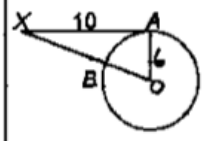
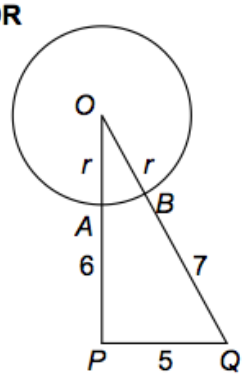
Circular Measures 2 (Radians) Answers

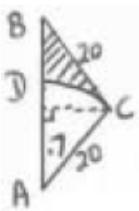
1)

7 [7]	 (i) $\angle AOB = \tan^{-1} 10/6 = 1.03$	B1
	(ii) Arc $AB = 6 \times 1.03$ $\quad$ [$XB = \sqrt{10^2 - 6^2} = 8$]	M1
	Perimeter = 6.18 + 5.66 + 10 = 21.8	M1 A1
	(iii) Sector $AOB = 1/2 \times 6^2 \times 1.03$ $\quad$ Area $XAB = 1/2 \times 10 \times 6$ – Sector AOB = 11.5	M1 M1A1

2)

11	**OR** 	
	(i) $(r + 6)^2 + 5^2 = (r + 7)^2$	M1
	Solve $\Rightarrow r = 6$	M1 A1
	tan AOB = 5/12 $\quad$ AOB = 0.395 or 22.6°	M1
	Length of arc AB = 6 x 0.395 = 2.37 or better	M1 A1
	(ii) Sector AOB = ½ x 6^2 x 0.395 = 7.11	M1
	Shaded area = ½ x 5 x 12 - 7.11	M1
	All figures in sector and triangle correct √	A1√
[10]	22.9 or better	A1

3)

10. (i) Area = Δ – sector BCA = π – 1.4 or height = 20sin0.7 $\Delta = ½.20^2\sin(\pi - 1.4)$ or ½bh = 197.1  Sector = $½20^2 0.7 = 140$ → Area = 57.1	M1 M1 M1 A1 [4]	Award for either of these. Correct method for area of Δ Use of $½r^2\theta$ Co
(ii) DC = 20 x 0.7 (=14) AB = 2 x 20cos0.7 or cos rule BD = AB – 20 = 10.6 → Perimeter = 44.6 Could be [5] + [3] if AB used in part (i)	M1 M1 M1 A1 [4]	Use of s = rθ Correct trig – could gain this in (i) Co

4)

12 (i) $\angle BOD = 2\sin^{-1} 0.8 \approx 1.855$ (106.3°) **or** $\angle BOE = 0.927$ (53.1°) **M1 A1**

$\angle BAD = ½ \angle BOD \approx 0.927$ (53.1°) **or** $\angle BAE = 0.464$ (26.6°) **M1 A1**

[**or** O to $BD = \sqrt{(10^2 - 8^2)} = 6$, $\angle BAD = 2\tan^{-1} 8/16$]

$AB = 8/\sin(½ \angle BAD) \approx 17.9$ [**or** via $\sqrt{(8^2 + 16^2)}$] **M1 A1**

(ii) Perimeter = (10 × 1.855) + (17.89 × 0.927) [**or** degrees × $\pi/180$] ≈ 35.1 **M1 A1**

(iii) Use of $½ r^2\theta$ or $½ r^2 (\theta - \sin\theta)$

(radians or degrees × $\frac{\pi}{180}$) **M1**

Complete plan **M1**

Segment $BCDB = ½ 10^2 \times 1.855 - ½ 16 \times 6 \approx 44.75$

Segment $BEDB = ½ 17.9^2 \times 0.927 - ½ 16 \times 16 \approx 20.3$~5 Area ≈ 24.2~5 **A1 [11]**

5)

11 [9]	(i) [*BOD* is diameter.] Realises most, or all, of $\angle DOA = \angle OAC = \angle ACO = \angle COB$	M1
	All these angles = π – 2.5 or 2.5 – $\angle AOC$ [or $\angle COB = x$, $\angle AOC = 2.5 - x$]	
	$\angle$s of Δ = π or $\angle$s on *BOD* = π or $\angle DOA = \pi - 2.5 = 2.5 - \angle AOC = \angle COB$	M1
	to find $\angle AOC$ directly [or find $x = \pi - 2.5$ & hence $\angle AOC$] = 5 – π (≈ 1.86)	A1
	(ii) Sector = $½ \times 12^2 \times (5 - \pi)$ (≈ 133.8 ~.9)	M1
	Sector – Δ(any method) = ( ) – $½ \times 12^2 \times \sin(5 - \pi)$ ≈ 64.7 ~.9	M1 A1
	(iii) Length *AC* (any method) [$2 \times 12 \times \sin\{½(5 - \pi)\}$ ≈ 19.2]	M1
	Length *AC* + length of arc = ( ) + 12 (5 – π) ≈ 41.5 ~ .6	M1 A1