

The length of a boat is 25m rounded to the nearest metre.

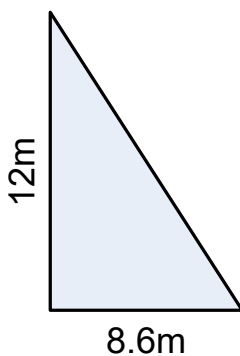
The error interval is the **lower bound**  $\leq$  **length**  $<$  **upper bound**. Note that the signs are different to account for the fact that when we round, 37.5 would round up to 38.

So the error interval would be  $24.5 \leq \text{length} < 25.5$ .

The error interval is the limit of the possible values of a particular variable that has been rounded or truncated. The length of the boat could be anything in between 24.5m and 25.5m so it could be 24m 87cm or 25m 49.8 cm. We don't know the actual value but we do know it is between the upper and lower bounds.

8. Work out and write the error intervals for the following.
- a A car is measured to the nearest 100 kg. It has a mass of 900 kg.
  - b A door height is measured to the nearest mm. It is measured as 1950mm.
  - c The width of a plate has been measured to the nearest cm. It is 23cm in diameter.
9. The following have been rounded to one significant figure. Write the error interval for each. The type of measure is given in parentheses.
- |                           |                                      |
|---------------------------|--------------------------------------|
| i) 600 miles (distance)   | v) 800 yards (length)                |
| ii) 5,000 tonnes (weight) | vi) 20 seconds (time)                |
| iii) 0.007 mm (length)    | vii) $70\text{kgm}^{-3}$ (density)   |
| iv) 30 metres (length)    | viii) $90\text{kgm}^{-2}$ (pressure) |

- 10 The dimensions of the right-angled triangle are shown below rounded to two significant figures.



- a Find the upper and lower bounds of the area of the triangle.
- b What is the percentage difference between the lower and upper bounds?
- c Write out the error interval for the area of the triangle.

11 The dimensions of the oblong below are rounded to 2 significant figures.



- a Write the error interval of the area of the oblong.  
b Write the error interval of the perimeter of the oblong.

12 A circular disc is 2mm deep rounded to one significant figure. The disc has a diameter of 3 metres, again, rounded to one significant figure. The weight of the disc is 40kg rounded to one significant figure. What is the error interval of the density of the disc?

Help:  $density, \rho = \frac{mass}{volume}$  and is measured in  $kgm^{-3}$

### Suitable Degrees of Accuracy

Sometimes you will be asked to give your answer to a suitable degree of accuracy. This means that you need to give your answer to the number of significant figures where the lower and upper bound match.

For example, if you had an upper bound of 7.21673837 and a lower bound of 7.21755847 then you would give the answer of 7.21 as after this point, the two numbers diverge from each other.

13 Give the following to a suitable degree of accuracy.

- a 83.399 and 84.019  
b 943.89288282 and 943.8998321  
c 5738.938484 and 5993.938293  
d 1234.6789 and 1234.5678

14 The length of the edges of a cube are 9cm long, rounded to one significant figure. The mass of the cube is 0.5 kg when rounded to one significant figure. Give the density of the cube to a suitable degree of accuracy.

Help:  $density, \rho = \frac{mass}{volume}$  and is measured in  $kgm^{-3}$