

Question	Scheme	Marks
<b>10 (a)</b>	For the correct value of $a = 10$	B1 [1]
<b>(b)</b>	Gradient of line $L_2$ $m = -\frac{1}{2}$ $y - '10' = -\frac{1}{2}(x - 2)$ $y - 10 = -\frac{1}{2}(x - 2)$ oe $x + 2y - 22 = 0$ *	B1  M1  A1  A1 cso [4]
<b>(c)</b>	Coordinates of point $A$ are $(-3, 0)$ Coordinates of point $B$ are $(22, 0)$  Length of $AC$ $(5\sqrt{2})^2 = (m - '-3')^2 + n^2$ [ $\Rightarrow 50 = m^2 + 6m + 9 + n^2$ ]  Gradient of $BC$ $\frac{1}{4} = \frac{n}{m - '22'} \Rightarrow n = \frac{m - '22'}{4} \Rightarrow n^2 = \frac{m^2 - 44m + 484}{16}$  $50 = m^2 + 6m + 9 + \frac{m^2 - 44m + 484}{16}$ [or $50 = (22 + 4n)^2 + 6(22 + 4n) + 9 + n^2$ ]  $17m^2 + 52m - 172 = 0$ OR $17n^2 + 200n + 575 = 0$ e.g. $m = \frac{-52 \pm \sqrt{52^2 - 4 \times 17 \times -172}}{2 \times 17} \Rightarrow m = 2, (-5.058...)$  $m = 2$ and $n = -5$	B1 B1  M1  M1  ddM1  A1 M1 A1A1 [9]
<b>(d)</b>	Area <sub>APB</sub> = $\frac{1}{2}('10') \times ('22' - '-3') = (125)$ Area <sub>ABC</sub> = $\frac{1}{2}('5') \times ('22' - '-3') = \left(\frac{125}{2}\right)$ Area of quadrilateral $ACBP = \frac{375}{2}$ (units) <sup>2</sup> ALT Area <sub>ACBP</sub> = $\frac{1}{2}('25') \times ('15') = ...$ Area of quadrilateral $ACBP = \frac{375}{2}$ (units) <sup>2</sup> ALT	M1 A1  A1 [3]  [M1A1 A1]

	$A = \frac{1}{2} \begin{bmatrix} -3 & 2 & 22 & 2 & -3 \\ 0 & 10 & 0 & -5 & 0 \end{bmatrix}$ $A = \frac{1}{2} \left( [(-3) \times 10 + 2 \times 0 + 22 \times (-5) + 2 \times 0] - [2 \times 0 + 22 \times 10 + 2 \times 0 + (-3) \times -5] \right) = \dots$ <p>Area of quadrilateral <math>APBC = \frac{375}{2}</math> (units)<sup>2</sup></p>	[M1 A1 A1]
<b>Total 17 marks</b>		

Part	Mark	Notes
(a)	B1	For the correct value of $a = 10$ . Accept embedded i.e. $P = (2, 10)$
(b)	B1	For the correct gradient of line $L_2$ $m = -\frac{1}{2}$
	M1	For a correct attempt at the equation of line $L_2$ using their gradient and their value for $a$ $y - '10' = '-\frac{1}{2}'(x - 2)$
	A1	For the correct equation in any form $y - 10 = -\frac{1}{2}(x - 4)$ oe
	A1 cso	For the correct equation in the required form $x + 2y - 22 = 0$ * [Accept for example $22 - x - 2y = 0$ provided all terms on one side]
(c)	B1	Coordinates of point $A$ are $(-3, 0)$
	B1	Coordinates of point $B$ are $(22, 0)$
	M1	Length of $AC$ $(5\sqrt{2})^2 = (m - '-3')^2 + n^2$ [ $\Rightarrow 50 = m^2 + 6m + 9 + n^2$ ] Allow use of $'-3'$ provided this is an $x$ -intercept i.e. $(-3, 0)$
	M1	Gradient of $BC$ $\frac{1}{4} = \frac{n}{m - '22'}$ [ $\Rightarrow n = \frac{m - '22'}{4} \Rightarrow n^2 = \frac{m^2 - 44m + 484}{16}$ ] Allow use of $'22'$ provided this is an $x$ -intercept i.e. $(22, 0)$
	ddM1	For attempting to form an equation in $m$ e.g. $50 = m^2 + 6m + 9 + \frac{m^2 - 44m + 484}{16}$
		OR, For attempting to form an equation in $n$ e.g. $50 = (22 + 4n)^2 + 6(22 + 4n) + 9 + n^2$
	A1	For the correct 3TQ in either $m$ or $n$ $17m^2 + 52m - 172 = 0$ OR $17n^2 + 200n + 575 = 0$
	M1	For attempting to solve their 3TQ to find a value for $m$ or $n$ by any valid method e.g. $m = \frac{-52 \pm \sqrt{52^2 - 4 \times 17 \times -172}}{2 \times 17} \Rightarrow m = 2, (-5.058\dots)$ If a calculator is used with the incorrect 3TQ award only with a full method seen.
	A1	For the value of $m$ or $n$ $m = 2$ or $n = -5$ If a second value for $m$ or $n$ is seen then condone for this mark.
	A1	For the value of $m$ and $n$ $m = 2$ and $n = -5$

		Any other values of $m$ and $n$ must be rejected.
<b>(d)</b>	<b>M1</b>	For either area of triangle $APB$ or $ABC$ $\text{Area}_{APB} = \frac{1}{2}('10') \times ('22' - '-3') = (125) \quad \text{or} \quad \text{Area}_{ABC} = \frac{1}{2}('5') \times ('22' - '-3') = \left(\frac{125}{2}\right)$
	<b>A1</b>	Either area of triangle $APB$ or $ABC$ correct
	<b>A1</b>	Area of quadrilateral $ACBP = \frac{375}{2}$ (units) <sup>2</sup>
<b>ALT</b>		
	<b>M1A1</b>	$\text{Area}_{ACBP} = \frac{1}{2}('25') \times ('15') = \dots$
	<b>A1</b>	Area of quadrilateral $ACBP = \frac{375}{2}$ (units) <sup>2</sup>
<b>ALT – determinant method</b>		
	<b>M1</b>	For using the ‘determinant method’ e.g. $A = \frac{1}{2} \begin{bmatrix} '-3' & 2 & '22' & '2' & '-3' \\ 0 & '10' & 0 & '-5' & '0' \end{bmatrix}$
	<b>A1</b>	For a correct evaluation of their determinants using <b>their</b> values e.g. $A = \frac{1}{2} \left( \left[ (-3) \times 10 + 2 \times 0 + 22 \times (-5) + 2 \times 0 \right] - \left[ 2 \times 0 + 22 \times 10 + 2 \times 0 + (-3) \times -5 \right] \right) = \dots$
	<b>A1</b>	Area of quadrilateral $APBC = \frac{375}{2}$ (units) <sup>2</sup>