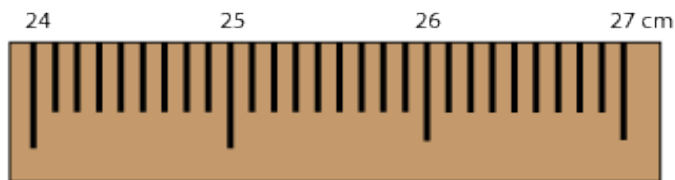
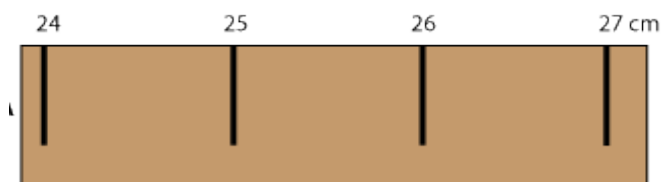


H/W 1 Including Answers (Uncertainties)

1. Pupil A measures the dimensions of a jotter to be 15.6 cm and 31.2 cm. He used the ruler shown below. Only part of it is shown.



- i) Express these values in the form $(l \pm \Delta l)$, where l is the dimension measured and Δl is the scale reading uncertainty. **Answer;** $(15.60 \pm 0.05)cm, (31.20 \pm 0.05)cm$
- ii) Calculate the percentage uncertainty in these values. **Answer;** 0.3% and 0.2%
- iii) Work out the area of the jotter with its absolute uncertainty and express it in the form $(A \pm \Delta A)$. **Answer;** $(4.87 \pm 0.02)10^2 cm^2$
2. Pupil B measures the dimensions of a jotter to be 15.6 cm and 31.2 cm. He used the ruler shown below.



- i) Express these values in the form $(l \pm \Delta l)$, where l is the dimension measured and Δl is the scale reading uncertainty. **Answer;** $(15.6 \pm 0.5)cm, (31.2 \pm 0.5)cm$
- ii) Calculate the percentage uncertainty in these values. **Answer;** 3% and 2%
- iii) Work out the area of the jotter with its absolute uncertainty and express it in the form $(A \pm \Delta A)$. **Answer;** $(4.86 \times 10^2 \pm 0.15 \times 10^2) cm^2$
3. Using a digital stop watch accurate to 100ths of a second and a meter stick accurate to mm, a pupil decides to find the speed of a vehicle down a slope complete with its absolute uncertainty. She repeats the activity six times and finds an average.

The distance was found to be 68.3 cm and the times were...

1.52 s, 1.59 s, 1.49 s, 1.51 s, 1.49 s, 1.55 s.

- i) Write down the average time with its scale reading uncertainty.

Answer; $(1.53 \pm 0.01)s$

ii) Write down the distance with its scale reading uncertainty.

Answer; $(68.30 \pm 0.05)cm$

iii) Write down the average time with its random uncertainty.

Answer; $(1.53 \pm 0.02)s$

iv) Calculate the average speed of the vehicle with its absolute uncertainty

Answer; $(44.60 \pm 0.60)ms^{-1}$

A jotter has a length that is accepted by all to be 12.5 cm.



All, that is, except Nestor!

No matter how often he measures the same jotter his value is different.

Unknown to Nestor his 30 cm ruler is 2 cm longer than everyone elses.

What measurement does Nestor record for the length of the jotter?

Answer; 11.7 cm

A timed event was accepted by all to be close to 22.0 s.



All, that is, except Benny!

No matter how often he times the same event his value is different.

Unknown to Benny his stopwatch is 3.0 s faster each minute than everyone elses.

What time does Benny record for the event?

Answer; 23.1 s