Question Number	Scheme	Marks
7 (a)	States or implies that B is $(10, 6)$	B1
	$\left(AB^2\right) = (10-0)^2 + ("6"-2)^2 \Rightarrow AB = 2\sqrt{29}$	M1, A1
		(3)
(b)	States or implies that grad $AB = \frac{2}{5}$	B1
	Uses perpendicular gradient rule $\Rightarrow$ grad $l_2 = -\frac{5}{2}$	M1
	$y - "6" = "-\frac{5}{2}"(x-10) \Rightarrow 5x + 2y - 62 = 0$	dM1, A1
		(4)
(c)	C is $\left(\frac{62}{5}, 0\right)$	B1 ft
	$\left(BC^2\right) = \left(\frac{62}{5} - 10\right)^2 + ("6"-0)^2 \Rightarrow BC = \frac{6\sqrt{29}}{5} = (6.46)$	
	Area $ABCD$ = 69.6	M1, A1
		(3)
		(10 marks)

(a)

B1: States or implies that B is $(10, 6)$. May be awarded for sight of $x = 10$, $y = 6$ without reference to "B"

It is implied via sight of $(10-0)^2 + (6-p)^2$. Also be aware the answer may be on the Figure

M1: Attempts AB or $(AB)^2$ between $(0, 2)$ and their $(10, "6")$ **This must be in part (a) and not in part (c).**

Award for $\sqrt{(10-0)^2 + ("6"-2)^2}$ or $(10-0)^2 + ("6"-2)^2$ It is implied by $AB = \sqrt{116}$ or $AB^2 = 116$

There are other methods including $BH - AH = \sqrt{15^2 + 6^2} - \sqrt{5^2 + 2^2}$ where H is the x intercept of l_1

A1: $AB = 2\sqrt{29}$. This isn't a non-calculator question so minimal working is condoned/allowed.

(b)

B1: States or implies that grad $l_1 = \frac{2}{5}$ o.e such as 0.4, $\frac{6}{15}$ It is implied by grad $l_2 = -\frac{5}{2}$

It cannot be awarded for just writing the equation of l_1 as $y = \frac{2}{5}x + \ldots$.

Candidates must know which part of the equation is the gradient

M1: Uses perpendicular gradient rule $\Rightarrow$ grad $l_2 = -\frac{1}{\text{grad } l_1}$

dM1: Full attempt at equation of line l_2 $y - "6" = "-\frac{5}{2}"(x-10)$

For this to be awarded

- the gradient of l_2 must be either $-\frac{1}{\text{their grad } l_1}$ or if that was not attempted $-\frac{5}{2}$ or $-\frac{1}{0.4}$
- the point used must be $x = 10$ and their $y = 6$ (see part (a) for their B)

If the form $y = mx + k$ is used then the method must proceed as far as k = ...

A1: $5x + 2y - 62 = 0$ or any integer multiple of this

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Special case in (b)

As the equation for l_1 is given as $5y = 2x + 10$ some candidates will assume the gradient is 2.

These candidates should get the equation of l_2 as $y - "6" = -\frac{1}{2}(x - 10)$

Such a candidate can score B0, M1, dM1, A0

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(c)

B1ft: States or implies that *C* is $\left(\frac{62}{5}, 0\right)$ o.e but follow through on their $-\frac{c}{a}$ from their $ax + by + c = 0$

M1: Attempts full method to find area *ABCD*. E.g $AB \times BC$ with a full attempt at *BC* using a correct method via Pythagoras' theorem. Follow through on their length *AB* from part (a)
If *A*, *B* and *C* are correct score for $AB = \text{awrt } 10.77, BC = 6.46$ followed by 10.77×6.46

A1: Exact answer is 69.6 or $\frac{348}{5}$ o.e. but accept awrt 69.6

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Other methods will be seen here, so look carefully at what is attempted.
E.g. The Shoelace Method
For example using *ABCD* which requires all 4 coordinates

$$\frac{1}{2} \times \begin{vmatrix} 0 & 10 & 12.4 & 2.4 & 0 \\ 2 & 6 & 0 & -4 & 2 \end{vmatrix} = \frac{1}{2} \times |0 \times 6 + 10 \times 0 + 12.4 \times -4 + 2.4 \times 2 - 10 \times 2 - 12.4 \times 6 - 2.4 \times 0 - 0 \times -4|$$

$$= \frac{1}{2} \times 139.2 = 69.6$$

B1ft: For *C* as in the main method

M1: Correct method for coordinate *D* (usually using vectors with $\overrightarrow{AD} = \overrightarrow{BC}$) followed by a full application of the method with correct signs. Score for an unsimplified expression following through on their *C*

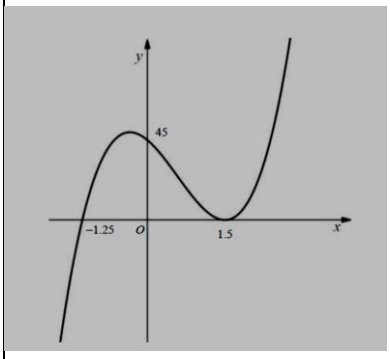
A1: AWRT 69.6

Or more easily by doubling area triangle *ABC* which does not use coordinate *D*

$$2 \times \frac{1}{2} \times \begin{vmatrix} 0 & 10 & 12.4 & 0 \\ 2 & 6 & 0 & 2 \end{vmatrix} = |0 \times 6 + 10 \times 0 + 12.4 \times 2 - 10 \times 2 - 12.4 \times 6 - 0 \times 0|$$

$$= 69.6$$

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Question Number	Scheme	Marks
8 (a)	$f'(x) = 2(x-3)(3x+2) = 6x^2 - 14x - 12$	B1
	$f(x) = 2x^3 - 7x^2 - 12x + k$	M1, A1
	Uses $P(4, 13) \Rightarrow 13 = 2\times64 - 7\times16 - 12\times4 + k \Rightarrow k = ...$	M1
	$(f(x)) = 2x^3 - 7x^2 - 12x + 45$	A1
		(5)
(b)	$2x^3 - 7x^2 - 12x + 45 \equiv (x^2 - 6x + 9)(px + q) \Rightarrow p = "2"$ or $q = \frac{"45"}{9}$	B1 ft
	States either $2x^3 - 7x^2 - 12x + 45 \equiv (x-3)^2(2x+5)$ or $p = 2$ & $q = 5$ following a fully correct (a) or correct but incomplete part (a) (See notes)	B1
		(2)
(c)		
	+ ve cubic curve	B1
	"Correct" y intercept for their part (b) equation. So $9q$ or "45"	B1ft
	Turning point at (1.5, 0)	B1
	x intercept at $(-1.25, 0)$	B1
		(4)
		(11 marks)

Mark parts (a) and (b) together but f(x) must be obtained via integration AND the use of (4, 13)

(a)

B1: $2(x-3)(3x+2) = 6x^2 - 14x - 12$ which may be left unsimplified BUT the brackets must be expanded

M1: Attempts to multiply out $2(x-3)(3x+2)$ and integrate each term.

Look for an expanded form which would simplify to $ax^2 + bx + c$ and **then each term** being integrated with each of the powers being correctly dealt with. So $ax^2 \to ...x^3$, $bx \to ...x^2$ and $+c \to cx$

There is no requirement to have a constant of integration for this mark

A1: $f(x) = 2x^3 - 7x^2 - 12x + k$ including the $+k$. (Any constant is acceptable)

The expression must now be in simplest form

M1: Uses $P(4, 13)$ and finds a value for k. It is dependent upon some 'correct' integration.

So, look for substituting $x = 4, y = 13$ into their $y = f(x)$ and finding a value for k.

A1: $f(x) = 2x^3 - 7x^2 - 12x + 45$. There is no requirement to see the f (x)