Extension Measurement Practice #3
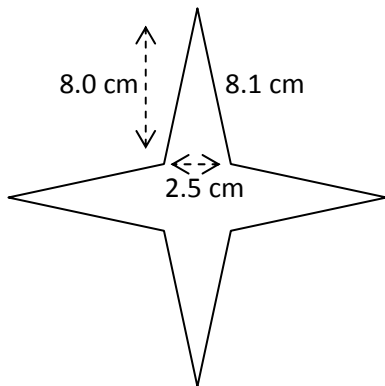
1.   Calculate the area and perimeter of the shape.

9 cm

12 cm
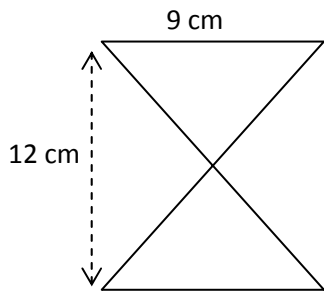
Area = ...

Perimeter = ...

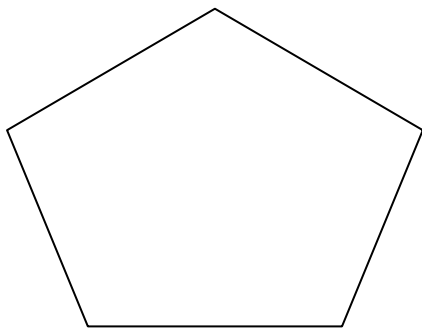2.   Calculate the area and perimeter of the star, including limits of accuracy.
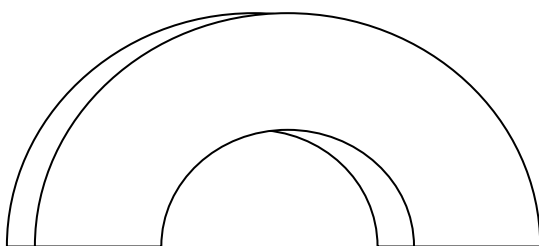   (each outer side is equal length, with the same angle)

8.0 cm   8.1 cm

2.5 cm

Area = ...

Perimeter = ...

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

Area = ...

4.   How much does a semicircular concrete arch weigh if:

- it is 120 cm across at the widest point.
- the inside gap has a diameter of 60 cm.
- it is 30 cm deep (thick).
- concrete weighs 2.4 tonnes per m^3.

Answers: Extension Measurement Practice #3

Area	Perimeter

1. 2 triangles

    $2 \times \frac{1}{2} \times b \times h$

    $2 \times \frac{1}{2} \times 9 \times 6 =$ **54 cm²**

    2 bases + 2 diagonals (via Pythagoras)

    $2 \times 9 + 2 \times \sqrt{9^2 + 12^2}$

    $2 \times 9 + 2 \times 15 =$ **48 cm**

2. square + 4 triangles

    $b \times h + 4 \times (\frac{1}{2} \times b \times h)$

    $2.5 \times 2.5 + 4 \times (\frac{1}{2} \times 2.5 \times 8)$

    $= $ **46.25 cm²**

    $2.55 \times 2.55 + 4 \times (\frac{1}{2} \times 2.55 \times 8.05)$

    $= 47.56$ cm²

    $2.45 \times 2.45 + 4 \times (\frac{1}{2} \times 2.45 \times 7.95)$

    $= 44.96$ cm²

    44.96 < area < 47.56 cm²

    8 sides

    8×8.1

    $= $ **64.8 cm**

    8×8.15

    $= 65.2$ cm

    8×8.05

    $= 64.4$ cm

    64.4 < perimeter < 65.2 cm

3. Trapezium = 34 mm base, 55 mm top, 26 mm height.

    Triangle = 55 mm base, 16mm height

    Trapezium $= \frac{34 + 55}{2} \times 26 = 1{,}157$ mm²   (= 11.57 cm²)

    Triangle $= \frac{1}{2} \times 55 \times 16 = 440$ mm²   (= 4.4 cm²)

    Area $= 1.157 + 440 =$ **1597 mm²   (= 15.97 cm²)**

    Max $= \frac{34.5 + 55.5}{2} \times 26.5 + \frac{1}{2} \times 55.5 \times 16.5 = 1650$

    Max $= \frac{33.5 + 54.5}{2} \times 25.5 + \frac{1}{2} \times 54.5 \times 15.5 = 1544$

    1544 < area < 1650 mm²

    (There are other ways to sensibly divide the pentagon e.g. three triangles   )
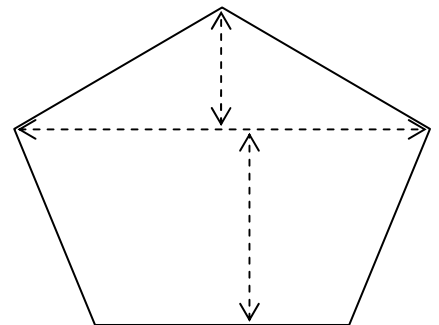
4. Diameter = 120 cm, so outer radius = 0.6 m. Inner diameter = 60 cm, so radius = 0.3 m.

    base area $= \frac{1}{2} \times$ (outer circle − inner circle) $= \frac{1}{2} \times (\pi \times 0.6^2 - \pi \times 0.3^2) =$ **0.4241 m²**

    volume = area × depth = 0.4241 × 0.3 = **0.1272m³ volume**

    If each m³ is 2.4 t, then weight = 0.1272 × 2.4 = **0.305 tonnes (= 305 kg)**