

Year 10 Unit 5: Number

INDEX LAWS: MULTIPLICATION AND DIVISION

when the **base** is the **same**, we use the following laws when multiplying and dividing

multiplying **add the powers**
e.g. $a^m \times a^n = a^{m+n}$

dividing **subtract the powers**
e.g. $a^m \div a^n = a^{m-n}$

raising a power by another power **multiply the powers**
e.g. $(a^m)^n = a^{mn}$

SPECIAL POWERS

p^0 anything to the **power of 0** is **1**

p^1 anything to the **power of 1** is **itself**

negative indices **reciprocal**, e.g. $a^{-m} = \frac{1}{a^m}$

fractional indices **root**, e.g. $a^{\frac{1}{n}} = \sqrt[n]{a}$
the **power $\frac{1}{2}$** = **square root**
the **power $\frac{1}{3}$** = **cube root**

STANDARD FORM: NOTATION

notation allows us to write **very large** or **very small** numbers without lots of zeros
numbers written in the form **$A \times 10^n$**
'A' is **between 1 and 10**
'n' is any **integer**

'n' is positive **large number** (≥ 1)

'n' is negative **small number** (< 1)

STANDARD FORM: LAWS (MULTIPLY & DIVIDE)

multiplication $A \times 10^n \times B \times 10^m = (A \times B) \times 10^{n+m}$

division $A \times 10^n \div B \times 10^m = (A \div B) \times 10^{n-m}$

INTEREST

simple interest the **same amount** is **added each year**, find the **percentage, x by years** and **add on**

compound interest exponential growth, **accumulated interest** paid on the original amount, each year a **larger amount** of interest is paid.
final total = principal x multiplierⁿ
principal = **original / starting amount**
multiplier = **% increase / decrease**
n = **number of time periods** (per annum = per year)

SURDS

surd an **irrational** number that is a **root** of a positive integer, whose **value cannot be determined exactly**
surds are **infinite non-recurring decimals**
e.g. $\sqrt{2}$

rational number an **integer**, **terminating decimal** or **recurring decimal** (can be negative)
they can be **represented as fraction** in the form $\frac{p}{q}$
where p and q are integers and $q \neq 0$

irrational number any number that is **not rational**, it has an **infinite** number of **decimal places**, that **don't repeat**
e.g. $\pi, \sqrt{3}$

SURDS: LAWS

multiplying surds $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$
special case: $\sqrt{a} \times \sqrt{a} = a$

dividing surds $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

simplifying surds using **square number factors** and **converting** it to an **integer**, to get the **smallest number possible in the surd**

rationalising the denominator when you **remove a surd** in the **denominator** by writing an **equivalent fraction** (usually with a surd in the numerator), using the **surd on the denominator**

NUMBER SENSE

decimal **not a whole number**, it has a **decimal point** in it, can be **positive** or **negative**

terminating decimals decimals which have a **finite number of place values**

recurring decimals decimals with **repeating digits** or **repeating patterns of digits**

RATIO

ratio **compares the size** of one part to **another part**

ratio notation the ratio of **A to B** is written as **A:B**

part (share) a **proportion** of the original amount

whole the **total** amount

proportion proportion **compares the size of one part** to the **size of the whole**

unit a **standard** amount used to **measure** something

compound units a unit made of **two other units**.
e.g. *speed is distance per time m/s*