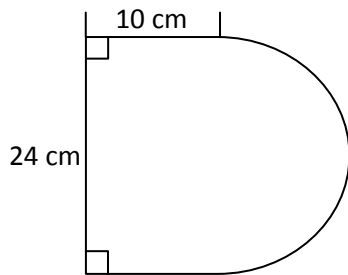


## Extension Measurement Practice #2

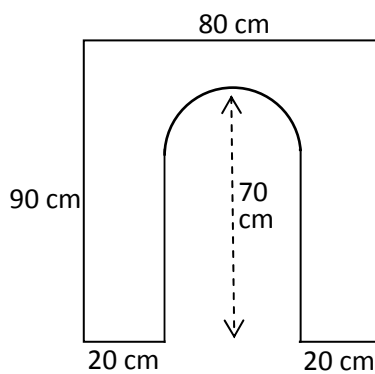
1. Calculate the area and perimeter of the D shape.  
Include limits of accuracy in your calculations.



Area = .....

Perimeter = .....

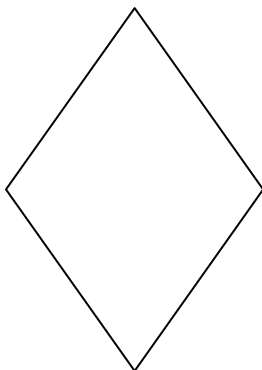
2. Calculate the area and perimeter of the arch shape.



Area = .....

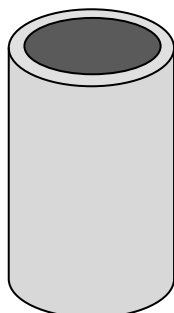
Perimeter = .....

3. Measure the shape below and calculate its area.  
Include limits of accuracy in your answer.



Area = .....

4. How much does a steel pipe weigh if:



- its diameter (to the outside) is 20 cm.
- the steel is 1 cm thick.
- it is 3 metres long.
- steel weighs 8 kg per litre.

Weight = .....

## Answers: Extension Measurement Practice #2

### Area

1. rectangle + semicircle

$$b \times h + \frac{1}{2} \times \pi \times r^2$$



$$10 \times 24 + \frac{1}{2} \times \pi \times \left(\frac{24}{2}\right)^2 = \mathbf{466.2 \text{ cm}^2}$$

accurate to  $\pm 0.5 \text{ cm}$

$$9.5 \times 23.5 + \frac{1}{2} \times \pi \times \left(\frac{23.5}{2}\right)^2 = 440.1 \text{ cm}^2$$

$$10.5 \times 24.5 + \frac{1}{2} \times \pi \times \left(\frac{24.5}{2}\right)^2 = 492.96 \text{ cm}^2$$

$$\mathbf{440 < \text{area} < 493 \text{ cm}^2}$$

(Range can be given in any suitable format. Note  $\pm 0.5$  on diameter, not radius)

### Perimeter

3 straight bits + half a circle

$$24 + 10 + 10 + \frac{1}{2} \times \pi \times d$$

$$24 + 10 + 10 + \frac{1}{2} \times \pi \times 24 = \mathbf{81.7 \text{ cm}}$$

accurate to  $\pm 0.5 \text{ cm}$

$$23.5 + 9.5 + 9.5 + \frac{1}{2} \times \pi \times 23.5 = 79.4 \text{ cm}$$

$$24.5 + 10.5 + 10.5 + \frac{1}{2} \times \pi \times 24.5 = 84.0 \text{ cm}$$

$$\mathbf{\text{perimeter} = 81.7 \pm 2.3 \text{ cm}}$$

2. rectangle – semicircle – inner rectangle

7 straight bits + half a circle

(height interior rectangle = 70 – circle radius; and circle has diameter = 40 so h = 50)

$$b \times h - \frac{1}{2} \times \pi \times r^2 - b \times h$$

$$80 + 90 + 20 + 50 + \frac{1}{2} \times \pi \times 40$$

$$(80 \times 90) - \left(\frac{1}{2} \times \pi \times \left(\frac{40}{2}\right)^2\right) - (40 \times 50)$$

$$+ 50 + 20 + 90$$

$$= \mathbf{4571.7 \text{ cm}^2}$$

$$= \mathbf{462.8 \text{ cm}}$$

3. Most accurate way to measure is point to point. Height = 48 mm and width = 34 mm

Area = two triangles of base = 34 and height = 24 ( $\frac{1}{2} \times 48$ )

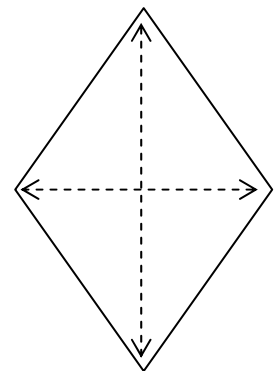
$$= 2 \times \left(\frac{1}{2} \times 34 \times 24\right) = \mathbf{816 \text{ mm}^2} \quad (= \mathbf{8.16 \text{ cm}^2})$$

Accurate to  $\pm 0.5 \text{ mm}$  (on height, not half height)

$$= 2 \times \left(\frac{1}{2} \times 33.5 \times \left(\frac{47.5}{2}\right)\right) = 795.6 \text{ mm}^2$$

$$= 2 \times \left(\frac{1}{2} \times 34.5 \times \left(\frac{48.5}{2}\right)\right) = 836.6 \text{ mm}^2$$

$$\mathbf{795 < \text{area} < 837 \text{ mm}^2}$$



(It can also be done as a 29 mm base by 28 mm high parallelogram = 8.12  $\text{cm}^2$  etc)

4. Diameter = 20, so outer radius = 10. Inner radius is 9, since it is 1 cm thick.

$$\mathbf{\text{cross section area}} = \text{outer circle} - \text{inner circle} = \pi \times 10^2 - \pi \times 9^2 = \mathbf{59.690 \text{ cm}^2}$$

$$\mathbf{\text{volume}} = \text{area} \times \text{depth} = 59.69 \times 300 = 17,907 \text{ cm}^3 \text{ volume} = 17,907 \text{ mL} = \mathbf{17.907 \text{ L}}$$

$$\text{If each L is 8 kg, then weight} = 17.907 \times 8 = \mathbf{143.26 \text{ kg}}$$