

Mark Scheme (Results)

Summer 2015

Pearson Edexcel Level 3 Award
in Algebra (AAL30)

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NOTES ON MARKING PRINCIPLES

1 Types of mark

M marks: method marks

A marks: accuracy marks

B marks: unconditional accuracy marks (independent of M marks)

2 Abbreviations

cao – correct answer only

isw – ignore subsequent working

oe – or equivalent (and appropriate)

indep - independent

ft – follow through

SC: special case

dep – dependent

3 No working

If no working is shown then correct answers normally score full marks

If no working is shown then incorrect (even though nearly correct) answers score no marks.

4 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the “correct” answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

5 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

6 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

7 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

8 Use of ranges for answers

If an answer is within a range this is inclusive, unless otherwise stated.

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Question		Working	Answer	Mark	Notes
1	(a)		$12xy(2xy + 1)$	2	B2 cao (B1 for any correct partial factorisation beginning with at least two of the factors a ($a \neq 1$), x , y .)
	(b)		$(e + 3)(f - 4)$	2	M1 for $e(f - 4)$ and $3(f - 4)$ OR $f(e + 3)$ and $-4(e + 3)$ A1 for $(e + 3)(f - 4)$ oe
	(c)		$(x - 4)(x + 4)$	1	B1
2			Circle centre (0, 1) radius 5 drawn	2	M1 for using (0,1) as the centre of a circle or a circle of radius 5 drawn A1 cao
3	(a)		$T = 13v^2$	3	M1 for $T = kv^2$ or T is proportional to v^2 oe M1 for substitution to find k A1 $T = 13v^2$
	(b)		-2 and 2	3	M1 for substitution of $T = 52$ into their 'formula' M1 for correct rearrangement to make v^2 the subject A1 for ± 2

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Question		Working	Answer	Mark	Notes
4	(a)		$x = \frac{2}{2w-3}$	3	M1 for correct first step e.g multiply by $2x$ M1 for isolating terms in x A1 for $x = \frac{2}{2w-3}$ oe
	(b)		72	2	M1 for substitution of $\frac{1}{2}$ into the formula A1 cao
5	(a)		$(0, \frac{1}{3})$	1	B1 cao
	(b)		$y = 0$ $x = -3$	2	B2 for both correct equations (B1 for one correct equation)
	(c)		Curve sketched	2	B2 for both branches drawn correctly (B1 only one branch drawn correctly or correct general shape with 2 branches)
6	(a)		$3 \pm \sqrt{3}$	3	M1 for stating the quadratic formula or substitution into formula A1 for $\frac{6 \pm \sqrt{12}}{2}$ or $3 + \sqrt{3}$ A1 for $3 \pm \sqrt{3}$
	(b)		$3 - \sqrt{3} < x < 3 + \sqrt{3}$	2	M1 use of $3 \pm \sqrt{3}$ or ft two answers from part (a) in an inequality A1 for ' $3 - \sqrt{3} < x < 3 + \sqrt{3}$ '

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Question		Working	Answer	Mark	Notes												
7			Shaded region	5	M3 for drawing all 3 lines correctly (M2 for drawing 2 lines correctly) (M1 for drawing 1 line correctly) A2 for fully correct shading of region (A1 for correct shading for 1 inequality)												
8		$y = 1 - 2x$ $2x^2 + 3(1 - 2x) = -1$ $2x^2 - 6x + 3 = -1$ $2x^2 - 6x + 4 = 0$ $x^2 - 3x + 2 = 0$ $(x - 1)(x - 2) = 0$	$x = 1, y = -1$ and $x = 2, y = -3$	5	M1 for correct method to eliminate one variable M1 (dep M1) for simplifying to get a quadratic (= 0) in one variable M1 (dep M2) for correct method to solve their quadratic A1 $x = 1, x = 2$ or $y = -1, y = -3$ A1 $x = 1, y = -1$ and $x = 2, y = -3$												
9	(a)	<table border="1"> <tr> <td>-2</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td>-1</td> <td>3</td> <td>1</td> <td>-1</td> <td>3</td> <td>19</td> </tr> </table>	-2	-1	0	1	2	3	-1	3	1	-1	3	19	Correct curve	4	B1 for drawing suitable axes on grid M1 for 4 or 5 points calculated for values of $x, -2 \leq x \leq 3$ A1 for 6 points calculated for values of $x, -2 \leq x \leq 3$ A1 for correct curve drawn
-2	-1	0	1	2	3												
-1	3	1	-1	3	19												
	(b)		-1.5 to -1.6 -0.3 to -0.4 1.8 to 1.9	2	M1 for correct use of cubic graph, e.g draw $y = 2$ or sight of $x^3 - 3x + 1 = 2$ A1 for at least one correct answer or ft from cubic graph (if M0, SCB1 for one correct coordinate pair)												

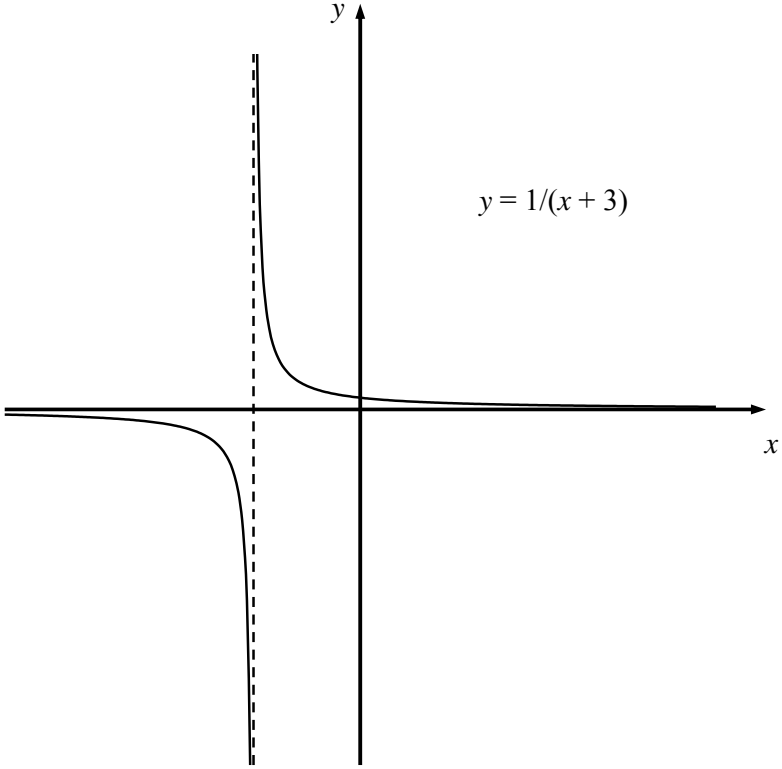
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Question	Working	Answer	Mark	Notes	
10	(a)	$2x^2 - 3x + 8x - 12$	$2x^2 + 5x - 12$	2	M1 for expanding bracket to obtain 4 terms with all 4 correct without considering signs or for 3 terms out of 4 correct with correct signs A1 cao
	(b)		x^{-9}	1	B1 cao
	(c)		$2y^2$	1	B1 cao
	(d)	$\frac{(x)(x+3) + (x-2)(x-3)}{(x-3)(x+3)}$	$\frac{2x^2 - 2x + 6}{(x-3)(x+3)}$	3	M1 for using a correct common denominator A1 $\frac{(x)(x+3)+(x-2)(x-3)}{(x-3)(x+3)}$ oe A1 $\frac{2x^2-2x+6}{(x-3)(x+3)}$ or $\frac{2(x^2-x+3)}{(x-3)(x+3)}$ or $\frac{2x^2-2x+6}{(x^2-9)}$ or $\frac{2(x^2-x+3)}{(x^2-9)}$
11	(a)	$7 + (59 \times 4)$ or $60 \times 4 + 3$	243	2	M1 for complete method e.g $7 + (59 \times 4)$ or $60 \times 4 + 3$ A1 cao
	(b)	$\begin{aligned} \frac{30}{2}(6 + 29d) &= -780 \\ 6 + 29d &= -52 \\ 29d &= -58 \\ d &= -2 \end{aligned}$ OR $\frac{30}{2}(3 + (3 + 29d)) = -780$	-2	3	M1 for substitution of $a = 3$ and $n = 30$ and $S = -780$ into a correct sum formula M1 (dep M1) for correct method to isolate terms in d A1 cao

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Question	Working	Answer	Mark	Notes	
12	(a)(i)	$(x + 3)^2 - 2$	4	B1 for $(x + 3)^2$ or $a = 3$ B1 for $(x + 3)^2 - 2$ or $a = 3, b = -2$	
	(ii)	$-3 \pm \sqrt{2}$		B1 ft $-3 - \sqrt{2}$ B1 ft $-3 + \sqrt{2}$	
	(b)	Graph drawn	3	B3 ft fully correct graph sketched with labels at points where the graph intersects the axes and at the turning point. (B2 correct graph sketched without labels) (B1 correct shape of graph in any position)	
13		$12^2 - 4 \times 9a = 0$ $144 - 36a = 0$	4	2	M1 for $b^2 - 4ac$ A1 cao
14	(a)	$y = \frac{2}{7}x + \frac{6}{7}$	$\frac{2}{7}$	2	M1 correct method to re arrange to $y = mx + c$, eg $y = \frac{2x+6}{7}$, $y = \frac{2}{7}x + \frac{6}{7}, y = \frac{2}{7}x + c$ A1 cao
	(b)	$y = -\frac{7}{2}x + 12$		3	(If M0 then SC B1 for $\frac{2}{7}x$) M1 $m_1m_2 = -1$ oe used M1 for substitution of $(4, -2)$ into $y = mx+c$ or $y - y_1 = m(x - x_1)$ A1 for $y = -\frac{7}{2}x + 12$
15		$-\frac{b}{a} = -\frac{7}{3}$ $\frac{c}{a} = \frac{-6}{3}$	sum = $-\frac{7}{3}$ product = -2	3	M1 for sum = $-\frac{b}{a}$ or product = $\frac{c}{a}$ A1 for $-\frac{7}{3}$ oe A1 for -2

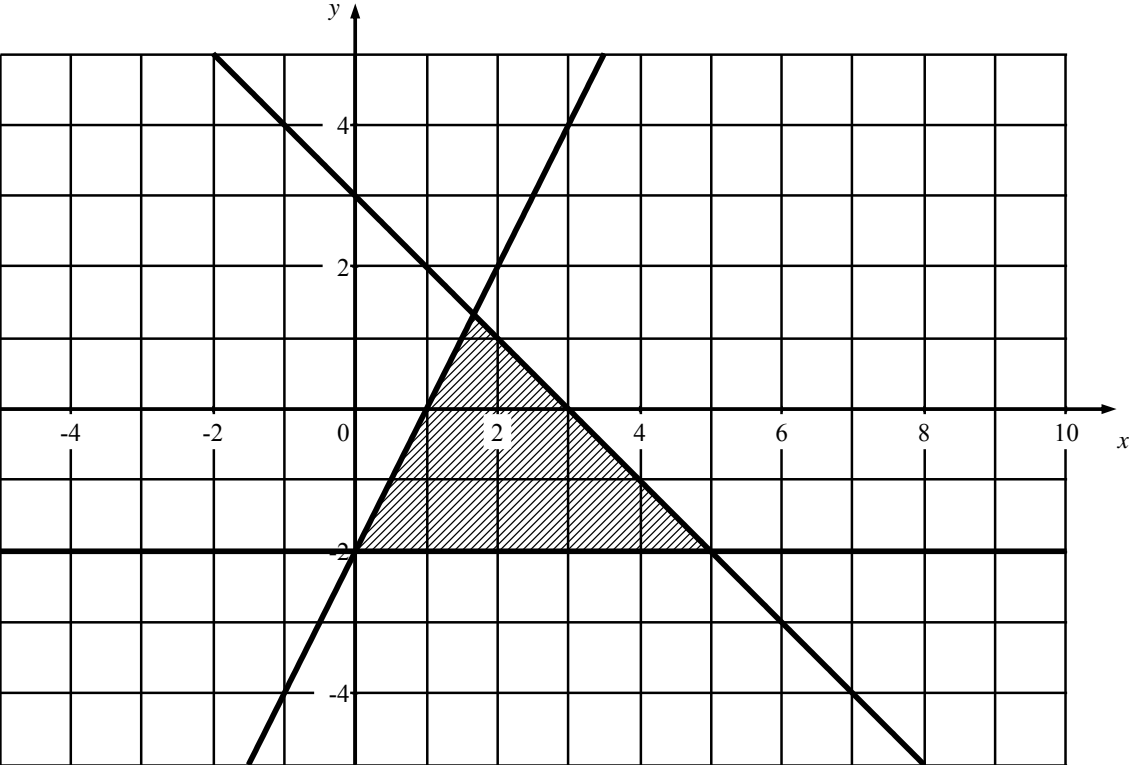
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Question		Working	Answer	Mark	Notes
16	(a)		Graph drawn	2	M1 for a stretch in the direction of the y-axis A1 cao
	(b)		Graph drawn	2	M1 for a stretch in the direction of the x-axis A1 cao
17	(a)	$2 \times 3 + 1$	7	2	M1 for one term correctly evaluated A1 cao
	(b)		$\frac{25 + 5\sqrt{7}}{6}$ or $\frac{5(5 + \sqrt{7})}{6}$	3	M1 for multiplying by $\frac{5 + \sqrt{7}}{5 + \sqrt{7}}$ M1 for $15(5 + \sqrt{7})$ or $75 + 15\sqrt{7}$ and $25 - 7 (= 18)$ A1 $\frac{25 + 5\sqrt{7}}{6}$ or $\frac{5(5 + \sqrt{7})}{6}$
18	(a)	$15 \div 20$	0.75	2	M1 complete method to find the gradient A1 for 0.75
	(b)		Line from (20,15) to (35,15)	1	B1 correct line to 35 seconds
	(c)	$0.5 \times 10 \times 7.5$	37.5	2	M1 for method to calculate correct area A1 37.5 oe

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Question	Working	Answer	Mark	Notes
19	$0.5(20 + 2(18 + 14 + 8) + 0)$ $0.5(20 + 2(40))$ 0.5×100	50	3	M1 for reading off values from the graph 20, 18, 14, 8, (0) M1 for substituting values into trapezium rule A1 cao (If M0 then SCB1 for 46)

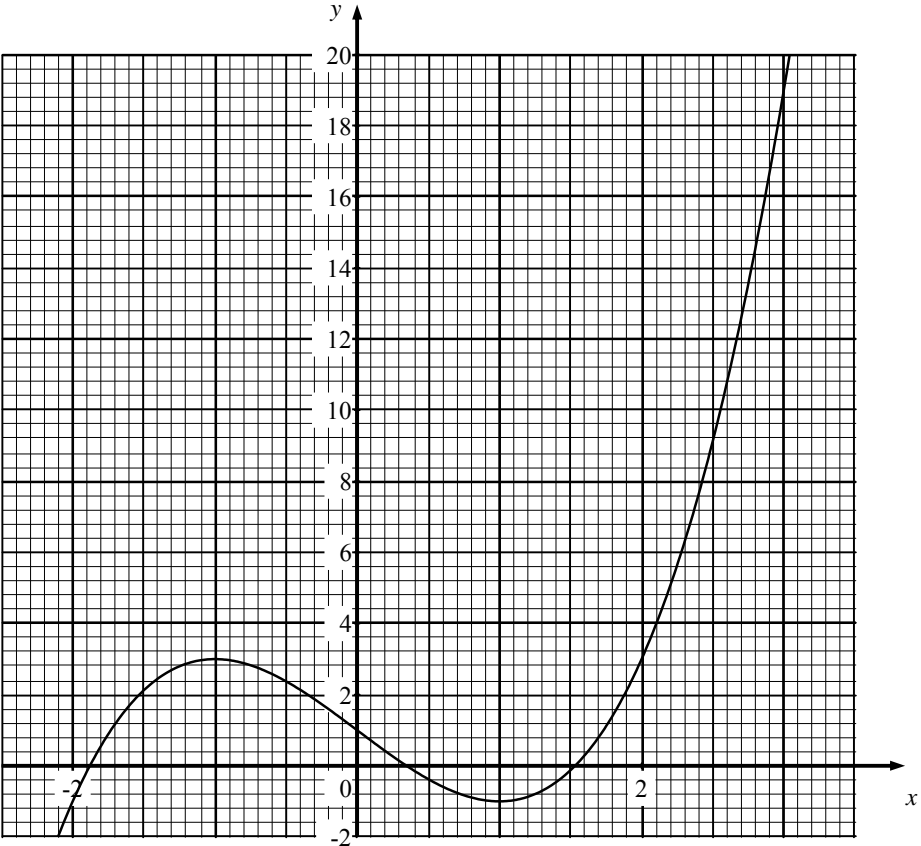
Question 5c



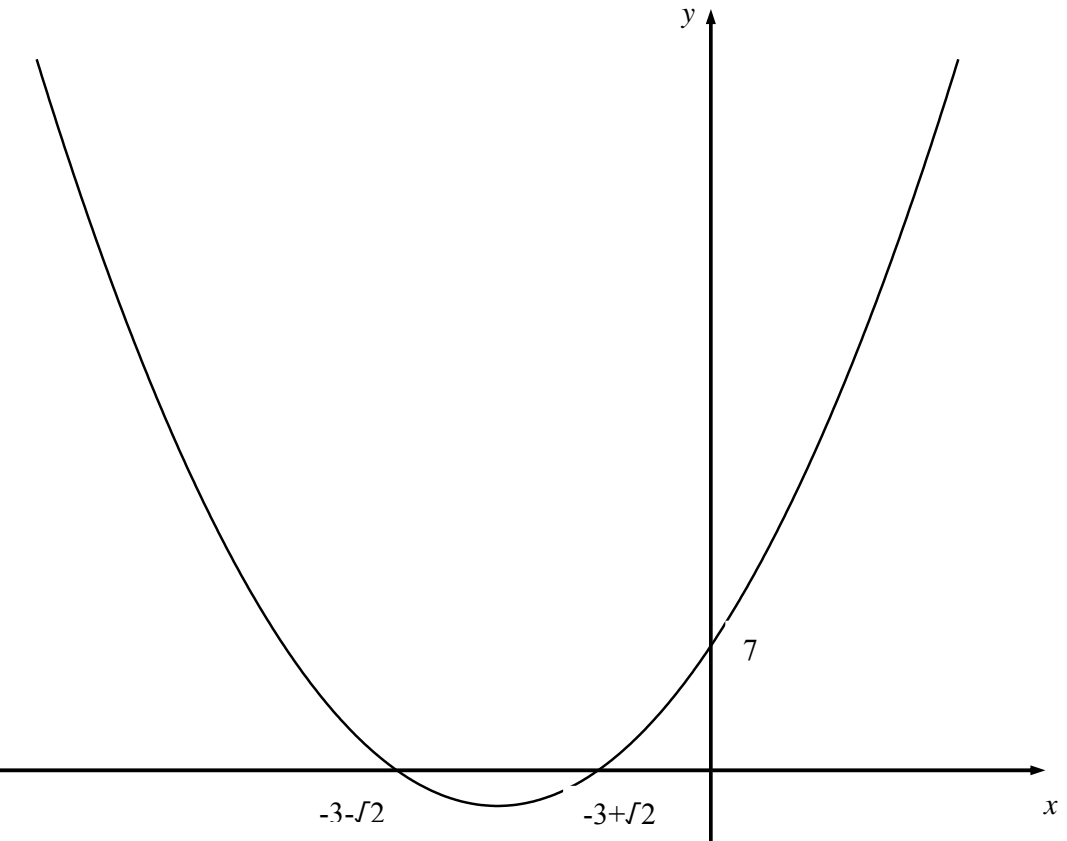
Question 7



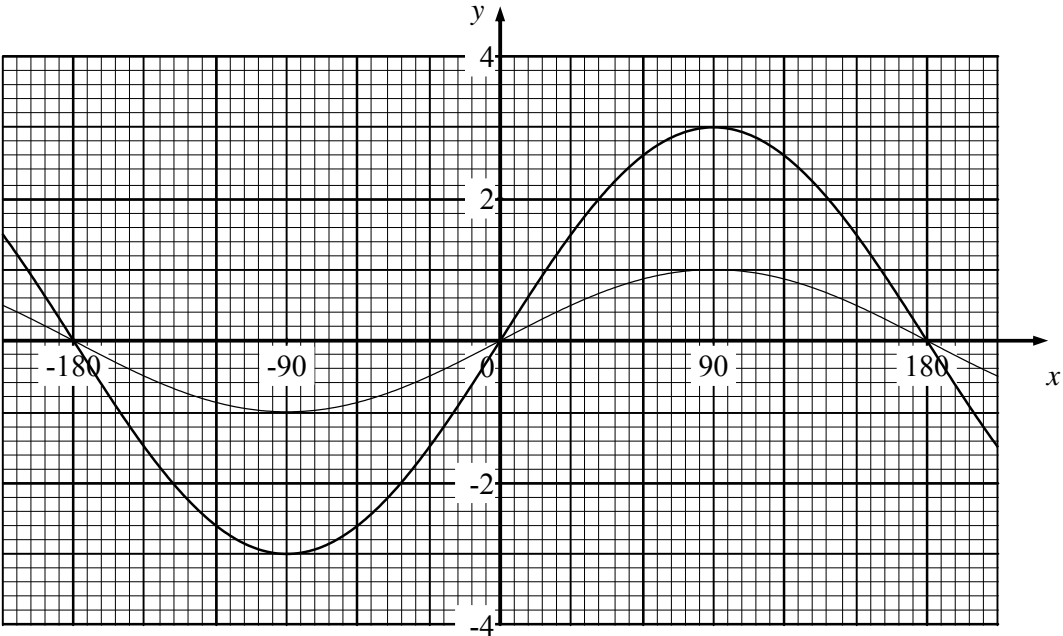
Qu 9



Q12



Question 16a



Question 16b

