



Pearson
Edexcel

Mark Scheme (Results)

Summer 2022

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

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)		$2y^2 + 3y - 9$	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, eg $2y^2 + 6y - 3y - 9$ A1 for $2y^2 + 3y - 9$
1 (b)		$4 + 20x + 25x^2$	2	M1 for 3 terms out of 4 correct A1 for $4 + 20x + 25x^2$
1 (c)		$2r^4$	2	M1 for $8^{\frac{1}{3}} (= 2)$ or $r^{\frac{12}{3}} (= r^4)$ A1 cao
1 (d)		$t^{-\frac{11}{4}}$	1	B1 $t^{-\frac{11}{4}}$ (accept $\frac{1}{t^{\frac{11}{4}}}$ or $(\frac{1}{t})^{\frac{11}{4}}$)
2		$x = \pm \sqrt{\frac{2-w}{w-3}}$	3	M1 for correct first step eg $w(x^2 + 1) = 3x^2 + 2$ M1 (dep M1) for isolating terms in x^2 eg $wx^2 - 3x^2 = 2 - w$ A1 oe
3	$\frac{- - 2 \pm \sqrt{(-2)^2 - 4 \times 3 \times -6}}{6}$	$\frac{2 \pm \sqrt{76}}{6}$	2	M1 for stating the quadratic formula, may be implied by correct substitution into formula A1 oe, eg $\frac{1 \pm \sqrt{19}}{3}$

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Question	Working	Answer	Mark	Notes
4		Region drawn	5	M1 for drawing $x = -2$ and $y = 1$ M1 for drawing $2x + 3y = 6$ M1 for drawing $y = x + 4$ A2 for shading required region (A1 (dep M2) for shading correctly for 3 inequalities)
5 (a)		Circle drawn	2	M1 for a circle centre (0, 0) or radius 7 A1 for a circle centre (0, 0) and radius 7
(b)		Tangent drawn at (0,7)	1	B1 for tangent drawn at (0, 7) or ft their circle
6 (a)		$y > 3$	2	M1 for isolating terms in y or critical value of 3 A1 cao
(b)(i)		$(x + 3)(x - 2)$	1	B1
(ii)		$-3 < x < 2$	2	M1 for critical values of -3 and 2 , ft $(x + a)(x + b)$ in (b)(i) A1 for $-3 < x < 2$ oe, ft $(x + a)(x + b)$ in (b)(i)

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Question	Working	Answer	Mark	Notes
7 (a)		$y = \frac{3}{4}x$	1	B1 $y = \frac{3}{4}x$ or $4y = 3x$ oe
(b)		$-\frac{5}{2}$	2	M1 for correct use of gradient of perpendicular to the line with gradient $m = -\frac{1}{m}$, eg $-\frac{-1}{2}$ A1 oe for $-\frac{5}{2}$ or $-2\frac{1}{2}$ or -2.5
8		2 real and equal supported	2	M1 for $(-12)^2 - 4 \times 9 \times 4$ oe A1 for statement from $(b^2 - 4ac =) 0$
9 (a)		$3x^2y(2y - 3x)$	2	M1 for a correct partial factorisation with a product of at least 3 terms, eg $3x(2xy^2 - 3x^2y)$ A1 for full and correct factorisation
(b)		$p^2(p - q)(p + q)$	2	M1 for $p^2(p^2 - q^2)$ or $(p^2 - pq)(p^2 + pq)$ or $p(p - q)(p^2 + pq)$ or $p(p^2 - pq)(p + q)$ A1 oe
10 (a)		3, 4	2	B2 for 3 and 4 or for $(x + 3)^2 + 4$ (B1 for 3 or 4, may be seen in the working, eg $(x + 3)^2 + 22$)
(b)		$(-3, 4)$	1	B1 ft (a)

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Question	Working	Answer	Mark	Notes
11 (a)		$7n-3$	2	M1 for $a + (n - 1)d$ oe (may be seen with substituted values) eg $4 + 7(n - 1)$ A1 cao
(b)		15	1	B1 cao
(c)		35 050	2	M1 for substitution into $\frac{1}{2}n(2a + (n - 1)d)$, eg $\frac{1}{2} \times 100(2 \times 4 + (100 - 1) \times 7)$ or for substitution into $\frac{1}{2}n(a + l)$, eg $\frac{1}{2} \times 100(4 + 697)$ A1 cao
12 (a)		$v = \frac{240}{t}$	3	M1 $v = \frac{k}{t}$ oe, or $v \propto \frac{1}{t}$ may be implied by substitution M1 for substitution in $v = \frac{k}{t}$ to find k , eg $60 = \frac{k}{4}$ A1 for $v = \frac{240}{t}$
(b)		3	2	M1 for substituting $v = 80 < \text{ft } v = \frac{k}{t}$, eg $80 = \frac{240}{t}$ A1 ft use of $v = \frac{k}{t}$
(c)		Graph sketched	1	B1
13 (i)		$-\frac{5}{6}$	1	B1 for $-\frac{5}{6}$ or $-0.8\dot{3}$
(ii)		-2	1	B1 cao

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Question	Working	Answer	Mark	Notes
14		$\frac{5}{6}$	3	<p>M1 for a complete substitution eg $20 = \frac{12(6h-3)}{3} + 12$ or for re-arranging as far as $3(V - f) = f(wh - 3)$ oe</p> <p>M1 for dealing with the fraction eg $24 = 12(6h - 3)$ or for making h the subject, eg $h = \frac{3V}{fw}$ oe</p> <p>A1 for $\frac{5}{6}$ or 0.8$\dot{3}$</p>
15		Graph sketch	4	<p>B1 for asymptote $x = 2$ or asymptote at $y = 0$ or y intercept at $(0, -\frac{1}{2})$ shown on the graph</p> <p>B1 for 2 of asymptote $x = 2$, asymptote at $y = 0$, y intercept at $(0, -\frac{1}{2})$ shown on the graph</p> <p>M1 for correct shape</p> <p>A1 for fully correct graph showing position of asymptotes and intersection with y-axis.</p>
16	$x + 1 = 3x^2 + 6x - 1$ $3x^2 + 5x - 2 = 0$ $(3x - 1)(x + 2) = 0$ OR $x^2 = (y - 1)^2$ $y = 3(y^2 - 2y + 1)$ $\quad\quad\quad + 6(y - 1)$ $\quad\quad\quad - 1$ $3y^2 - y - 4 = 0$ $(3y - 4)(y + 1) = 0$	$x = \frac{1}{3}, y = \frac{4}{3}$ $x = -2, y = -1$	4	<p>M1 for method to eliminate one variable to form one quadratic equation, eg substitute $y = x + 1$ or $x = y - 1$</p> <p>M1 for writing equation in the form $ax^2 + bx + c = 0$ or $ay^2 + by + c = 0$, eg $3x^2 + 5x - 2 (= 0)$ or $3y^2 - y - 4 (= 0)$</p> <p>A1 $x = \frac{1}{3}, -2$ or $y = \frac{4}{3}, -1$</p> <p>A1 for $x = \frac{1}{3}, y = \frac{4}{3}$ and $x = -2, y = -1$</p>

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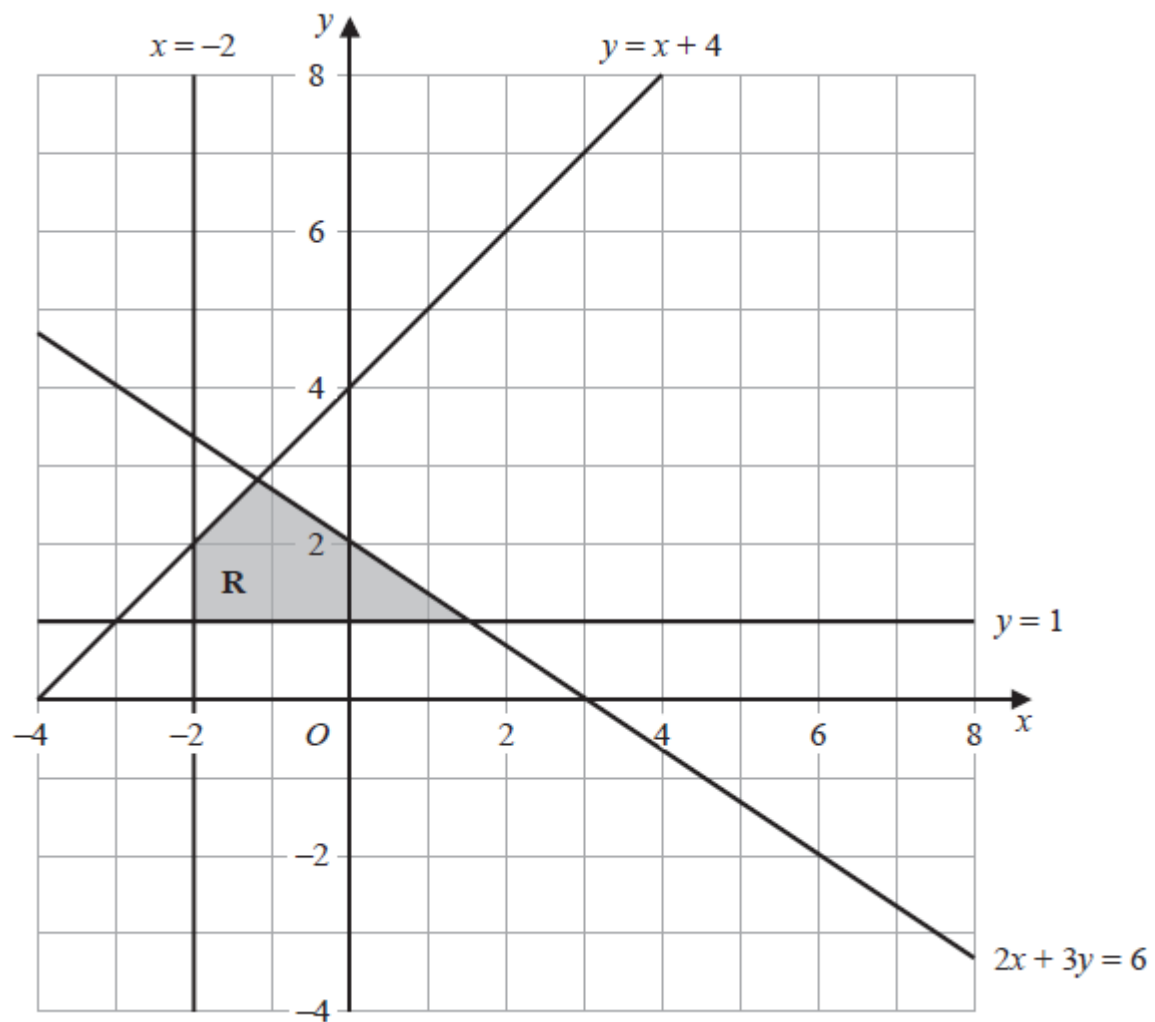
Question	Working	Answer	Mark	Notes
17 (a)		$-3 + \sqrt{3}$	3	B1 for using $\sqrt{12} = 2\sqrt{3}$ or $\sqrt{3}\sqrt{12} = 6$ M1 for expanding bracket to obtain 4 terms with all 4 correct without considering signs or for 3 terms out of 4 correct with correct signs, eg $15 - 9\sqrt{3} + 5\sqrt{12} - 3\sqrt{3}\sqrt{12}$ A1 for $-3 + \sqrt{3}$
(b)		$\frac{11 - \sqrt{13}}{12}$	3	M1 for multiplying by $\frac{1+\sqrt{13}}{1+\sqrt{13}}$ oe M1 for rationalising to $\frac{2-13+2\sqrt{13}-\sqrt{13}}{1-13}$ oe A1 for $\frac{11-\sqrt{13}}{12}$
18		$15x + 4y - 13 = 0$	3	M1 for a method to find the correct gradient, eg $\frac{7--8}{-1-3} (= -\frac{15}{4})$ M1 for a correct equation in any form, eg $y = -\frac{15x}{4} + \frac{13}{4}$ or $y - -8 = -\frac{15}{4}(x - 3)$ A1 for $15x + 4y - 13 = 0$ oe in correct form

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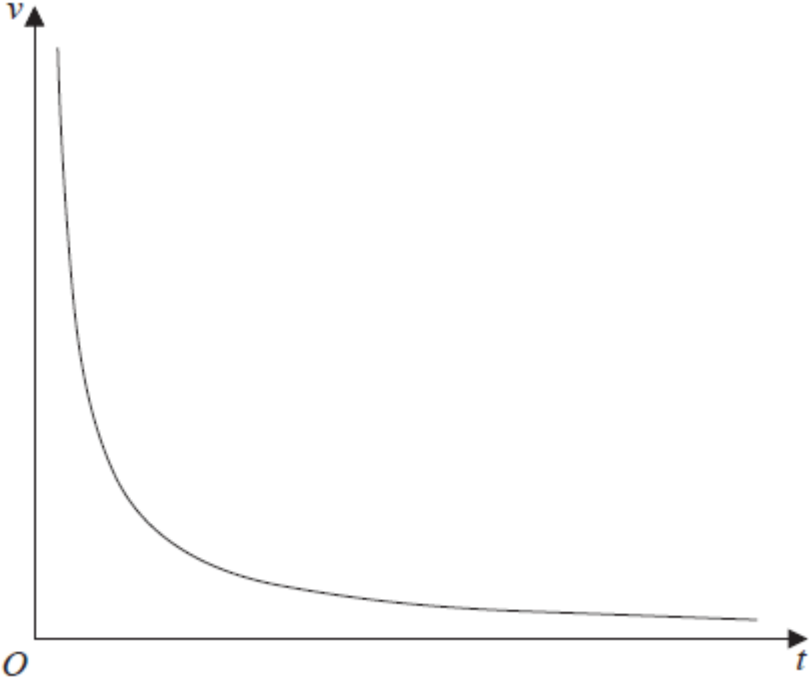
Question	Working	Answer	Mark	Notes
19 (a)		Graph drawn	2	M1 for suitable axes drawn and all points correctly plotted OR for suitable axes drawn , 5 or 6 points plotted correctly and joined with a curve A1 fully correct graph
(b)		3.6	2	M1 for a line drawn at $y = 6$ or for $2^{x-1} = 6$ A1 for value in the range 3.5 to 3.7 from $y = 6$ on graph
(c)		10.5	2	M1 for substituting values and $h = 1$ into trapezium rule, eg $\frac{1}{2}(1 + 8 + 2(2 + 4))$ A1 for 10.5 oe
20 (a)	(3, 0), (4, -3), (-1, -4)	Graph drawn	2	M1 for translation parallel to y -axis or for 2 points correct A1 for correct sketch
(b)	(1.5, 2), (2, -1), (-0.5, -2)	Graph drawn	2	M1 for a stretch in the x direction or for 2 points correct A1 for correct sketch

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Question	Working	Answer	Mark	Notes
21 (a)		$\frac{4x - 8}{x^2 - 16}$	3	M1 for using a correct common denominator may be seen as $(x - 4)(x + 4)$ oe A1 for $\frac{3(x-4)+1(x+4)}{(x-4)(x+4)}$ oe A1 for $\frac{4x-8}{x^2-16}$ or $\frac{4x-8}{(x-4)(x+4)}$ or $\frac{2(2x-4)}{x^2-16}$ or $\frac{2(2x-4)}{(x-4)(x+4)}$ or $\frac{4(x-2)}{x^2-16}$ or $\frac{4(x-2)}{(x-4)(x+4)}$
(b)		-1, 6	3	M1 for clearing the fractions, eg $5(4x - 8) = 4(x^2 - 16)$, ft from $\frac{ax+b}{x^2-c}$ in (a) A1 for writing equation in the form $ax^2 + bx + c = 0$, eg $x^2 - 5x - 6(= 0)$ or $4x^2 - 20x - 24(= 0)$ ft from $\frac{ax+b}{x^2-c}$ in (a) A1 cao
22 (a)		27	1	B1 cao
(b)		80	2	M1 for recognition that the gradient of the first section of the graph represents the acceleration eg $\frac{20}{15}$ or $\frac{20}{0.25}$ A1 cao
(c)		Description	1	B1 for reference to distance without contradiction

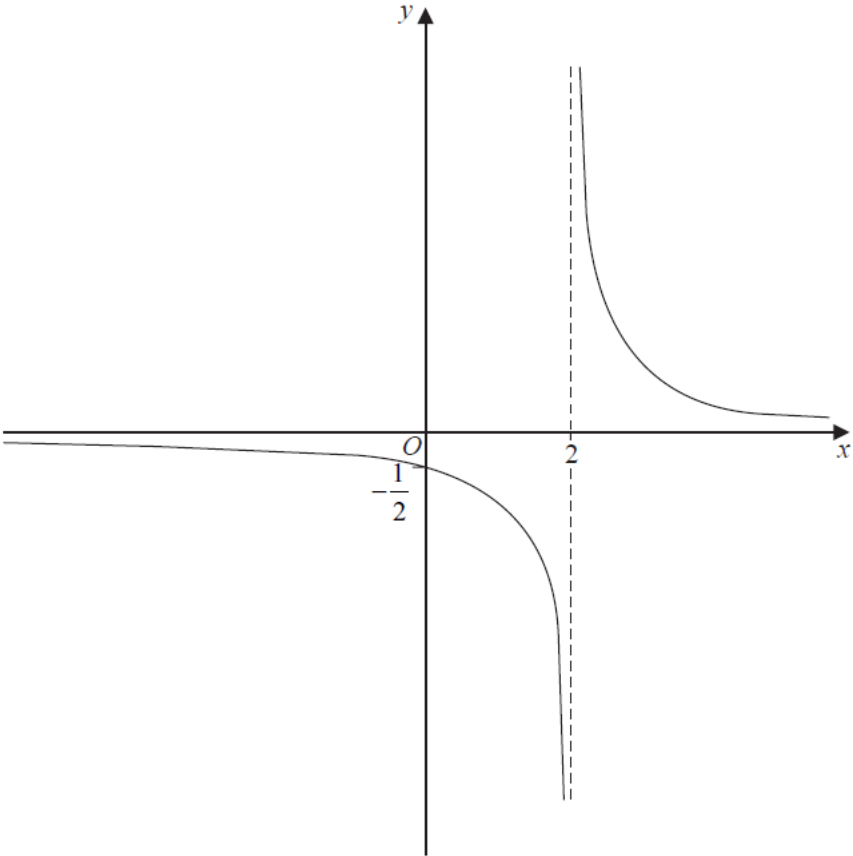
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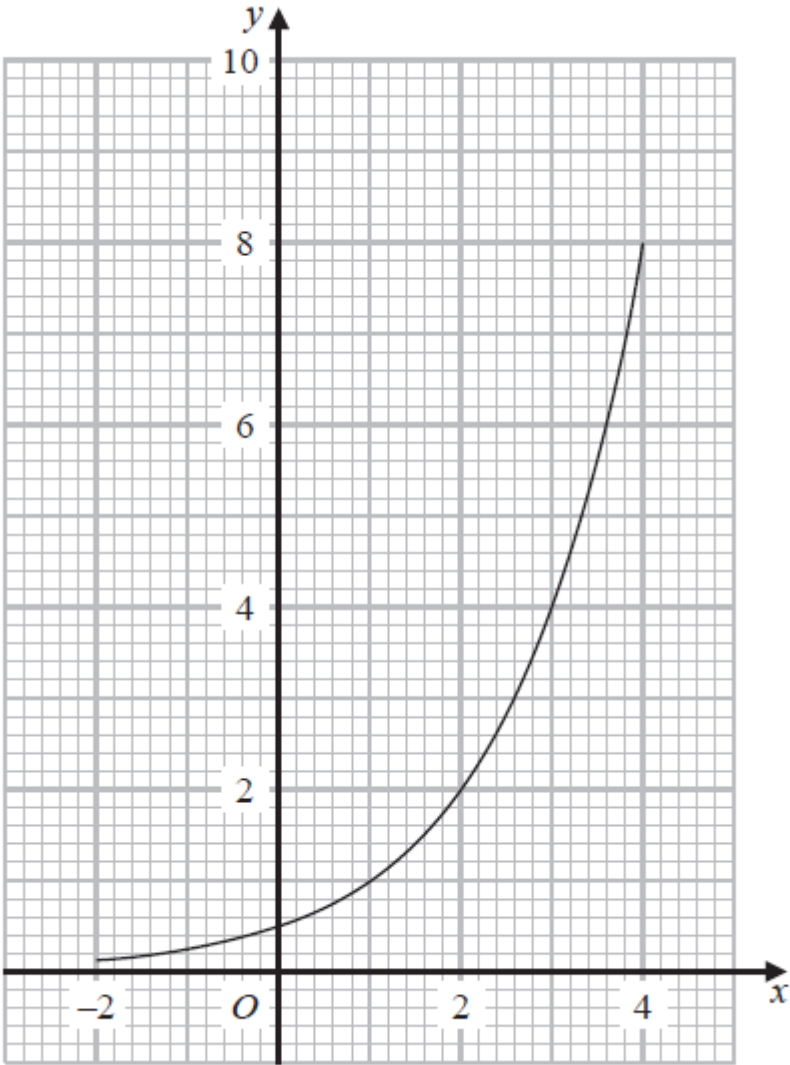
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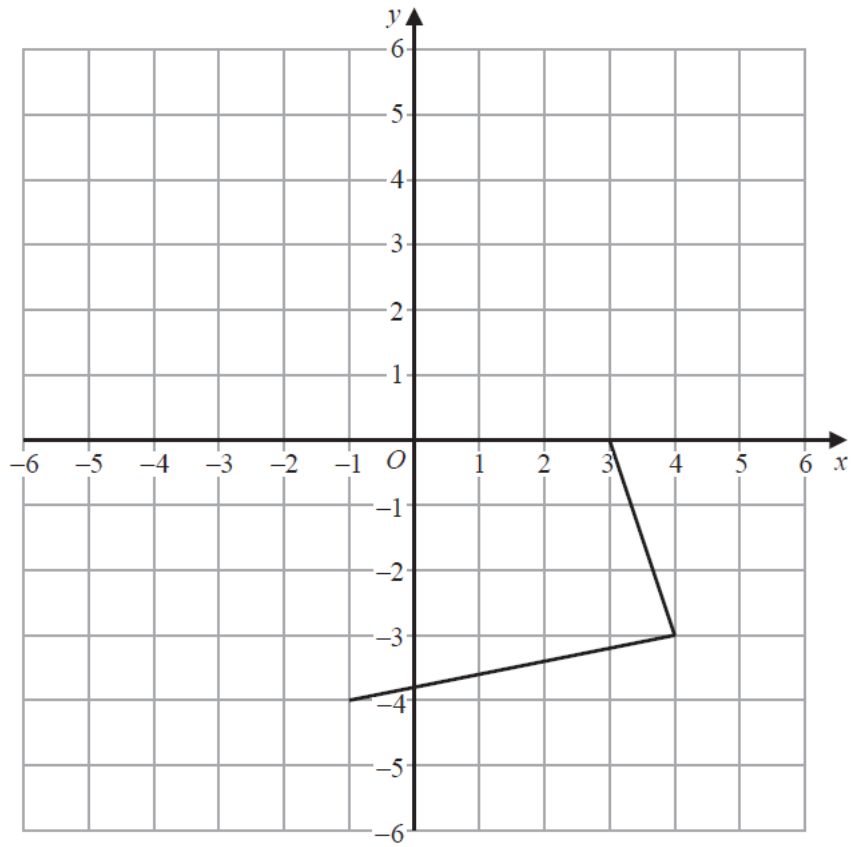
Question 15



Question 19



Question 20(a)



Question 20(b)

