

## Calculator Use

This is a big part of the Junior Cert course. You must be able to use a calculator. A word of warning some students make the mistake of using the calculator too much, which will make you over dependent on it.

Each calculator is slightly different so have you own calculator in front of you and do the work as we go.

### Scientific notation

This is one of the easier parts to deal with as we use the **EXP** button on the calculator

A number in scientific notation is written in the form  $a.bc \times 10^n$  so it has only one digit before the decimal point.

A big number has a positive power on the 10.

$$2300000 = 2.3 \times 10^6$$

$$1.5 \times 10^4 = 15000$$

A small number has a negative power on the 10.

$$0.0000023 = 2.3 \times 10^{-6}$$

$$1.5 \times 10^{-4} = 0.00015$$

**Example 1** Find the value of  $2.5 \times 10^{-5} + 1.4 \times 10^{-6}$  in the form  $a.bc \times 10^n$ .

$$2.5 \times 10^{-5} + 1.4 \times 10^{-6}$$

All of this is done on the calculator as follows

$$2.5 \boxed{\text{EXP}} 3 \boxed{\pm} + 1.4 \boxed{\text{EXP}} 6 \boxed{\pm}$$

$$= 0.0000264$$

$$= 2.64 \times 10^{-5}$$

**Note** Must change 0.0000265 back into scientific notation so need to move the decimal so that is after the first digit. Count the number of places the decimal has moved. Remember that small numbers have a negative power on the 10.

**Example 2** Find the value of

$$(i) \quad (3.4 \times 10^5) \times (2.1 \times 10^6)$$

$$(ii) \quad (2.5 \times 10^3)^2$$

$$(iii) \quad \frac{3.6 \times 10^4}{1.2 \times 10^2}$$

$$(iv) \quad \frac{(2.1 \times 10^3) \times (4 \times 10^5)}{7 \times 10^{-2}}$$

$$(i) \quad (3.4 \times 10^5) \times (2.1 \times 10^6)$$

$$3.4 \text{ [EXP] } 5 \times 2.1 \text{ [EXP] } 6 = 7.14 \times 10^{11}$$

$$(ii) \quad (2.5 \times 10^3)^2 \text{ square means multiply by itself.}$$

$$= (2.5 \times 10^3) \times (2.5 \times 10^3)$$

$$= 2.5 \text{ [EXP] } 3 \times 2.5 \text{ [EXP] } 3 = 6250000$$

$$= 6250000 = 6.25 \times 10^6$$

**Note** Must change 6250000 back into scientific notation so need to move the decimal so that is after the first digit. Count the number of places the decimal has moved. Remember that big numbers have a positive power on the 10.

$$(iii) \quad \frac{3.6 \times 10^4}{1.2 \times 10^2} = 3.6 \text{ [EXP] } 4 \div 1.2 \text{ [EXP] } 2 = 300 = 3 \times 10^2$$

$$(iv) \quad \frac{(2.1 \times 10^3) \times (4 \times 10^5)}{7 \times 10^{-2}}$$

$$(2.1 \times 10^3) \times (4 \times 10^5) = 2.1 \text{ [EXP] } 3 \times 4 \text{ [EXP] } 5 = 8400000000$$

$$8400000000 \div 7 \text{ [EXP] } 2 \text{ [±]} = 1.2 \times 10^{11}$$

**Note** In the last example split it up. Do out the top first and then divide by the bottom.

## Decimal Places

This is when we asked to round off our answer to a required number of decimal places.

If we are asked to round off to two decimal places we need to have only two digits after the decimal point.

**Example 3** Round 3.567 off to two decimal places

Go to the third digit if it is four or less leave the digit in-front alone if it is 5 or more round the digit in-front up.

$$3.567 = 3.57$$

**Example 4** Round 23.6953

to one decimal place,  
to two decimal places,  
to three decimal places.

One decimal place – look at the second digit after the decimal.

$$23.6953 = 23.7$$

Two decimal places – look at the third digit after the decimal.

$$23.6953 = 23.70 \text{ since when we round up } 69 \text{ becomes } 70$$

Three decimal places – look at the fourth digit after the decimal.

$$23.6953 = 23.695$$

## Significant Figures

This is nearly the same as decimal places but this time we are to round off to two significant figures we need to have only two digits and every other digit must turn into zeros.

**Example 5** Round 53643  
to one significant figure,  
to two significant figures,  
to three significant figures.

One significant figure – look at the second digit if it is 4 or less leave the first digit alone otherwise round up.

$$53643 = 50000$$

Two significant figures – look at the third digit.

$$53643 = 54000$$

Three significant figures – look at the fourth digit after the decimal.

$$53643 = 53500$$

## Estimations and calculator use

Square roots

$$\sqrt{41.5} = \boxed{\sqrt{\quad}} 41.5 = 6.44$$

Powers

$$(4.1)^3 = 4.1 \boxed{y^x} 3 = 68.921$$

Fractions or reciprocals

$$\frac{1}{3.5} = 1 \boxed{\div} 3.5 = 0.2875714286$$

## Estimations

This is where we need to round a number so that it is easy to evaluate.

**Example 6** Estimate the value of  $\sqrt{34.56}$

Have to decide which number 34.56 is closest to, which we know the root of.  
Answer 36

$$\sqrt{34.56} \text{ is approximately } = 6.$$

**Example 7** Estimate the value of  $(5.3)^3$

5.3 is close to 5

$$(5.3)^3 \text{ is approximately } = 5^3 = 125$$

**Example 8** Estimate the value of  $\frac{1}{0.23}$

0.23 is close to 0.2

$$\frac{1}{0.23} \text{ approximately } = \frac{1}{0.2} = 5$$

**Example 9** By rounding appropriately, estimate the value of

$$(3.57)^2 + \frac{1}{1.65} \times \sqrt{24.3}$$

Evaluate  $(3.57)^2 + \frac{1}{1.65} \times \sqrt{24.3}$ , correct to two decimal places.

$$(3.57)^2 + \frac{1}{1.65} \times \sqrt{24.3}$$

$$\text{is approximately } = 4^2 + \frac{1}{2} \times \sqrt{25}$$

$$= 16 + \frac{1}{2} \times 5$$

$$= 16 + 2.5 = 18.5$$

$$(3.57)^2 + \frac{1}{1.65} \times \sqrt{24.3}$$

$$= 12.7449 + 0.606 \times 4.9295$$

$$= 15.732$$

## How to use fractions on the calculator

We need to be able to use the  $\boxed{a\ b/c}$

**Example 10** Find the value of

$$(i) \frac{1}{2} + \frac{1}{3}$$

$$(ii) 1\frac{2}{3} + 2\frac{3}{5}$$

$$(iii) 3\frac{1}{2} \times 4\frac{3}{5}$$

$$(i) \frac{1}{2} + \frac{1}{3}$$

$$1 \boxed{a\ b/c} 2 + 1 \boxed{a\ b/c} 3 = \frac{5}{6}$$

**Note** When you use the calculator  $1 \boxed{a\ b/c} 2$  appears as 1 r 2.

$$(ii) 1\frac{2}{3} + 2\frac{3}{5}$$

$$1 \boxed{a\ b/c} 2 \boxed{a\ b/c} 3 + 2 \boxed{a\ b/c} 3 \boxed{a\ b/c} 5 = 4\text{ r }4\text{ r }15 = 4\frac{4}{15}$$

$$(iii) 3\frac{1}{2} \times 4\frac{3}{5}$$

$$3 \boxed{a\ b/c} 1 \boxed{a\ b/c} 2 \times 4 \boxed{a\ b/c} 3 \boxed{a\ b/c} 5 = 16\text{ r }1\text{ r }10 = 16\frac{1}{10}$$