Lesson 5

A-Level Pure Mathematics : Year 2
Applications of Trigonometry

5.1 Revision

Any solution based entirely on graphical
or numerical methods is not acceptable
Marks Available : 40

Question 1

Convert the following angles, written in radians, into their degrees equivalent,

(i) $\frac{\pi}{2}$ **(ii)** $\frac{5\pi}{6}$ **(iii)** $\frac{13\pi}{12}$

[3 marks]

Question 2

Convert the following angles, written in degrees, into their radian equivalent.
Give exact answers in terms of π.

(i) $45°$ **(ii)** $15°$ **(iii)** $330°$

[3 marks]

Question 3

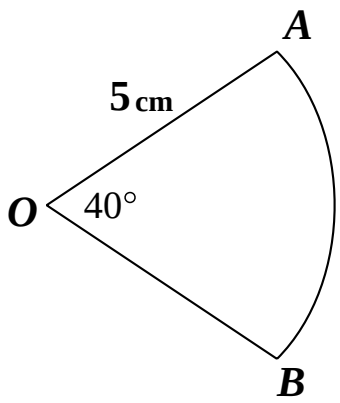
Solve the following equation over the interval $0 \leqslant \theta \leqslant 2\pi$
Give exact answers in terms of π

$$2\cos\left(2x + \frac{\pi}{8}\right) = \sqrt{2}$$

[6 marks]

Question 4

A-Level Examination question from June 2019, Paper 2, Q3



The diagram shows a sector AOB of a circle with centre O, radius 5 cm and angle $AOB = 40°$.

The attempt of a student to find the area of the sector is shown below,

$$\text{Area of sector} = \frac{1}{2} r^2 \theta$$
$$= \frac{1}{2} \times 5^2 \times 40$$
$$= 500 \text{ cm}^2$$

(a) Explain the error made by this student.

[1 mark]

(b) Write out a correct solution.

[2 marks]

Question 5

(i) When θ is small and measured in radians, use the small angle approximations to show that,

$$\frac{1 - cos\, 3\theta}{\theta\, tan\, 2\theta} \approx \frac{9}{4}$$

[4 marks]

(ii) When $\theta = 0.1^c$ (about 6°) what is the percentage error introduced by using the small angle approximations ?

[3 marks]

Question 6

A-Level Examination question from June 2018, Paper 2, Q7 (i)

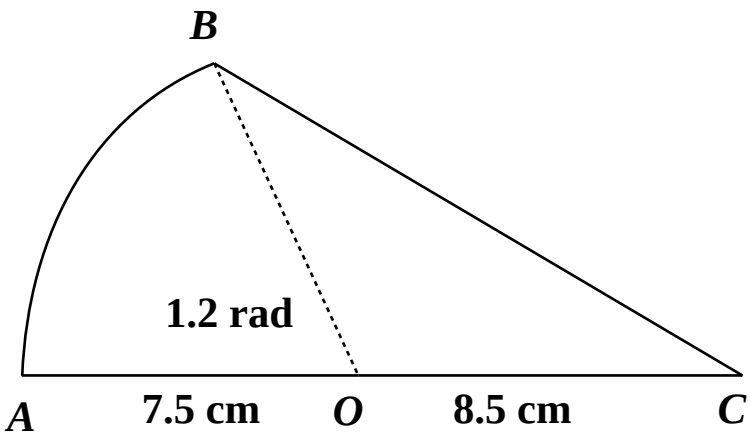
Solve the equation,

$$4 \sin x = \sec x \qquad \text{for} \qquad 0 \leqslant x < \frac{\pi}{2}$$

[4 marks]

Question 7

A-Level Official Mock Examination Question from 2019, Paper 1, Q2



The shape *AOCBA*, shown, consists of a sector *AOB* of a circle centre *O* joined to a triangle *BOC*.

The points *A*, *O* and *C* lie on a straight line with $AO = 7.5$ cm and $OC = 8.5$ cm.

The size of angle *AOB* is 1.2 radians.

Find, in cm, the perimeter of *AOCBA*, giving your answer to one decimal place.

[5 marks]

Question 8

A-Level Examination question from June 2010, C3, Q3

(a) Express $5 \cos x - 3 \sin x$ in the form $R \cos (x + \alpha)$ where $R > 0$ and $0 < \alpha < \frac{1}{2} \pi$

[4 marks]

(b) Hence, or otherwise, solve the equation

$$5\cos x - 3\sin x = 4$$

for $0 \leqslant x < 2\pi$, giving your answers to 2 decimal places.

[5 marks]