Question Number	Scheme	Marks
6.(a)	$(2.5, 3)$ oe	B1 B1
		(2)
(b)	Attempts one solution usually $4x-10+3=3x-2 \Rightarrow x=5$	M1 A1
	Attempts both solutions $-4x+10+3=3x-2 \Rightarrow x=\frac{15}{7}$	dM1 A1
		(4)
(c)	Attempts to solve $y=kx+2$ with $x=2.5, y=3$ or states that $k<4$	M1
	$k...\frac{2}{5}$	A1
	States $\frac{2}{5}<k<4$	A1
		(3)
		9 marks

(a)

B1 For one correct coordinate, either $x=2.5$ or $y=3$

B1 For $(2.5, 3)$. Allow $x=..., y=...$ Allow exact equivalents

If a candidate reverses these and just writes down $(3, 2.5)$ score SC 10

(b)

M1 For a correct method of finding one point of intersection. The signs of the terms must be correct

Accept $2(2x-5)+3=3x-2 \Rightarrow x=...$ oe or $-2(2x-5)+3=3x-2 \Rightarrow x=...$ oe

Note that equations such as $2(2x-5)+3=-3x+2 \Rightarrow x=...$ are incorrect and score M0

A1 For 5 or $\frac{15}{7}$ Ignore any reference to the *y* coordinate

dM1 For a correct method of finding both intersections

A1 For both values 5 and $\frac{15}{7}$ (with no extra solutions)

Ignore any reference to the *y* coordinates or $x=\frac{2}{3}$ within the body of their solution.

(c)

M1 Attempts to solve $y=kx+2$ with THEIR $x=2.5, y=3$ to find *k* or deduces that $k<4$

An equivalent is attempting to set *k* equal to the gradient between (0,2) and (2.5,3)

A1 Finds that $k=\frac{2}{5}$ is a critical value

A1 $\frac{2}{5}<k<4$

.....

Alt to (b) via squaring. Cannot be scored via squaring each term.

In reality expect the squaring to start from the point where $2|2x-5| = 3x-2 \pm 3$ is simplified

M1A1 $4(2x-5)^2 = (3x-5)^2 \Rightarrow 7x^2 - 50x + 75 = 0$

dM1A1 Solve 5 and $\frac{15}{7}$

.....

Alternatives to (c)

Alt I

M1A1 Deduces that it must hit the lhs once so $kx+2 = -4x+13 \Rightarrow x = \frac{11}{k+4} < \frac{5}{2} \Rightarrow k > \frac{2}{5}$

Variations on this are

$$kx+2 = 4x-7 \Rightarrow x = \frac{9}{4-k} > \frac{5}{2} \Rightarrow k > \frac{2}{5} \quad \text{for M1 A1}$$

$$\frac{11}{4+k} < \frac{9}{4-k} \Rightarrow k > \frac{2}{5} \text{ for M1 A1}$$

Alt II via squaring

M1 Sets $2|2x-5| = kx+2 \pm 3$, collects terms, squares and writes in the form $Ax^2 + Bx + C = 0$

FYI they should get $(16-k^2)x^2 + (2k-80)x + 99 = 0$

Then attempts to use $b^2 - 4ac = 0$ with at least a, b in terms of k reaching a value or values for k

A1 $k = \frac{2}{5}$

.....

Question Number	Scheme	Marks
7. (a)	$y\big\vert_{0.8} = 2\cos 2.4 - 2.4 + 4 = 0.13$ AND $y\big\vert_{0.9} = 2\cos 2.7 - 2.7 + 4 = -0.51$	M1
	States change of sign, continuous and hence root	A1
		(2)
(b) (i)	$\left(x_2\right) = \frac{1}{3}\arccos\left(1.5\times 0.8 - 2\right) = 0.8327$	M1 A1
(ii)	$x_5 = 0.8110$	A1
		(3)
(c)	$\frac{\mathrm{d}y}{\mathrm{d}x} = -6\sin 3x - 3$	M1 A1
	Attempts $\frac{\mathrm{d}y}{\mathrm{d}x} = 0 \Rightarrow \sin 3x = -\frac{1}{2} \Rightarrow x = ...$ via correct order of operations	dM1
	Achieves either $\frac{7\pi}{18}$ or $\frac{19\pi}{18}$	A1
	Correct attempt to find the third positive solution e.g. $x = \frac{\frac{\pi}{6} + 3\pi}{3}$	ddM1
	$\beta = \frac{7\pi}{18}$ and $\lambda = \frac{19\pi}{18}$	A1
		(6)
		11 marks

(a)

M1 Attempts the value of y at 0.8 **AND** 0.9 with at least one correct to 1 sf rounded or truncated.
Note that it is possible to choose a tighter interval containing the root but to score the A1 the conclusion must refer to the given interval.

A1 Both values correct to 1sf rounded or truncated, with reason (Sign change **and** continuous function) and minimal conclusion (root)
If the candidate chooses 0.8 and 0.9 the minimal conclusion does not need to mention the interval.
So e.g. $y\big\vert_{0.8} = 0.1 > 0$, $y\big\vert_{0.9} = -0.5 < 0$ and function is continuous, so ✓ would be acceptable