

Mark Scheme (Results)

January 2014

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

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)	x^{6-1}	x^5	1	B1 cao
	(b)	y^{-2+-3}	y^{-5}	1	B1 cao
	(c)		v^2	1	B1 cao
	(d)	$\frac{w^2}{w}$	w	2	M1 for correct method for partial simplification A1 for w (accept w^1)
2	(a)	$2x - 5 = 6y$ $y = \frac{2}{6}x - \frac{5}{6}$	$\frac{1}{3}$	2	M1 for correct method to rearrange to $6y=2x-5$ or $y=\frac{1}{3}x+c$ A1 for $\frac{1}{3}$ oe
	(b)	$y = -5x + 10$	$y = \frac{1}{5}x + c$	2	M1 for correct method to find gradient of line perpendicular to $5x + y = 10$ A1 for $y = \frac{1}{5}x + c$ oe
3	(a)		$4a^2 - 4a - 3$	2	M1 for 3 terms correct out of 4 terms A1 cao
	(b)		$3cd(3cd - 8)$	2	B2 for $3cd(3cd - 8)$ (B1 for a correct but not fully factorised expression)
	(c)	$25(4g^2 - h^2)$	$25(2g - h)(2g + h)$	2	B2 cao (B1 for 2 correct linear factors)

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Question	Working	Answer	Mark	Notes
4	$p + 5 = \frac{2}{n^2}$ $n^2 = \frac{2}{p + 5}$ <p>OR</p> $pn^2 = 2 - 5n^2$ $pn^2 + 5n^2 = 2$ $(p + 5)n^2 = 2$ $n^2 = \frac{2}{p + 5}$	$n = \pm \sqrt{\frac{2}{p + 5}}$	3	<p>M1 for correct first operation</p> <p>A1 for $(p + 5)n^2 = 2$ or $n^2 = \frac{2}{p + 5}$</p> <p>A1 for $n = \pm \sqrt{\frac{2}{p + 5}}$</p>
5	$a = 4, b = -6, c = 1$ $\frac{- -6 \pm \sqrt{(-6)^2 - 4 \times 4 \times 1}}{2 \times 4}$ $= \frac{6 \pm \sqrt{36 - 16}}{8} = \frac{6 \pm \sqrt{20}}{8}$ $= \frac{3 \pm \sqrt{5}}{4}$	$\frac{3 \pm \sqrt{5}}{4}$	3	<p>M1 for correct formula or $\frac{- -6 \pm \sqrt{(-6)^2 - 4 \times 4 \times 1}}{2 \times 4}$ oe</p> <p>M1 for $\frac{6 \pm \sqrt{36 - 16}}{8}$</p> <p>A1 for $\frac{3 \pm \sqrt{5}}{4}$ oe</p>
6		<p>Exponential</p> <p>Cubic</p> <p>Quadratic</p> <p>Circular</p> <p>Reciprocal</p>	3	<p>B3 cao</p> <p>(B2 for 3 or 4 correct, B1 for 1 or 2 correct)</p>

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Question		Working	Answer	Mark	Notes
7			$\frac{-3}{x(3x-2)}$	3	M1 for correct method to combine the fractions M1(dep) for full simplification of the numerator A1 for $\frac{-3}{x(3x-2)}$ or $\frac{3}{x(2-3x)}$ or $\frac{-3}{3x^2-2x}$ or $\frac{3}{2x-3x^2}$
8			shaded region	5	M1 for drawing line $x = 3$ M1 for drawing line $3x + 2y = 6$ M1 for drawing line $y = \frac{1}{2}x + 5$ A2 for fully correct region shaded (A1 for correct shading for one inequality)
9			5.55 to 5.65	3	M1 for using values 3, 1.5, 1, 0.7 to 0.8, 0.6, 0.5 (condone one error) M1 (dep) for substituting 'values' into trapezium rule, eg $\frac{1}{2} \times 1 \{ (3 + 0.5) + 2(1.5 + 1 + 0.75 + 0.6) \}$ A1 for 5.55 to 5.65

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Question		Working	Answer	Mark	Notes
10	(a)		$-1, 2$	2	M1 for correct method to factorise $x^2 - x - 2$ A1 cao
	(b)	$(3p - 5)(p + 2) > 0$	$p < -2, p > \frac{5}{3}$	3	M1 for factorising $(3p - 5)(p + 2)$ A1 ft for establishing the critical values, $\frac{5}{3}$ oe, -2 A1 for $p < -2$ (or) $p > \frac{5}{3}$ (do not accept $p < -2$ and $p > \frac{5}{3}$) OR M1 for sketching $y = 3p^2 + p - 10$ A1 ft for establishing the critical values, $\frac{5}{3}$ oe, -2 A1 for $p < -2$ (or) $p > \frac{5}{3}$ (do not accept $p < -2$ and $p > \frac{5}{3}$)
11	(a)	$3^2 - 4 \times a \times 4 \geq 0$	$a \leq \frac{9}{16}$	2	M1 for use of discriminant, eg $3^2 - 4 \times a \times 4$ A1 for $a \leq \frac{9}{16}$ oe

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Question	Working	Answer	Mark	Notes	
	(b)	$\frac{-b}{6} = \frac{11}{6}$ $\frac{c}{6} = -\frac{5}{3}$	-11, -10	3	M1 for at least one correct equation A1 for $b = -11$ A1 for $c = -10$
12	(a)	$(x + \frac{3}{2})^2 - \frac{9}{4} + 1$	$(x + \frac{3}{2})^2 - \frac{5}{4}$	2	M1 for $(x + \frac{3}{2})^2$ oe A1 for $(x + \frac{3}{2})^2 - \frac{5}{4}$ oe
	(b)	When $x = 0, y = 1$	Sketch graph	3	B1 for general shape (parabola) B1 for minimum point in third quadrant B1 for y intercept labelled at (0, 1)
	(c)		$(-\frac{3}{2}, -\frac{5}{4})$	1	B1 cao
13			Sketch graph $x = 4$ and $y = 0$ $(0, -\frac{1}{2})$	4	M1 for correct shape A1 for fully correct graph with one y intercept shown and not crossing the x axis B1 for equations of asymptotes $x = 4$ and $y = 0$ B1 for $(0, -\frac{1}{2})$ marked on the graph

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Question		Working	Answer	Mark	Notes
14		$8x^2 + (2x)^2 = 3$ $12x^2 = 3$ $x^2 = \frac{1}{4}$ $x = \pm \frac{1}{2}$ $y = \pm 1$	$x = \frac{1}{2}, y = 1$ $x = -\frac{1}{2}, y = -1$	4	M1 for eliminating one variable M1 for simplifying to get $x^2 = \frac{1}{4}$ oe or $y^2=1$ A2 for $x = \frac{1}{2}$ oe, $y = 1$ AND $x = -\frac{1}{2}$ oe, $y = -1$ (A1 for $x = \pm \frac{1}{2}$ oe or $y = \pm 1$ or $x = \frac{1}{2}$ oe, $y = 1$ or $x = -\frac{1}{2}$ oe, $y = -1$)
15	(a)	$\sqrt{36 \times 3}$	$6\sqrt{3}$	1	B1 cao
	(b)	$(2 - \sqrt{3})(2 + \sqrt{3}) = 4 - 3$	1	2	M1 for correct method to expand A1 cao
	(c)	$\frac{1}{2\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$	$\frac{\sqrt{3}}{6}$	2	M1 for multiplying both numerator and denominator by a suitable expression, eg $\sqrt{3}$ or a multiple of $\sqrt{3}$ A1 $\frac{\sqrt{3}}{6}$ oe where a and b are both integers

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Question		Working	Answer	Mark	Notes
16	(a)(i)		2	1	B1 cao
	(ii)		5	1	B1 cao
	(b)	$\frac{1}{2} \times n \times (2 \times 2 + (n-1) \times 5)$ $\frac{1}{2} n(5n-1)$ OR $\frac{1}{2} \times n \times (2 + 5n - 3)$ $= \frac{1}{2} n(5n-1)$	$\frac{1}{2} n(5n-1)$	2	M1 for stating or using $S = \frac{1}{2} n(2a + (n-1)d)$ A1 ft for $\frac{1}{2} n(5n-1)$ oe OR M1 for stating or using $S = \frac{1}{2} n(a + l)$ and $l = a+(n-1)d$ A1 ft for $\frac{1}{2} n(5n-1)$ oe
17		$54 = k \times 3^3$ $k = 2$	$V = 2x^3$	3	M1 for $V \propto x^3$ or $V = kx^3$ M1 for method to establish value of k A1 for $V = 2x^3$
18			circle drawn	2	M1 for circle centre (0, 0) drawn A1 for circle centre (0, 0), radius 6 drawn

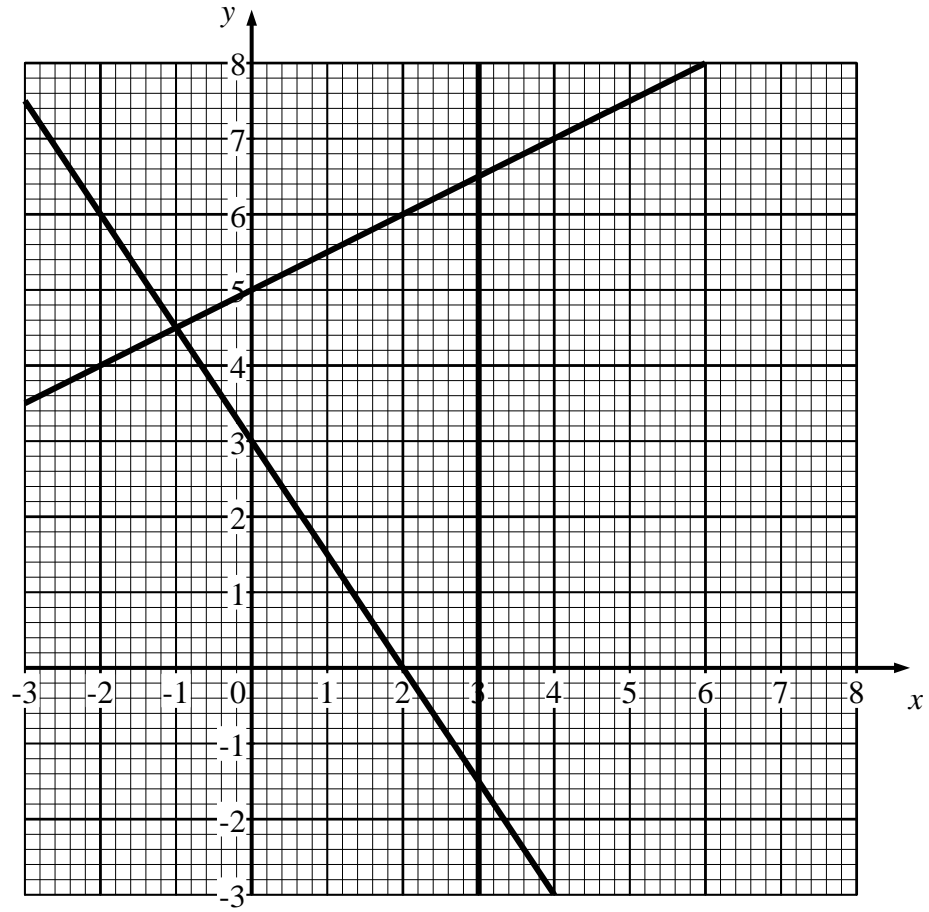
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Question		Working	Answer	Mark	Notes
19	(a)		Cubic graph drawn	4	M1 for calculating points for values of x from $x = -3$ to $+3$ with at least 4 correct values of y B1 for drawing suitable axes on grid for their points A1 for all points correct A1 for drawing smooth curve through the correct points
	(b)		-2.5, 0.1, 2.4	1	B1ft for all three values, accept values in the range -2.5 to -2.6, 0.1 to 0.2 and 2.3 to 2.4
	(c)		-2.2, 0.5, 1.6	2	M1 for equation written in the form $6x - x^3 = 2x + 2$ or line $y = 2x + 2$ drawn on graph or equation $y = 2x + 2$ seen A1 ft for all three values, accept values in the range -2.2 to -2.3, 0.5 to 0.6 and 1.6 to 1.7

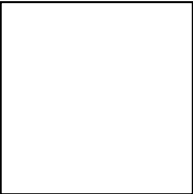
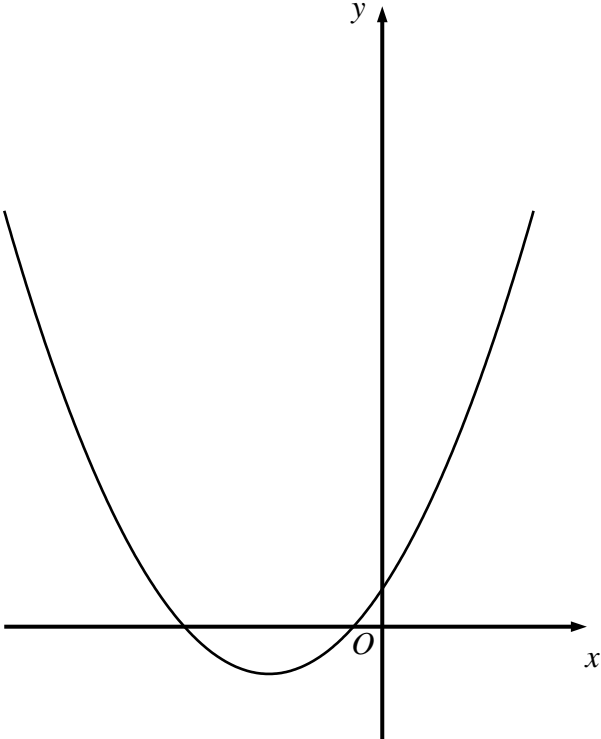
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Question		Working	Answer	Mark	Notes
20	(a)		between 10 38 and 10 39	1	B1 for between 10 38 and 10 39 (accept “in the first minute of the journey” oe)
	(b)	$\frac{12}{2 \times 60}$	$\frac{1}{10}$	2	M1 for attempt to find gradient by using a right angled triangle or using the formula or using $\frac{12(m/s)}{2(min)}$ or $\frac{12}{120}$ A1 for $\frac{1}{10}$ oe
	(c)	$\frac{1}{2} \times 60 \times 26$ $\frac{1}{2} \times (26 + 38) \times 120$ 780 + 3840	4620	3	M1 for attempt to find the area under the graph, eg $\frac{1}{2} \times 60 \times 26$, $\frac{1}{2} \times (26 + 38) \times 120$ M1 for complete and correct method A1 cao (SCB1 for 77 if no other marks awarded)
21			± 8	4	M1 for intention to multiply all terms by $(10 - x)$ or $(10 + x)$ or correct method to add $\frac{9}{10 - x}$ and $\frac{9}{10 + x}$ M1 for multiplying all terms by $(10 - x)(10 + x)$ oe M1 for correct method to clear brackets A1 cao

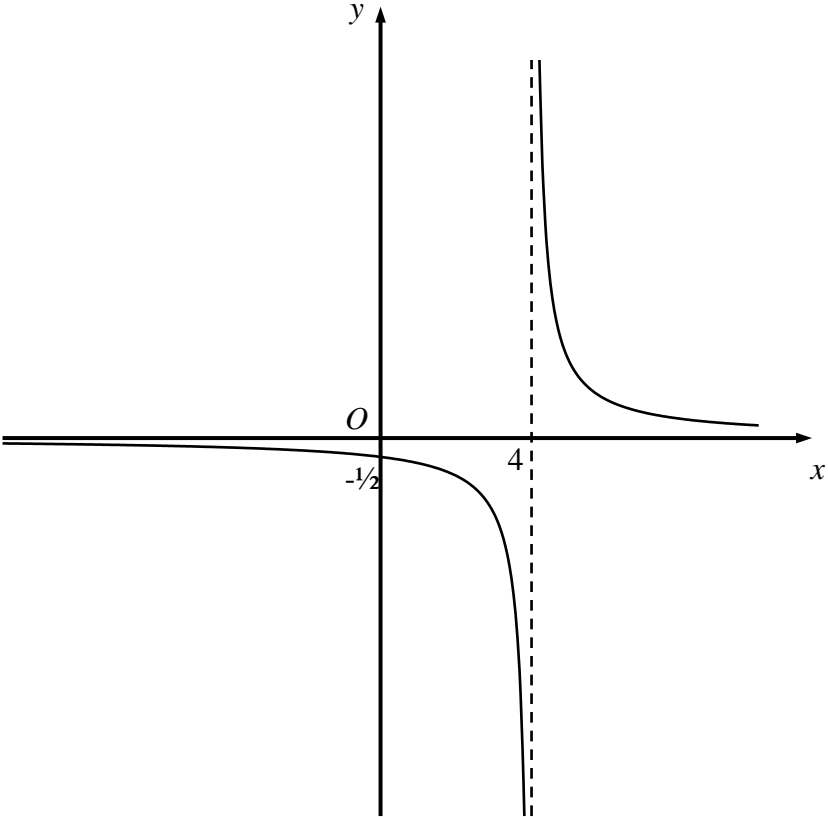
Q8



Q12b



Q13



Q19

