Unit 1 Foundation   Number

BIDMAS is the acronym to give the priority of operations:
Brackets, **Indices** (powers and roots),
Division AND **Multiplication**, **Addition** AND **Subtraction**
Do anything in brackets first, then any indices, then, from left to right, and divisions or multiplications, then, from left to right, any additions or subtractions.
Video 211 - https://tinyurl.com/y98jn4wk

= means equals

≠ means not equals

≈ means roughly equals

A **function** is a rule that acts on a number. Eg) x2 (times 2)

An **inverse function** reverses the effect of a function

+ and − are inverse operations

x and ÷ are inverse operations

Key Points:

https://tinyurl.com/y7zu77l9

Squaring a number means multiplying it by itself. The result is a **square number**. Eg) $4^2 = 4 \times 4 = 16$ which is a square number
Video 226 - https://tinyurl.com/ya4v48rn

Cubing a number means multiplying it by itself twice. The result is a **cube number**. Eg) $4^3 = 4 \times 4 \times 4 = 64$ which is a cube number
Video 212 - https://tinyurl.com/ydd72o3d

The **square root** of a number is the number you must square to get the original number. It is the inverse of squaring. Eg) $\sqrt{16} = 4$
Video 228 - https://tinyurl.com/yc28q7lv

The **cube root** of a number is the number you must cube to get the original number. It is the inverse of cubing. Eg) $\sqrt[3]{64} = 4$
Video 214 - https://tinyurl.com/y9q9m7nb

A **prime number** has two factors, itself and 1. Eg) 2, 3, 5, 7, 11, 13, 17, 19, 23…
Video 225 - https://tinyurl.com/ybnk7z5n

To **multiply powers** of the same number, add the indices, e.g. $4^3 \times 4^8 = 4^{11}$
To **divide powers** of the same number, subtract the indices, e.g. $4^8 \div 4^3 = 4^5$
Video 174 - https://tinyurl.com/za9u7h2

Knowledge Check:

https://tinyurl.com/ya7obwjs

Rounding is where you approximate a number to make it more manageable.
If we round to decimal places, we get rid of all digits after the required decimal place. The final decimal place goes up by one if the first digit we ignore is 5 or more. Eg) 4.597 = 4.6 (1 d.p.)
Video 278 - https://tinyurl.com/y9x7ltoh

If we round to **significant figures,** we get rid of all digits after the required digits from the left (ignoring leading zeros). The final digit goes up by one if the first digit we ignore is 5 or more. Eg) 0.0465 = 0.047 (2 s.f.)
Video 279a - https://tinyurl.com/yakhqfup

To **estimate** we round all numbers in a calculation to 1 significant figure (1 s.f.).

A **factor** is a number you can multiply by to get a desired number. Eg) 2 is a factor of 8
Video 117 - https://tinyurl.com/zymmfev

A **multiple** is a number you can divide by an integer to get a desired number. Eg) 16 is a multiple of 8
Video 220 - https://tinyurl.com/yaudfco3

Highest Common Factor (**HCF**) is the highest factor that is common to two or more numbers. Eg) 4 is the HCF of 8 and 12
Video 219 - https://tinyurl.com/zel3pzq

Lowest Common Multiple (**LCM**) is the lowest multiple that is common to two or more numbers. Eg) 24 is the LCM of 8 and 12
Video 218 - https://tinyurl.com/y8hg8z35

Unit 2 Foundation   Algebra

A **term** is a number, a letter, or a number and a letter multiplied together. Eg) 3, a, 2b, $4c^2$
Video 19 - https://tinyurl.com/hgw9ulw
Letters represent **variables**; the value can vary.
Like terms contain the same letters or power of letters, or are just numbers. Eg) 3 and 4, 3a and 6a, b^3 and $2b^3$
To **simplify** an expression we can **collect like terms**.
Eg) $3a + 2 + 4a = 7a + 2$
Video 9 - https://tinyurl.com/z77lutd
We can also simplify multiplications by removing the multiplication symbol and divisions by making into a fraction. Eg) $2 \times a = 2a$, $c \div d = c/d$ or $\frac{c}{d}$

If we have an expression or equation and are given the value of a variable, we can **substitute** this value in. Eg) $3a + b = c$ where $a = 2$ becomes $6 + b = c$
Video 20 - https://tinyurl.com/zd6tv9j

A **formula** shows the relationship between terms. Eg) $4a + b = c$

An **expression** is a collection of terms. Eg) $2a + 1$

An **equation** is an expression equalling another. Eg) $3b + 2 = 2d$

An **inequality** is where two expressions don't, or don't necessarily, equal each other ($<, >, \leq, \geq$). Eg) $4f > 6$

An **identity** is two expressions that always equal each other, regardless of the variables. Eg) $2(a + 5) \equiv 2a + 10$

A **not equal** symbol shows that two expressions do not equal each other. Eg) $2a \neq b$
Video 16 - https://tinyurl.com/j5cdu68

To multiply terms, multiply any numbers, put non-like terms next to each other, and add powers of like terms. Eg) $2a \times 3a \times 4b = 24a^2b$
Video 18 - https://tinyurl.com/ybaxlv6k
To multiply the same variable with powers, add the indices. Eg) $2a^2 \times 4a^3 = 8a^5$
To divide the same variable with powers, subtract the indices. Eg) $8a^5 \div 2a^3 = 4a^2$
Video 11 - https://tinyurl.com/ycvjot5b

To **expand brackets**, multiply the terms in the brackets by the multiplier. Eg) $5(a + 2) = 5 \times a + 5 \times 2 = 5a + 10$
Video 13 - https://tinyurl.com/hepjutn
To expand **double brackets**, multiply every term in on bracket by every term in the other. Eg) $(a + b)(c + d) = a \times c + a \times d + b \times c + b \times d = ac + ad + bc + bd$
Video 14 - https://tinyurl.com/ycptvous

To **factorise** expressions we reverse the expansion of brackets. We do this by dividing through by the **HCF** (highest common factor) and putting the HCF as the multiplier outside the brackets. Eg) $5a + 10b = 5(a + 2b)$

Video 117 - https://tinyurl.com/zymmfev

To rearrange an equation (or inequality), always do the same to both sides of the equation and use the opposite operator to remove a term. Eg) $a + 2b = c$ [- a]

$2b = c - a$ [÷ 2]

$b = \frac{c-a}{2}$

We use this to change the subject of a formula.

Video 110 - https://tinyurl.com/y866296z

Key Points:

https://tinyurl.com/y9j5u8ws

Knowledge Check:

https://tinyurl.com/yb8a3eto