Question Number	Scheme	Marks
8.	Equates $y=k(2x-1)$ and $y=x^2+2x+11 \Rightarrow k(2x-1)=x^2+2x+11$ $\Rightarrow x^2+(2-2k)x+11+k \quad (=0)$	M1 A1
	Attempts "b^2-4ac"$...0 \Rightarrow (2-2k)^2-4(11+k)...0$ and proceeds to critical values	M1
	Critical values of $(k=)\ 5,-2$	A1
	No roots so $b^2-4ac<0$ so choose inside region $-2<k<5$	M1 A1 **(6)** **(6 marks)**

M1 Attempts to equate $y=k(2x-1)$ and $y=x^2+2x+11 \Rightarrow k(2x-1)=x^2+2x+11$

A1 $x^2+(2-2k)x+11+k \quad (=0)$ oe

Correct quadratic or correct values of *a*, *b* and *c*. The terms should be collected on one side of the equation and the *x* terms must have been collected together in a bracket. Condone a missing "=0". This mark may be implied by values of *a*, *b* and *c* used in later work.

M1 Attempts "b^2-4ac" where $a=\pm 1,\ b=\pm 2\pm 2k,\ c=\pm 11\pm k$ to achieve a 3TQ and proceeds to find critical values. Condone arithmetical slips in the rearrangement to a 3TQ. Usual rules for solving a quadratic apply. You may see "$b^2...4ac$".
FYI "b^2-4ac"$=4k^2-12k-40$ (Be careful that this may result from incorrect working which loses the A marks that follow)

A1 Correct critical values $(k=)\ 5,-2$ **MUST HAVE COME FROM CORRECT WORKING**

M1 Finds inside region for their critical values. May be awarded for eg $-2\leqslant k\leqslant 5$ or $-2\leqslant k<5$. Allow this mark if another variable is used.

A1 $-2<k<5$ oe such as $k\in(-2,5)$ cso

Note that $-2<x<5$ is A0

Question Number	Scheme	Marks
9.	$\frac{4x^2+9}{2\sqrt{x}}=\frac{4x^2}{2\sqrt{x}}+\frac{9}{2\sqrt{x}}=2x^{\frac{3}{2}}+\frac{9}{2}x^{-\frac{1}{2}}$	M1 A1
	$\left(\frac{dy}{dx}=\right)\ 3x^{\frac{1}{2}}-\frac{9}{4}x^{-\frac{3}{2}}$	M1 A1
	$\left(\frac{dy}{dx}=\right)\ 3x^{\frac{1}{2}}-\frac{9}{4}x^{-\frac{3}{2}}=0\Rightarrow x^2=\frac{3}{4}\Rightarrow x=\frac{\sqrt{3}}{2}$	M1 A1 **(6)** **(6 marks)**
Alt(I)	Quotient rule	
	$u=4x^2+9, u'=8x, v=2\sqrt{x}, v'=x^{-\frac{1}{2}}$	M1A1
	$\left(\frac{dy}{dx}=\right)\ \frac{2\sqrt{x}\times 8x-(4x^2+9)\times x^{-\frac{1}{2}}}{4x}$	M1A1
	$\left(\frac{dy}{dx}=\right)\ \frac{2\sqrt{x}\times 8x-(4x^2+9)\times x^{-\frac{1}{2}}}{4x}=0\Rightarrow x^2=\frac{3}{4}\Rightarrow x=\frac{\sqrt{3}}{2}$	M1A1
Alt(II)	Product rule	
	$u=4x^2+9, u'=8x, v=\frac{1}{2}x^{-\frac{1}{2}}, v'=\frac{1}{4}x^{-\frac{3}{2}}$	M1A1
	$\left(\frac{dy}{dx}=\right)\ (4x^2+9)\times\frac{1}{4}x^{-\frac{3}{2}}+8x\times\frac{1}{2}x^{-\frac{1}{2}}$	M1A1
	$\left(\frac{dy}{dx}=\right)\ \frac{2\sqrt{x}\times 8x-(4x^2+9)\times x^{-\frac{1}{2}}}{4x}=0\Rightarrow x^2=\frac{3}{4}\Rightarrow x=\frac{\sqrt{3}}{2}$	M1A1