



Mark Scheme (Results)

Summer 2024

Pearson Edexcel Level 3 Award
In Algebra (AAL30)
Paper 01

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

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.

Question	Working	Answer	Mark	Notes
1 (a)		w^{-8}	1	B1 for w^{-8} or $\frac{1}{w^8}$
1 (b)		$4t$	2	M1 for $pt, p \neq 4$ or for $4t^n, n \neq 1$ or for $64^{\frac{1}{3}}(t^3)^{\frac{1}{3}}$ A1 for $4t$
1 (c)		$\frac{x-2}{x+2}$	2	M1 for at least one factorisation, eg $(x+2)(x-2)$ or $(x-2)^2$ A1 for $\frac{x-2}{x+2}$
2 (a)	$\frac{- - 9 \pm \sqrt{(-9)^2 - 4 \times 2 \times 5}}{2 \times 2}$	$\frac{9 \pm \sqrt{41}}{4}$	2	M1 for correct substitution into the quadratic formula A1 (accept $m = 9, n = 41, p = 4$)
2 (b)		$y < -4, y > 3$	3	M1 for factorising to $(y+4)(y-3)$ oe or for correct substitution into the quadratic formula or for completing the square M1 for critical values, $-4, 3$ A1 for $y < -4, y > 3$ oe
3		Correct region indicated	5	M1 for drawing $x = \frac{1}{2}y$ M1 for drawing $x + 2y = 8$ M1 for drawing $5x + 4y = 40$ A2 for correctly shading required region (A1 for correct shading for 2 inequalities)

Question	Working	Answer	Mark	Notes
4 (a)(i)		104	2	M1 for $(b^2 - 4ac =) (-8)^2 - 4 \times 2 \times -5$ A1 cao
(ii)		2 real and distinct roots	1	B1 for eg real and distinct roots or ft from (a)
(b)		$5, \frac{1}{2}$	3	M1 for sum = $-\frac{b}{a}$ or product = $\frac{c}{a}$, can be implied by one correct answer or for $2x^2 - 10x + 1 (= 0)$ A1 for (sum =) 5 A1 for (product =) $\frac{1}{2}$ or 0.5
5		Circle centre (0, 0), radius 6 drawn	2	M1 for using (0, 0) as the centre of a circle or a circle of radius 6 drawn A1 for correct graph.
6 (a)		$3pn^2 (2p + 3n^2)$	2	M1 for a correct partial factorisation with a product of at least 3 terms, eg $3pn (2pn + 3n^3)$ or $n^2(6p^2 + 9pn^2)$ A1 for $3pn^2 (2p + 3n^2)$ oe

Question		Working	Answer	Mark	Notes
	(b)		$4(q + 2)(q - 8)$	2	M1 for a correct first step to factorise with two factors, eg $(2q + 4)(2q - 16)$ or $(4q + 8)(q - 8)$ or $4(q^2 - 6q - 16)$ A1 for fully factorised expression
	(c)		$(2 - m)(3 - 5d)$	2	M1 for $3(2 - m)$ and $-5d(2 - m)$ or $2(3 - 5d)$ and $-m(3 - 5d)$ oe A1 for $(2 - m)(3 - 5d)$ oe
7	(a)		$\frac{\sqrt{5}}{10}$	2	M1 for multiplying by $\frac{\sqrt{5}}{\sqrt{5}}$ oe A1 oe in the correct form
	(b)		$18(4 + \sqrt{3})$	3	M1 for reduction of surd, eg $\sqrt{27} = 3\sqrt{3}$ or $\sqrt{81} = 9$ M1 for correct expansion of brackets, eg $81 + 27\sqrt{3} - 3\sqrt{27} - \sqrt{3}\sqrt{27}$ A1 for $18(4 + \sqrt{3})$ (accept $m = 18, n = 4$)
8	(a)		$(x + 3)^2 - 7$	2	M1 for $(x + 3)^2 + d$ A1 for $(x + 3)^2 - 7$ (accept $c = 3, d = -7$)
	(b)		Sketch	3	M1 for correct shape and orientation M1 for graph intersecting y-axis at $(0, 2)$ or for turning point on graph at $(-3, -7)$ ft their (a) in the correct form for turning point $(-3, -7)$ A1 for fully correct graph with intercept of y-axis and turning point shown and labelled

Question		Working	Answer	Mark	Notes
9	(a)		-13.5, -4, (-0.5), 0, 0.5, (4), 13.5	2	B2 for all 5 missing values correct (B1 for 3 or 4 values)
	(b)		Curve drawn	3	M1 for suitable axes drawn M1 (dep B1 in (a)) for plotting at least 6 of their points correctly, ft (a) A1 for a correct curve drawn
	(c)		2.8	2	M1 for $\frac{1}{2}(x-1)^3 = 3$ or $y = 3$ used on graph A1 for value in the range 2.7 to 2.9 or ft cubic graph
10	(a)		$y = \frac{1}{50}\sqrt{x}$	3	M1 $y \propto \sqrt{x}$ or $y = k\sqrt{x}$ oe, may be implied by substitution M1 for substitution to find k , eg $0.1 = k\sqrt{25}$ A1 for $y = 0.02\sqrt{x}$ or $y = \frac{1}{50}\sqrt{x}$
	(b)		90000	2	M1 for substituting $y = 6$ into equation of form $y = k\sqrt{x}$ eg $6 = \frac{1}{50}\sqrt{x}$, ft $y = k\sqrt{x}$ A1 cao

Question	Working	Answer	Mark	Notes
11 (a)		$y = \frac{1}{2}x - 3$	2	M1 for working with an equation of a straight line, eg for $y = \frac{1}{2}x + c, c \neq 0$ and $c \neq -3$ or $y = mx - 3, m \neq \frac{1}{2}$ or $\frac{1}{2}x - 3$ or for a correct equation in the incorrect form, eg $y + 3 = \frac{1}{2}(x - 0)$ A1 for $y = \frac{1}{2}x - 3$ or $y = 0.5x - 3$
11 (b)		$4x - y = 5$	3	M1 for a method to find the correct gradient, eg $\frac{3--1}{2-1} (= 4)$ M1 for a correct equation in the incorrect form, eg $y - 3 = 4(x - 2)$ or $y = 4x - 5$ A1 for $4x - y = 5$ oe in correct form
12		0.84	3	M1 for stating values ($y_0 =$) 0.5, ($y_1 =$) 0.25, ($y_2 =$) 0.16 (accept 0.16 to 0.17) ($y_3 =$) 0.125 (accept 0.12 to 0.13), ($y_4 =$) 0.1 (condone 1 error) M1(dep) for substituting “values” and $h = 1$ into trapezium rule, eg $\frac{1}{2}\{(0.5 + 0.1) + 2(0.25 + 0.16 + 0.125)\}$ A1 for 0.83 to 0.85 oe
13 (a)		25	2	M1 for substitution into $a + (n - 1)d$, eg $a + (100 - 1)5$ or for stating (n th term $=$) $5n + 20$ A1 cao

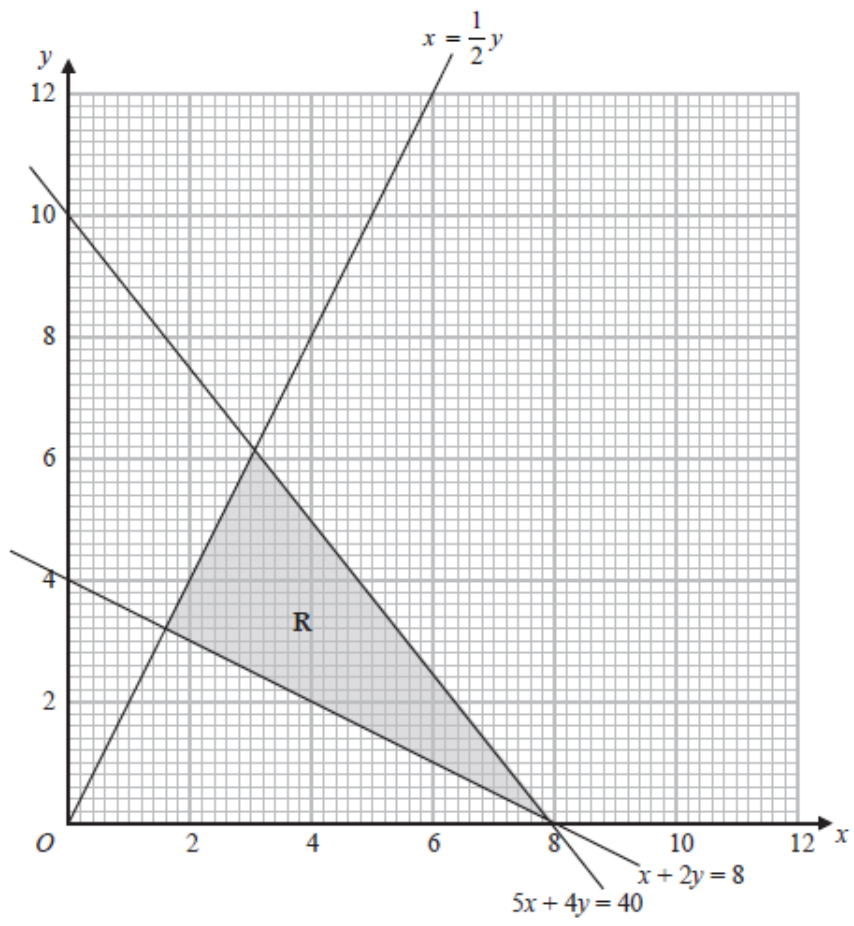
Question	Working	Answer	Mark	Notes
(b)		-5355	3	M1 for stating $\frac{1}{2}n(2a + (n - 1)d)$ or for stating $\frac{1}{2}n(a + l)$ and $a + (n - 1)d$ M1 for substitution into $\frac{1}{2}n(2a + (n - 1)d)$ or into $\frac{1}{2}n(a + l)$ eg $\frac{1}{2} \times 51(2 \times 20 + (51 - 1) \times -5)$ A1 cao
14 (a)		0.2	2	M1 for substitution, eg $6\sqrt{\frac{2}{50}} - 1$ oe A1 for 0.2 or $\frac{1}{5}$
(b)		$c = \frac{72}{(m+1)^2}$	3	M1 for getting as far as $\frac{m+1}{6} = \sqrt{\frac{2}{c}}$ or $(m + 1)^2 = 36 \times \frac{2}{c}$ M1 for rearranging so that c is part of the numerator, eg $(m + 1)^2 \times c = 36 \times 2$ or $\frac{m+1}{6} \sqrt{c} = \sqrt{2}$ or $c \left(\frac{m+1}{6}\right)^2 = 2$ or $\frac{c}{2} = \left(\frac{6}{m+1}\right)^2$ or $c = \frac{2}{\left(\frac{m+1}{6}\right)^2}$ or $\sqrt{c} = \frac{6\sqrt{2}}{m+1}$

Question	Working	Answer	Mark	Notes
				A1 for eg $c = \frac{72}{(m+1)^2}$ or $c = \frac{72}{m^2+2m+1}$ or $c = 2\left(\frac{6}{m+1}\right)^2$
15 (a)		Graph drawn	3	<p>M1 for straight line drawn from (0, 0) with gradient 2.5</p> <p>M1 for a straight line drawn with gradient 0 from the end of their first line</p> <p>A1 for fully correct graph</p>
(b)		41.25	2	<p>M1 for method to find an area under the graph, eg $\frac{1}{2} \times 3 \times 7.5 (= 11.25)$ or $4 \times 7.5 (= 30)$, ft their graph with two stages (dep on M1 in (a))</p> <p>A1 for 41.25 oe ft their graph with two line segments (dep on M1 in (a))</p>

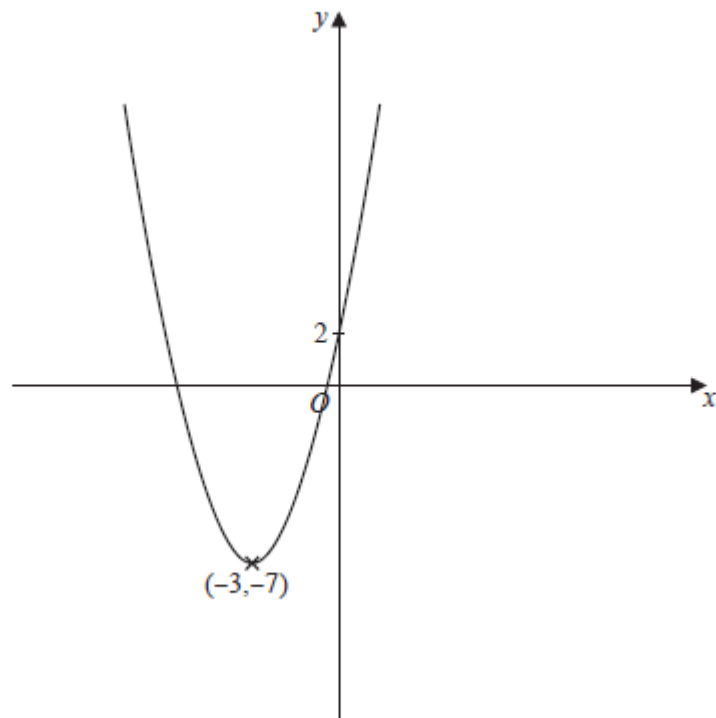
Question	Working	Answer	Mark	Notes
16	eg $3\left(\frac{y+1}{3}\right)^2 - 2y^2 + 5 (= 0)$ $3\left(\frac{1}{9}y^2 + \frac{2}{9}y + \frac{1}{9}\right) - 2y^2 + 5 (= 0)$ $-5y^2 + 2y + 16 (= 0)$ oe	$x = 1, y = 2$ $x = -\frac{1}{5}, y = -\frac{8}{5}$	5	M1 for substitution of $y = 3x - 1$ into $3x^2 - 2y^2 + 5 (= 0)$ oe to obtain equation in one variable, x or substitution of $x = \frac{y+1}{3}$ into $3x^2 - 2y^2 + 5 (= 0)$ oe to obtain equation in one variable, y eg $3x^2 - 2(3x - 1)^2 + 5 (= 0)$ M1 for expanding $(3x - 1)^2$ or $\left(\frac{y+1}{3}\right)^2$ within a correct equation, eg $3x^2 - 2(9x^2 - 6x + 1) + 5 (= 0)$ M1 for writing equation in the form $ax^2 + bx + c (= 0)$ or in the form $ay^2 + by + c (= 0)$ eg $5x^2 - 4x - 1 (= 0)$ oe A1 for $x = 1, x = -\frac{1}{5},$ or $y = 2, y = -\frac{8}{5}$ oe A1 for $x = 1, y = 2$ and $x = -\frac{1}{5}, y = -\frac{8}{5}$ oe
17 (a)		Graph drawn	2	M1 for translation parallel to y-axis A1 for translation parallel to y-axis by $\begin{pmatrix} 0 \\ 2 \end{pmatrix}$
17 (b)		Graph drawn	2	M1 for a reflection in a line of the form $x = c$ ($c \neq 0$) A1 for a reflection in the y-axis
18		Sketch	3	M1 for correct shape and orientation. M1 for asymptote $y = 0$ with correct shape and orientation or for graph intersecting y-axis at $(0, 1)$

Question	Working	Answer	Mark	Notes
				A1 fully correct graph
19		0, 8	4	<p>M1 for correctly writing fractions with a common denominator, eg $\frac{8(2x-1)+3(x+2)}{2x^2+3x-2} (= 1)$ or $\frac{8(2x-1)}{(x+2)(2x-1)} + \frac{3(x+2)}{(x+2)(2x-1)} (= 1)$</p> <p>or for dealing with the fractions, eg $3(x+2) + 8(2x-1) = (x+2)(2x-1)$</p> <p>M1 for dealing with the fractions and expanding the brackets, eg $3x+6+16x-8 = 2x^2-x+4x-2$</p> <p>M1 for writing equation in the form $ax^2+bx (= 0)$, eg $2x^2-16x (=0)$</p> <p>A1 cao</p>

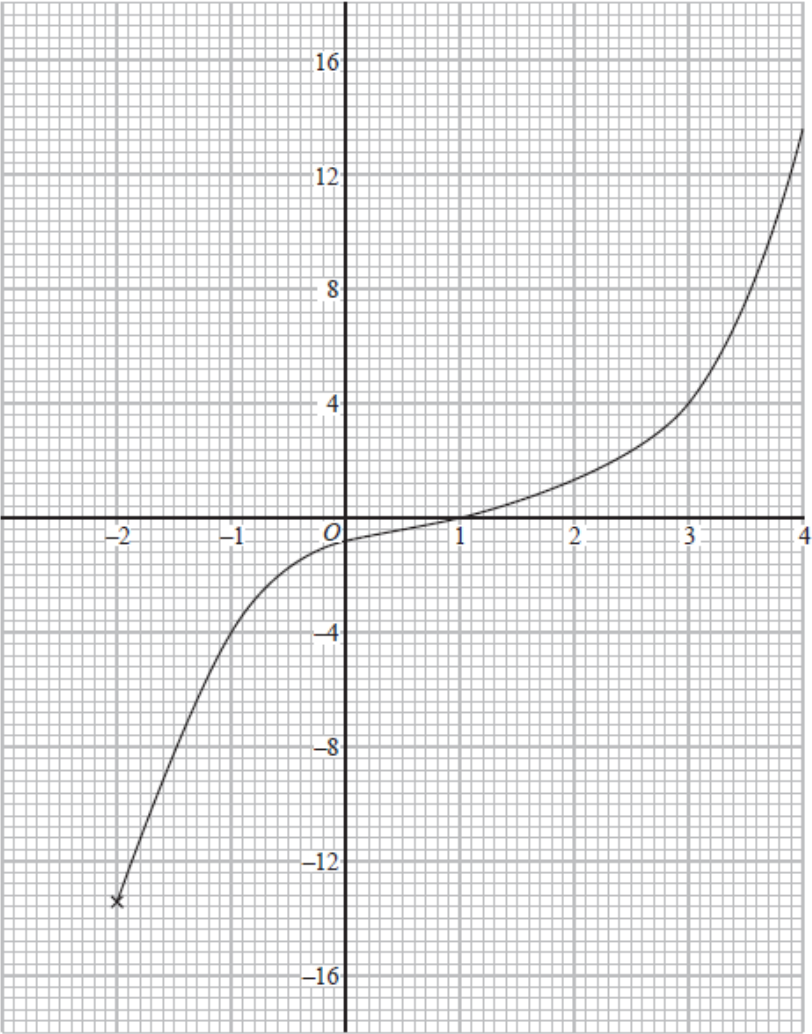
Question 3



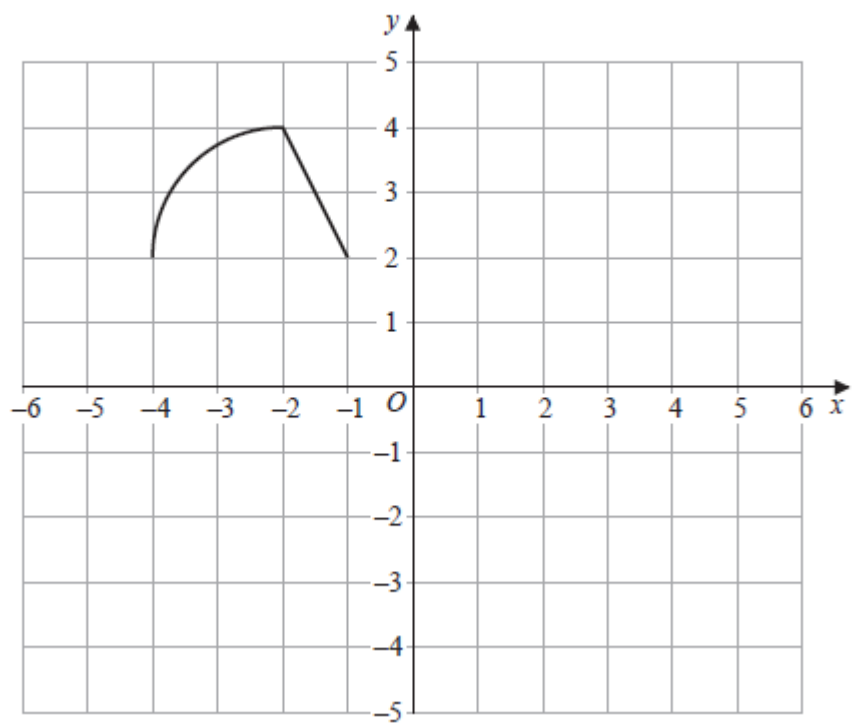
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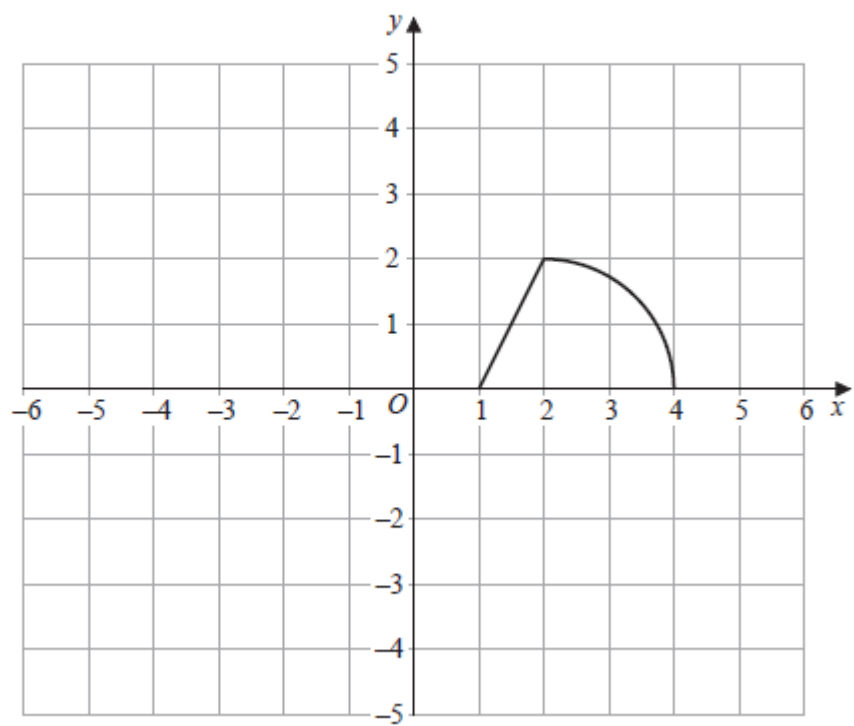
Question 9



Question 17(a)



Question 17(b)



Question 18

