Question 2 **(25 marks)**

(a) Prove that $\cos 2A = \cos^2 A - \sin^2 A$.

(b) The diagram shows part of the circular end of a running track with three running lanes shown. The centre of each of the circular boundaries of the lanes is at O.

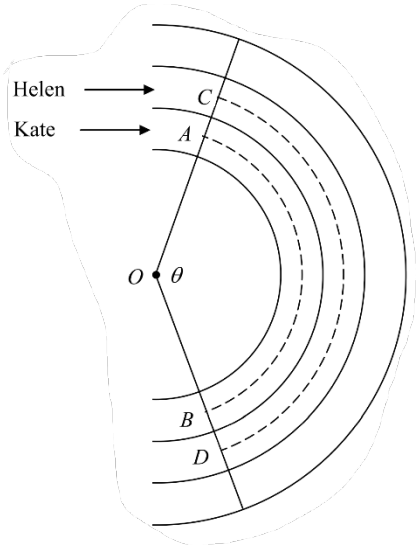
Kate runs in the middle of lane 1, from A to B as shown.

Helen runs in the middle of lane 2, from C to D as shown.

Helen runs 3 m further than Kate.

$|\angle AOB| = |\angle COD| = \theta$ radians.

If each lane is 1·2 m wide, find θ.



Question 2 **(25 marks)**

(a) Prove that $\cos 2A = \cos^2 A - \sin^2 A$.

$\cos(A+B) = \cos A \cos B - \sin A \sin B$

$\cos 2A = \cos(A+A) = \cos A \cos A - \sin A \sin A = \cos^2 A - \sin^2 A$

(b) The diagram shows part of the circular end of a running track with three running lanes shown. The centre of each of the circular boundaries of the lanes is at O.

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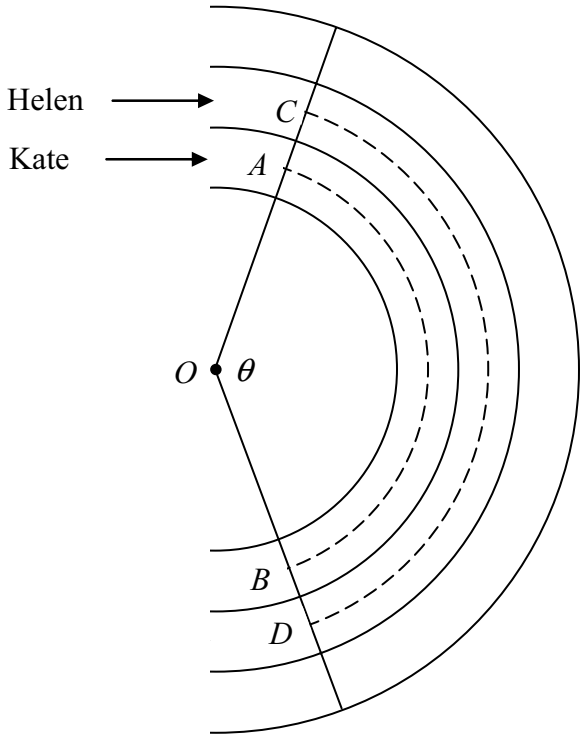

Kate: $|AB| = s_1 = |OA|\theta = r\theta$

Helen: $|CD| = s_2 = (|OA| + 1\cdot 2)\theta = (r + 1\cdot 2)\theta$

$s_1 + 3 = s_2$

$\Rightarrow r\theta + 3 = r\theta + 1\cdot 2\theta$

$\Rightarrow 1\cdot 2\theta = 3$

$\Rightarrow \theta = 2\cdot 5$ radians

Question 2 **(25 marks)**

(a) Scale 15C (0, 5, 10, 15)

Low Partial Credit:

- Relevant compound angle formula
- Tested with one or more values for A

High Partial Credit

- Expansion correct but not tidied

(b) Scale 10D (0, 2 ,5, 8, 10)

Low Partial Credit:

- Correct formula for finding either arc

Mid Partial Credit

- One or both arcs expressed correctly

High Partial Credit

- θ not fully evaluated
- $|CD| - |AB| = 3$ or equivalent statement
- Substantially correct with one non arithmetic error