Question Number	Scheme	Marks
4 (a)	$2\times 4^{x}-2^{x+3}=17\times 2^{x-1}-4$ Uses an index law and states or implies any of $4^{x}=p^{2},\quad 2^{x+3}=8p \quad \text{or} \quad 2^{x-1}=\frac{p}{2}$	B1
	Writes the given equation in terms of p $2\times 4^{x}-2^{x+3}=17\times 2^{x-1}-4\Rightarrow 2p^{2}-2^{3}\times p=\frac{17p}{2^{1}}-4$	M1
	Proceeds to $4p^{2}-33p+8=0$ via $2p^{2}-8p=\frac{17p}{2}-4$ * CSO	A1*
		(3)
(b)	$4p^{2}-33p+8=0\Rightarrow (4p-1)(p-8)=0\Rightarrow p=...,...$	M1
	Sets $2^{x}=\frac{1}{4},8\Rightarrow x=...$	M1
	$x=-2,3$	A1
		(3)
		(6 marks)

(a) Watch out here as this is a given answer. All stages of working are required to score the 3 marks

B1: Uses an index law and states or implies any of $4^{x}=p^{2},\ 2^{x+3}=8p$ or $2^{x-1}=\frac{p}{2}$

Allow equivalents such as $4^{x}=p\times p,\ 2^{x+3}=8\times p, p\times 8$ or $2^{x-1}=\frac{1}{2}p, p\div 2, 0.5p$

M1: Attempts to write the given equation in x to a quadratic equation in terms of p

$2\times 4^{x}-2^{x+3}=17\times 2^{x-1}-4\Rightarrow 2p^{2}-2^{3}\times p=\frac{17p}{2^{1}}-4$ or $2p^{2}-2^{3}\times p=17p\times 2^{-1}-4$

All three index laws must be seen but condone slips on signs or on the 2^{3} if there was an incorrect attempt to process.

$2\times 4^{x}-2^{x+3}=17\times 2^{x-1}-4\Rightarrow 2p^{2}-6\times p=\frac{17p}{2^{1}}-4$ would be fine for the M1

Allow a recovery for this M1, e.g. $2^{x+3}=2^{x}+2^{3}=8p$ but not the A1*

Watch for candidates who manipulate the given equation first. This is acceptable.

$$2\times 4^{x}-2^{x+3}=17\times 2^{x-1}-4\Rightarrow 4^{x}-2^{x+2}=17\times 2^{x-2}-2$$

So $$\Rightarrow p^{2}-2^{2}\times p=\frac{17p}{2^{2}}-2$$

A1*: CSO Proceeds to the given answer of $4p^{2}-33p+8=0$ with no errors or omissions.

Condone working such as $4^{x}=2^{x^{2}}$ leading to p^{2}. It is often hard to decipher the relative heights of the indices.

An intermediate line of $2p^{2}-8p=\frac{17p}{2}-4$ o.e. must be seen.

(b) **This is a non-calculator part so the use of a calculator is penalised**

M1: Valid **non calculator** attempt at solving $4p^2-33p+8=0$. Allow slips/miscopies on $4p^2-33p+8=0$ for example, $4p^2-33p-8=0$. The roots cannot just appear.

Examples such as $4p^2-33p+8=(p-8)\left(p-\frac{1}{4}\right)=0\Rightarrow p=8,\frac{1}{4}$ is obvious calculator work and scores M0

Award for an attempt to

- factorise (usual rules) leading to values for (p)
- use the quadratic formula condoning this calculation $\frac{33\pm\sqrt{(-33)^2-4(4)(8)}}{2(4)}$ followed by $\frac{1}{4},8$
- complete the square leading to values for (p)

M1: Valid non calculator attempt at solving an equation of the form $2^x=k,\quad k>0$

This can be implied for a correct solution for either root.

If the value of k is not a power of 2 then score for $2^x=k\Rightarrow x=\log_2 k$

A1: Both solutions $x=-2,3$ following the correct quadratic equation in p. There is no need to state $x=$ If they then go on to reject $x=-2$ say then A0

Note that 011 is possible in part (b) for candidates who don't show a non-calculator solution of $4p^2-33p+8=0$

Question Number	Scheme	Marks
5 (a)	Attempts the gradient $\frac{\Delta y}{\Delta x}=\frac{9-6}{-2-10}=\left(-\frac{1}{4}\right)$	M1
	Uses the gradient and a point to form an eqn for l_1 $y-9=-\frac{1}{4}\left(x+2\right)$	dM1
	$y=-\frac{1}{4}x+\frac{17}{2}$	A1
		(3)
(b)	Eqn of l_2 is $y=4x$	B1ft
	Attempts to solve their $y=4x$ and their $y=-\frac{1}{4}x+\frac{17}{2}$ simultaneously	M1
	$R=(2,8)$	A1, A1
		(4)
(c)	Attempts $(OR)=\sqrt{"2"^2+"8"^2}$ or $(PQ)=\sqrt{3^2+12^2}$	M1
	Full attempt at area $OPQ=\frac{1}{2}\times\sqrt{3^2+12^2}\times\sqrt{2^2+8^2}$	dM1
	$=\frac{1}{2}\times3\sqrt{17}\times2\sqrt{17}=51$	A1
		(3)
		(10 marks)

This is a non-calculator question so the use of a calculator is penalised

(a)

M1: Attempts gradient. It must be the "correct way up" with $\Delta y/\Delta x$ and an attempt at differences (seen or implied at least once on either the numerator or denominator). It is implied by a correct answer.

dM1: Uses gradient and one of the points to form a straight line. The coordinates must be in the correct place in the unsimplified equation. It is dependent upon the previous M

A1: $y=-\frac{1}{4}x+\frac{17}{2}$ o.e. but it must be in the form $y=mx+c$. ISW after sight of a correct answer.

Alt (a) via simultaneous equations

M1: Attempts to form two simultaneous equations using both points and either $y=mx+c$ **or** $ax+by+c=0$

dM1: Solves the two simultaneous equations **via a non calculator method** to find both unknowns. It is important to see some working but it can be minimal. For example, $9=-2m+c$ and $6=10m+c$ must be followed by $12m=-3$ o.e before you see $m=-0.25$ oe.

A1: $y=-0.25x+8.5$ o.e. but it must be in the form $y=mx+c$.

Note that 101 is possible for candidates who don't show any working in solving their simultaneous equations but produce the correct equation (in the correct form)