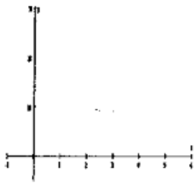
Straight line graphs - Edexcel Past Exam Questions MARK SCHEME

Question 1: Jan 05 Q8

Question number	Scheme	Marks
	(a) $p = 15$, $q = -3$	B1 B1 (2)
	(b) Grad. of line ADC: $m = -\frac{5}{7}$, Grad. of perp. line $= -\frac{1}{m}$ $\left(= \frac{7}{5}\right)$	B1, M1
	Equation of l: $y - 2 = \frac{7}{5}(x - 8)$	M1 A1ft
	$7x - 5y - 46 = 0$ (Allow rearrangements, e.g. $5y = 7x - 46$)	A1 (5)
	(c) Substitute $y = 7$ into equation of l and find $x = \ldots$	M1
	$\frac{81}{7}$ or $11\frac{4}{7}$ (or exact equiv.)	A1 (2)
		9
	(a) Special case: If B0 B0 from main scheme, allow M1 for a correct method, e.g. $8 = \frac{1+p}{2}$. (b) Finding eqn. of ADC instead of l scores M1 A0 A0.	

Question 2: Jan 05 Q10

Question number	Scheme	Marks
	(a) $x^2-6x+18=(x-3)^2,\ +9$	B1, M1 A1 (3)
	(b)  "U"-shaped parabola	M1
	Vertex in correct quadrant	A1ft
	P: (0, 18) (or 18 on y-axis)	B1
	Q: (3, 9)	B1ft (4)
	(c) $x^2-6x+18=41$ or $(x-3)^2+9=41$	M1
	Attempt to solve 3 term quadratic $x=\ldots$	M1
	$x=\dfrac{6\pm\sqrt{36-(4\times-23)}}{2}$ (or equiv.)	A1
	$\sqrt{128}=\sqrt{64}\times\sqrt{2}$ (or equiv. surd manipulation)	M1
	$3+4\sqrt{2}$ (Ignore other value)	A1 (5)
		12
	(a) M1 requires $(x\pm a)^2\pm b\pm 18,\ a\neq 0,\ b\neq 0$ Answer only: full marks.	

Question 3: June 05 Q8

Question Number	Scheme	Marks
(a)	$y-(-4)=\frac{1}{3}(x-9)$	M1 A1
	$3y-x+21=0$ (o.e.) (condone 3 terms with integer coefficients e.g. $3y+21=x$)	A1
		(3)
(b)	Equation of l_2 is: $y=-2x$ (o.e.)	B1
	Solving l_1 and l_2 : $-6x-x+21=0$	M1
	p is point where $x_p=3$, $y_p=-6$ — x_p or y_p	A1
	y_p or x_p	A1f.t.
		(4)
(c)	(l_1 is $y=\frac{1}{3}x-7$) C is (0, -7) or OC = 7	B1f.t.
	Area of $\Delta OCP=\frac{1}{2}OC\times x_p$, $=\frac{1}{2}\times 7\times 3=10.5$ or $\frac{21}{2}$	M1 A1c.a.o.
		(3)
		(10)
(a)	M1 for full method to find equation of l_1 1stA1 any unsimplified form	
(b)	M1 Attempt to solve two linear equations leading to linear equation in one variable 2^{nd} A1 f.t. only f.t. their x_p or y_p in $y=-2x$	
(c)	B1f.t. Either a correct OC or f.t. from their l_1 M1 for correct attempt in letters or symbols for ΔOCP A1 c.a.o. $-\frac{1}{2}\times 7\times 3$ scores M1 A0	

Question 4: Jan 06 Q3

Question number	Scheme	Marks
	(a) $y = 5 - (2 \times 3) = -1$ (or equivalent verification) (*)	B1
		(1)
	(b) Gradient of L is $\frac{1}{2}$	B1
	$y - (-1) = \frac{1}{2}(x - 3)$ (ft from a <u>changed</u> gradient)	M1 A1ft
	$x - 2y - 5 = 0$ (or equiv. with integer coefficients)	A1
		(4)
		Total 5 marks
	(a) $y - (-1) = -2(x - 3) \Rightarrow y = 5 - 2x$ is fine for B1. Just a table of values including $x = 3,\ y = -1$ is insufficient. (b) M1: eqn of a line through (3, –1), with any numerical gradient (except 0 or ∞). For the M1 A1ft, the equation may be in any form, e.g. $\frac{y - (-1)}{x - 3} = \frac{1}{2}$. Alternatively, the M1 may be scored by using $y = mx + c$ with a numerical gradient and substituting (3, –1) to find the value of c, with A1ft if the value of c follows through correctly from a <u>changed</u> gradient. Allow $x - 2y = 5$ or equiv., but must be integer coefficients. The "= 0" can be implied if correct working precedes.	

Question 5: June 06 Q11

Question number	Scheme	Marks
(a)	$m = \frac{8-2}{11+1}$ $\left(= \frac{1}{2}\right)$	M1 A1
	$y - 2 = \frac{1}{2}(x - -1)$ or $y - 8 = \frac{1}{2}(x - 11)$ o.e.	M1
	$y = \frac{1}{2}x + \frac{5}{2}$ accept exact equivalents e.g. $\frac{6}{12}$	A1c.a.o. (4)
(b)	Gradient of $l_2 = -2$	M1
	Equation of l_2: $y - 0 = -2(x - 10)$ $[y = -2x + 20]$	M1
	$\frac{1}{2}x + \frac{5}{2} = -2x + 20$	M1
	$\underline{x = 7 \text{ and } y = 6}$ depend on all 3 Ms	A1, A1 (5)
(c)	$RS^2 = (10-7)^2 + (0-6)^2 (= 3^2 + 6^2)$	M1
	$RS = \sqrt{45} = 3\sqrt{5}$ (*)	A1c.s.o. (2)
(d)	$PQ = \sqrt{12^2 + 6^2}, = 6\sqrt{5}$ or $\sqrt{180}$ or $PS = 4\sqrt{5}$ and $SQ = 2\sqrt{5}$	M1,A1
	Area $= \frac{1}{2} PQ \times RS = \frac{1}{2} 6\sqrt{5} \times 3\sqrt{5}$	dM1
	$\underline{= 45}$	A1 c.a.o. (4)
		15

(a)	1st M1	for attempting $\frac{y_1 - y_2}{x_1 - x_2}$, must be y over x. No formula condone one sign slip, but if formula is quoted then there must be some correct substitution.
	1st A1	for a fully correct expression, needn't be simplified.
	2nd M1	for attempting to find equation of l_1.
(b)	1st M1	for using the perpendicular gradient rule
	2nd M1	for attempting to find equation of l_2. Follow their gradient provided different.
	3rd M1	for forming a suitable equation to find S.
(c)	M1	for expression for RS or RS^2. Ft their S coordinates
(d)	1st M1	for expression for PQ or PQ^2. $PQ^2 = 12^2 + 6^2$ is M1 but $PQ = 12^2 + 6^2$ is M0. Allow one numerical slip.
	2nd dM1	for a full, correct attempt at area of triangle. Dependent on previous M1.

Question 6: June 07 Q10

Question number	Scheme		Marks
	(a) $x=1:\ y=-5+4=\underline{-1}$, $\quad x=2:\ y=-16+2=\underline{-14}$	(can be given in (b) or (c))	1st B1 for – 1 2nd B1 for - 14
	$PQ=\sqrt{(2-1)^2+(-14-(-1))^2}=\sqrt{170}$	(*)	M1 A1cso (4)

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Question 7: June 07 Q11

Question number	Scheme	Marks	
	(a) $y = -\frac{3}{2}x(+4)$ Gradient $= -\frac{3}{2}$	M1 A1	(2)
	(b) $3x + 2 = -\frac{3}{2}x + 4$ $x = \ldots,\ \underline{\frac{4}{9}}$	M1, A1	
	$y = 3\left(\frac{4}{9}\right) + 2 = \underline{\frac{10}{3}}\ \left(= 3\frac{1}{3}\right)$	A1	(3)
	(c) Where $y = 1$, $l_1 : x_A = -\frac{1}{3}$ $l_2 : x_B = 2$ M: Attempt one of these	M1 A1	
	Area $= \frac{1}{2}(x_B - x_A)(y_P - 1)$	M1	
	$= \frac{1}{2} \times \frac{7}{3} \times \frac{7}{3} = \underline{\frac{49}{18} = 2\frac{13}{18}}$ o.e.	A1	(4)
			9
(a)	M1 for an attempt to write $3x + 2y - 8 = 0$ in the form $y = mx + c$ or a full method that leads to $m =$, e.g find 2 points, and attempt gradient using $\frac{y_2 - y_1}{x_2 - x_1}$ e.g. finding $y = -1.5x + 4$ alone can score M1 (even if they go on to say $m = 4$) A1 for $m = -\frac{3}{2}$ (can ignore the $+c$) or $\frac{dy}{dx} = -\frac{3}{2}$		
(b)	M1 for forming a suitable equation in one variable and attempting to solve leading to $x = ..$or $y =$ 1st A1 for any exact correct value for x 2nd A1 for any exact correct value for y (These 3 marks can be scored anywhere, they may treat (a) and (b) as a single part)		
(c)	1st M1 for attempting the x coordinate of A or B. One correct value seen scores M1. 1st A1 for $x_A = -\frac{1}{3}$ and $x_B = 2$ 2nd M1 for a full method for the area of the triangle – follow through their x_A, x_B, y_P. e.g. determinant approach $\frac{1}{2}\begin{vmatrix} 2 & -\frac{1}{3} & \frac{4}{9} & 2 \\ 1 & 1 & \frac{10}{3} & 1 \end{vmatrix} = \frac{1}{2}\left\|2 - \ldots - (-\frac{1}{3}\ldots)\right\|$ 2nd A1 for $\frac{49}{18}$ or an exact equivalent. All accuracy marks require answers as single fractions or mixed numbers not necessarily in lowest terms.		

Question 8: Jan 08 Q4

Question number	Scheme	Marks
	(a) $m = \frac{4-(-3)}{-6-8}$ or $\frac{-3-4}{8-(-6)}$, $= \frac{7}{-14}$ or $\frac{-7}{14}$ $\left(= -\frac{1}{2}\right)$	M1, A1
	Equation: $y - 4 = -\frac{1}{2}(x-(-6))$ or $y-(-3) = -\frac{1}{2}(x-8)$	M1
	$x + 2y - 2 = 0$ (or equiv. with <u>integer</u> coefficients… must have '= 0')	A1 (4)
	(e.g. $14y + 7x - 14 = 0$ and $14 - 7x - 14y = 0$ are acceptable)	
	(b) $(-6-8)^2 + (4-(-3))^2$	M1
	$14^2 + 7^2$ or $(-14)^2 + 7^2$ or $14^2 + (-7)^2$ (M1 A1 may be implied by 245)	A1
	$AB = \sqrt{14^2 + 7^2}$ or $\sqrt{7^2(2^2+1^2)}$ or $\sqrt{245}$	
	$7\sqrt{5}$	A1cso (3)
		7
	(a) 1st M: Attempt to use $m = \frac{y_2 - y_1}{x_2 - x_1}$ (may be implicit in an equation of L). 2nd M: Attempting straight line equation in any form, e.g $y - y_1 = m(x - x_1)$, $\frac{y - y_1}{x - x_1} = m$, with any value of m (except 0 or ∞) and either (–6, 4) or (8, –3) N.B. It is also possible to use a different point which lies on the line, such as the midpoint of AB (1, 0.5). Alternatively, the 2nd M may be scored by using $y = mx + c$ with a numerical gradient and substituting (–6, 4) or (8, –3) to find the value of c. Having coords the <u>wrong way round</u>, e.g. $y-(-6) = -\frac{1}{2}(x-4)$, loses the 2nd M mark <u>unless</u> a correct general formula is seen, e.g. $y - y_1 = m(x - x_1)$. (b) M: Attempting to use $(x_2 - x_1)^2 + (y_2 - y_1)^2$. <u>Missing bracket</u>, e.g. $-14^2 + 7^2$ implies M1 if no earlier version is seen. $-14^2 + 7^2$ with no further work would be M1 A0. $-14^2 + 7^2$ followed by 'recovery' can score full marks.	

Question 9: June 08 Q10

Question Number	Scheme	Marks
(a)	$QR = \sqrt{(7-1)^2 + (0-3)^2}$	M1
	$= \sqrt{36+9}$ or $\sqrt{45}$	A1
	$= 3\sqrt{5}$ or $a = 3$	A1 (3)
(b)	Gradient of QR (or l_1) $= \dfrac{3-0}{1-7}$ or $\dfrac{3}{-6}, = -\dfrac{1}{2}$	M1 A1
	Gradient of l_2 is $-\dfrac{1}{-\frac{1}{2}}$ or 2	M1
	Equation for l_2 is: $y-3 = 2(x-1)$ or $\frac{y-3}{x-1} = 2$ [or $y = 2x + 1$]	M1 A1 ft (5)
(c)	P is (0, 1) (allow "$x = 0, y = 1$" but it must be clearly identifiable as P)	B1 (1)
(d)	$PQ = \sqrt{(1-x_P)^2 + (3-y_P)^2}$	M1
	$PQ = \sqrt{1^2 + 2^2} = \sqrt{5}$	A1
	Area of triangle is $\frac{1}{2} QR \times PQ = \frac{1}{2} 3\sqrt{5} \times \sqrt{5}, = \dfrac{15}{2}$ or 7.5	M1 A1 (4)
		(13 marks)

Question 10: Jan 09 Q10

Question Number	Scheme	Marks
(a)	$y-5=-\frac{1}{2}(x-2)$ or equivalent, e.g. $\frac{y-5}{x-2}=-\frac{1}{2}$, $\quad y=-\frac{1}{2}x+6$	M1A1, A1cao (3)
(b)	$x=-2 \Rightarrow\ y=-\frac{1}{2}(-2)+6\ =\ 7$ (therefore B lies on the line) (or equivalent verification methods)	B1 (1)
(c)	$\left(AB^2=\right)(2--2)^2+(7-5)^2,\quad =16+4=20,\quad AB=\sqrt{20}=2\sqrt{5}$	M1, A1, A1 (3)
(d)	C is $(p,\ -\frac{1}{2}p+6)$, so $\quad AC^2=(p-2)^2+\left(-\frac{1}{2}p+6-5\right)^2$	M1
	Therefore $\quad 25=p^2-4p+4+\frac{1}{4}p^2-p+1$	M1
	$25=1.25p^2-5p+5$ or $100=5p^2-20p+20$ (or better, RHS simplified to 3 terms)	A1
	Leading to: $\quad 0=p^2-4p-16 \quad (*)$	A1cso (4) [11]
(a)	M1 A1 The version in the scheme above can be written down directly (for 2 marks), and M1 A0 can be allowed if there is just one slip (sign or number). If the 5 and 2 are the wrong way round the M mark can still be given if a correct formula (e.g. $y-y_1=m(x-x_1)$) is seen, otherwise M0. If (2, 5) is substituted into $y=mx+c$ to find c, the M mark is for attempting this and the 1st A mark is for $c=6$. Correct answer without working or from a sketch scores full marks.	
(b)	A conclusion/comment is not required, except when the method used is to establish that the line through $(-2,7)$ with gradient $-\frac{1}{2}$ has the same eqn. as found in part (a), or to establish that the line through $(-2,7)$ and $(2,5)$ has gradient $-\frac{1}{2}$. In these cases a comment 'same equation' or 'same gradient' or 'therefore on same line' is sufficient.	
(c)	M1 for attempting AB^2 or AB. Allow one slip (sign or number) <u>inside</u> a bracket, i.e. do <u>not</u> allow $(2--2)^2-(7-5)^2$. 1st A1 for 20 (condone bracketing slips such as $-2^2=4$) 2nd A1 for $2\sqrt{5}$ or $k=2$ (Ignore $\pm$ here).	
(d)	1st M1 for $(p-2)^2+(\text{linear function of } p)^2$. The linear function may be unsimplified but must be equivalent to $ap+b,\ a\neq 0,\ b\neq 0$. 2nd M1 (dependent on 1st M) for forming an equation in p (using 25 or 5) and attempting (perhaps not very well) to multiply out both brackets. 1st A1 for collecting like p terms and having a correct expression. 2nd A1 for correct work leading to printed answer. <u>Alternative, using the result</u>: Solve the quadratic $\left(p=2\pm 2\sqrt{5}\right)$ and use one or both of the two solutions to find the length of AC^2 or $C_1C_2{}^2$: e.g. $AC^2=\left(2+2\sqrt{5}-2\right)^2+\left(5-\sqrt{5}-5\right)^2$ scores 1st M1, and 1st A1 if fully correct. Finding the length of AC or AC^2 for both values of p, or finding C_1C_2 with some evidence of halving (or intending to halve) scores the 2nd M1. Getting $AC=5$ for both values of p, or showing $\frac{1}{2}C_1C_2=5$ scores the 2nd A1 (cso).	

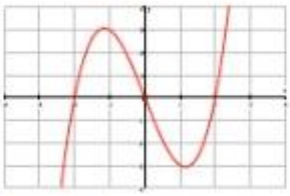
Question 11: June 09 Q8

Question Number	Scheme	Marks
Q (a)	AB: $m = \frac{2-7}{8-6}$, $\left(= -\frac{5}{2}\right)$	B1
	Using $m_1 m_2 = -1$: $m_2 = \frac{2}{5}$	M1
	$y - 7 = \frac{2}{5}(x-6)$, $2x - 5y + 23 = 0$ (o.e. with integer coefficients)	M1, A1 (4)
(b)	Using $x = 0$ in the answer to (a), $y = \frac{23}{5}$ or 4.6	M1, A1ft (2)
(c)	Area of triangle = $\frac{1}{2}\times 8 \times \frac{23}{5} = \frac{92}{5}$ (o.e) e.g. $\left(18\frac{2}{5},\ 18.4,\ \frac{184}{10}\right)$	M1 A1 (2)
		[8]
(a)	B1 for an expression for the gradient of AB. Does not need the $= -2.5$ 1st M1 for use of the perpendicular gradient rule. Follow through their m 2nd M1 for the use of (6, 7) and their changed gradient to form an equation for l. Can be awarded for $\frac{y-7}{x-6} = \frac{2}{5}$ o.e. Alternative is to use (6, 7) in $y = mx + c$ to <u>find a value</u> for c. Score when $c = \ldots$ is reached. A1 for a correct equation in the required form and must have "= 0" and integer coefficients	
(b)	M1 for using $x = 0$ in their answer to part (a) e.g. $-5y + 23 = 0$ A1ft for $y = \frac{23}{5}$ provided that $x = 0$ clearly seen <u>or</u> C (0, 4.6). Follow through their equation in (a) If $x = 0$, $y = 4.6$ are clearly seen but C is given as (4.6,0) apply ISW and award the mark. This A mark requires a simplified fraction or an exact decimal Accept their 4.6 marked on diagram next to C for M1A1ft	
(c)	M1 for $\frac{1}{2}\times 8 \times y_C$ so can follow through their y coordinate of C. A1 for 18.4 (o.e.) but their y coordinate of C must be positive <u>Use of 2 triangles or trapezium and triangle</u> Award M1 when an expression for area of OCB only is seen <u>Determinant approach</u> Award M1 when an expression containing $\frac{1}{2}\times 8 \times y_C$ is seen	

Question 12: Jan 10 Q3

Question number	Scheme	Marks
	(a) Putting the equation in the form $y = mx\ (+c)$ <u>and</u> attempting to extract the m or mx (<u>not</u> the c), or finding 2 points on the line and using the correct gradient formula.	M1
	Gradient $= -\frac{3}{5}$ (or equivalent)	A1 (2)
	(b) Gradient of perp. line $= \frac{-1}{"\left(-\frac{3}{5}\right)"}$ (Using $-\frac{1}{m}$ with the m from part (a))	M1
	$y - 1 = "\left(\frac{5}{3}\right)"(x-3)$	M1
	$y = \frac{5}{3}x - 4$ (Must be in this form... allow $y = \frac{5}{3}x - \frac{12}{3}$ but not $y = \frac{5x-12}{3}$) This A mark is dependent upon <u>both</u> M marks.	A1 (3) **[5]**
	(a) Condone sign errors and ignore the c for the M mark, so... both marks can be scored even if c is wrong (e.g. $c = -\frac{2}{5}$) or omitted. <u>Answer only</u>: $-\frac{3}{5}$ scores M1 A1. Any other <u>answer only</u> scores M0 A0. $y = -\frac{3}{5}x + \frac{2}{5}$ with no further progress scores M0 A0 (m or mx not extracted). (b) 2nd M: For the equation, in any form, of a straight line through (3, 1) with <u>any</u> numerical gradient (except 0 or ∞). (Alternative is to use (3, 1) in $y = mx + c$ to <u>find a value</u> for c, in which case $y = \frac{5}{3}x + c$ leading to $c = -4$ is sufficient for the A1). (See general principles for straight line equations at the end of the scheme).	

Question 13: Jan 10 Q9

Question number	Scheme	Marks
	(a) $x(x^2-4)$ Factor x seen in a <u>correct</u> factorised form of the expression. $= x(x-2)(x+2)$ M: Attempt to factorise quadratic (general principles). Accept $(x-0)$ or $(x+0)$ instead of x at any stage. Factorisation must be seen in part (a) to score marks.	B1 M1 A1 (3)
	(b)  Shape (2 turning points required) Through (or touching) origin Crossing x-axis or "stopping at x-axis" (<u>not</u> a turning point) at $(-2, 0)$ and $(2, 0)$. Allow -2 and 2 on x-axis. Also allow $(0, -2)$ and $(0, 2)$ if marked on x-axis. Ignore extra intersections with x-axis.	B1 B1 B1 (3)
	(c) <u>Either</u> $y = 3$ (at $x = -1$) <u>or</u> $y = 15$ (at $x = 3$) Allow if seen elsewhere. Gradient $= \frac{"15-3"}{3-(-1)}$ $(= 3)$ Attempt correct grad. formula with their y values. For gradient M mark, if correct formula not seen, allow one slip, e.g. $\frac{"15-3"}{3-1}$ $y - "15" = m(x-3)$ or $y - "3" = m(x-(-1))$, with any value for m. $y - 15 = 3(x-3)$ or the <u>correct</u> equation in <u>any</u> form, e.g. $y-3 = \frac{15-3}{3-(-1)}(x-(-1))$, $\frac{y-3}{x+1} = \frac{15-3}{3+1}$ $y = 3x + 6$	B1 M1 M1 A1 A1 (5)
	(d) $AB = \sqrt{("15-3")^2 + (3-(-1))^2}$ (With their <u>non-zero</u> y values)... Square root is required. $= \sqrt{160}$ $\left(= \sqrt{16}\sqrt{10}\right) = 4\sqrt{10}$ (Ignore $\pm$ if seen) ($\sqrt{16}\sqrt{10}$ need not be seen).	M1 A1 (2) [13]
	(a) $x^3-4x \rightarrow x(x^2-4) \rightarrow (x-2)(x+2)$ scores B1 M1 A0. $x^3-4x \rightarrow x^2-4 \rightarrow (x-2)(x+2)$ scores B0 M1 A0 (dividing by x). $x^3-4x \rightarrow x(x^2-4x) \rightarrow x^2(x-4)$ scores B0 M1 A0. $x^3-4x \rightarrow x(x^2-4) \rightarrow x(x-2)^2$ scores B1 M1 A0 Special cases: $x^3-4x \rightarrow (x-2)(x^2+2x)$ scores B0 M1 A0. $x^3-4x \rightarrow x(x-2)^2$ (with no intermediate step seen) scores B0 M1 A0 (b) The 2nd and 3rd B marks are not dependent upon the 1st B mark, but <u>are</u> dependent upon a sketch having been attempted. (c) 1st M: May be implicit in the equation of the line, e.g. $\frac{y-"15"}{3-"15"} = \frac{x-"3"}{-1-"3"}$ 2nd M: An equation of a line through $(3, "15")$ or $(-1, "3")$ <u>in any form</u>, with any gradient (except 0 or ∞). 2nd M: Alternative is to use one of the points in $y = mx + c$ to <u>find a value</u> for c, in which case $y = 3x + c$ leading to $c = 6$ is sufficient for both A marks. 1st A1: <u>Correct</u> equation in <u>any</u> form.	

Question 14: June 10 Q8

Question Number	Scheme	Marks	
(a)	$m_{AB} = \frac{4-0}{7-2} \quad \left(=\frac{4}{5}\right)$	M1	
	Equation of AB is: $y-0=\frac{4}{5}(x-2)$ or $y-4=\frac{4}{5}(x-7)$ (o.e.)	M1	
	$\underline{4x-5y-8=0}$ (o.e.)	A1	(3)
(b)	$(AB=)\sqrt{(7-2)^2+(4-0)^2}$	M1	
	$=\sqrt{41}$	A1	(2)
(c)	Using isos triangle with $AB = AC$ then $t = 2\times y_A = 2\times 4 = 8$	B1	(1)
(d)	Area of triangle $=\frac{1}{2}t\times(7-2)$	M1	
	$= \underline{20}$	A1	(2)
			8

	Notes
(a)	**Apply the usual rules for quoting formulae here.** For a correctly quoted formula with some correct substitution award M1 If no formula is quoted then a fully correct expression is needed for the M mark 1st M1 for attempt at gradient of AB. Some correct substitution in correct formula. 2nd M1 for an attempt at equation of AB. Follow through their gradient, not e.g. $-\frac{1}{m}$ Using $y = mx + c$ scores this mark when c is found. Use of $\frac{y-y_1}{y_2-y_1}=\frac{x-x_1}{x_2-x_1}$ scores 1st M1 for denominator, 2nd M1 for use of a correct point A1 requires integer form but allow $5y + 8 = 4x$ etc. Must have an "=" or A0
(b)	M1 for an expression for AB or AB^2. Ignore what is "left" of the equals sign
(c)	B1 for $t = 8$. May be implied by correct coordinates (2, 8) or the value appearing in (d)
(d)	M1 for an expression for the area of the triangle, follow through their $t\ (\neq 0)$ but must have the $(7-2)$ or 5 and the $\frac{1}{2}$.
DET	e.g. $\begin{matrix} 2 & 7 & 2 & 2 \\ 0 & 4 & t & 0 \end{matrix}$ Area $=\frac{1}{2}\left[8+7t+0-(0+8+2t)\right]$ Must have the $\frac{1}{2}$ for M1

Question 15: Jan 11 Q9

Question Number	Scheme	Marks
(a)	$(8-3-k=0)$ so $\underline{k=5}$	B1 (1)
(b)	$2y=3x+k$ $y=\frac{3}{2}x+\ldots$ and so $m=\frac{3}{2}$ o.e.	M1 A1 (2)
(c)	Perpendicular gradient $=-\frac{2}{3}$ Equation of line is: $y-4=-\frac{2}{3}(x-1)$ $\underline{3y+2x-14=0}$ o.e.	B1ft M1A1ft A1 (4)
(d)	$y=0, \Rightarrow B(7,0)$ or $\underline{x=7}$ $\quad x=7$ or $-\frac{c}{a}$	M1A1ft (2)
(e)	$AB^2=(7-1)^2+(4-0)^2$ $AB=\sqrt{52}$ or $2\sqrt{13}$	M1 A1 (2) 11
	Notes	
(b)	M1 for an attempt to rearrange to $y=\ldots$ A1 for clear statement that gradient is 1.5, can be $m=1.5$ o.e.	
(c)	B1ft for using the perpendicular gradient rule correctly on their "1.5" M1 for an attempt at finding the equation of the line through A using their gradient. Allow a sign slip 1st A1ft for a correct equation of the line follow through their changed gradient 2nd A1 as printed or equivalent with integer coefficients – allow $\underline{3y+2x=14}$ or $\underline{3y=14-2x}$	
(d)	M1 for use of $y=0$ to find $x=\ldots$in their equation A1ft for $x=7$ or $-\frac{c}{a}$	
(e)	M1 for an attempt to find AB or AB^2 A1 for any correct surd form- need not be simplified	

Question 16: June 11 Q3

Question Number	Scheme	Marks
	Mid-point of PQ is (4, 3)	B1
	PQ: $m = \frac{0-6}{9-(-1)}$, $\left(= -\frac{3}{5}\right)$	B1
	Gradient perpendicular to PQ $= -\frac{1}{m}$ $\left(= \frac{5}{3}\right)$	M1
	$y - 3 = \frac{5}{3}(x-4)$	M1
	$5x - 3y - 11 = 0$ or $3y - 5x + 11 = 0$ or multiples e.g. $10x - 6y - 22 = 0$	A1 (5) **5**

Notes

B1: correct midpoint.
B1: correct numerical expression for gradient – need not be simplified
1st M: Negative reciprocal of their numerical value for m
2nd M: Equation of a line through **their** (4, 3) with any gradient except 0 or ∞.

If the 4 and 3 are the wrong way round the 2nd M mark can still be given if a correct formula (e.g. $y - y_1 = m(x - x_1)$) is seen, otherwise M0.
If (4, 3) is substituted into $y = mx + c$ to find c, the 2nd M mark is for attempting this.

A1: Requires integer form with an = zero (see examples above)