

## IB Math Studies 1 BELL WORK

complete:

- a If 24 kg of peas are sold for \$66.24, they earn me \$..... per kg.
- b My car uses 18 L of petrol every 261 km. The rate of petrol consumption is ..... km per litre.
- c 675 litres of water are pumped into a tank in 25 minutes. This is a rate of .....  $\text{L min}^{-1}$ .
- d Jasmin is paid \$87 for working 6 hours. This is a rate of \$..... per hour.

$$b. \frac{261 \text{ km}}{18 \text{ L}} = 14.5 \text{ km per litre}$$

$$a. \frac{\$66.24}{24 \text{ kg}} = \$2.76 \text{ per kg}$$

$$c. \frac{675}{25} = 27 \text{ L per min.}$$

$$d. \frac{\$87}{6 \text{ h}} = \$14.5/\text{h}$$

Rev 2A.

#6  $1.91 \times 10^8 \text{ m/s}$

$$\text{a) } 3740 \text{ m} \times \frac{1 \text{ s}}{1.91 \times 10^8 \text{ m}} \\ 1.96 \times 10^{-5}$$

$$\text{b) } \frac{2.1 \times 10^6 \text{ m}}{1.91 \times} \times \frac{1 \text{ s}}{1.91 \times 10^8}$$

$$\frac{100 \text{ km}}{\text{hr}} \times \frac{1000 \text{ m}}{\text{km}} \times \frac{1 \text{ hr}}{3600 \text{ s}} = 27.8 \text{ ms}^{-1}$$

$$\frac{30 \text{ mL}}{\text{s}} \times \frac{1000 \text{ mL}}{\text{L}} \times \frac{3600 \text{ s}}{\text{h}}$$

$$\frac{240000 \text{ L}}{1 \text{ min}} \times \frac{1 \text{ kL}}{1000 \text{ L}} \times \frac{60 \text{ min}}{1 \text{ hr}} =$$

$$42.3 \text{ km} \times \frac{\text{hr}}{5.7 \text{ km}}$$

## Chapter

# 2

## Measurement

- G** Accuracy of measurements
- H** Error and percentage error
- I** Currency conversions

**Syllabus reference: 1.2, 1.3, 1.4, 1.5**

## G

## ACCURACY OF MEASUREMENTS

balance mass (g)

## MEASURING DEVICES

grad. cylinder mL

What are some things we use to measure, and what are their units?

item:	measures:
ruler	cm / m
weight	lbs. kg
length	cm in
volume	m <sup>3</sup>
capacity	L

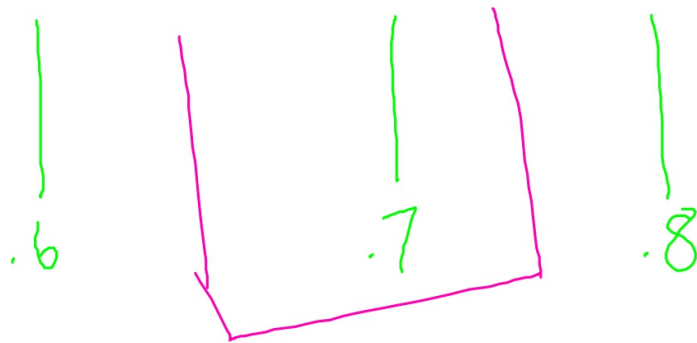
When we take measurements, we are usually reading some sort of scale.

The scale of a ruler may have millimetres marked on it, but when we measure the length of an object, it is likely to fall between two divisions. We **approximate** the length of the object by recording the value at the nearest millimetre mark. In doing so our answer may be inaccurate by up to a half a millimetre.

A measurement is accurate to  $\pm \frac{1}{2}$  of the smallest division on the scale.

Ling uses a ruler to measure the length of her pencil case. She records the length as 18.7 cm. Find the range of values in which the length may lie.

$$18.65 - 18.75 \text{ cm}$$



Find the range of possible values corresponding to the following measurements:

**a** 27 mm

**b** 38.3 cm

**c** 4.8 m

$$26.5 - 27.5$$

$$38.25 - 38.35$$

$$4.75 - 4.85$$

A rectangular block of wood was measured as 78 cm by 24 cm. What are the boundary values for its perimeter?

$$\underline{77.5} - \underline{78.5} \quad \underline{23.5} - \underline{24.5 \text{ cm}}$$

$$77.5(2) + 23.5(2) \text{ to } 78.5(2) + 24.5(2)$$

$$202 \quad \text{to} \quad 206 \quad \text{cm}$$

A paver is measured as 18 cm  $\times$  10 cm. What are the boundary values for its actual area?

$$17.5 - 18.5 \quad 9.5 - 10.5$$

$$17.5(9.5) \text{ to } 18.5(10.5)$$

# H

## ERROR AND PERCENTAGE ERROR

An **approximation** is a value given to a number which is close to, but not equal to, its true value.

An **estimation** is a value which has been found by judgement or prediction instead of carrying out a more accurate measurement.

If the actual or exact value is  $V_E$  and the approximate value is  $V_A$  then the

$$\text{error} = V_A - V_E$$

Error is often expressed as a percentage of the exact value, and in this case we use the *size* of the error, ignoring its sign. We therefore use the **modulus** of the error.

$$\text{Percentage error } E = \frac{|V_A - V_E|}{V_E} \times 100\%$$



You estimate a fence's length to be 70 m whereas its true length is 78.3 m. Find, correct to one decimal place:

- a** the error
- b** the percentage error.

Alan wants to lay carpet on his 4.2 m by 5.1 m lounge room floor. He estimates the area of the lounge room by rounding each measurement to the nearest metre.

- a** Find Alan's estimate of the lounge room area.
- b** The carpet costs \$39 per square metre. Find the cost of the carpet using Alan's estimate of the area.
- c** Find the actual area of Alan's lounge room.
- d** Find the percentage error in Alan's estimation.
- e** Will Alan have enough carpet to cover his lounge room? How should he have rounded the measurements?



Assignment:

2 G # 3, 6, 10

2 H # 4, 6