

LC 2018: PAPER 2

QUESTION 9 (40 MARKS)

Diagram 1
(Starting position)

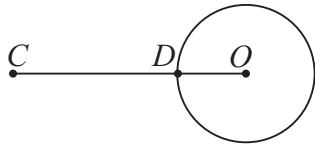


Diagram 2

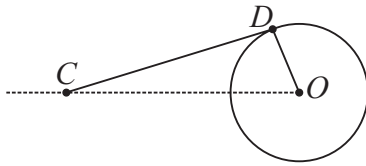
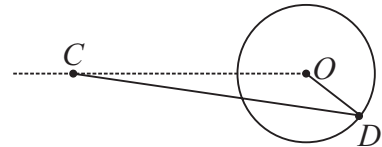
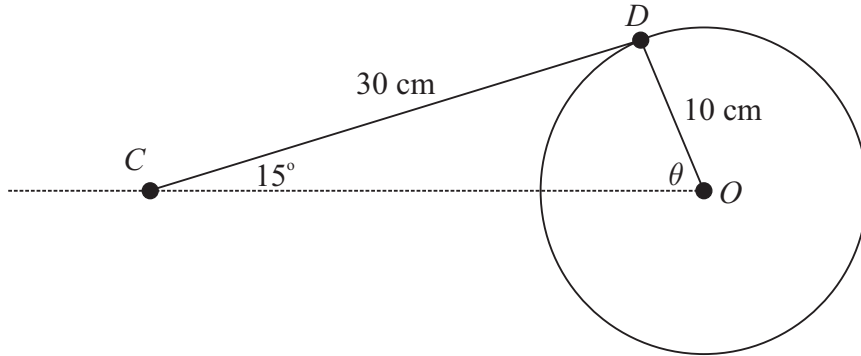


Diagram 3



Question 9 (a)



$$\frac{\sin \theta}{30} = \frac{\sin 15^\circ}{10} \Rightarrow \theta = \sin^{-1} \left(\frac{30 \sin 15^\circ}{10} \right) = 50.9^\circ$$

$$|\angle COD| = 51^\circ$$

MARKING SCHEME NOTES

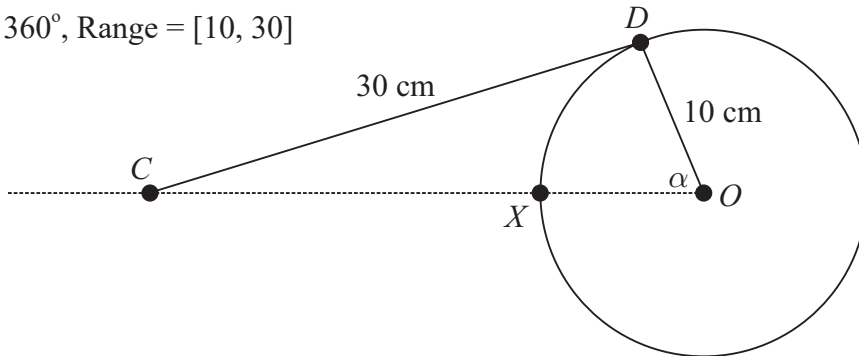
Question 9 (a) [Scale 10C (0, 3, 7, 10)]

3: • Sine rule formulated with some substitution

7: • $\sin x$

Question 9 (b)

(i) Period = 360° , Range = $[10, 30]$



(ii) Table:

α	0°	90°	180°	270°	360°
$f(\alpha)$ (cm)	30	18.28	10	18.28	30

MARKING SCHEME NOTES

Question 9 (b) (i) [Scale 5C (0, 2, 4, 5)]

2: • Period or range correct

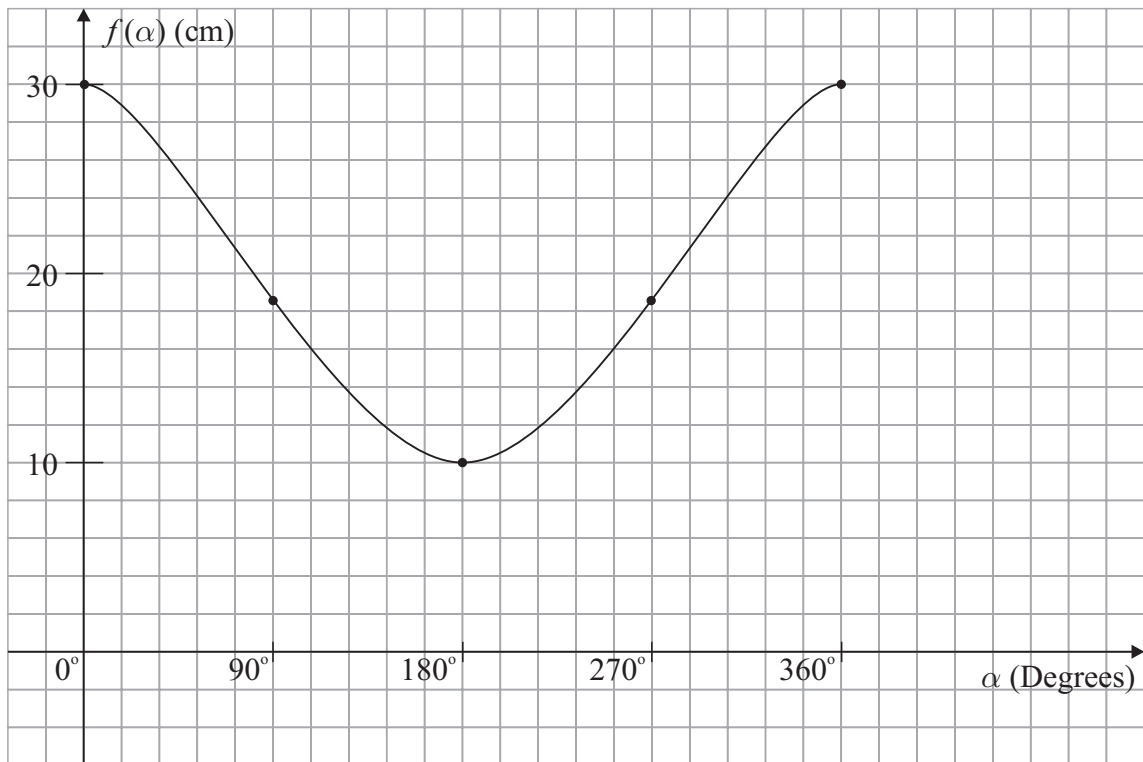
4: • Period correct and range partly correct
• Period **and** range in incorrect order

Question 9 (b) (ii) [Scale 5C (0, 2, 4, 5)]

2: • 1 correct new value

4: • 2 correct new values

(iii) Graph:



(iv) Diagram 2 - graph has a greater rate of change in this position.

MARKING SCHEME NOTES

Question 9 (b) (iii) [Scale 10C (0, 3, 7, 10)]

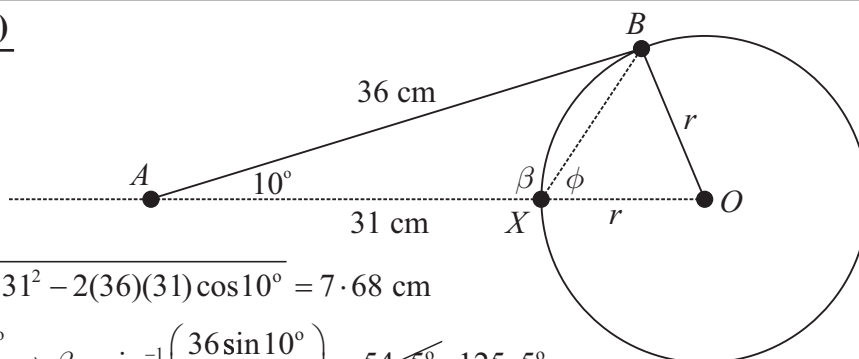
3: • 1 point from table plotted

7: • 3 points from table plotted

Question 9 (b) (iv) [Scale 5B (0, 2, 5)]

2: • Diagram 2 identified but without reason or with invalid reason

Question 9 (c)



$$|XB| = \sqrt{36^2 + 31^2 - 2(36)(31)\cos 10^\circ} = 7.68 \text{ cm}$$

$$\frac{\sin \beta}{36} = \frac{\sin 10^\circ}{31} \Rightarrow \beta = \sin^{-1}\left(\frac{36 \sin 10^\circ}{7.68}\right) = 54.5^\circ, 125.5^\circ$$

$$\phi = 180^\circ - 125.5^\circ = 54.5^\circ$$

$$r^2 = r^2 + 7.68^2 - 2r(7.68)\cos 54.5^\circ$$

$$2r(7.68)\cos 54.5^\circ = 7.68^2$$

$$2r \cos 54.5^\circ = 7.68$$

$$r = \frac{7.68}{2 \cos 54.5^\circ} \approx 7 \text{ cm}$$

MARKING SCHEME NOTES

Question 9 (c) [Scale 5C (0, 2, 4, 5)]

2: • Cosine rule formulated with some substitution

• $(31 + r)$

4: • Relevant equation in r