Question Number	Scheme	Notes	Marks
6	Question has: "Solutions relying on calculator technology are not acceptable"		
	$k\left(3x^2+8x+9\right)=2-6x \Rightarrow$ $3kx^2+(8k+6)x+9k-2=0$	Expresses equation correctly as a three term quadratic or states the correct *a*, *b* and *c* Accept $3kx^2+8kx+6x+9k-2=0$ with LHS terms in any order Could be implied by attempt at discriminant	**B1**
	$(8k+6)^2-4(3k)(9k-2)$ $\Rightarrow -44k^2+120k+36$ $\left\{\Rightarrow 11k^2-30k-9\right\}$ M1: Uses b^2-4ac correctly allowing for $a=\pm 3k, b=\pm 8k\pm 6$ and $c=\pm 9k\pm 2$ or $c=\pm 9k$. No need to expand for the M mark. If e.g., $a=3kx^2$ is used then the '*x*'s must disappear later. Could be seen within use of quadratic formula/CTS. May see e.g. $b^2...4ac$ with = or any inequality sign for ... A1: Any correct three term quadratic expression for b^2-4ac (may be under root sign)		**M1** **A1**
	e.g., $(11k+3)(k-3)=0 \Rightarrow k=3,-\frac{3}{11}$	dM1: For an attempt at finding the critical values via a valid non-calculator method. Must see the precise 3TQ that is then solved (see guidance). May have complex roots. Requires previous M mark. A1: Correct critical values. Could be labelled with *x* = ... or unlabelled	**dM1** **A1**
	$k<-\frac{3}{11},\ k>3$ M1: Chooses outside region appropriately for their real critical values. Must not be fortuitous from e.g., two errors that correct themselves. Signs may non-strict or one strict, one non-strict. Requires **FIRST** M mark. May use e.g., *x* Do not condone e.g., $-\frac{3}{11}>k>3$ A1: Correct region - any suitable notation but must be using *k* only. Do not condone $k_1<-\frac{3}{11},\ k_2>3$ ISW once a correct answer is seen even if an incorrectly modified answer follows. Condone "and" but not $\cap$ Note that e.g.,1110011 is possible		**M1** **A1**
			(7)
			Total 7

Question Number	Scheme	Notes	Marks
7	Ignore units **in parts (b) and (c).** There is no credit for quoting correct formulae and then mis-applying. Question says "...you must show detailed reasoning"		
(a)	$r\theta = 6\times 3.5 = 21\,\mathbf{cm}$ M1: Any correct numerical expression or value for the arc length A1: 21**cm** only but allow e.g., 21.0 cm or 210 mm. Not awrt. **Units required**.		**M1** **A1**
			(2)
(b)	$AB^2 = 9^2 + 6^2 - 2\times 9\times 6\cos\left(\frac{3}{2}\pi - 3.5\right)$ $\{= 79.115..., \quad AB = 8.89...\}$	Correct expression for, or equation involving, AB^2 or AB - but allow with any angle in the cosine rule, even if it is negative or has come from mixed units. Not implied by a wrong value if there is no work - only accept awrt 78 or 79 (or 8.8 or 8.9) provided no incorrect method seen. Approaches that do not use the cosine rule must validly reach $AB^2 = \text{awrt } 78 \text{ or } 79$ OR $AB = \text{awrt } 8.8 \text{ or } 8.9$	**M1**
	$P = 6+9+"21"+AB = ...$	Obtains a value using 6 + 9 + their (a) + their AB	**dM1**
	$P = 44.9$	awrt 44.9	**A1**
			(3)
(c)	{Area triangle ABE =} $\frac{1}{2}\times 6\times 9\sin\left(\frac{3}{2}\pi - 3.5\right)$ or e.g., $\frac{1}{2}\times 9\times 6\cos(3.5-\pi)$ $\{= 25.284...\}$	**Fully correct** numerical expression or value for the area of ABE If angle is a decimal must be awrt 1.2 (1.212...) or if degrees awrt 69° (69.46...) Implied by awrt 25 (25.28433..) provided no incorrect method seen Alternative multi-step approaches where the work is not clear must validly reach Area ABE = awrt 25	**M1**
	{Area sector $BCDE$=} $\frac{1}{2}\times 6^2\times 3.5\{= 63\}$	Any correct expression or value for sector area	**B1**
	$\frac{1}{2}\times 6\times 9\sin\left(\frac{3}{2}\pi - 3.5\right) + \frac{1}{2}\times 6^2\times 3.5 = 88.3$	dM1: Obtains a **value** for sector + triangle. Sector must be $\frac{1}{2}\times 6^2\times 3.5\{= 63\}$ or $6^2\times 3.5\{= 126\}$ oe	**dM1** **A1**

		A1: Awrt 88.3	
			(4)
			Total 9