Maths
Number

Year 9H
Term 1

Your teacher will tell you which topic you should revise. Read and learn all the information in the topic, ready for a Quiz in lesson.

Topic 1: Basic Number

In Maths you will encounter many problems set in real-life contexts. You will have to read them carefully, think about the problem and then plan a strategy to solve it. This may involve arithmetical skills such as long multiplication and long division and you will need to know how to work out these problems with or without a calculator.
For example: A party of 613 children and 59 adults are going on a day out to a theme park. How many coaches, each holding 53 people, will be needed?
Altogether there are 613 + 59 = 672 people. Therefore, the number of coaches needed is 672 ÷ 53 = 12, with 36 people remaining. This means 13 coaches must be booked so all passengers can be sat down.

Muiltiplying with decimals: Example: 3.42 x 2.7

1. Multiply each decimal by a power of 10 to make it into a whole number. 3.42×10^2 (100) = 342 and 2.7×10^1 (10) = 27
2. Multiply your two whole numbers. 342 x 27 = 9234
3. Multiply together the powers you used from step 1. $10^2 \times 10^1 = 10^3$ (or 100 x 10 = 1000)
4. Divide the product of the numbers from step 2 by the power of 10 from step 3. 9234 ÷ 10^3 (1000) = 9.234

Dividing by a decimal: Example: 0.42 ÷ 0.2

1. Look at the value in your questions which has the most digits after the decimal place. In this case 0.42 has more digits after the decimal place
2. Multiply this value by a power of 10 so that you make it into a whole number. 0.42×10^2 (100) = 42
3. Multiply your other value in the calculation by the same power of 10. 0.2×10^2 = 20
4. Now complete the division. 42 ÷ 20 = 2.1

Rounding to Significant Figures (You will often see Significant Figures used when you want to approximate a number that has quite a few digits in it.)

1. From the left of the number, count the digits (when the number is less than 1, e.g. 0.0456678, **start from the first non-zero digit**). If you are rounding to 2 significant figures (sf) count in two digits, 3 sf count in three digits, and so on.
2. Look at the next digit to the right of this. When the value is less than 5 then leave the last counted digit the same. If, however, the next digit is 5 or greater then add 1 to the previously counted digit. For example, 45389 to 2 sf is 45000 and 45389 to 3 sf is 45400.

Ignore all other digits, BUT you must put in enough zeros to keep the value of the number.

How to round to significant figures

Round the following...	... to 1 significant figure	... to 2 significant figures
3875	4000	3900
6.254	6	6.3
0.07109	0.07	0.071

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Topic 1: Basic Number

Lowest Common Multiple (LCM): The LCM of two numbers is the smallest value which appears in the multiplications for both numbers.

For example, find the LCM of 18 and 24.

Write out the 18 times tables: 18, 36, 54, 72, 90

Write out the 24 times tables: 24, 48, 72 I can stop here as I can see the first number that appears in both lists is 72, so this is the LCM of 18 and 24.

Highest Common Factor (HCF): The HCF of two numbers is the biggest value that divides exactly into both numbers.

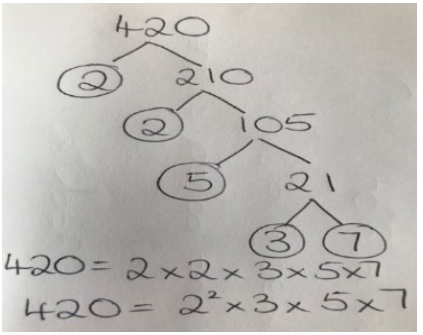
For example, find the HCF of 28 and 16.

Write out the factors of 28: 1, 2, 4, 7, 14, 28

Write out the factors of 16: 1, 2, 4, 8, 16 I can see the biggest number that appears in both lists is 4, so this if the HCF of 28 and 16.

Prime factors: Here we find we can write any value as a product (multiplication) of its prime factors.

1) Start by writing your number at the top of your working out and draw two lines (branches coming out of it)
2) Now find a pair of numbers which multiply together to give this value, ideally making one of them a prime number (has exactly 2 factors, 1 and itself)
3) Circle your prime number as there is nothing else you can do here and then draw two branches out of your other value.
4) Repeat process 2 from these new branches and keep repeating until you only have prime numbers.
5) Write your circled values down as a multiplication together in index form, you should find the answer is your original number.



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Topic 2: Algebra: Algebraic Manipulation

Substitution

Substitution involves replacing one or more letters with numbers in an **expression**, any combination of letters and numbers, or **formula**, like equations but include more than one variable. Whenever you substitute a number for a variable in an expression you are replacing a letter with its known value. It is worthwhile when substituting values into an expression or formula to write them in with brackets around them. The reason it is useful putting brackets around substituted values is to ensure that negative values are calculated correctly. It is also essential when substituting to remember BIDMAS, the order of calculation.

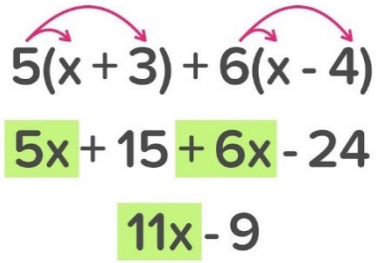
Evaluate a / 2b + c, for a = 10 b = 1 c = 4

a / 2b + c (a = 10 b = 1 c = 4)

= 10 / 2(1) + 4

= 10 / 2 + 4 (Divide before Adding)

= 5 + 4 = 9 ✓



Expanding

In mathematics to expand usually means 'multiply out', whereby the variable directly outside the bracket is multiplied by every variable within the bracket. For example, expressions such as 3(y + 2) becomes 3y + 6 or $4y^2(2y - 3)$ which becomes $8y^3 - 12y^2$. Remember the product of a negative and positive value is negative and the product of two negative values will be positive. **Note: A minus sign on its own in front of a bracket actually means -1 so –(x – 3) would become – x + 3**

You will often see two separate brackets in an expression which need expanding like explained above and then like terms collected to complete your answer. Like terms are terms that have the same letter(s) raised to the same power but can have different numerical coefficients (numbers in front of them).

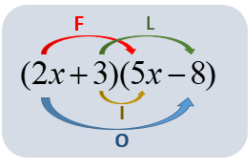
Factorising into one bracket

Factorisation is the opposite of expansion. It puts an expression back into the brackets it may have come from. In factorisation you need to look for the highest common factors in every term of the expression. To factorise an expression such as $6m^2 + 9m$, first look at the numerical coefficients 6 and 9, their highest common factor (HCF) is 3. The look at the variables m^2 and m, their HCF is m (remember m^2 means m x m). The expression could therefore be seen as 3m x 2m for $6m^2$ and 3m x 3 for 9m. 3m is the common factors in both these variables therefore your answer is written as 3m(2m + 3). You can always check your factorised answer by expanding again to see if you get back to the original expression.

Quadratic expansion

A quadratic expression is indicated by having two brackets that need multiplying together, giving you an answer where a variable has a power of 2. For example being asked to expand (3y + 2)(4y – 5) each of these brackets can be called a **binomial**, the sum of two terms. You can use the acronym FOIL to help expand the double brackets. Where F – First variable in each bracket, O – outer variables in each bracket, I – inner variables in each bracket and L – last variables in each bracket.

FOIL Method



First: $(2x)(5x) = 10x^2$

Outer: $(2x)(-8) = -16x$

Inner: $(3)(5x) = 15x$

Last: $(3)(-8) = -24$

$(2x+3)(5x-8)$
$= 10x^2 - 16x + 15x - 24$
$= 10x^2 - x - 24$

Maths
Support and application

Year 9H
Term 1

Vocabulary	Wider Research	Apply
Negative Number **Positive Number** **Significant** **Divisible** **Factor** **Integer** **Multiple** **HCF** **LCM** **Square Number** **Square Root** **Cube** **Cube Root** **Power** **Factor Tree** **Prime Number** **Index Form** **Prime Factor** **Equation** **Expression** **Substitution** **Expanding** **Factorisation** **Quadratic** **Binomial**	**Topic 1: Basic Number** https://www.mathsgenie.co.uk/multiplication-and-division.html https://corbettmaths.com/2013/09/07/rounding-significant-figures/ https://www.mathsgenie.co.uk/factors-multiples-and-primes.html **Topic 2: Algebra** https://www.bbc.co.uk/bitesize/guides/zqdqtfr/revision/3 https://www.bbc.co.uk/bitesize/guides/zcqmsrd/revision/3 https://www.youtube.com/watch?v=UrOJrsRv9iI https://corbettmaths.com/2013/12/23/expanding-two-brackets-video-14/	1) A floor measures 5.25 m by 4.5 m. It is to be covered with square carpet tiles of side 25 cm. Tiles are sold in boxes of 24. How many boxes are needed? 2) a) Express 315 as a product of its prime factors. b) Find the highest common factor (HCF) of 315 and 63. 3) Jack thinks of two numbers. He says, "The highest common factor (HCF) of my two numbers is 9. The lowest common multiple (LCM) of my two numbers is 108." Write down two numbers that Jack could be thinking of. 4) Find the value of L = a2 -8b2 when a = -6 and b = ½ 5) Expand the following expression $5p^3(4p^2 - 5m)$ 6) Expand and simplify m(4 + p) + p(3 + 2m) 7) Expand and simplify 3y(4w + 5t) – 2w(5y – 1) 8) A rectangle with side lengths of 6 and 4x – 2 has a smaller rectangle within it with side lengths of 3 and 2x + 3. Work out the remaining area between the two rectangles. 9) Factorise the following expressions 5k – 25 6my + 4py $10a^2b - 15a^2b^2$ 10) Expand and simplify this quadratic expression (t + 5)(t – 2) 11) Expand and simplify (2t – 3) (3t – 6)