



Pearson
Edexcel

Mark Scheme (Results)

January 2023

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

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.

Mark scheme Edexcel Award in Algebra

Question	Working	Answer	Mark	Notes
1		$3t^4$	1	B1 cao
(a)		1	2	M1 for y^{2-2} oe A1 cao
(b)		x^5	1	B1 cao
(c)		$4f^2 - 16f + 16$	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 for $4f^2 - 16f + 16$
2		$3a(a-2c)$	1	B1 oe
(a)		$(3y+5)(4x-3)$	2	M1 for $3y(4x-3)$ and $5(4x-3)$ or $4x(3y+5)$ and $-3(3y+5)$ A1 $(3y+5)(4x-3)$
(b)		$(5e-6h)(5e+6h)$	1	B1 $(5e-6h)(5e+6h)$
(c)		$\frac{3}{2}$	2	M1 for factorising $2w+4 = 2(w+2)$ or $3w-6 = 3(w-2)$ or $3(w^2-4)$ and $2(w^2-4)$ A1 oe
(d)				

Question	Working	Answer	Mark	Notes
3		Region drawn	5	M1 for drawing $x = -1$ correctly M1 for drawing $3x + 5y = 15$ correctly M1 for drawing $y = 2x - 1$ correctly A2 for correctly shading required region (A1 for correct shading for 2 inequalities)
4		Circle drawn	2	M1 for a circle centre (0,0) or radius 4 A1 for a circle centre (0,0) and radius 4
5 (a)		$2x - 3y + 12 = 0$	3	M1 for use of gradient $\frac{2}{3}$ in an equation of a straight line or for $y = mx + 4$ A1 for a correct equation of the straight line in any form eg $3y = 2x + 12$ A1 oe in correct format
(b)		$y = -\frac{3}{2}x - 8$	3	M1 for using $m_1 m_2 = -1$ eg gradient of perpendicular line shown as $-\frac{3}{2}$ M1 for a method to find the value of c eg $-5 = -\frac{3}{2} \times -2 + c$ or for $y - -5 = -\frac{3}{2}(x - -2)$ A1 cao

Question	Working	Answer	Mark	Notes
6 (a)		$y = 4x$	2	M1 $y = kx$ oe, or $y \propto x$, may be implied by substitution A1 cao
(b)		$\sqrt{24}$	4	M1 $p^2 = \frac{K}{r^3}$ oe, or $p^2 \propto \frac{1}{r^3}$, may be implied by substitution M1 for substitution in $p^2 = \frac{K}{r^3}$ to find K eg $3^2 = \frac{K}{2^3}$ or $K = 72$ M1 for substitution of $3^{\frac{1}{3}}$ into $p^2 = \frac{"72"}{r^3}$ oe eg $p^2 = \frac{"72"}{\left(\frac{1}{3^{\frac{1}{3}}}\right)^3} (= 24)$ A1 cao
7 (a)		9	2	M1 for correct substitution into $b^2 - 4ac$ or into $b^2 = 4ac$ (accept substitution into $\sqrt{b^2 - 4ac}$) A1 cao
(b)		$\frac{15}{2}, -3$	3	M1 for $-\frac{5}{a} = -\frac{2}{3}$ or $-\frac{b}{a} = \frac{2}{5}$ oe M1 for $a = \frac{15}{2}$ or re arranging to $b = -\frac{2}{5} \times a$ oe (may be seen with substituted value) A1 oe
8 (a)		$x < -\frac{2}{3}$	2	M1 for isolating terms in x eg $2x + x < 2 - 4$ or critical value of $-\frac{2}{3}$ A1 oe
(b)		$-4 < x < 3$	3	M1 for collecting terms on one side e.g. $x^2 + x - 12 (< 0)$ M1 for critical values of -4 and 3 or $-4 < x$ or $x < 3$ A1

Question	Working	Answer	Mark	Notes
9 (a)	$a = 4, d = 10, n = 100$	994	2	M1 for $a + (n - 1)d$ oe (may be seen with substituted values) eg $10n - 6$ A1 cao
(b)	$a = 4, d = 10, n = 100,$ $l = 994$ from (a)	49900	2	M1 for using $S = \frac{n}{2}\{2a + (n - 1)d\}$ or $S = \frac{n}{2}\{a + l\}$, may be implied by substitution, ft value for l from part (a) A1 cao
(c)	$a = 3, n = 10, u_{10} = 102$	11	2	M1 for using an equation e.g. $a + (n - 1)d = 102$ with at least one of a or n substituted and no incorrect substitution A1 cao
10	$2(2y - 3)^2 + 4y^2 = 18$ $6y^2 - 12y (= 0)$ $y(6y - 12)$	$x = -3, y = 0$ $x = 1, y = 2$	5	M1 for eliminating one variable eg substitution of $4y^2 = (x + 3)^2$ into the quadratic equation oe to obtain equation in one variable M1 for a quadratic in one variable and in the form $ax^2 + bx + c (= 0)$ eg $3x^2 + 6x - 9 (= 0)$ oe M1 for factorising the quadratic eg $3(x + 3)(x - 1)$ oe or using the formula to the point of $\frac{-6 \pm \sqrt{144}}{6}$ A1 $x = -3, 1$ or $y = 0, 2$ A1 for $x = -3, y = 0$ and $x = 1, y = 2$

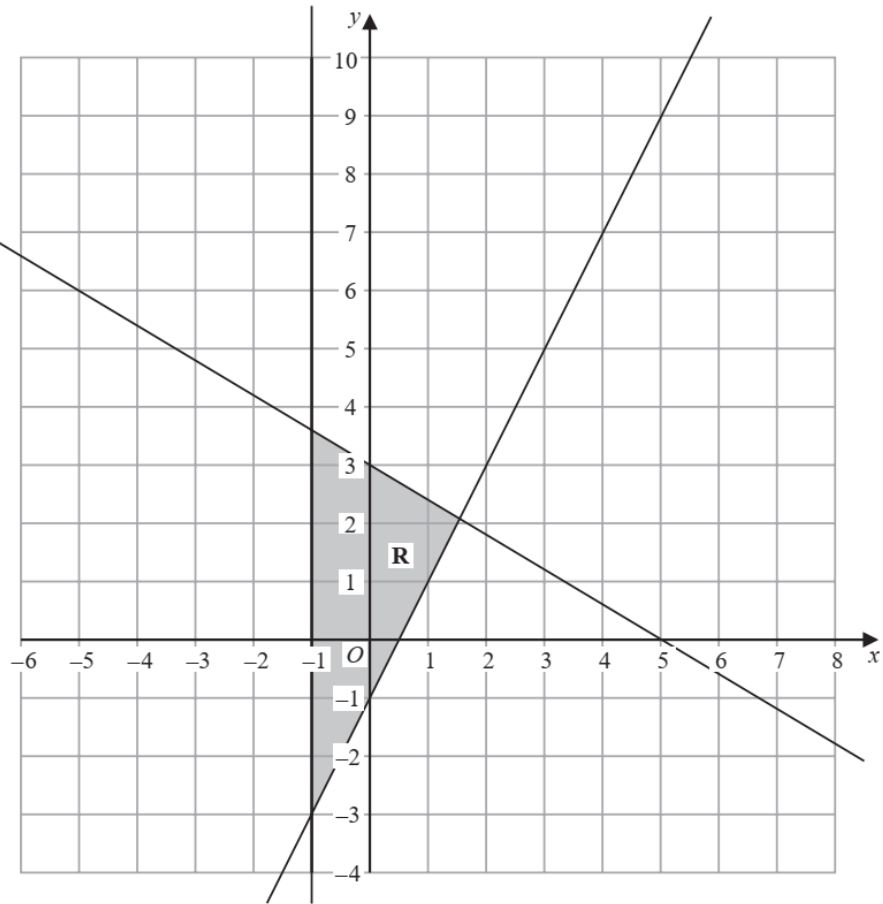
Question	Working	Answer	Mark	Notes
11 (a)	-3 -2 -1 0 1 2 -9 5 7 3 -1 1	Graph drawn	4	B2 for all values correct (B1 for 4 or 5 values correct) M1 (dep on B1) for at least 5 of their 6 values plotted accurately A1 for correct curve
(b)		-2.3 or 0.2	2	M1 for $x^3 - 5x + 3 = 2$ or line drawn at $y = 2$ A1 for -2.4 to -2.2 or 0.1 to 0.3 or ft their cubic graph
12 (a)		5	2	M1 for full substitution of values eg $\frac{2 \times 5^2 - 2 \times 5}{4 \times 2}$ A1 cao
(b)		$t = \frac{2w^2}{4B+w}$	3	M1 for clearing the fraction eg $4Bt = 2w^2 - wt$ M1 for isolating terms in t eg $4Bt + wt = 2w^2$ A1 oe

Question	Working	Answer	Mark	Notes
13 (a)		$\frac{2 \pm \sqrt{10}}{3}$	3	M1 for stating the quadratic formula or correct substitution into formula A1 for $\frac{4 \pm \sqrt{40}}{6}$ or $\frac{4 \pm 2\sqrt{10}}{6}$ A1 cao
(b)(i)		$(2x - 3)^2 + 1$	3	M1 for a correct first step eg $(2x - a)^2$ or $4(x^2 - 3x) + 10$ or $4(x^2 - 3x + \frac{10}{4})$ M1 for $(2x - 3)^2$ or $4(x - \frac{3}{2})^2 + 1$ or fully correct equivalent expression eg $4[(x - \frac{3}{2})^2 + \frac{1}{4}]$ A1 for $(2x - 3)^2 + 1$
(ii)		Graph sketched with labels	3	M1 for a parabola in the correct orientation M1 for a parabola with (1.5, 1) labelled at turning point or (0, 10) labelled A1 fully correct graph drawn with all labels

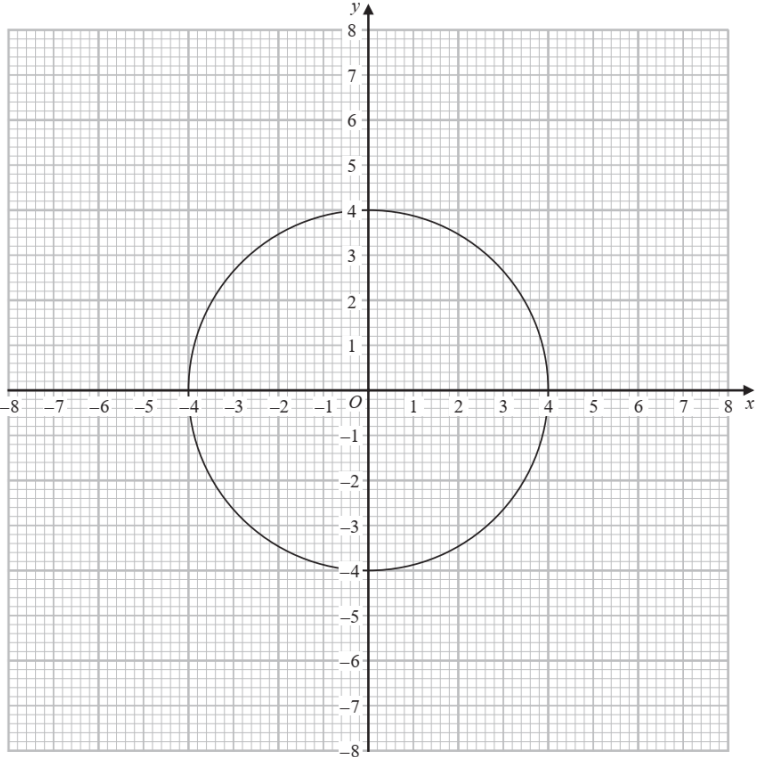
Question	Working	Answer	Mark	Notes
14 (a)		$\frac{\sqrt{5}}{35}$	2	M1 for rationalising the denominator eg $\frac{7\sqrt{5}}{7\sqrt{5} \times 7\sqrt{5}}$ A1 oe
14 (b)		$2\sqrt{2}$	3	M1 for writing both fractions over a common denominator eg $\frac{-1+\sqrt{2}}{(1+\sqrt{2})(-1+\sqrt{2})} + \frac{1+\sqrt{2}}{(1+\sqrt{2})(-1+\sqrt{2})}$ or $\frac{-1+1+2\sqrt{2}}{(\sqrt{2}-1)(\sqrt{2}+1)}$ or for rationalising both fractions eg $\frac{1-\sqrt{2}}{(1+\sqrt{2})(1-\sqrt{2})} + \frac{-1-\sqrt{2}}{(-1+\sqrt{2})(-1-\sqrt{2})}$ M1 for simplifying to $\frac{2\sqrt{2}}{2-1}$ or $\frac{1-\sqrt{2}}{-1} + \frac{-1-\sqrt{2}}{-1}$ A1 cao
15		Diagram	4	B2 for two of asymptote drawn at $x = 2$ or asymptote drawn at $y = 3$ or intercept of graph with the y-axis at $(0, 2\frac{1}{2})$ (B1 for one of asymptote drawn at $x = 2$ or asymptote drawn at $y = 3$ or intercept of graph with the y-axis at $(0, 2\frac{1}{2})$) M1 for correct shape A1 for fully correct sketch.

Question	Working	Answer	Mark	Notes
16 (a)		3	1	B1 cao
(b)		55	3	M1 for stating values ($y_0=$) 8, ($y_1=$) 14, ($y_2=$)17,($y_3=$)15, ($y_4=$) 10 (condone 1 error) M1(dep) for substituting “values” and $h = 1$ into trapezium rule, eg $\frac{1}{2}((8+10)+2(14+17+15))$ A1 cao
(c)		Distance	1	B1 for eg distance travelled between $t = 1$ and $t = 5$
17 (a)		Graph drawn	2	M1 for a reflection in the x -axis or a stretch in the y -direction A1 for correct curve sketched
(b)		Graph drawn	2	M1 for a stretch only in the x -direction A1 for correct curve sketched

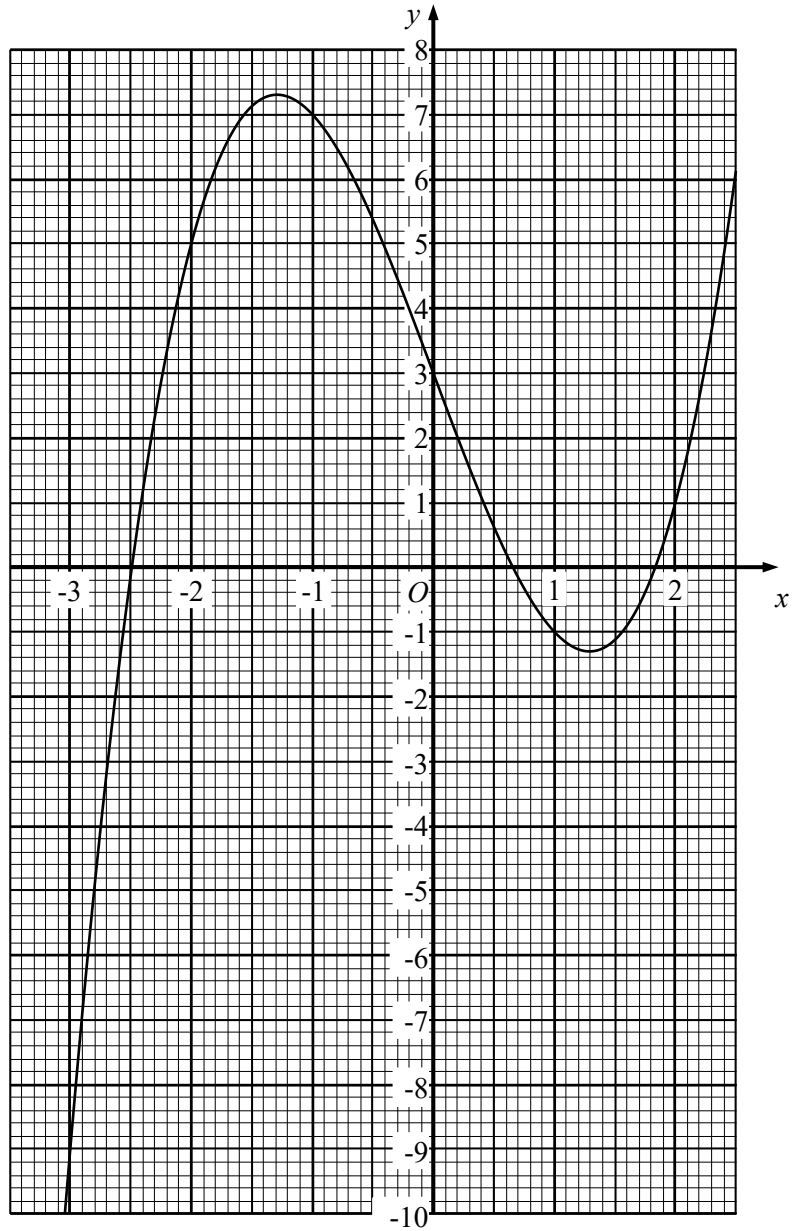
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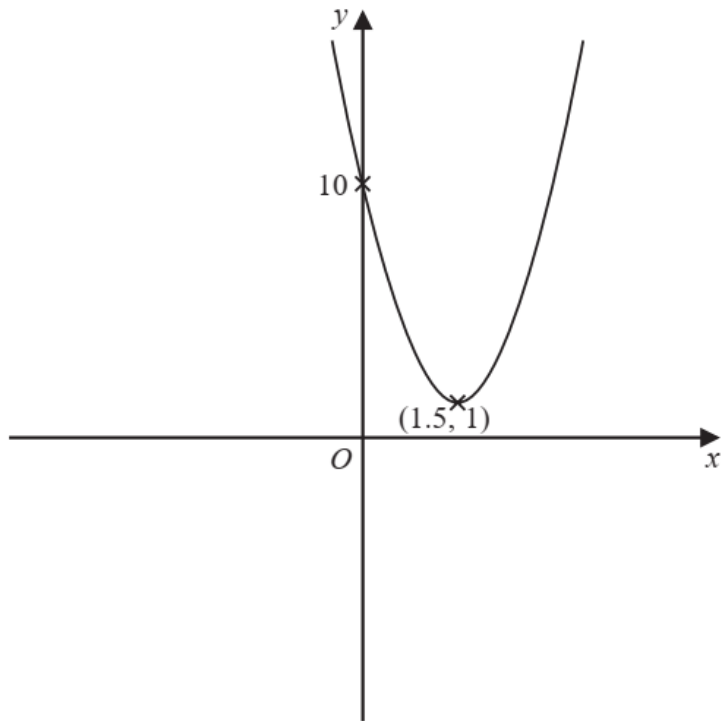
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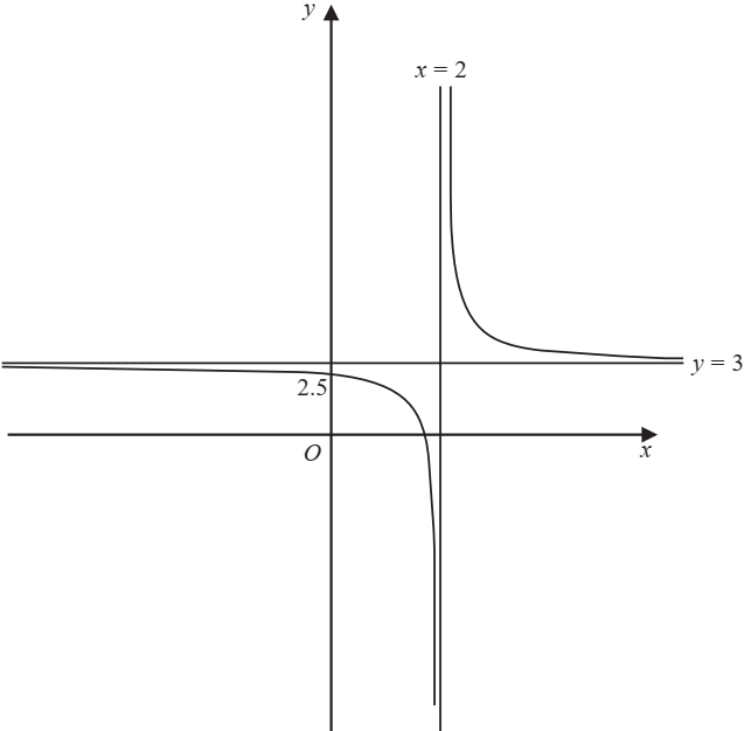
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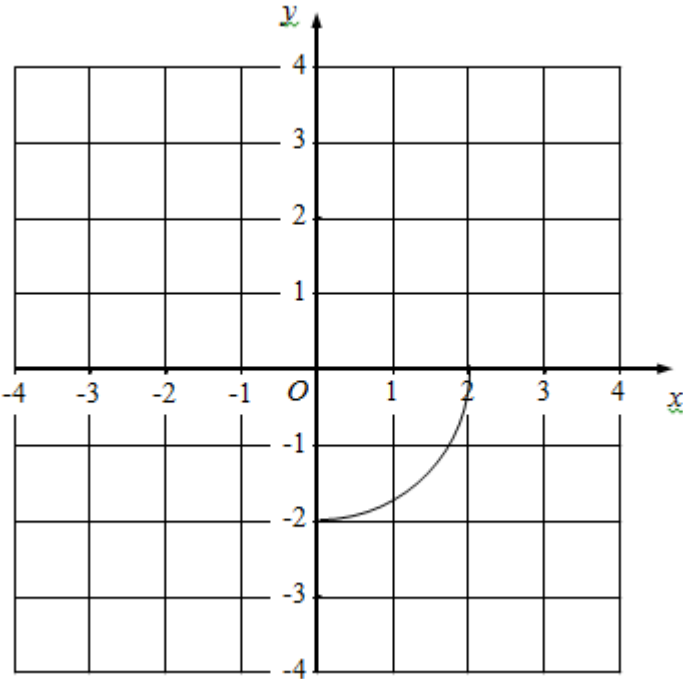
Question 12c



Question 15



Question 17 (a)



Question 17 (b)

