

“JUST THE MATHS”

SLIDES NUMBER

1.2

**ALGEBRA 2
(Numberwork)**

by

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UNIT 1.2 - ALGEBRA 2

NUMBERWORK

1.2.1 TYPES OF NUMBER

(a) NATURAL NUMBERS

1, 2, 3, 4,

(b) INTEGERS

.....-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5,

(c) RATIONALS

The ratio of two integers or a terminating decimal or a recurring decimal

$$\frac{2}{5} = 0.4 \quad \text{and} \quad \frac{3}{7} = 0.428714287142871....$$

(d) IRRATIONALS

Neither the ratio of two integers nor a recurring decimal

$$\pi \simeq 3.1415926....., \quad e \simeq 2.71828..... \quad \sqrt{2} \simeq 1.4142135....$$

$$\sqrt{5} \simeq 2.2360679....$$

The above four types of number form the system of “**Real Numbers**”.

1.2.2 DECIMAL NUMBERS

(a) Rounding to a specified number of decimal places

When rounding to n decimal places, the digit in the n -th place is left as it is when the one after it is below 5; otherwise it is taken up by one digit.

$362.5863 = 362.586$ to 3 decimal places;

$362.5863 = 362.59$ to 2 decimal places;

$362.5863 = 362.6$ to 1 decimal place;

$362.5863 = 363$ to the nearest whole number.

(b) Rounding to a specified number of significant figures

The first significant figure of a decimal quantity is the first non-zero digit from the left, whether it be before or after the decimal point.

$0.02158 = 0.0216$ to 3 significant figures;

$0.02158 = 0.022$ to 2 significant figures;

$0.02158 = 0.02$ to 1 significant figure.

1.2.3 USE OF ELECTRONIC CALCULATORS

(a) B.O.D.M.A.S.

$$7.25 + 3.75 \times 8.32 = 38.45, \text{ not } 91.52.$$

$$6.95 \div [2.43 - 1.62] = 8.58, \text{ not } 1.24$$

(b) Other Useful Numerical Functions

\sqrt{x} , x^2 , x^y , $x^{\frac{1}{y}}$, using, where necessary, the “shift” control

$$\sqrt{173} \simeq 13.153, \quad 173^2 = 29929, \quad 23^3 = 12167, \quad 23^{\frac{1}{3}} \simeq 2.844$$

(c) The Calculator Memory

For $(1.4)^3 - 2(1.4)^2 + 5(1.4) - 3 \simeq 2.824$, store each of the four terms in the calculation (positively or negatively) then recall their total sum at the end.

1.2.4 SCIENTIFIC NOTATION

(a) Very large numbers written as

$$a \times 10^n$$

n is a positive integer

a lies between 1 and 10.

$$521983677.103 = 5.21983677103 \times 10^8$$

(b) Very small numbers written as

$$a \times 10^{-n}$$

n is a positive integer

a lies between 1 and 10.

$$0.00045938 = 4.5938 \times 10^{-4}$$

Note:

Enter numbers by using the **EXP** or **EE** buttons

EXAMPLES

1. Key in the number 3.90816×10^{57} on a calculator.

Press **3.90816** **EXP** **57**

2. Key in the number 1.5×10^{-27} on a calculator

Press **1.5** **EXP** **27** **+/-**

Notes:

(i) Scientific notation is also called *floating point notation*.

(ii) Accuracy = one significant figure more than the least number of significant figures in any measurement.

1.2.5 PERCENTAGES

Definition

A percentage is a fraction whose denominator is 100.

$$\frac{17}{100} = 17\%$$

EXAMPLES

1.

$$\frac{2}{5} = \frac{2}{5} \times \frac{20}{20} = \frac{40}{100} = 40\%$$

2.

$$27\% \text{ of } 90 = \frac{27}{100} \times 90 = \frac{27}{10} \times 9 = 24.3$$

3.

$$30\% = \frac{30}{100} = 0.3$$

1.2.6 RATIO

We may use a colon (:)

eg. 7:3 instead of either $7 \div 3$ or $\frac{7}{3}$.

7:3 could also be written $\frac{7}{3}:1$ or $1:\frac{3}{7}$.

EXAMPLES

1. Divide 170 in the ratio 3:2

170 is made up of $3 + 2 = 5$ parts, each of value $\frac{170}{5} = 34$.

$$3 \times 34 = 102 \text{ and } 2 \times 34 = 68.$$

$$170 = 102 + 68$$

2. Divide 250 in the ratio 1:3:4

250 is made up of $1 + 3 + 4 = 8$ parts, each of value $\frac{250}{8} = 31.25$.

$$3 \times 31.25 = 93.75 \text{ and } 4 \times 31.25 = 125.$$

$$250 = 31.25 + 93.75 + 125.$$