Question Number	Scheme	Marks
6(a)	(i) $P(0,\ 3a)$ (ii) $Q(a,\ 0)$ $R\left(\frac{7}{3}a,\ 0\right)$ (iii) $S\left(\frac{5}{3}a,\ -2a\right)$	B1 B1 B1 B1
		(4)
(b)	$3x-5a-2a=x-2a\Rightarrow x=...$ **or** $-(3x-5a)-2a=-(x-2a)\Rightarrow x=...$	M1
	$x=\frac{5}{2}a$ **or** $x=\frac{1}{2}a$	A1
	$3x-5a-2a=x-2a\Rightarrow x=...$ **and** $-(3x-5a)-2a=-(x-2a)\Rightarrow x=...$	dM1
	$x=\frac{5}{2}a$ **and** $x=\frac{1}{2}a$	A1
		(4)
		Total 8

(a) Question states simplest form so don't accept e.g. $\frac{10}{6}a$ for $\frac{5}{3}a$

(i)

B1: For (0, 3*a*). Condone just $y = 3a$ as long as there isn't a value for *x* coordinate (apart from 0).
Note that either of $P = 3a$ or (3*a*, 0) is B0 unless $y = 3a$ is previously seen

(ii)

B1: For either coordinate (*a*, 0) **or** $\left(\frac{7}{3}a,\ 0\right)$ which may or may not be linked correctly to *Q* and *R*

Condone just $x = a$ ($x = 1a$) or $x=\frac{7}{3}a$ as long as there isn't a *y* coordinate (that isn't 0).

Note that an answer such as $Q = a$ or (0, *a*) is B0 unless $x = a$ is previously seen.

Likewise an answer such as $R=\frac{7}{3}a$ or (0,7 *a*/ 3) is B0 unless $x = 7a/3$ is previously seen

B1: For (*a*, 0) **and** $\left(\frac{7}{3}a,\ 0\right)$. Allow the coordinates to be given separately. They do not need to be linked to the correct letter. Condone just $x = a$ ($x = 1a$) and $x=\frac{7}{3}a$ as long as there isn't a *y* coordinate(that isn't 0).

SC: $Q = a$ **AND** $R=\frac{7}{3}a$ or vice versa is B1 B0

(iii)

B1: $\left(\frac{5}{3}a,\ -2a\right)$. Allow this to be given as $x = ...$, $y = ...$

(b)

M1: Attempts to solve one **correct** equation. It must be an equation without moduli and be found correctly

For example, look for

- Either taking both positive aspects of the modulus equation $|3x-5a|-2a=|x-2a|$

  So $3x-5a-2a=x-2a$ or exact equivalent such as $3x-7a=x-2a \Rightarrow x=...$

  Condone for this mark $\Rightarrow a=...$

- Or taking both negative aspects of the modulus equation $|3x-5a|-2a=|x-2a|$

  So $-3x+5a-2a=-x+2a$ or exact equivalent such as $-3x+3a=-x+2a \Rightarrow x=...$

  Condone for this mark $\Rightarrow a=...$

  The $2a$ may be moved over first so it is possible to solve $|3x-5a|=|x-2a|+2a$

  So both positive will give an equation $3x-5a=x-2a+2a$ or $3x-5a=x$

  or both negative would give $-3x+5a=-x+2a+2a$ or $-3x+5a=-x+4a$

A1: One correct value of x which must be found from a correctly produced equation

dM1: Attempts to solve both of these equations.

There may be other equations which should be ignored for this mark

A1: Both correct values of x (coming from correct equations) with no other values given.

Also allow if 4 answers are found, for example, followed by the 2 correct answers being chosen and the other 2 incorrect answers discarded.

Question Number	Scheme	Marks
7(a)	$x = 3\tan\left(y - \frac{\pi}{6}\right) \Rightarrow \frac{\mathrm{d}x}{\mathrm{d}y} = 3\sec^2\left(y - \frac{\pi}{6}\right)$	B1
	$\Rightarrow \frac{\mathrm{d}y}{\mathrm{d}x} = \frac{1}{3\sec^2\left(y - \frac{\pi}{6}\right)}$	M1
	$\frac{1}{3\left(1+\tan^2\left(y - \frac{\pi}{6}\right)\right)} = \frac{1}{3\left(1+\left(\frac{x}{3}\right)^2\right)}$	dM1
	$= \frac{3}{x^2+9}$	A1
		(4)
(b)	$y = \frac{\pi}{3} \Rightarrow x = 3\tan\frac{\pi}{6} = \sqrt{3}$	B1
	$x = \sqrt{3} \Rightarrow \frac{\mathrm{d}y}{\mathrm{d}x} = \frac{3}{\left(\sqrt{3}\right)^2+9}$ or $y = \frac{\pi}{3} \Rightarrow \frac{\mathrm{d}y}{\mathrm{d}x} = \frac{1}{3\sec^2\left(\frac{\pi}{3} - \frac{\pi}{6}\right)} = \ldots$	M1
	$y - \frac{\pi}{3} = \frac{1}{4}\left(x - \sqrt{3}\right)$	dM1
	$y = 0 \Rightarrow 0 - \frac{\pi}{3} = \frac{1}{4}\left(x - \sqrt{3}\right) \Rightarrow x = \ldots$	ddM1
	$x = \sqrt{3} - \frac{4\pi}{3}$	A1
		(5)
		Total 9

(a)

B1: Correct derivative, including correct lhs. Condone $\frac{\mathrm{d}x}{\mathrm{d}y} = k\sec^2\left(y - \frac{\pi}{6}\right)$ where k is a constant.

M1: Either (1) attempts to apply the reciprocal rule $\frac{\mathrm{d}y}{\mathrm{d}x} = 1 \div \frac{\mathrm{d}x}{\mathrm{d}y}$.

Don't be too concerned by the position of the constant, it is the function and variable that is important.

Or (2) attempts to apply $\sec^2\left(y - \frac{\pi}{6}\right) = 1 + \tan^2\left(y - \frac{\pi}{6}\right)$ with $\tan\left(y - \frac{\pi}{6}\right)$ being replaced by $\frac{x}{3}$ to get $\frac{\mathrm{d}x}{\mathrm{d}y}$ in terms of x

dM1: Attempts both (1) and (2) to obtain $\frac{\mathrm{d}y}{\mathrm{d}x}$ in terms of x

A1: Correct answer

(b)

B1: Correct value for x. Condone awrt 1.73. This can be awarded from the sight of this value in an equation

M1: Uses a correct method to find the value of $\frac{\mathrm{d}y}{\mathrm{d}x}$ which may be a decimal.