Question Number	Scheme	Marks
8 (a)	Attempts to use $S = r\theta \Rightarrow 9 = OD \times 0.8 \Rightarrow OD = 11.25$ or $\frac{45}{4}$	M1, A1
	$AO = \frac{5}{8} \times "11.25" = 7.03\,\text{m}$ *	A1*
		(3)
(b)	Attempts $A = 7.03 \times (2\pi - 0.8) = (38.55)$	M1
	Attempts $9 + 2 \times (11.25 - 7.03) + 7.03 \times \theta$	M1
	Perimeter = awrt 56.0 m	A1
		(3)
(c)	Attempts $\frac{1}{2} \times "11.25"^2 \times 0.8 = (50.625)$ OR $\frac{1}{2} \times 7.03^2 \times (2\pi - 0.8) = (135.4)$	M1
	Full method for area of platform = $\frac{1}{2} \times "11.25"^2 \times 0.8 + \frac{1}{2} \times 7.03^2 \times (2\pi - 0.8)$	M1
	=awrt 186 m^2	A1
		(3)
		(9 marks)

(a) **This is a show that question and it is important that the method is shown**

M1: Attempts to use $S = "r"\theta \Rightarrow 9 = "r" \times 0.8 \Rightarrow "r" = ...$ Implied by $(r) = \frac{9}{0.8}$

A1: Achieves $\underline{OD} = 11.25$ or $\underline{OC} = 11.25$ but condone $\underline{"r"} = 11.25$. May be implied by $AO = \frac{5}{8} \times \left(\frac{9}{0.8}\right)$ o.e

A1*: Shows that AO is $7.03(m)$ via $\frac{5}{8} \times 11.25, 11.25 - \frac{3}{8} \times 11.25$ o.e. Units are not required.

You do not need to see *AO* specifically mentioned as long as there was an *OD*, *OC* or *r* stated earlier.
You do not need to see 7.03125 before it being rounded to 7.03.
You can also condone leaving as a more accurate value, e.g. *AO* = 7.03125
Allow a more accurate value of 7.03 to be used in part (b) and (c). E.g. 7.03125

(b)

M1: Attempts arc length *AEB* via $7.03 \times (2\pi - 0.8)$ o.e such as $2\pi(7.03) - 7.03 \times (0.8)$

Allow the angle calculation to be implied by sight of awrt 5.48 so score for 7.03×5.48

If the calculation $(2\pi - 0.8)$ has been seen, allow 5.5 to be used for the angle

M1: Attempts to add the correct parts together E.g. $9 + 2 \times ("11.25" - 7.03) + 7.03 \times \theta$

The major arc must have been attempted by a correct formula but allow for this mark an incorrect angle to be used for candidates who don't equate 2π to $360°$. So allow for this mark calculations with e.g. $7.03(\pi - 0.8)$

You may see $9 + 2 \times \left(\frac{3}{8} \times 11.25\right) + 7.03 \times \theta$. Allow accuracy to 1 dp so $9 + 2 \times 4.2 + 38.6$

A1: Perimeter = awrt 56.0m. ISW after a correct answer. Condone 56m following a correct calculation.
The units are not necessary, they can be ignored

(c)

M1: Attempts to find the value of $\frac{1}{2}r^2\theta$ with their $r = 11.25$ and $\theta = 0.8$

or the value of $\frac{1}{2}r^2\theta$ with $r = 7.03$ and $\theta = 2\pi - 0.8$ or awrt 5.48 or 5.5 following sight of $2\pi - 0.8$

An alt for the second sector is $\pi \times 7.03^2 - \frac{1}{2} \times 7.03^2 \times 0.8$

dM1: Adds two sectors. See above for how to apply the method for each sector

A1: Awrt 186. The units are not necessary, they can be ignored

Useful diagram

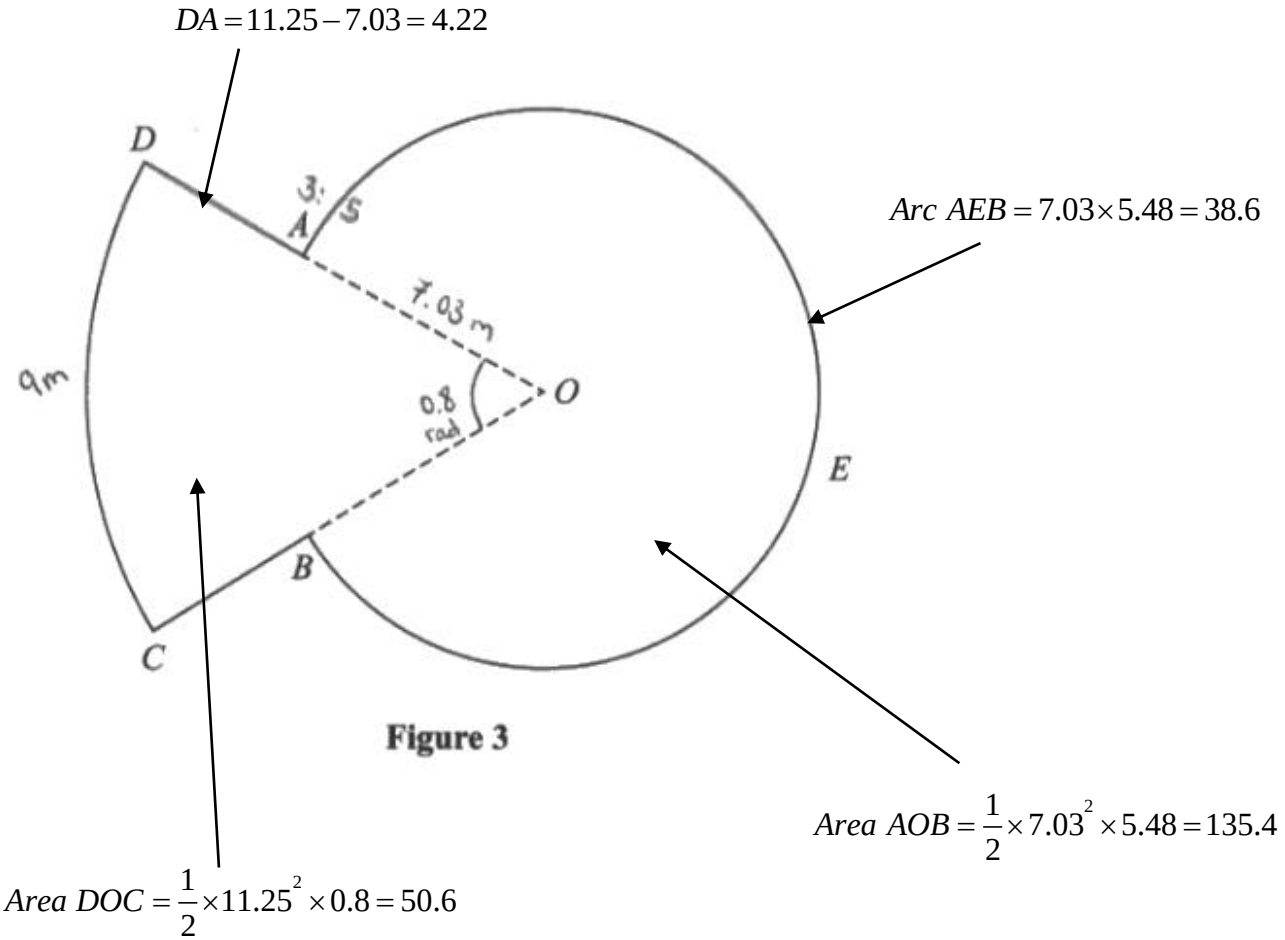


Figure 3

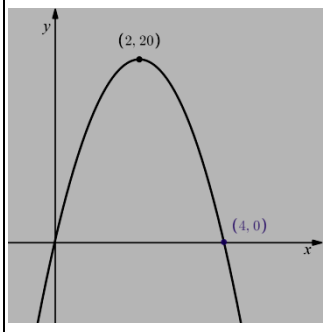
Note: It is possible to do this question in degrees and use the formulae $\frac{\theta}{360} \times 2\pi r$ in (b) and $\frac{\theta}{360} \times \pi r^2$ in (c)

Only allow such a method if the conversion has been attempted by a correct method. Allow for M's awrt 46

(a) $0.8 \text{ rad} = 0.8 \times \frac{180}{\pi} = 45.8°$ so solve $9 = \frac{45.8}{360} \times 2\pi r$ for the first M1

(b) Arc $AEB = \frac{360 - 45.8}{360} \times 2\pi \times 7.03$

(c) Sector $DOC = \frac{45.8}{360} \times \pi \times 11.25^2$ and Sector $AOB = \frac{360 - 45.8}{360} \times \pi \times 7.03^2$

Question Number	Scheme	Marks
9 (a)	 Correct shape and position passing through (0, 0)	B1
	Intersection at (4, 0)	B1
		(2)
(b)	Attempts form of equation. E.g. $y = Ax(x-4)$ or $y = 20 \pm C(x-2)^2$	M1
	Full attempt to find equation. E.g. $20 = A \times 2(2-4) \Rightarrow A = ...$ Or $0 = 20 + C(4-2)^2 \Rightarrow C = ...$	dM1
	$y = -5x(x-4)$, $y = 20 - 5(x-2)^2$ o.e.	A1
		(3)
(c)	Sets $x\left(x^2-4\right) = "-5x(x-4)"$	M1
	$x^3 + 5x^2 - 24x = 0 \Rightarrow x\left(x^2 + 5x - 24\right) = 0$	dM1
	$(x+8)(x-3) = 0 \Rightarrow$ x coordinate of P is -8	ddM1, A1
	$P = \left(-8, -480\right)$	A1
		(5) **(10 marks)**

(a)

B1: ∩ shaped quadratic passing through the origin with maximum on the rhs of the *y*-axis and an intercept on the + ve *x*-axis. Be tolerant of slips of the pen. It must appear in quadrants 3, 1 and 4 Ignore extra graphs (e.g. cubics) if they are superimposed on top of this one.

Score if the intention seems correct but do penalise ∧ shaped "curves"

B1: Intersection at (4, 0). Allow 4 marked on the positive *x*- axis but (0, 4) is B0. Condone graphs that just meet the *x*-axis at 4 for ones that seem to "sit" on the *x* -axis and only appear in quadrant 1.

(b)

M1: Attempts form of equation. E.g. $y = \pm Ax(x-4)$ or $y = 20 \pm C(x-2)^2$. Condone with *A*, *C* =1

It is possible they could try $y = ax^2 + bx + c$ with an attempt to use all three coordinates.

Look for setting up 3 different equations using the given information

- Uses $(0, 0)$ in $y = ax^2 + bx + c \Rightarrow c = 0$
- Uses $(2, 20)$ in $y = ax^2 + bx + c \Rightarrow 20 = 4a + 2b$
- Uses $(4, 0)$ $y = ax^2 + bx + c \Rightarrow 0 = 16a + 4b$ OR $\left.\frac{dy}{dx}\right|_{X=2} = 2ax + b = 0 \Rightarrow 4a + b = 0$

It is acceptable just to state the rhs of the equation. E.g. $Ax(x-4)$

dM1: Full attempt at equation for $f(x)$ with an attempt at finding values for A or C or a,b c

A1: $y = -5x(x-4)$, $y = 20 - 5(x-2)^2$ o.e. such as $y = -5x^2 + 20x$ Allow $f(x) \leftrightarrow y$

The question asks for an expression for $f(x)$ so allow just $5x(4-x)$ o.e.

Allow this to be written down for all 3 marks. ISW after a correct answer.

Allow this to be scored in part (c) if you are certain that this is meant for (b). Use review if unsure.