Mark Scheme (Results)

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

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

PAPER: AAL30_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
1 (a)		$3x^2 + 4x - 4$	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 $3x^2 + 4x - 4$
(b)		$4y^2 + 20y + 25$	2	M1 for 3 terms out of 4 correct A1 for $4y^2 + 20y + 25$
(c)		$6t^4$	2	M1 for 6 or $t^{\frac{8}{2}}$ (= t^4) A1 cao
(d)		$r^{-\frac{13}{4}}$	1	B1 for $r^{-\frac{13}{4}}$ oe
2		$m = \pm\sqrt{\frac{-3}{d-6}}$	3	M1 for first step eg $d - 6 = -\frac{3}{m^2}$ or $dm^2 = 6m^2 - 3$ M1 (dep M1) for making m^2 the subject, eg $m^2 = \frac{-3}{d-6}$ **or** $m = \sqrt{\frac{-3}{d-6}}$ oe A1 oe
3	$\frac{--3 \pm \sqrt{(-3)^2 - 4 \times 5 \times -2}}{10}$	$-\frac{2}{5}$, 1	2	M1 for stating the quadratic formula, may be implied by correct substitution into formula A1 for $-\frac{2}{5}$, 1 oe

PAPER: AAL30_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
4		Region drawn	5	M1 for drawing $x = -1$ and $y = 2$ M1 for drawing $3x + 5y = 15$ M1 for drawing $y - x = 6$ A2 for shading required region (A1 for correct shading for 3 inequalities)
5 (a)		Circle drawn	2	M1 for a circle centre (0, 0) or radius 4 A1 for a circle centre (0, 0) and radius 4
(b)		$x = 4$	1	B1 for $x = 4$ oe
6 (a)		$x < 6$	2	M1 for isolating terms in x or critical value of 6 A1 for $x < 6$
(b)(i)		$(y + 4)(y - 2)$	1	B1 for $(y + 4)(y - 2)$ or equivalent factorisation
(ii)		$-4 < y < 2$	2	M1 for critical values of -4 and 2 (ft (b)(i)) A1 oe

PAPER: AAL30_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
7 (a)		$\frac{3}{4}$	1	B1 for $\frac{3}{4}$ oe
(b)		$y = -\frac{5}{2}x$	2	M1 for $-\frac{5}{2}$ oe A1 for $y = -\frac{5}{2}x$ oe
8		no real roots supported	2	M1 for use of discriminant eg $(-5)^2 - 4 \times 2 \times 4$ $(=-7)$ A1 for no real roots from correct discriminant
9 (a)		$5xy^2(2y + 3x)$	2	M1 for a correct partial factorisation with a product of at least 3 factors, eg $5x(2y^3 + 3xy^2)$ A1 oe
(b)		$q^2(p-1)(p+1)$	2	M1 for partial factorisation with at least 3 factors, eg $q^2(p^2-1)$ or $q(qp-q)(p+1)$ or $q(p-1)(qp+q)$ **or** for $(pq-q)(pq+q)$ A1 oe
10 (a)		$4, -5$	2	M1 for $(x+4)^2 + c$ or one correct value A1 for 4 and -5
(b)		$(-4, -5)$	1	B1 ft (a)

PAPER: AAL30_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
11 (a)		$5n + 1$	2	M1 for $a + (n – 1)d$ oe (may be seen with substituted values) eg $6 + 5(n – 1)$ or for $5n + c$, $c \neq 1$ A1 cao
(b)		24	1	B1 cao
(c)		25 856	2	M1 for substitution into $\frac{1}{2}n(2a + (n– 1)d)$ eg $\frac{1}{2} \times 101(2 \times 6 + (101 – 1) \times 5)$ or for substitution into $\frac{1}{2}n(a + l)$ with $l = 6 + 100 \times 5$ eg $\frac{1}{2} \times 101(6 + 506)$ A1 cao
12 (a)		$t = \frac{300}{v}$	3	M1 $t = \frac{k}{v}$ oe, or $t \propto \frac{1}{v}$ may be implied by substitution M1 for substitution to find k A1 oe
(b)		50	2	M1 for substituting $t = 6$ into $t = \frac{k}{v}$ A1 ft use of $t = \frac{k}{v}$
(c)		Graph sketched	1	B1
13 (i)		$\frac{4}{3}$	1	B1 for $\frac{4}{3}$ or $1\frac{1}{3}$ or $1.\dot{3}$
(ii)		$\frac{5}{3}$	1	B1 for $\frac{5}{3}$ or $1\frac{2}{3}$ or $1.\dot{6}$

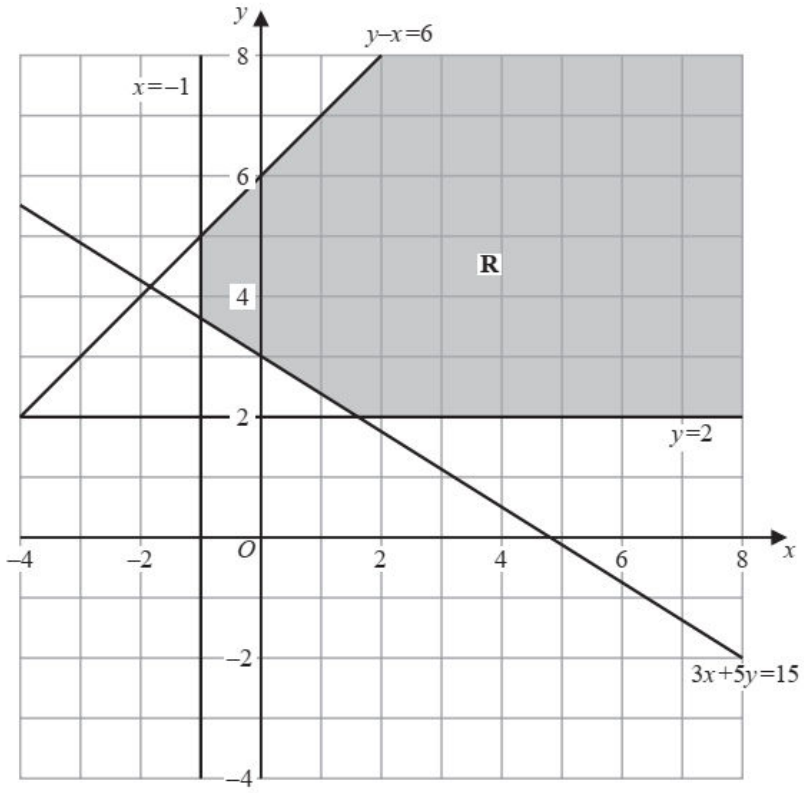
PAPER: AAL30_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
14		$\frac{5}{2}$	3	M1 for a complete substitution eg $27 = \frac{9(20+c)}{3c}$ or for re-arranging to isolate terms in c before substitution, eg $3Pc - ac = ab$ M1 for re-arranging the formula to isolate terms in c, eg $81c - 9c = 180$ A1 for $\frac{5}{2}$ or 2.5 or $2\frac{1}{2}$
15		Graph sketch	4	B1 for asymptote of $x = 1$ or $y = 0$ B1 for y intercept at (0, 1) M1 for correct shape A1 for fully correct graph showing position of asymptotes and intersection with y-axis.
16	$2x = 5x^2 - 22x - 5$ $5x^2 - 24x - 5 = 0$ $(5x + 1)(x - 5) = 0$ OR $x = \frac{y}{2}$ $y = 5\left(\frac{y}{2}\right)^2 - 22\left(\frac{y}{2}\right) - 5$ $5y^2 - 48y - 20 = 0$ $(5y + 2)(y - 10) = 0$	$x = -\frac{1}{5}$, $y = -\frac{2}{5}$ $x = 5$, $y = 10$	4	M1 for substitution of $y = 2x$ into the quadratic equation to obtain equation in one variable, x or using $x = \frac{y}{2}$ into the quadratic equation to obtain equation in one variable, y. M1 for writing equation in the form $ax^2 + bx + c = 0$ or $ay^2 + by + c = 0$, eg $5x^2 - 24x - 5$ (= 0) or $5y^2 - 48y - 20$ (= 0) A1 $x = -\frac{1}{5}$, 5, or $y = -\frac{2}{5}$, 10 A1 for $x = -\frac{1}{5}$, $y = -\frac{2}{5}$ and $x = 5$, $y = 10$

PAPER: AAL30_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
17 (a)		$-30 + 14\sqrt{5}$	3	M1 for a partial expansion and a simplification of $\sqrt{5} \times \sqrt{5} = 5$ eg $9 - 3\sqrt{5} - 3\sqrt{5} + 5$ or $\sqrt{5}(3 - \sqrt{5}) = 3\sqrt{5} - 5$ **or** for a full expansion of the expression eg $9\sqrt{5} - 3\sqrt{5} \times \sqrt{5} - 3\sqrt{5} \times \sqrt{5} + \sqrt{5} \times \sqrt{5} \times \sqrt{5}$ M1 for a full expansion and a simplification of $\sqrt{5} \times \sqrt{5} = 5$, eg $14\sqrt{5} - 6\sqrt{5} \times \sqrt{5}$ or $9\sqrt{5} - 15 - 3\sqrt{5} \times \sqrt{5} + 5\sqrt{5}$ A1 for $-30 + 14\sqrt{5}$ or $2(-15 + 7\sqrt{5})$
(b)		$\frac{13 + 5\sqrt{7}}{2}$	3	M1 for multiplying by $\frac{3+\sqrt{7}}{3+\sqrt{7}}$ oe M1 for rationalising to $\frac{6+7+2\sqrt{7}+3\sqrt{7}}{9-7}$ A1 for $\frac{13+5\sqrt{7}}{2}$
18		$y = -3x + 2$	3	M1 for a method to find the correct gradient, eg $\frac{-4-11}{2--3}$ or gradient, $m = -3$ M1 for a method to find c eg by substitution of point into equation, $11 =$ "-3" $\times -3 + c$ or $-4 =$ " -3" $\times 2 + c$ or for eg $y - 11 =$ " -3"$(x - -3)$ A1 cao

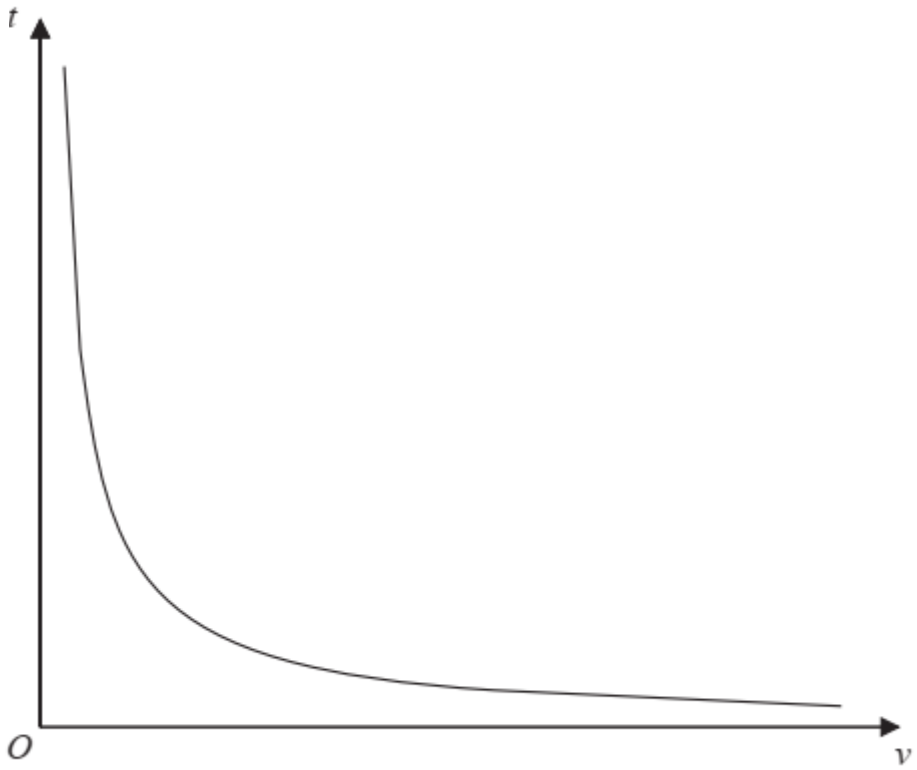
PAPER: AAL30_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
19 (a)		Graph drawn	2	M1 all points correctly plotted or for 5 or 6 points plotted correctly and joined with a curve A1 fully correct graph
(b)		-1.6	2	M1(dep M1) for a line drawn at $y = 6$ or for $2^{1-x} = 6$ A1 for -1.6 or ft from graph
(c)		5.25	2	M1 for substituting values and $h = 1$ into trapezium rule, eg $\frac{1}{2}(4 + \frac{1}{2} + 2(2 + 1))$ A1 for 5.25 oe
20 (a)		Graph drawn	2	M1 for a reflection in line parallel to the x axis **or** for 3 out of 4 points correct A1 for correct graph sketched
(b)		Graph drawn	2	M1 for a translation parallel to the x axis A1 for correct graph sketched
21 (a)		7.6	1	B1 cao
(b)		7	1	B1 for 6.8 – 7.2
(c)		18 – 18.4	2	M1 for recognising area gives distance, eg 9 × 2 A1 for 18 – 18.4

PAPER: AAL30_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
22 (a)		$\frac{x}{x-2}$	2	M1 for factorisation, eg $x(x-3)$ or $(x-2)(x-3)$ A1 cao
(b)		$0, -\frac{3}{2}$	4	M1 for writing as a single fraction, eg $\frac{1(x+2)+2(x+1)}{(x+1)(x+2)}$ or deals with the fractions, eg $1(x+2)+2(x+1)=2(x+1)(x+2)$ M1 for dealing with the fractions and expanding brackets, eg $x+2+2x+2=2x^2+6x+4$ M1 for writing equation in the form $ax^2+bx+c=0$, eg $2x^2+3x(=0)$ A1 oe

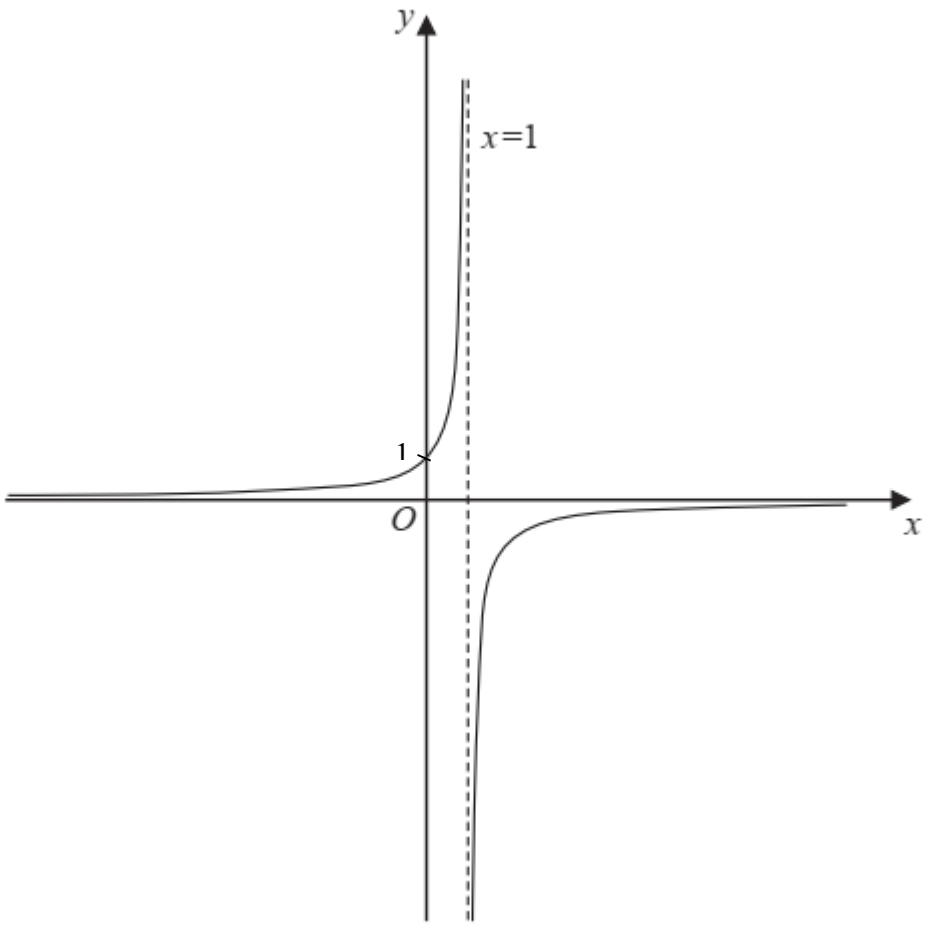
Question 4



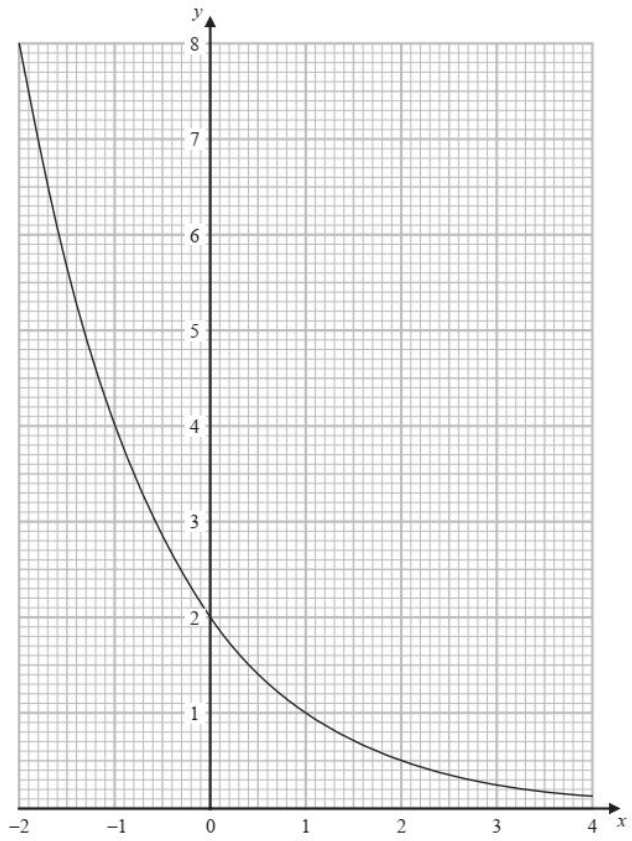
Question 12



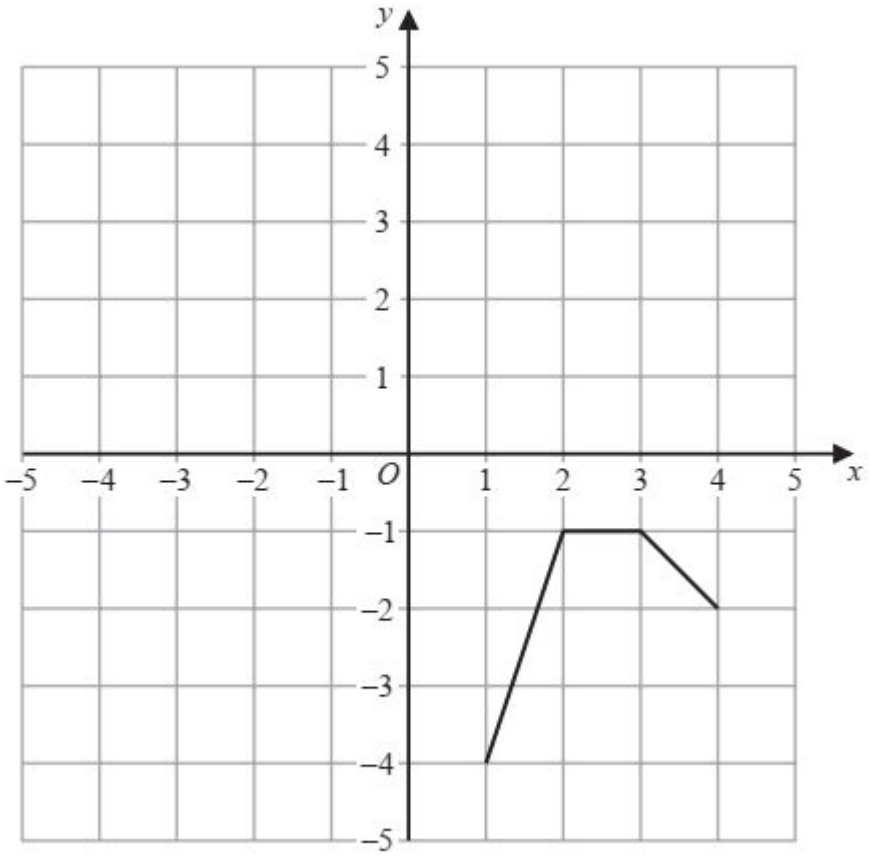
Question 15



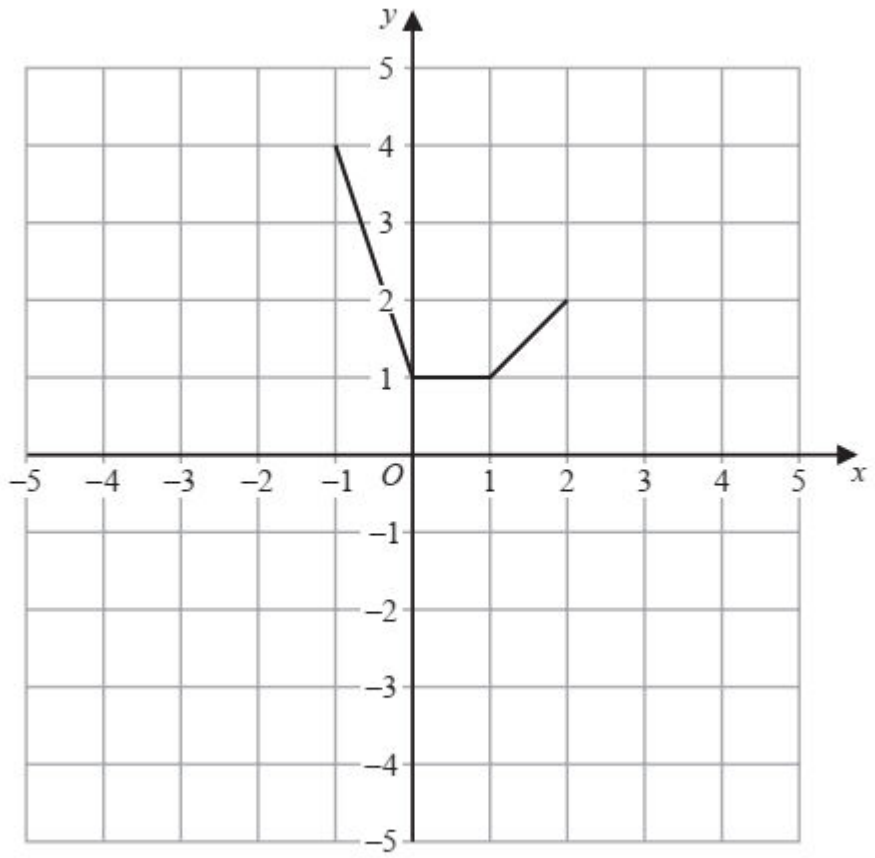
Question 19



Question 20(a)



Question 20(b)



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