



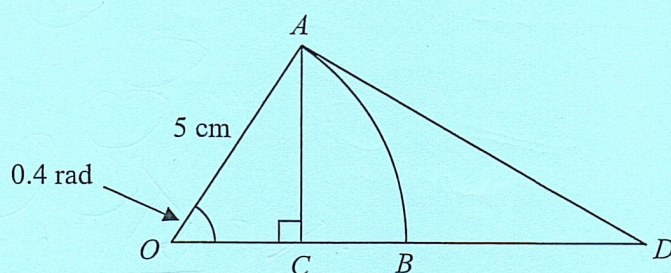
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Class: 3E1

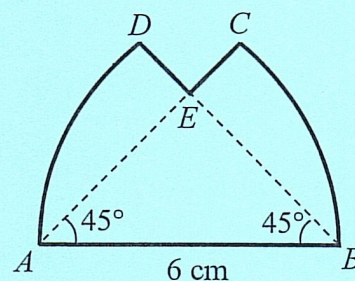
Date: 5th Aug

MA304.1.E1 – Circular Measure Exercise

1. The figure below shows part of a sector OAB of a circle with radius 5 cm and $\angle AOB = 0.4$ rad. The point C is the foot of the perpendicular of A to OB , and the tangent to the circle at A meets OB extended at D .



- (a) Find the area of the region ABC .
- (b) Find the perimeter of the region ABD .
2. The diagram shows a planar figure which is formed by overlapping two identical sectors ABC and BAD of a circle with radius 6 cm. Find, in **exact form**, the



- (a) area, and
- (b) perimeter of the figure.



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B-

$$1. \text{ (a) } AOB = \left\{ \frac{1}{2} \times 5^2 \times 0.4 \right\} \text{ units}^2$$
$$= 5 \text{ units}^2$$

$$AC = 5 \sin(0.4) \text{ units}$$

$$DC = 5 \cos(0.4) \text{ units}$$

$$\therefore \Delta AOC = \left\{ \frac{1}{2} \times 5 \sin(0.4) \times 5 \cos(0.4) \right\} \text{ units}^2$$
$$= 4.4835 \text{ units}^2$$

$$ABL = (AOB - \Delta AOC) \text{ units}^2$$

$$= (5 - 4.4835) \text{ units}^2$$

$$= 0.52 \text{ units}^2 \text{ (3 s.f.)}$$

this is not 3 sf.

$$\text{b) } AB = (0.4 \times 5) \text{ units}$$

$$= 2 \text{ units}$$

$$AD = 5 \tan(0.4) \text{ units}$$

$$BD = (OD - 5) \text{ units}$$

$$= \left\{ \frac{5}{\cos(0.4)} - 5 \right\} \text{ units}$$

$$\therefore \text{Perimeter of ABD} = \left\{ 2 + 5 \tan(0.4) + \frac{5}{\cos(0.4)} - 5 \right\} \text{ units}$$
$$= 4.54 \text{ units (3 s.f.)}$$

did you read? the lengths
are in cm?



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$$2. \text{ as Area of AED} = (ADB - AEB) \text{ units}^2$$

$$= \left\{ \frac{45^\circ}{360^\circ} \times \pi \times 6^2 - \frac{1}{2} (6 \cos(45^\circ))^2 \right\} \text{ units}^2$$

$$= \left\{ \frac{9}{2} \pi - 9 \right\} \text{ units}^2$$

$$\text{Area of ADECB} = \left\{ \left(\frac{9}{2} \pi - 9 \right) \times 2 + 9 \right\} \text{ units}^2$$

$$= (9\pi - 9) \text{ units}^2$$

$$\text{cb length of DE} = (6 - 6 \cos(45^\circ)) \text{ units}$$

$$\text{Perimeter of ADECB} = \left\{ \frac{45^\circ}{360^\circ} \times 6 \times \pi \times 2 + 6 + 2 \times (6 - 6 \cos(45^\circ)) \right\} \text{ units}$$

$$= \left\{ \frac{3}{2} \pi + 6 + 12 - 12 \cos(45^\circ) \right\} \text{ units}$$

$$= \left\{ \frac{3}{2} \pi - 12 \cos(45^\circ) + 18 \right\} \text{ units}$$

X

evaluate.

$$= (3\pi + 18 - 6\sqrt{2}) \text{ cm}$$

11/8/21



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$$1. a) AOB = \left(\frac{1}{2} \times 5^2 \times 0.4\right) \text{ cm}^2$$
$$= 5 \text{ cm}^2$$

$$AC = 5 \sin(0.4) \text{ cm}$$

$$DC = 5 \cos(0.4) \text{ cm}$$

$$\therefore AOC = \left\{ \frac{1}{2} \cdot 5 \sin(0.4) \cdot 5 \cos(0.4) \right\} \text{ cm}^2$$
$$= 4.4835 \text{ cm}^2 \text{ (5 s.f.)}$$

$$ABC = (AOB - AOC) \text{ cm}^2$$

$$= (5 - 4.4835) \text{ cm}^2$$

$$= 0.517 \text{ cm}^2 \text{ (3 s.f.)}$$

$$b) AB = (0.4 \times 5) \text{ cm}$$

$$= 2 \text{ cm}$$

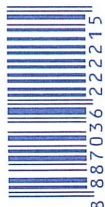
$$AD = 5 \tan(0.4) \text{ cm}$$

$$BD = (OD - 5) \text{ cm}$$

$$= \left(\frac{5}{\cos(0.4)} - 5 \right) \text{ cm}$$

$$\therefore \text{Perimeter of } ABD = \left(2 + 5 \tan(0.4) + \frac{5}{\cos(0.4)} - 5 \right) \text{ cm}$$

$$= 4.54 \text{ cm (3 s.f.)}$$



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$$2. \text{ (a) Area of AED} = (\text{ADB} - \text{AEB}) \text{ cm}^2$$

$$= \left(\frac{45^\circ}{360^\circ} \times \pi \times 6^2 - \frac{1}{2} (6 \cos(45^\circ))^2 \right) \text{ cm}^2$$

$$= \left(\frac{9}{2} \pi - 9 \right) \text{ cm}^2$$

$$\text{Area of ADECB} = \left(\left(\frac{9}{2} \pi - 9 \right) \times 2 + 9 \right) \text{ cm}^2$$

$$= (9\pi - 9) \text{ cm}^2$$

$$\text{Length of DE} = (6 - 6 \cos(45^\circ)) \text{ cm}$$

$$\text{Perimeter of ADECB} = \left(\frac{45^\circ}{360^\circ} \times 6 \times \pi \times 2 + 6 + 2 \times (6 - 6 \cos(45^\circ)) \right) \text{ cm}$$

$$= (3\pi + 6 + 12 - 12 \cos(45^\circ)) \text{ cm}$$

$$= (3\pi + 18 - 6\sqrt{2}) \text{ cm}$$