



Mark Scheme (Results)

January 2021

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

| PAPER: AAL30_01 | | | | |
|-----------------|---------|---|------|--|
| Question | Working | Answer | Mark | Notes |
| 1 (a) | | $6x^2 + 7x - 3$ | 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 $6x^2 + 7x - 3$ |
| (b) | | $49x^2$ | 2 | M1 for $(7x)^2$ or $49x^n$ where $n \neq 2$ or ax^2 where $a \neq 49$ A1 cao |
| (c) | | $8y^3$ | 2 | M1 for $4^{\frac{3}{2}}$ (= 8) or $y^{\frac{2 \times 3}{2}}$ ($= y^3$) or $(2y)^3$ oe or $(64y^6)^{\frac{1}{2}}$ oe A1 cao |
| 2 | | Region drawn | 5 | M1 for drawing $y = 1$ correctly M1 for drawing $3x + 2y = 9$ correctly M1 for drawing $y = \frac{1}{2}x + 3$ correctly A2 for correctly shading required region (A1 for correct shading for 2 inequalities) |
| 3 (a)(i) | | Circle centre origin, radius 5 | 2 | M1 for a circle centre (0,0) or radius 5 A1 for accurate correct circle drawn |
| (ii) | | Parabola drawn | 2 | M1 for a parabola in the correct orientation A1 for the correct parabola |
| (b) | | $x = 2.8, y = 4.1$ $x = -2.8, y = 4.1$ | 2 | M1 for intersection of graphs indicated or one solution eg $x = 2.8, y = 4.1$ A1 $x = 2.8, y = 4.1$ and $x = -2.8, y = 4.1$ or fit the graphs in part (a) provided M1M1 scored |

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|-----------------|--|------------------------------------|------|--|
| Question | Working | Answer | Mark | Notes |
| 4 (a) | | $(y - x)(y + x)$ | 1 | B1 oe |
| (b) | | $(3x - 4)(2y + 3)$ | 2 | M1 for a start to the method of factorisation eg $2y(3x - 4)$ and $3(3x - 4)$ or $3x(2y + 3)$ and $-4(2y + 3)$ A1 $(3x - 4)(2y + 3)$ |
| 5 | | $\frac{2x^2 + 12}{(x - 3)(x + 3)}$ | 3 | M1 for using a suitable common denominator eg $(x - 3)(x + 3)$ M1 for a complete method to simplify to a single fraction, eg $\frac{(x+2)(x+3)+(x-2)(x-3)}{(x-3)(x+3)}$ A1 $\frac{2x^2+12}{x^2-9}$ or $\frac{2x^2+12}{(x-3)(x+3)}$ or $\frac{2(x^2+6)}{x^2-9}$ or $\frac{2(x^2+6)}{(x-3)(x+3)}$ |
| 6 (a) | | $2(x - 3)^2 - 5$ | 3 | M1 for a start to the process eg $2(x^2 - 6x) + 13$ or $2(x^2 - 6x + 6.5)$ M1 for $2(x - 3)^2 + c$ or $2[(x - 3)^2 + c]$ A1 cao |
| (b) | | $3 \pm \sqrt{\frac{5}{2}}$ | 2 | M1 (dep M2) for isolating $(x - 3)^2$ term A1 $3 \pm \sqrt{\frac{5}{2}}$ |
| 7 (a) | -2, -1, 0, 1, 2, 3, 4 -15, 0, 3, 0, -3, 0, 15 | Curve drawn | 4 | M1 for calculating at least 4 correct values of y B1 for suitable axes drawn A1 for at least 4 correct points plotted A1 for a smooth curve through correct points |
| (b) | | 3.2 0.5 -0.7 | 3 | M1 for $(x - 1)(x + 1)(x - 3) = 2$ or use of $y = 2$ or draws graph translated by $\begin{pmatrix} 0 \\ -2 \end{pmatrix}$ A2 for three correct solutions (A1 for one or two correct solutions) |

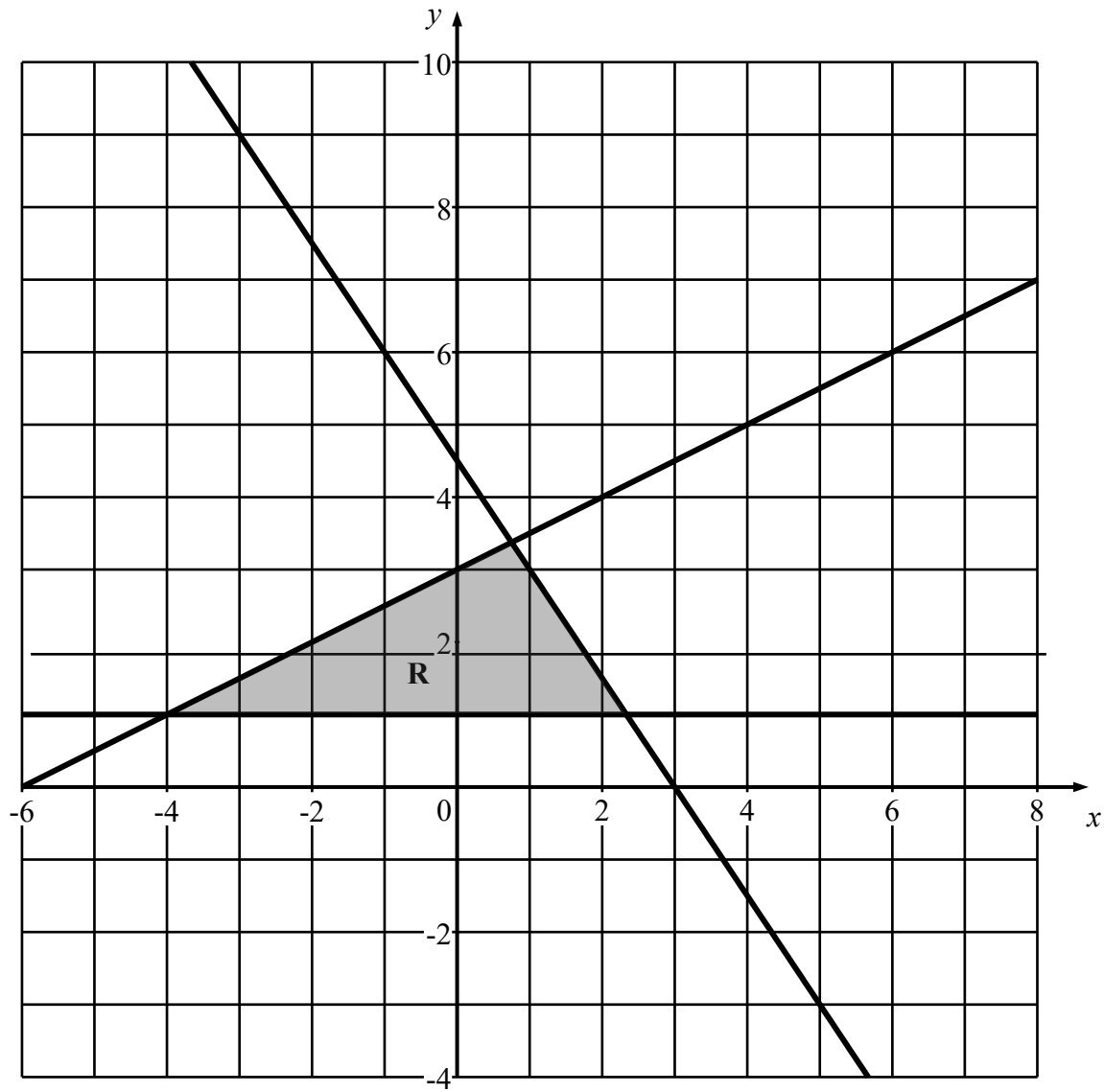
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|-----------------|---------|---|------|--|
| Question | Working | Answer | Mark | Notes |
| 8 (a) | | 1.04 | 2 | M1 for correct substitution, eg $\frac{13x8}{25x2^2}$. A1 oe |
| (b) | | $h = \pm \sqrt{\frac{13w}{25B}}$ | 2 | M1 for $h^2 = \frac{13w}{25B}$ A1 |
| (c) | | $k = \frac{5mn}{5n + 2}$ | 3 | M1 for a correct first step eg adding k to both sides or multiplying throughout by $5n$, M1 for isolating and factorising terms in k , eg $m = k\left(\frac{2}{5n} + 1\right)$ A1 |
| 9 (a) | | $x < -3, x > 3$ | 2 | M1 critical values of -3 and 3 A1 |
| (b)(i) | | $\frac{2 \pm \sqrt{10}}{3}$ | 3 | M1 for stating the quadratic formula, may be implied by correct substitution into formula A1 for $\frac{4 \pm \sqrt{40}}{6}$ or $\frac{4 \pm \sqrt{40}}{2 \times 3}$ A1 cao |
| (ii) | | $\frac{2 - \sqrt{10}}{3} < x < \frac{2 + \sqrt{10}}{3}$ | 1 | B1 ft two critical values in (i) |

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|-----------------|--|-----------------------------------|------|---|
| Question | Working | Answer | Mark | Notes |
| 10 (a) | | $y = \frac{54}{x^3}$ | 3 | M1 $y = \frac{k}{x^3}$ oe, or $y \propto \frac{1}{x^3}$ may be implied by substitution M1 for substitution to find k A1 oe |
| (b) | | $6^{\frac{1}{3}}$ | 2 | M1 for substituting $y = 9$ into $y = \frac{k}{x^3}$, eg $9 = \frac{54}{x^3}$ A1 cao |
| 11 | $(2x - 3)(x - 2)$ | $a = 2, b = 3$ and $c = 2$ | 2 | M1 $(2x - 3)(x - 2)$ A1 for all values correct |
| 12 | | Graph sketched and labelled | 3 | M1 for correct shape of graph for $x > 0$ or for $x < 0$ A1 for correct shape and position of graph for $x > 0$ and for $x < 0$ A1 fully correct and labelled graph, showing $y = 1$ and $(-1, 0)$ |
| 13 | $2x^2 - 6 = 3(2x - 2)$ $2x^2 - 6 = 6x - 6$ $2x^2 = 6x$ | $x = 0, y = -2$ $x = 3, y = 4$ | 4 | M1 for substitution to obtain equation in one variable, M1 for method to simplify to a quadratic in the form $ax^2 + bx + c = 0$ eg $2x^2 - 6x (= 0)$ A1 $x = 0, 3$ or $y = -2, 4$ A1 for $x = 0, y = -2$ and $x = 3, y = 4$ |
| 14 (a) | | 1.8 | 2 | M1 for correct substitution into $b^2 - 4ac = 0$ A1 oe |
| (b) | | $\frac{5}{3}, -\frac{8}{3}$ | 2 | B1 for sum = $\frac{5}{3}$ B1 for product = $-\frac{8}{3}$ |

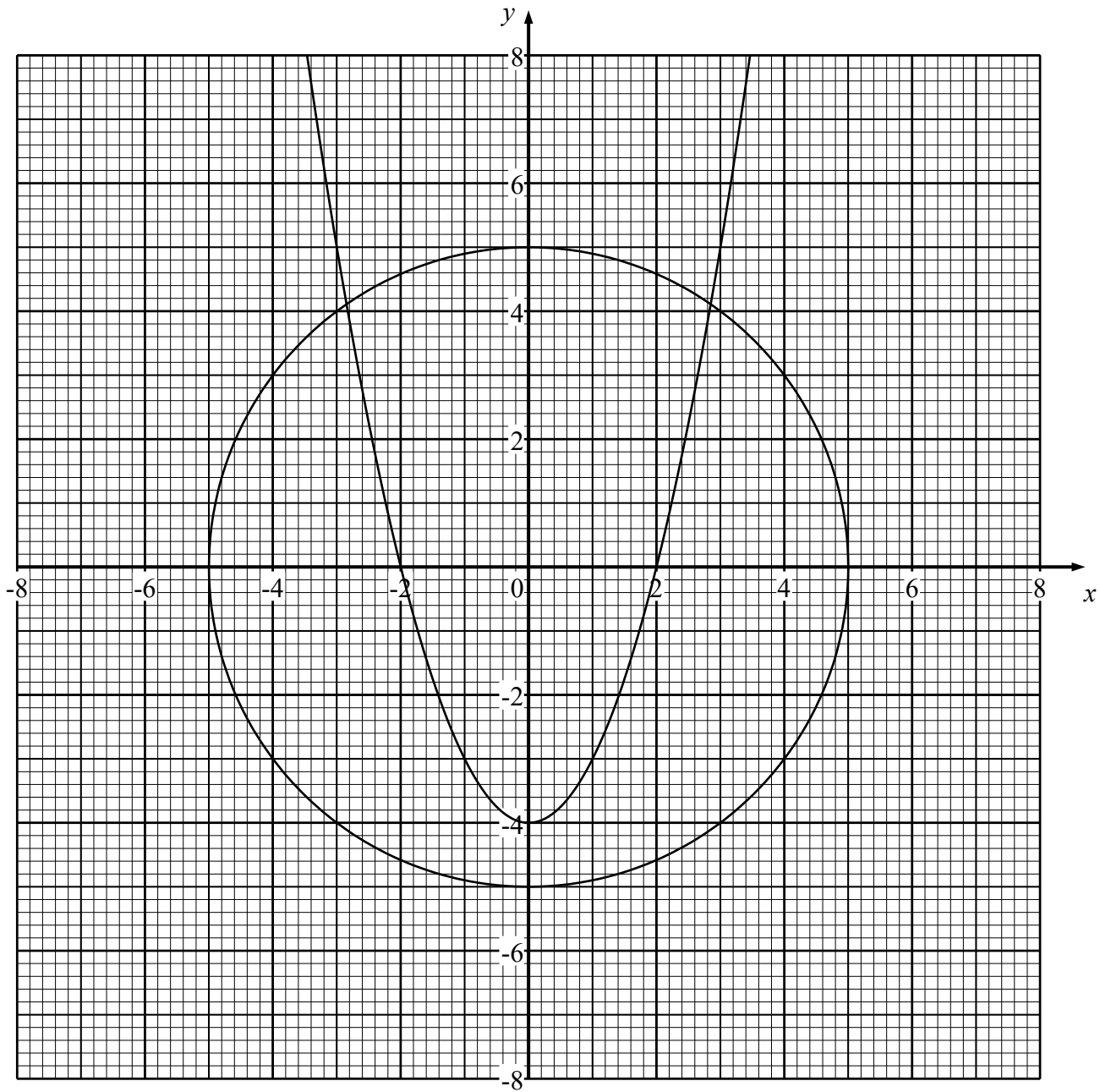
| PAPER: AAL30_01 | | | | |
|-----------------|---------|----------------|------|--|
| Question | Working | Answer | Mark | Notes |
| 15 (a) | | $y = 3x - 4$ | 3 | M1 for full method to find gradient, eg $\frac{-5-7}{-2-2}$ M1 for substituting in values to find c , eg $5 = m \times 3 + c$ A1 for $y = 3x - 4$ |
| (b) | | $-\frac{1}{3}$ | 1 | B1 ft “gradient” from part (a) |
| 16 (a) | | 114 | 2 | M1 for use of $a = 6$ and $d = 12$ in $a + (n-1)d$ oe or $12n-6$ A1 cao |
| (b) | | 1670 | 3 | B1 for stating or using values of a and d or a and l eg $a = -2$ and $d = 9$ or $a = -2$ and $l = 169$ M1 for using $S = \frac{n}{2}\{2a + (n-1)d\}$ or $S = \frac{n}{2}\{a + l\}$, may be implied by substitution A1 cao |
| 17 (a)(i) | | 6 | 1 | B1 cao |
| (ii) | | 0 | 1 | B1 cao |
| (b) | | 1.5 – 1.9 | 2 | M1 tangent drawn at $t = 3$ A1 for value in the range 1.5 – 1.9 |
| (c) | | 72 | 3 | M1 for using 5 strips to find the area between $t = 0$ and $t = 10$ and states values ($y_0 =$) 0, ($y_1 =$) 5.6, ($y_2 =$) 8.8, ($y_3 =$) 10 ($y_4 =$) 8.8, ($y_5 =$) 5.6 (condone 1 error) M1(dep) for substituting “values” and $h = 2$ into trapezium rule, eg $\frac{2}{2}((0 + 5.6) + 2(5.6 + 8.8 + 10 + 8.8))$ A1 |

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|-----------------|---------|---|------|---|
| Question | Working | Answer | Mark | Notes |
| (d) | | Distance (travelled between $t = 0$ and $t = 10$) | 1 | B1 explanation |
| 18 (a) | | Correct Graph | 2 | M1 for a reflection in a line of the form $y = c$ A1 correct graph |
| (b) | | Correct Graph | 2 | M1 for a graph translated parallel to the x -axis A1 correct graph |
| 19 | | $\frac{-21 + 14\sqrt{5}}{11}$ | 3 | M1 for multiplying by $\frac{3-2\sqrt{5}}{3-2\sqrt{5}}$ oe M1 (dep M1) for correct expansion of the denominator, eg $\frac{-21+14\sqrt{5}}{3^2 - (2\sqrt{5})^2}$ or $\frac{7(3-2\sqrt{5})}{3^2 - 6\sqrt{5} + 6\sqrt{5} - (2\sqrt{5})^2}$ A1 for $\frac{-21+14\sqrt{5}}{11}$ oe |

Question 2

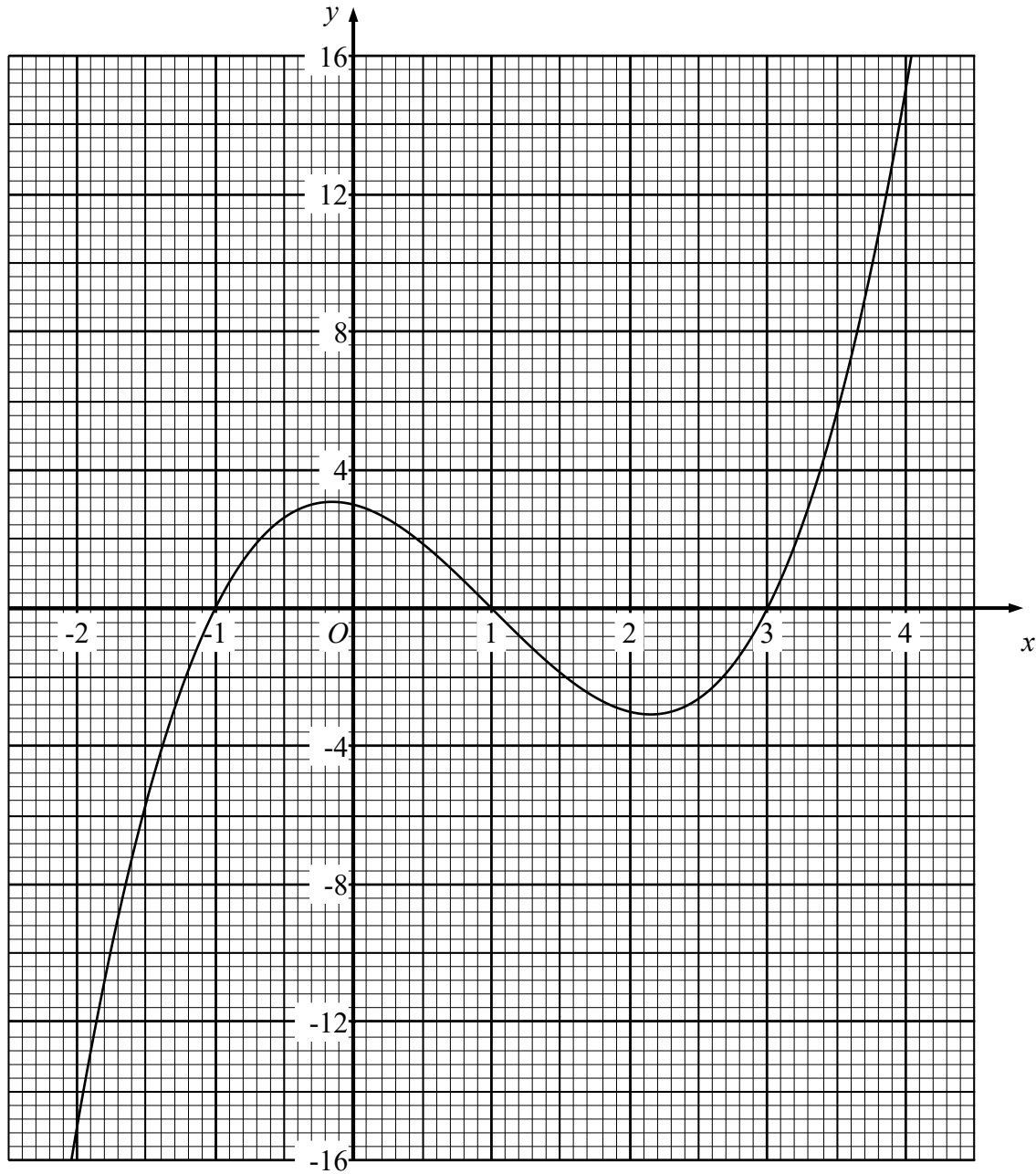


Question 3

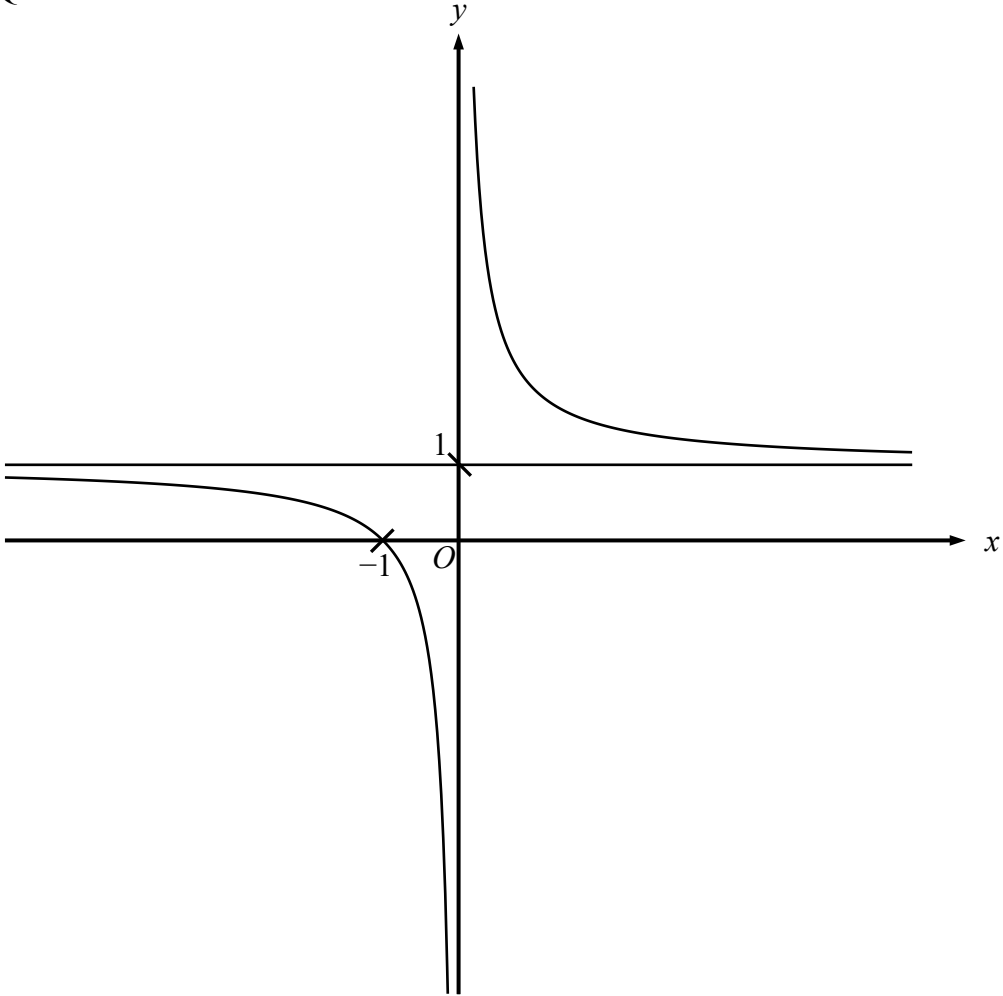


Question 7

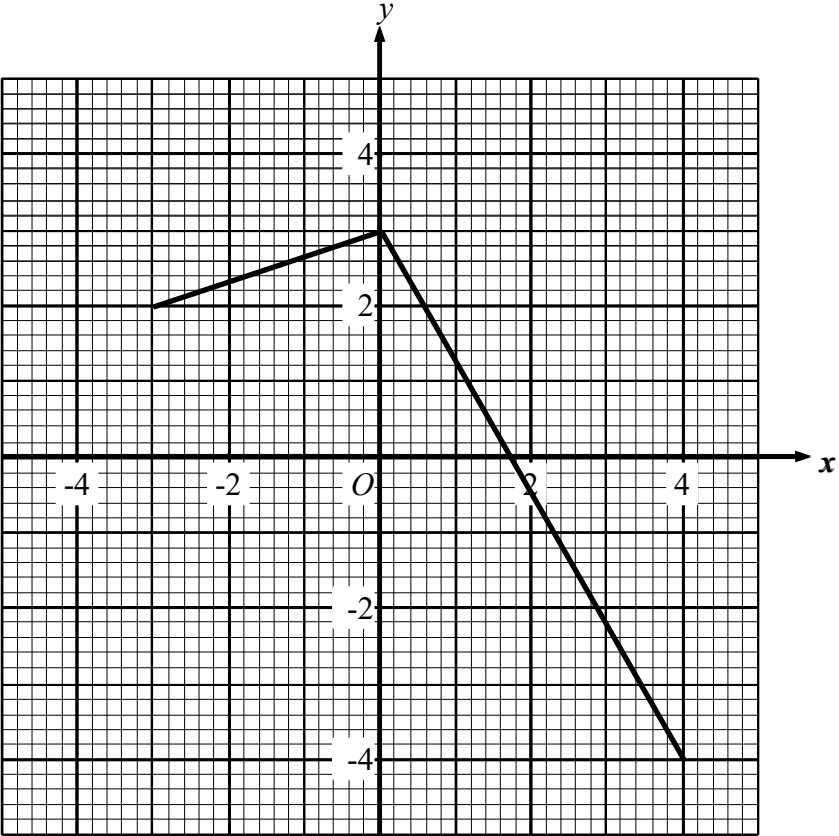
Note: scales may vary.



Question 12



Question 18(a)



Question 18(b)

