9

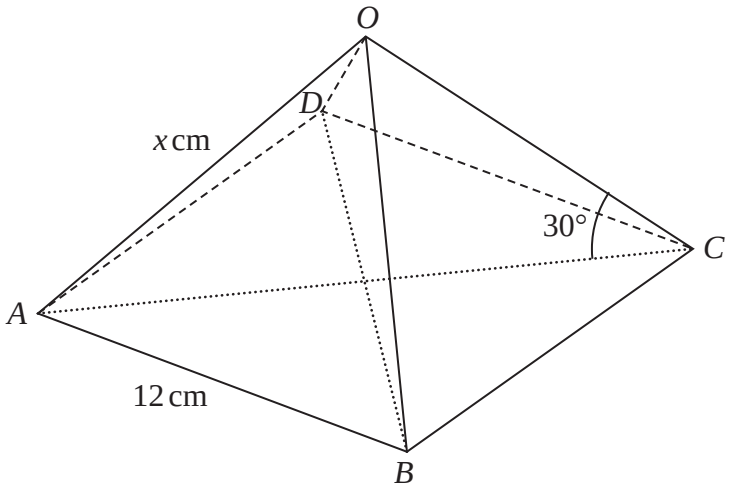

Diagram **NOT** accurately drawn

Figure 2

Figure 2 shows the right pyramid $OABCD$ with a square base $ABCD$ of side 12 cm.

$$OA = OB = OC = OD = x \text{ cm} \quad \text{and} \quad \angle OAC = \angle ODB = \angle OCA = \angle OBD = 30°$$

(a) Find the exact length of AC

(2)

(b) Show that $x = 4\sqrt{6}$

(2)

(c) Find the total surface area, to the nearest cm^2, of the pyramid.

(5)

(d) Find the size of the obtuse angle, to the nearest degree, between the plane OAB and the plane OBC

(4)

Question 9 continued

Question 9 continued

Question 9 continued

(Total for Question 9 is 13 marks)

10 Using formulae from page 2

(a) show that $\cos(A - B) - \cos(A + B) = 2\sin A \sin B$

(2)

(b) Hence show that $\cos 5\theta - \cos 9\theta = 2\sin 7\theta \sin 2\theta$

(1)

(c) Solve the equation

$$\cos 5\theta - \cos 9\theta = \sqrt{3}\sin 7\theta \quad \text{for} \quad 0 < \theta \leqslant \frac{1}{3}\pi$$

Give your solutions in terms of π

(7)

(d) Using calculus and showing your working, evaluate

$$\int_0^{\frac{\pi}{7}} 8\sin 7x \cos 2x \tan 2x \, \mathrm{d}x$$

Give your answer to 3 decimal places.

(6)

Question 10 continued

Question 10 continued

(Total for Question 10 is 16 marks)

TOTAL FOR PAPER IS 100 MARKS