with a scale factor of 2 ii) enlarge the shape with a S.F of $\frac{1}{2}$
Enlarging shapes practice question	
Enlarging shapes exam tip	In this lesson we will learn an exam tip for enlarging any shape with a S.F $\frac{3}{2}$ This is a popular scale factor in exam questions and it always confuses students. You will learn a useful tip on how to easily work out the lengths of a shape that is being enlarged by this scale factor. The question covered in this lesson is, enlarge the shape by a S.f $\frac{3}{2}$
Enlargement with a centre of enlargement	In this lesson you will learn how to enlarge a shape from a centre of enlargement (COE). You will also learn a useful tip for quickly completing these types of questions. You must know how to plot coordinates before trying this lesson. If not then watch the following lesson in the Algebra Section. Plotting Coordinates. The question covered in this lesson is enlarge the shape by S.F2, centre of enlargement (1,2)
Enlargement with a centre of	

enlargement practice question	
Enlargement with a fractional scale factor (Higher Only) (F and H 2017 TBC)	In this lesson we will learn how to enlarge a shape with a fractional Scale factor (S.f) The question covered in this lesson is, enlarge the shape by a S.F $\frac{1}{3}$ with COE (3,7)
Enlargement with a fractional scale factor practice question (Higher Only) (F and H 2017 TBC)	
Enlargements with a negative scale factor (Higher Only)	In this lesson we will learn how to enlarge a shape with a negative scale factor and a centre of enlargement. You will learn what effect the negative sign has on the enlargement. Finally you will also learn what an inverted shape is and tips for quickly and accurately completing these types of questions. The question covered in this lesson is enlarge ABCDE by S.F -2, centre (1,1)
Enlargements with a negative scale factor practice question (Higher Only)	
Finding the centre of enlargement	In this lesson you will learn how to find the centre of enlargement when given the original shape and the enlarged shape. Finally you will learn how text books and exams word these types of questions as many students do not understand the language exam questions use. The questions covered in this lesson are i) find the COE when the shape ABC is mapped into shapes e A'B'C' ii) find the COE when the shape ABCD is mapped into shape A'B'C'D'
Finding the centre of enlargement practice question	
Finding the scale factor of enlargement	In this lesson you will learn how to find the scale factor when given the original shape and enlarged shape. This only requires a very simple formula.

	The questions covered in this lesson are i) find the S.F used to enlarge shape A and A' ii) find the S.F used to enlarge shape A and A' iii) find the S.F used to enlarge shape A and A'
Finding the scale factor of an inverted enlargement (Higher Only)	In this lesson you will learn how to find the scale factor when the enlarged shape has been inverted. You will also learn tips on how to recognise that a shape has been inverted. This lesson is for higher tier students only. It would help if you can enlarge shapes with a negative scale factor before trying this lesson as there are a lot of similarities between these 2 topics. Review the following lesson if you need too: Enlargements with a negative scale factor. The question covered in this lesson is, find the S.F when triangle ABC is mapped onto triangle A'B'C'.

Surface Area

Surface area of a cuboid	In this lesson we will learn how to calculate the surface area of a cuboid. Rob uses 3 Dimensional cuboids to show you tips on calculate the surface area of any cuboid. The question covered in this lesson is, calculate the surface area of the cuboid.
Surface area of a triangular prism	In this lesson we will learn how to calculate the surface area of a triangular prism. Rob uses 3 Dimensional shapes to show you all the different faces of a triangular prism and gives you tips on how to save time in these types of questions. The question covered in this lesson is, calculate the surface area of the triangular prism.
Surface area of a cylinder	In this lesson we will learn how to calculate the surface area of a cylinder. Rob uses 3 Dimensional shapes to visually show you all of the surfaces that make a cylinder. This allows you to fully understand exactly how to calculate the surface area. You must be able to calculate the circumference of a circle and calculate the area of a circle before you try this lesson. If not then watch the following lessons: Area of a circle and/or Circumference of a circle

	The question covered in this lesson is calculate the S.A of the cylinder
Surface area of a sphere (Higher Only)	In this lesson we will learn how to calculate the surface area of a sphere. The question covered in this lesson is calculate the surface area of the sphere with a radius of 8cm.
Surface area of a hemisphere exam question (Higher Only)	In this lesson we will learn what a hemisphere is and how to calculate its surface area. You must be able to calculate the surface area of a sphere and area of a circle before you try this lesson. If not then watch the following lessons: Area of a circle and/or Surface area of a sphere The question covered in this lesson us calculate the surface area of a hemisphere with a radius of 11cm.
Curved surface area of a cone (Higher Only)	In this lesson we learn how to calculate the curved surface area of a cone. You will also learn how to find the whole surface area (S.A) of a cone and the different types of questions that you can be asked in this topic. This lesson uses special 3-dimensional shapes to show you all the different types of lengths on a cone. Seeing these real 3D shapes makes learning this topic very easy. You must be able to find the area of a circle and substitute numbers into formula before trying this lesson. If not then watch the following lessons: Area of a circle and/or from the Algebra section: Substituting numbers into formula part 1, 2 and 3 The question covered in this lesson is, calculate the curved S.A of the cone.
Calculating the surface area of a frustum (Higher Only)	In this lesson we will learn what type of shape a frustum is, how a frustum is made and how to calculate the surface area of a frustum. This lesson uses special 3-dimensional shapes made from chocolate to teach you what a frustum is and how it is made. Seeing these real 3D shapes makes learning this lesson very easy. But really it was just a good excuse for Rob to eat chocolate. You must be able to calculate the curved surface area of a cone and the area of a circle before you try this question. If not then watch the following lessons: Area of a circle and/or Curved surface area of a cone The question covered in this lesson is, calculate the Surface Area (S.A) of the frustum that is made

	when the top part of the cone is cut off.

Volume

Volume of a cuboid	In this lesson we will learn how to calculate the volume of any cuboid. W will learn tips on identifying lengths on 3D diagrams of cuboids and you will learn that a cuboid is really just a prism. Finally we will also learn a common mistake that students make when calculating the volume of a cuboid when the sides are given in different units. The question covered in this lesson is, calculate the volume of the cuboid.
Calculating the volume of any prism	In this lesson we will learn what a prism is and the meaning of the term "cross sectional area" (C/S area). Rob uses different 3 Dimensional cakes and shapes to teach this lesson in a unique and fun way. We will also learn the formula for calculating the volume of any prism and all of the different shapes that are prisms. This lesson will make finding the volume of most shapes very easy. But again this lesson was just an excuse for Rob to eat his favorite cakes.
Volume of triangular prism	In this lesson we will learn how to use the volume of a prism formula to calculate the volume of any triangular prism. You must be able to calculate the area of a triangle and find the volume of any prism before you try this lesson. If not then watch the following lessons. Area of a triangle and/or Volume of any prism. The question covered in this lesson is to calculate the volume of the prism.
Volume of a cylinder	In this lesson we will learn how to calculate the volume of any cylinder. Rob takes you to Tonga to swim with humpback whales where you will be estimating the volume of a whale by calculating the volume of a cylinder that a whale would fit in. You must be able to calculate the area of a circle and be able to substitute numbers into formula before you try this lesson. If not then watch the following lessons: Area of a circle and/or In the Algebra section: Substituting numbers into formula part 1.

	The question covered in this lesson is, estimate the volume of a whale by finding the volume of the cylinder.
Finding the height of a cylinder using its volume (Higher Only)	In this lesson you will learn how to find the height of a cylinder when you are given its volume. You will also learn tips on solving other types of questions like this and the different ways that the exam board can ask this question. You must be able to calculate the volume of a cylinder/prism, rearrange formula and substitute numbers into formula before trying this lesson. If not then watch the following lessons: Volume of a cylinder, and in the Algebra section: Rearranging formula part 1 and/or substituting numbers into formula part 1 The question covered in this lesson is calculate the height of the cylinder
Volume of a cylinder practice question	This is a typical exam question that you could get on the volume of a cylinder. The question covered in this lesson is, calculate the volume of this hollow cylinder which is 2cm thick and 20cm high.
Volume of a sphere (Higher Only)	In this lesson you will learn how to calculate the volume of a sphere. The question is this lesson is, calculate the volume of a sphere with a radius of 1.2m
Volume of a sphere practice question (Higher Only)	
Volume of a cone (Higher Only)	In this lesson we will learn how to calculate the volume of a cone. Rob uses 3 Dimensional cones to explain the meaning of the terms “perpendicular height” and “Slant height” You will also learn an easier way of using the formula for the volume of a cone. The question covered is this lesson is, calculate the volume of the cone with a radius of 11cm and a height of 20cm
Volume of a cone exam question (Higher Only)	This is a typical exam question. To complete this question you will need to be able to calculate lengths using Pythagoras and be able to calculate the volume of a cone. Rob uses 3 dimensional cones to help explain parts of this question. The question covered in this lesson is calculate the volume of the cone with a radius of 15cm and

	slant height 40cm
Volume of a frustum (Higher Only)	In this lesson we will learn what type of shape a frustum is, how a frustum is made and how to calculate the volume of a frustum. This lesson uses special 3-dimensional shapes made from chocolate to teach you what a frustum is and how it is made. Seeing these real 3D shapes makes learning this lesson very easy. But really it was just a good excuse for Rob to eat chocolate. The question covered in this lesson is, calculate the volume of the frustum that is made when the small cone is cut off.
Volume of a square based pyramid	In this lesson Rob takes you to the great pyramids of Egypt where you will learn how to calculate the volume of a square based pyramid. You will also learn how to complete more complicated questions which will require calculating lengths using 3 dimensional Pythagoras. The question covered in this lesson is, calculate the volume of the square based pyramid of Giza in Egypt.

Vectors (Higher Only)

Introduction to vectors	In this lesson we will learn what a vector is and the 3 different ways that a vector can be written. We will learn what a column vector is and how to draw a column vector. We will also look at the differences between a vector and a coordinate as some students get these mixed up. Finally we will learn how to write vectors as we write them in a different way to how they are printed.
Writing and drawing column vectors	In this lesson we will learn how to write column vectors from diagrams and also how to draw a column vector onto a diagram. We will also learn about what positive and negative numbers in vectors mean. The questions covered in this lesson are i) write vector **b** as a column vector ii) write vector **a** as a column vector iii) draw and label the following vector $\overrightarrow{AB} = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$

	iv) draw and label the following vector $\begin{pmatrix}-3\\-5\end{pmatrix}$
Subtracting vectors	In this lesson we will learn how to subtract vectors. We will learn how to do this on a diagram by drawing the vectors and we will also learn how to subtract column vectors on paper without a diagram. Finally we will learn how to find the resultant vector from a diagram or on paper by using the column vectors. The question covered in this lesson is, **a** = $\begin{pmatrix}6\\3\end{pmatrix}$ **b** = $\begin{pmatrix}2\\5\end{pmatrix}$, draw **a - b**
Subtracting vectors practice question	
Adding Vectors	In this lesson we will learn how to add vectors. We will learn how to do this on a diagram by drawing the vectors and we will also learn how to add column vectors on paper without a diagram. Finally we will learn how to find the resultant vector from a diagram or on paper by using the column vector. You must be able to draw and write vectors and add together negative numbers before trying this lesson. If not then watch the following lessons: Writing and drawing column vectors and/or in the number section. Adding negative numbers. The question covered in this lesson is, draw the following vectors and add them together $\overrightarrow{AB}$ = $\begin{pmatrix}3\\5\end{pmatrix}$ $\overrightarrow{BC}$ = $\begin{pmatrix}2\\3\end{pmatrix}$
Reversing the direction of vectors	In this lesson we will learn how to reverse the direction of a vector. We will learn how this affects the column vector and how to label the new reversed vector. The questions covered in this lesson are i) reverse the direction of the vector **d** = $\begin{pmatrix}3\\4\end{pmatrix}$ ii) reverse the direction of the vector **a** = $\begin{pmatrix}-4\\2\end{pmatrix}$
Multiplying vectors	In this lesson we will learn how to multiply vectors. We will learn how to label a vector that has been multiplied and how it changes when drawn on a square grid. Finally we will learn how to

	reverse the direction of a vector. You must be able to multiply negative numbers before trying this lesson. If not then watch the following lesson in the Number section: Multiplying negative numbers. The questions covered in this lesson are i) multiply vector **a** by the scalar $\frac{1}{2}$, **a** = $\binom{4}{10}$, ii) multiply vector **a** by the scaler -2, **a** = $\binom{2}{-3}$
Multiplying vectors practice question	
Vector problems	In this lesson we will learn how to solve vector problems. There are 3 main types of vector problems that you could be given. I recommend learning them in the order that they are shown in this topic. This lesson covers the 1st type. You must know how to write vectors and be able to add negative numbers and simplify algebraic terms before trying this lesson. If not then watch the following lessons: Introduction to vectors and/or In the Algebra section: Simplifying algebraic terms and/or in the Number section: Adding negative numbers. The question covered in this lesson is, OACB and BCDE are identical parallelograms $\overrightarrow{OA}$ = **a** and $\overrightarrow{OB}$ = **b**, find i) $\overrightarrow{OD}$ ii) $\overrightarrow{DB}$ in terms of **a** and **b**
Vector problems practice question	
Vector problems with midpoints	In this lesson we will learn how to solve vector problems that contain midpoints. There are 3 main types of vector problems that you could be given. I recommend learning them in the order that they are shown in this topic. This lesson covers the 2nd type. You must be able to solve simpler vector problems before you try this lesson. If not then watch the following lesson: Vector problems. The question covered in this lesson is, the midpoint of $\overrightarrow{OC}$ is M $\overrightarrow{OA}$ = **a** and $\overrightarrow{OB}$ = **b** OACB is a parallelogram. Find i) $\overrightarrow{OM}$ ii) $\overrightarrow{MA}$ in terms of **a** and **b**
Vector problems with ratios	In this lesson we will learn how to solve vector problems that contain ratios. There are 3 main

	types of vector problems that you could be given. I recommend learning them in the order that they are shown in this topic. This lesson covers the 3rd type. You must be able to solve vector problems with midpoints before you try this lesson. If not then watch the following lesson: Vector problems with midpoints The question covered in this lesson is $\overrightarrow{OA}$ = 2**a** and $\overrightarrow{OB}$ = 3**b**, M is a point on AB such that $\overrightarrow{AM} : \overrightarrow{MB}$ = 1:3 Find $\overrightarrow{OM}$ in terms of **a** and **b**
Proving vectors are parallel	In this lesson we will learn how to complete a vectors question when we are asked to prove that a vector is parallel to another vector. You must be able to complete vector problems with a ratio before trying this lesson. If not then watch the following lesson: Vector problems with ratios The question covered in this lesson is $\overrightarrow{OA}$ = 2**a,** $\overrightarrow{OB}$ = 3**b.** M is a point on AB, such that $\overrightarrow{AM} : \overrightarrow{MB}$ = 2:3, prove that $\overrightarrow{OM}$ is parallel to the vector **a + b**.

Data Handling

Averages

Calculating the mean	In this lesson you will learn how to calculate the mean. You will also learn what the mean actually tells you about a set of data. Finally we will recap how to round any answers that involve money. The questions covered in this lesson are i) the table on the BBM website shows how many hours Paul watched TV each day in a week. Calculate the mean number of hours he watches TV for and ii) The price of an iPhone in 4 different shops is shown on the BBM website. Calculate the mean price.
Calculations involving the mean	In this lesson we will learn how to use the mean to calculate information about the original data. For example the sum of the data. These types of questions test your understanding of the mean and many students often get confused with these questions. The questions covered in this lesson are i) the mean number of Tweets Paul posts per day is 22 tweets. Calculate how many tweets Paul posts per week (7 days) ii) the mean number of goals scored in five hockey games is 4 goals. Calculate the total number of goals scored in all five games.
Calculations involving the mean practice question	
Calculating the mean of grouped continuous data	In this lesson we will learn how to calculate the mean of grouped continuous data. You will also learn why this answer is only an estimate and not the actual mean. The question covered in this lesson is, the heights of a group of 20 students are shown on the BBM website. Calculate an estimate of the mean height.
Calculating the mean of grouped continuous data practice question	
Using fx notation to calculate the	In this lesson we will learn the formula and notation that is used in schools and texts books when

mean of continuous data	finding the mean of grouped continuous data. You must be able to find the mean of grouped discrete data before you try this lesson. If not then watch the following lesson: Calculating the mean of grouped continuous data. The question covered in this lesson is, the heights of a group of 20 students are shown on the BBM website. Calculate an estimate of the mean height.
Calculating the mean of grouped discrete data	In this lesson we will learn how to calculate the mean of grouped discrete data. You should be able to calculate the mean of grouped continuous data before you try this lesson as are a lot of similarities between these 2 lessons. If not then watch the following lesson: Calculating the mean of grouped continuous data. The question covered in this lesson is, the number of goals scored in 14 football games is shown on the BBM website. Calculate the mean number of goals scored.
Calculating the mean of grouped discrete data practice question	
Using fx notation to calculate the mean of discrete data	In this lesson we will learn the formula and notation that is used in schools and texts books when finding the mean of grouped discrete data. You must be able to find the mean of grouped discrete data before you try this lesson. If not then watch the following lesson: Calculating the mean of grouped discrete data The question covered in this lesson is, the number of goals scored in 14 football games is shown on the BBM website. Calculate the mean number of goals scored.
Choosing the best average	In this lesson you will learn how to choose the best average depending on the type of data that you have been given. You will learn the best time to use each of the averages, (mean, mode and median) and when not to use each of these averages. The question covered in this lesson is, the heights of a small group of students are shown on the BBM website, calculate the best average for this data set.

Finding the Median

Introduction to Finding the Median	In this lesson we will learn what the median is and how to find the median from a small set of numbers. The question that is covered in this lesson is, find the median of the following numbers 159, 181, 179, 165, 148, 155, 188, 172, 181.
Finding the location of the median	In this lesson we will learn how to find the location of the median. This is a much better method to use when given lots of numbers or when you are asked to find the median from a stem and leaf diagram. The questions that are covered in this lesson are i) the maths scores in % of 25 student are shown below. Find the median score. 30, 32, 44, 44, 49, 52, 52, 54, 56, 56, 59, 60, 64, 65, 68, 70, 70, 75, 82, 85, 88, 88, 90, 92, 93. ii) The English scores in % of 28 students is shown below. Find the median score. 33, 34, 36, 36, 36, 39, 40, 43, 45, 45, 49, 50, 52, 54, 61, 62, 65, 66, 66, 67, 68, 68, 70, 71, 71, 71, 73, 78.
Finding the Median Exam Tip	In this lesson you will learn a exam tip for finding the median when you are given an even amount of numbers and the median is in-between 2 numbers. The questions that are covered in this lesson are i) the heights of 8 people in cm are shown below. Find the median. 145, 147, 152, 158, 160, 163, 166, 172. ii) The heights of 8 people in cm are shown below. Find the median. 140, 149, 158, 159, 173, 176, 177, 181.
Finding the Median from a Stem and Leaf Diagram	In this lesson you will learn how to find the median from a stem and leaf diagram. A lot of students cross off numbers from each end of the stem and leaf diagram but this can be confusing and it can take a long time if you have a lot of numbers.

	You must be able to find the location of the median before you try this lesson. If not them watch the following lesson: Finding the location of the median The question that is covered in this lesson is: the stem and leaf diagram shows the marks for a history test marked out of 50. Find the median.
Finding the Median of Grouped Data	In this lesson we will learn how to find the median of grouped discrete data. The question covered in this lesson is: the number of goals scored in 15 games of football is shown. Find the median number of the goals scored.

Stem and Leaf

Introduction to stem and leaf diagrams	In this lesson we will learn how to read values on a stem and leaf diagram and what the different parts of the key represent. You will also learn how back to back stem and leaf diagrams can be used to compare data and what the term "model group" means and how to identify the modal group on a stem and leaf diagram.
Making a stem and leaf diagram	In this lesson you will learn how to make a stem and leaf diagram from a set of data. You will learn tips on how to avoid making silly mistakes when entering your data into a stem and leaf and how to check that you have not missed any numbers. Finally you will learn what an unordered and ordered stem and leaf diagram is, how to order a stem and leaf diagram and why you need an ordered stem and leaf. The question covered in this lesson is, a group of students were asked how many text messages they send per day. The results are on the BBM website. Construct and stem and leaf diagram to show this data.

Finding the median and quartiles from a stem and leaf diagram	In this lesson we will learn how to find the median and lower/upper quartiles from a stem and leaf diagram. You must be able to read values from a stem and leaf diagram and be able to find the median and lower/upper quartiles before you try this lesson. If not then watch the following lessons: Introduction to stem and leaf diagrams and/or Drawing box plots from data (in this lesson you will learn how to find the upper/lower quartiles) The question covered in this lesson is, the results of a math's exam for a group of students are shown on the BBM website. Find the median, LQ and UQ.

2 Way Tables

Completing 2 Way Tables	In this lesson we will learn how to draw and enter data into a 2 way table and we will also learn how each row and column adds up the total. The question covered in this lesson is: 90 people are asked about their sight. 23 Males are short sighted. 14 males are long sighted. 5 males have normal sight. 11 females are short sighted. 16 females are long sighted and 21 females have normal sight. Show this information in a 2 way table.
2 Way Tables Practice Question	The question covered in this lesson is 80 students were asked what language they took. Complete the 2 way table filling in the missing gaps.
2 Way Tables Exam Question	This is a typical exam question which will require a 2 way table in order to complete the question. The question covered in this lesson is: 80 people were asked about their phone network, 34 of the people were female, 10 out of the 13 people who was on O2 were male, 29 of the people were on Vodafone and 15 males were on EE. How many female were on Vodafone?

Scatter Graphs

Types of correlation	In this lesson we will learn what the word "correlation" actually means and we will learn all the

	different types of correlation. We will also learn what you need to write when you are given a graph and you are asked to describe the relationship shown by the graph.
Plotting scatter graphs	In this lesson we will learn how to plot a scatter graph. You will learn which axis to choose for each quantity in a table of data and how to plot this data on a graph. You must be able to draw a line of best fit and describe different correlations before you try this lesson. If not then watch the following lessons: Drawing a line of best fit (LOBF) and/or Types of correlation The question covered in this lesson is, the weight and height of 12 adults is shown on the BBM website i) draw a scatter graph to show this information ii) describe the correlation shown by your graph
Drawing a line of best fit (LOBF)	In this lesson we will learn the basic guidelines for drawing a perfect line of best fit. You will also learn how the examination board marks your line of best fit. Understanding this inside knowledge increases your ability to draw a LOBF that will score you full marks.
Estimating values from scatter graphs	In this lesson we will learn how to accurately estimate values from a scatter graph. You will also learn why these answers are an estimate and why there is more than one correct answer. You will also learn the common mistakes that students often make when reading off values from scatter graphs. You must be able to draw a line of best fit before you try this lesson. If not then watch the following lesson: Drawing a line of best fit (LOBF) The question covered in this lesson is, the scatter graph shows the height and weights of 12 people. Use the graph to estimate i) the weight of a person who is 175cm tall ii) the height of a person who is 70kg.

Pie Charts

Calculating angles in pie charts	In this lesson we will learn how to calculate the angle for any sector in a pie chart. You will learn a great tip for calculating the angles in a pie chart when given a table of data.

	The question covered in this lesson is, 120 people were asked what pet they had. The results are shown on the BBM website. Show these results in a pie chart.
Calculating the frequency of a sector (Higher Only)	In this lesson we will learn how to calculate the frequency of any sector in a pie chart when you are only given the angle and frequency of one of the other sectors. You must be able to calculate the angle of a sector in a pie chart before you try this lesson. If not then watch the following lesson: Calculating angles in pie charts. The question covered in this lesson is, the pie chart shows people's favorite type of car. 26 people choose BMW and this is represented by a sector with an angle of 104°. Calculate how many people choose Mercedes.
Finding the total number of items in a pie chart (Higher Only)	In this lesson we will learn how to find the total number of items represented by a pie chart when you are only given the angle and frequency of one of the sectors. Rob calls the total frequency the total number of items because pie charts could represent the number of people or number of cars or the number of anything really. The question covered in this lesson is, the pie chart shows the different types of animals in a part of Africa. There were 90 Zebra that are represented by a sector with an angle of 135°. Calculate the total number of animals shown by the pie chart on the BBM website.

Cumulative Frequency (Higher Only)

Completing a cumulative frequency table	In this lesson we will learn how to complete a cumulative frequency table. You will learn what the term "cumulative frequency" means and also what each cumulative frequency in the table represents. The question covered in this lesson is, the amount of time spent on Facebook in a week by a group of students is shown on the BBM website. Complete a C.F table to show this data.
Cumulative frequency graphs of discrete data	In this lesson you will learn how to plot and draw a cumulative frequency graph of discrete data or data that has gaps between the class intervals. You will also learn what point to start drawing

	your graph from and tips on drawing a good curve. The question covered in this lesson is, that a group of people estimates the length of a line to the nearest 1cm. The results are shown on the BBM website. Draw a C.F graph to show this data.
Drawing cumulative frequency graphs	In this lesson you will learn how to plot a cumulative frequency graph. You will also learn the general shape of these types of graphs so you can easily check that you have plotted your graph correctly. You must be able to complete a cumulative frequency table before you try this lesson. If not then watch the following lesson: Completing a cumulative frequency table The question covered in this lesson is, the times of 40 students who took part in the 400m relays are shown on the BBM website. Draw a cumulative frequency graph to show the results.
Finding information from cumulative frequency graphs	In this lesson we will learn how to accurately read off values from a cumulative frequency graph. The question covered in this lesson is, the graph on the BBM website shows the cumulative frequency distribution of the masses of 80 adults. Use the graph to estimate the number of adults i) who are less than 75kg ii) who are more than 97kg.
Finding the median and quartiles from a C.F graph part 1	In this lesson we will learn how to find the values of the median and interquartile range from a cumulative frequency graph. There are two different methods (although very similar) for this depending on how big your cumulative frequency is. Part 1 covers how to do this when the C.f is small. You must be able to find the median and lower/upper quartiles before you try this lesson. If not then watch the following lessons: Finding the median and/or Drawing box plots from data (in this lesson you will learn how to find the upper/lower quartiles) The question covered in this lesson is, the C.F graph on the BBM website shows the data about the masses of 19 newborn babies. Find the i) median ii) interquartile range
Finding the median and quartiles from a C.F graph part 2	In this lesson we will learn how to find the values of the median and lower/upper quartiles from a cumulative frequency graph. There are two different methods for this (although very similar)

	depending on big your cumulative frequency is. Part 2 covers how to do this when the C.f is big. You must be able to complete the example in part 1 before you try this lesson. The question covered in this lesson is, the C.F graph on the BBM website shows the data about the heights of 80 people. Find the i) median ii) interquartile range

Box Plots (Higher Only)

Introduction to box plots	In this lesson we will learn what each part of a box plot represents and what values are needed to be able to draw a box plot.
Drawing box plots from data	In this lesson we will learn how to draw a box plot from a set of data. You will also learn how to calculate the lower and upper quartiles of a set of data. You must be able to calculate the median and understand what each part of a box plot represents before you try this lesson. If not then watch the following lessons: Calculating the median and/or Introduction to box plots The question covered in this lesson is, the temperatures, in °C, of 23 capital cities around the world is shown on the BBM website. Draw a box plot to represent this data.
Draw a box plot from a cumulative frequency graph	In this lesson we will learn how to draw a box plot from a cumulative frequency graph. You will learn how to read the smallest and biggest values from a C.f graph and tips on choosing an axis for your box plot. The question covered in this lesson is, the graph on the BBM website shows the cumulative frequency distribution for the heights of 80 people. Draw a box plot from this information.
Introduction to comparing box plots	In this lesson we will take a more detailed look at what each part of a box plot represents. You need to understand this information before you can start comparing box plots.
Comparing box plots	In this lesson we will learn how to compare box plots. You will learn how to compare each part of a box and how to put these comparisons into sentences. You will also learn tips on the best comparisons to make and when certain comparisons will score you zero marks. You must

	understand what each part of a box plot represents before you try this lesson. If not then watch the following lesson: Introduction to box plots The question covered in this lesson is, the heights of a group of males and females are shown on the box plots on the BBM website. Compare the heights of the two groups.

Histograms (Higher Only)

Different types of histograms	In this lesson we will learn the 2 different types of histograms that you could be given. You will learn the meaning of the term "class interval" which you also need to know for other lessons. You will also learn how to label the y-axis on each type of histogram as both types have different labels depending on the class intervals. You must be able to read inequalities before you try this lesson. If not then watch the following lesson in the Algebra section: Writing a list of integers from inequalities. The questions covered in this lesson is, i) plot a histogram using the equal class data on the BBM website. ii) plot a histogram using the unequal class data on the BBM website.
Drawing histograms	In this lesson we will learn how to draw a histogram. You will also learn the meaning of the term "frequency density" and learn the formula to calculate frequency density. You must know the 2 different types histograms and understand the term "class interval" before you try this lesson. If not then watch the following lesson: Different types of histograms. The question covered in this lesson is, the mass of a group of adults is shown on the BBM website. Draw a histogram to show this data.
Calculating frequency's from a histogram part 1	In this lesson we will learn how to calculate the frequency of the bars in any histogram. We will learn how to complete questions when the y-axis is blank (has no labels or numbers on it) and we will learn the common mistakes that students always make with these types of questions. This is

	a very common question and it can be asked in 2 different ways. Part 1 covers the first way. The question covered in this lesson is, the histogram shows the distribution of distances thrown in a competition. 15 competitors threw more than 40m. Find the missing frequency's.
Calculating frequency's from a histogram part 2	In this lesson we will learn the second way that the question in part 1 can be asked. The question covered in this lesson is, the histogram shows the distribution of distances thrown in a competition. 15 competitors threw 40m or more. How many competitors threw 40m or less.

Frequency Polygons

Plotting frequency polygons	In this lesson we will learn how to plot a frequency polygon and how to draw a line through the points. This is one of the easier graphs to draw in maths but many students often make mistakes and lose easy marks. The question covered in this lesson is, the frequency distribution of the heights of a hockey team is shown on the BBM website. Draw a frequency polygon to show this data.

Moving Averages (Higher Only)

Moving averages	In this lesson we will learn how to calculate and plot a 3-point and 4-point moving average on a graph. You will also learn the meaning of the term 'trend line'. You must be able to calculate the mean and draw a line of best fit before you try this lesson. If not then watch the following lessons: Calculating the mean and/or Drawing a line of best fit (LOBF) The question covered in this lesson is, the price of gold per ounce, every 3 months, for 3 years is

	shown on the BBM website. Calculate a 4- point moving average and plot this moving average on a graph.

Sampling (Higher Only)

Introduction to stratified sampling	In this lesson we will learn what stratified sampling is. We will compare stratified and random sampling and explain when and why you would use stratified sampling. Rob uses the question and data on the BBM website to explain this sampling method. Paul wants to know if people in his year enjoy science. He samples 20% of the year (22 people).
2 Stratified sampling	In this lesson we will learn how to complete questions involving stratified random sampling. You must be able to write a number as a percentage of another number and be able to calculate percentages before you try this lesson. If not then watch the following lessons in the Number section: Writing a number as a percentage of another number and/or Finding percentages using a calculator. The questions covered in this lesson are, i) Paul is conducting a survey about the amount of money students spend on their phones each week. Paul wants a stratified random sample of 84 students. How many students should be selected from each group. ii) Clare is investigating make-up, she carries out a stratified random sample of 45 girls from year 10 and 11. How many girls from each year should Clare choose

Probability

Tree Diagrams Part 1	In this lesson we will learn how to draw tree diagrams and how to work out the probabilities that go on each of the branches. We will also learn how to list all of the outcomes from the tree diagram. In part 2 of this lesson we will work out the probabilities of these outcomes.

	The question covered in this lesson is: Box A contains 4 blue balls and 2 red balls and box B contains 3 blue balls and 5 red balls. A ball is chosen at random from box A and then another ball is chosen at random from box B. Draw a tree diagram to represent this information.
Tree Diagrams Part 2	In this lesson we will learn how to calculate the probabilities of the outcomes from the tree diagram in Part 1 of this lesson and we will learn the rules for finding probabilities in tree diagrams. You must be able to multiply and add fractions together and simplify fractions. If not then watch the following lessons from the number section: Multiplying fractions, Adding fractions and Simplifying fractions. The question covered in this lesson is: Using the tree diagram from Part 1 of this lesson i) Calculate the probability that you get 2 balls of the same colour and ii) Calculate the probability of getting at least 1 blue ball.
Tree Diagrams when Items are not Replaced Part 1	In this lesson we will learn how to draw tree diagrams and how to calculate the probabilities on each of the branches when the items are not replaced. You must be able to draw tree diagrams and calculate the probabilities on the branches. If not then watch the following lesson: Tree Diagrams Part 1. The question covered in this lesson is: Bag contains 8 yellow, 5 blue and 7 red balls. Two balls are taken at random. Draw a tree diagram to show this information.
Tree Diagrams when Items are not Replaced Part 2	In part 2 of this lesson we will answer the question below using the tree diagram that we completed in part 1. Using the tree diagram from Part 1 of this lesson i) calculate the probability that both balls are the same colour.

	You must be able to calculate the probabilities of the outcomes on a tree diagram before trying this lesson. If not then watch the following lesson: Tree Diagrams Part 2 Once we have completed this question we will compare the difference between the question above and the question below which look very similar to each other but is very different. A bag contains 8 yellow, 5 blue and 7 red balls. A ball is chosen at random **and then replaced**. Then another ball is chosen at random. Calculate the probability that both balls are the same colour.
Tree Diagrams Exam Tip	In this lesson we will learn a quicker way to complete tree diagram questions. This method will save you a lot of time on more complicated tree diagram questions. The question covered in this lesson is: A bag contains 5 yellow, 4 blue and 6 red balls. Two balls are chosen. Calculate the possibility that the two balls are different colours.