NAME:____________________________________ **DATE: 02/23/2017**

<u>ASSIGNMENT</u>: Sine Rule / Cosine Rule / Trigonometric Area
<u>DIRECTIONS</u>: Here are the formulas that will be useful in solving the problem below. Remember, π = 180° and a triangle's angles must sum to 180°.

The answer key is on the PDF online. Please try the problem first.

3.6	Cosine rule	$c^2 = a^2 + b^2 - 2ab\cos C$; $\cos C = \dfrac{a^2 + b^2 - c^2}{2ab}$
	Sine rule	$\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$
	Area of a triangle	$A = \dfrac{1}{2}ab\sin C$

Length of an arc	$l = \theta r$
Area of a sector	$A = \dfrac{1}{2}\theta r^2$

[Maximum mark: 13] *[SL-calc]*

The following diagram shows a circle with centre O and radius 4 cm.

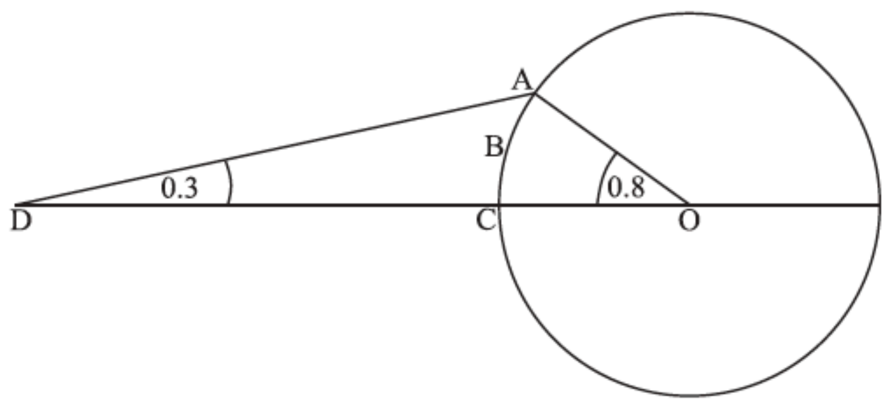

diagram not to scale

The points A, B and C lie on the circle. The point D is outside the circle, on (OC).
Angle $\text{ADC} = 0.3$ radians and angle $\text{AOC} = 0.8$ radians.

(a) Find AD. *[3 marks]*

(b) Find OD. *[4 marks]*

(c) Find the area of sector OABC. *[2 marks]*

(d) Find the area of region ABCD. *[4 marks]*

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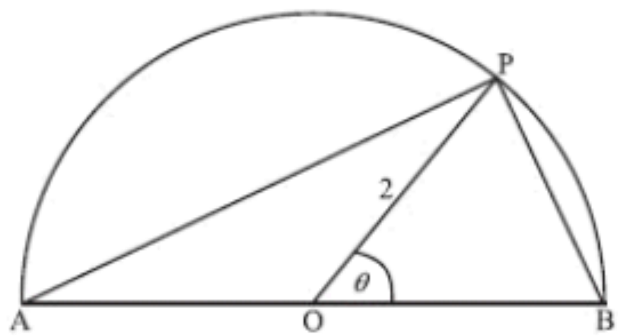
	Sine rule	$\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$
	Area of a triangle	$A = \dfrac{1}{2}ab\sin C$

Length of an arc	$l = \theta r$
Area of a sector	$A = \dfrac{1}{2}\theta r^2$

[Maximum marks 16] *[non-calc]*

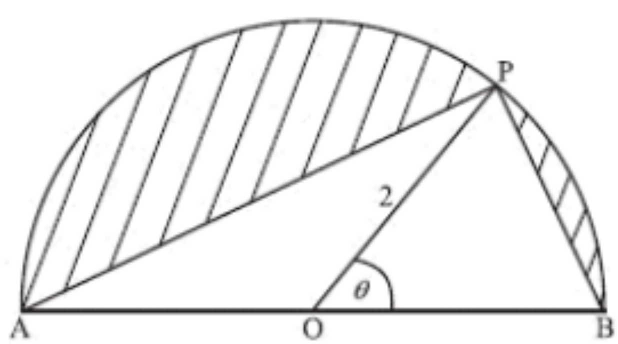
The following diagram shows a semicircle centre O, diameter [AB], with radius 2.
Let P be a point on the circumference, with $\hat{POB} = \theta$ radians.



(a) Find the area of the triangle OPB, in terms of θ. **(2)**

(b) Explain why the area of triangle OPA is the same as the area triangle OPB. **(3)**

Let S be the total area of the two segments shaded in the diagram below.



(c) Show that $S = 2(\pi - 2\sin\theta)$.

(3)

(d) Find the value of θ when S is a local minimum, justifying that it is a minimum.

(8)

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Answers (command term is “find” throughout, so please show all calculations):

1) 9.71
2) 12.1
3) 6.4 cm^2
4) 10.8 cm^2

For the second question, use the trigonometric triangular area formula.

Also, isn’t it interesting that $\sin 30^\circ = \sin 150^\circ$. So interesting.