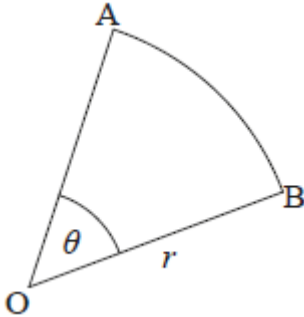


AI HL 08.09 [13 marks]

1. [Maximum mark: 8]

22M.1.AHL.TZ2.8

The diagram shows a sector,  $OAB$ , of a circle with centre  $O$  and radius  $r$ , such that  $\widehat{AOB} = \theta$ .



Sam measured the value of  $r$  to be 2 cm and the value of  $\theta$  to be  $30^\circ$ .

- (a) Use Sam's measurements to calculate the area of the sector. Give your answer to four significant figures.

[2]

Markscheme

$$\pi \times 2^2 \times \frac{30}{360} \quad (M1)$$

$$= 1.047 \text{ cm}^2 \quad A1$$

**Note:** Do not award the final mark if the answer is not correct to 4 sf.

[2 marks]

It is found that Sam's measurements are accurate to only one significant figure.

- (b) Find the upper bound and lower bound of the area of the sector.

[3]

Markscheme

attempt to substitute any two values from 1.5, 2.5, 25 or 35 into area of sector formula (M1)

$$\left( \text{upper bound} = \pi \times 2.5^2 \times \frac{35}{360} = \right) 1.91 \text{ cm}^2 (1.90895\dots)$$

**A1**

$$\left( \text{lower bound} = \pi \times 1.5^2 \times \frac{25}{360} = \right) 0.491 \text{ cm}^2 (0.490873\dots)$$

**A1**

**Note:** Given the nature of the question, accept correctly rounded **OR** correctly truncated 3 significant figure answers.

**[3 marks]**

- (c) Find, with justification, the largest possible percentage error if the answer to part (a) is recorded as the area of the sector.

[3]

Markscheme

$$\left( \left| \frac{1.047 - 1.90895\dots}{1.90895\dots} \right| \times 100 = \right) 45.2 \text{ (\%)} (45.1532\dots) \quad \mathbf{A1}$$

$$\left( \left| \frac{1.047 - 0.490873\dots}{0.490873\dots} \right| \times 100 = \right) 113 \text{ (\%)} (113.293\dots) \quad \mathbf{A1}$$

so the largest percentage error is 113 % **A1**

**Note:** Accept 45.1 (%) (45.1428), from use of full accuracy answers. Given the nature of the question, accept correctly rounded **OR** correctly truncated 3 significant figure answers. Award **AOA1A0** if 113% is the only value found.

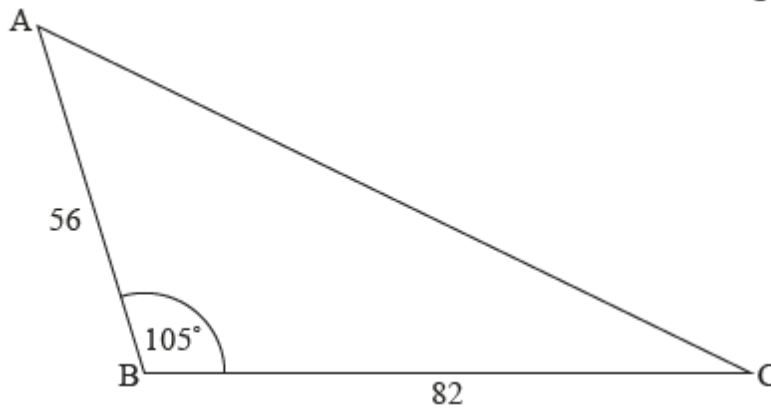
[3 marks]

2. [Maximum mark: 5]

21M.1.SL.TZ1.9

A triangular field ABC is such that  $AB = 56$  m and  $BC = 82$  m, each measured correct to the nearest metre, and the angle at B is equal to  $105^\circ$ , measured correct to the nearest  $5^\circ$ .

diagram not to scale



Calculate the maximum possible area of the field.

[5]

Markscheme

attempt to find any relevant maximum value (M1)

largest sides are 56.5 and 82.5 (A1)

smallest possible angle is  $102.5$  (A1)

attempt to substitute into area of a triangle formula (M1)

$$\frac{1}{2} \times 56.5 \times 82.5 \times \sin(102.5^\circ)$$

$$= 2280 \text{ (m}^2\text{)} \text{ (2275.37...)} \text{ A1}$$

[5 marks]

