

Mark Scheme (Results)

Summer 2013

Edexcel Level 3 Award (AAL30)
Algebra

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

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.

PAPER: AAL30_01					
Question		Working	Answer	Mark	Notes
1	(a)		m^6	1	B1 cao
	(b)		$n^{\frac{5}{2}}$	1	B1 for $n^{\frac{5}{2}}$ (accept $n^{2.5}$)
	(c)		p^2	1	B1 cao
	(d)	$d^{-1}(d^2 - d^{\frac{1}{2}})$ $d - d^{\frac{-1}{2}}$	$1, -\frac{1}{2}$	3	M1 for method to enable simplification, eg $d^{-1}(d^2 - d^{\frac{1}{2}})$ or $\frac{d^2}{d} - \frac{d^{\frac{1}{2}}}{d}$ A1 $x = 1$ A1 $y = -\frac{1}{2}$
2	(a)		$(x + 3)(x + 5)$	1	B1 for $(x + 3)(x + 5)$
	(b)		$(2y + 3)(2y - 3)$	1	B1 for $(2y + 3)(2y - 3)$
	(c)	$p(t + 2) + 7(t + 2)$	$(p + 7)(t + 2)$	2	M1 for $p(t + 2)$ and $7(t + 2)$ or $t(p + 7)$ and $2(p + 7)$ A1 for $(p + 7)(t + 2)$
3		Correct region shaded	5	M3 for drawing all 3 lines correctly (M2 for drawing 2 lines correctly) (M1 for drawing one line correctly) A2 for correct shading of triangle with vertices $((1, 2); (1, 4\frac{1}{2}); (2, 4)$ (A1 for correct shading for two inequalities)	

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Question		Working	Answer	Mark	Notes
4	(a)	$(x - 4)^2 - 16$	-4, -16	2	M1 for $(x - 4)^2 \pm c$ A1 cao
	(b)	$4\{(x - 4)^2 - 16\} + 63 = 0$ $4(x - 4)^2 = 1$ $x - 4 = \pm \frac{1}{2}$ OR $4x^2 - 32x + 63 = 0$ $(2x - 7)(2x - 9) = 0$ OR $a = 4, b = -32, c = 63$ $\frac{- -32 \pm \sqrt{(-32)^2 - 4 \times 4 \times 63}}{2 \times 4}$ $= \frac{32 \pm \sqrt{1024 - 1008}}{8} =$ $\frac{32 \pm \sqrt{16}}{8}$ $= \frac{9}{2} \text{ or } \frac{7}{2}$	$\frac{7}{2}, \frac{9}{2}$	3	M1 for correct use of completing the square, eg $4\{(x - 4)^2 - 16\} + 63 = 0$ or $(2x - 8)^2 - 64 + 63 = 0$ M1 for $(x - 4) = \pm \sqrt{\frac{1}{4}}$ or $(2x - 8) = \pm 1$ A1 for $\frac{7}{2}, \frac{9}{2}$ oe OR M1 for $4x^2 - 32x + 63 = 0$ M1 for factorisation of $4x^2 - 32x + 63$ A1 for $\frac{7}{2}, \frac{9}{2}$ oe OR M1 for correct substitution into the formula M1 for $\frac{32 \pm \sqrt{16}}{8}$ or $\frac{16 \pm \sqrt{4}}{4}$ or $\frac{8 \pm 1}{2}$ A1 for $\frac{7}{2}, \frac{9}{2}$ oe

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Question		Working	Answer	Mark	Notes
5	(a)	$-2w < 4 - 7$ $w > \frac{-3}{-2}$	$w > \frac{3}{2}$	2	M1 for intention to subtract 7 or 4 from both sides or add 2w to both sides or divide all three terms by 2, eg $-2w < 4 - 7$ or $2w > 3$ or $w = \frac{3}{2}$ oe or $w < \frac{3}{2}$ oe A1 for $w > \frac{3}{2}$
	(b)	$(x + 5)(x - 2) \leq 0$	$-5 \leq x \leq 2$	3	M1 for correct method to solve $x^2 + 3x - 10 = 0$ A1 for establishing the critical values, -5, 2 A1 for $-5 \leq x \leq 2$ OR M1 for sketching $y = x^2 + 3x - 10$ A1 for establishing the critical values, -5, 2 A1 for $-5 \leq x \leq 2$
6	(a)(i)		2	2	B1 cao
	(ii)		$\frac{1}{2}$		B1 cao
	(b)	$6^2 - 4 \times 1 \times c < 0$ $4c > 36$	$c > 9$	2	M1 for discriminant, eg $b^2 - 4ac$, $6^2 - 4 \times 1 \times c$ or $c = 9$ or $c < 9$ or $c \leq 9$ or $c \geq 9$ A1 for $c > 9$

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Question		Working	Answer	Mark	Notes
7	(a)		$2x^2 - 11x - 6$	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 $2x^2 - 11x - 6$
	(b)	$\frac{x(x+2)}{(x+2)(x+5)}$	$\frac{x}{x+5}$	2	M1 for factorisation of numerator or denominator A1 for $\frac{x}{x+5}$
8		Gradient of L_1 is $-\frac{1}{2}$ Gradient of $L_2 = 2$ $y - 2 = 2(x - 3)$ $2x - y - 4 = 0$	$2x - y - 4 = 0$	3	M1 for method to find gradient of L_2 , eg use of $-\frac{1}{m}$ or sight of “ $m = 2$ ” M1 for method to find equation, ie use of $y - y_1 = m(x - x_1)$ or $y = mx + c$, with attempt to find c A1 for $2x - y - 4 = 0$ or $-2x + y + 4 = 0$ (accept $2x + -1y + -4 = 0$)

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Question		Working	Answer	Mark	Notes
9	(a)	$xy = 180x - 360$ $x(y - 180) = -360$ $x = \frac{-360}{y - 180}$	$x = \frac{360}{180 - y}$	2	M1 for one correct operation, eg $xy = 180x - 360$ or $y - 180 = -\frac{360}{x}$ A1 for $x = \frac{360}{180 - y}$ oe
	(b)(i)	$\frac{-6}{-6 + 2}$	1.5	5	M1 for substitution of $t = -6$ into $\frac{t}{t + 2}$ A1 for 1.5 or $\frac{3}{2}$ or $\frac{6}{4}$
	(ii)	$s(t + 2) = t$ $st + 2s = t$ $st - t = -2s$ $t(s - 1) = -2s$ $t = \frac{-2s}{s - 1}$	$t = \frac{-2s}{s - 1}$		M1 for multiplying both sides by $t + 2$ M1 for isolating terms in t on one side A1 for $t = \frac{-2s}{s - 1}$ oe
10	(a)		correct sketch	2	M1 for correct shape in interval $0 \leq x \leq 360$ A1 fully correct sketch with 1 and -1 marked on y axis
	(b)		correct sketch	2	M1 for correct shape A1 fully correct sketch with $(0, 1)$ marked as y intercept

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Question		Working	Answer	Mark	Notes
11	(a)	$d = kv^2$ $6 = k \times 30^2$ $k = \frac{1}{150}$	$d = \frac{1}{150} v^2$	3	M1 for $d \propto v^2$ or $d = kv^2$ M1 for method to establish the value of k , eg by substituting to get $6 = k \times 30^2$ A1 for $d = \frac{1}{150} v^2$ oe
	(b)		sketch	1	B1 for sketch of $d = "k"v^2$
	(c)	$\frac{1}{150} \times 60^2$	24	2	M1 for substituting $v = 60$ into $d = "k"v^2$ A1 ft
	(d)	$96 = \frac{1}{150} v^2$ $v^2 = 14400$	120	2	M1 for substituting $d = 96$ into $d = "k"v^2$ A1 ft
12	(a)(i)		Tangent drawn	3	B1 for tangent to curve drawn at (1, 2) (professional judgement)
	(ii)	$1 + x - x^2 = 0$ $2 + x - x^2 = 1$	-0.6, 1.6		M1 for correct use of graph, eg line from 1 on y axis across to graph or sight of $2 + x - x^2 = 1$ A1 for both values, accept values in the range -0.55 to -0.65 and 1.55 to 1.65
	(b)		Crosses at (-1, 4) and (1, -3)	1	B1 for crosses at (-1, 4) and (1, -3) (use professional judgement)

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Question		Working	Answer	Mark	Notes
13	(a)	$3\sqrt{5} \times 3\sqrt{5}$	45	1	B1 for 45
	(b)	$7\sqrt{2} + 3\sqrt{2}$	$10\sqrt{2}$	2	M1 for correct method to write $\sqrt{98}$ or $\sqrt{18}$ in the form $a\sqrt{2}$ or sight of $7\sqrt{2}$ or $3\sqrt{2}$ A1 cao
	(c)	$\frac{1}{5-\sqrt{2}} \times \frac{5+\sqrt{2}}{5+\sqrt{2}}$	$\frac{5+\sqrt{2}}{23}$	2	M1 for multiplying both numerator and denominator by a suitable expression, eg $5 + \sqrt{2}$ A1 cao
14		$\frac{1}{2} \times 1 \times \left\{ \begin{array}{l} (3.25 + 27.25 + \\ 2(8 + 15.75) \end{array} \right\}$ $\frac{1}{2} \{ (30.5) + 2(23.75) \}$	39	4	B1 for width of strip = 1 M1 for reading off values from graph, 3.25, 8, 15.75, 27.25 (allow ± 0.25) M1 for substituting values in trapezium rule for $t = 2, 3, 4, 5$ A1 for value in the range 38.25 to 39.75
15		$2x - 3 = x^2 - x - 7$ $x^2 - 3x - 4 = 0$ $(x - 4)(x + 1) = 0$ $x = 4$ or $x = -1$ $y = 5$ or $y = -5$	$x = -1, y = -5$ $x = 4, y = 5$	5	M1 for eliminating one variable M1 for rearranging to get a quadratic (= 0) in one variable M1 for correct method to solve their quadratic equation. A1 for $x = 4$ or $x = -1$ A1 for $y = 5$ or $y = -5$ linked to corresponding x values

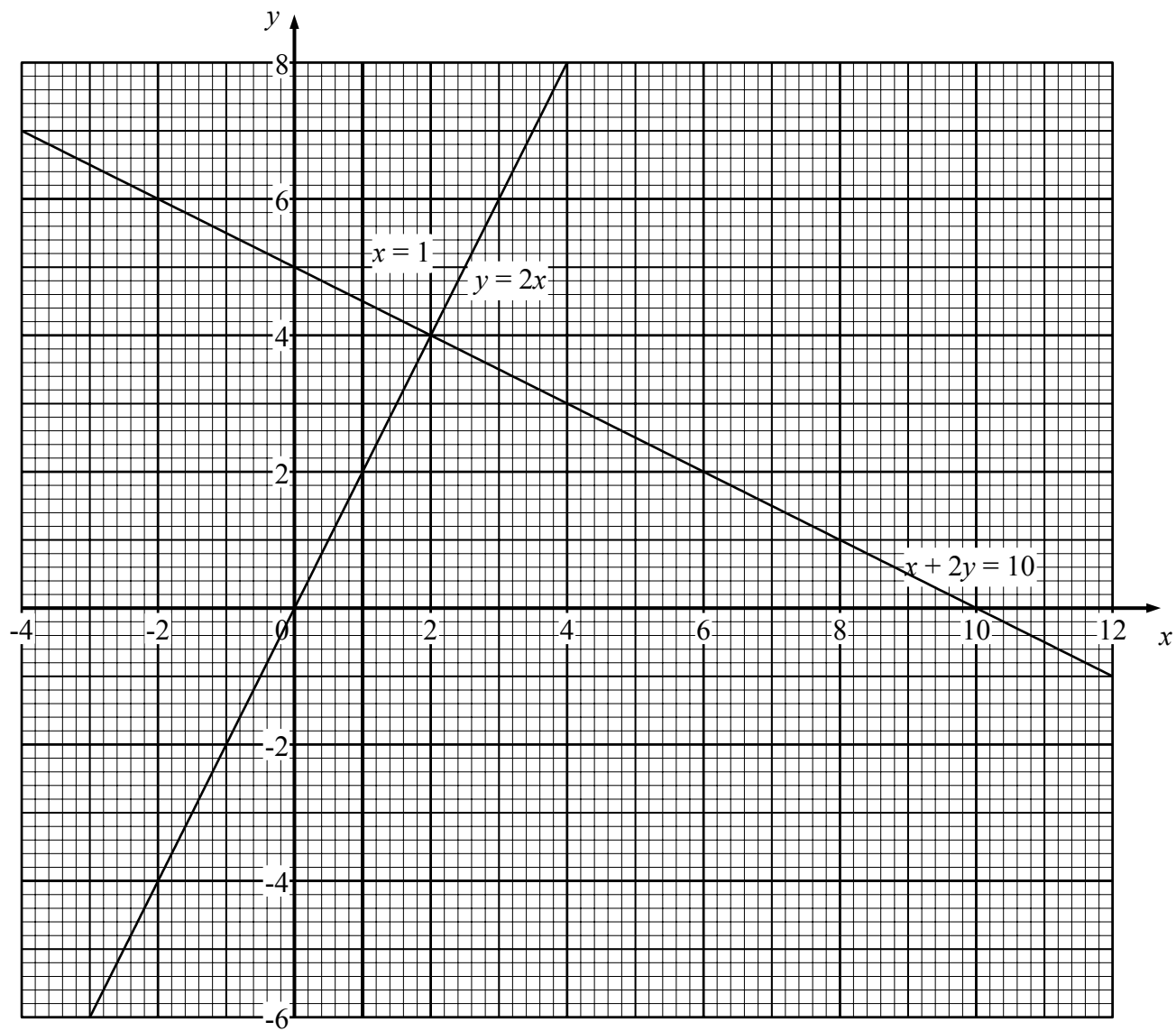
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Question		Working	Answer	Mark	Notes
16	(a)(i)		8	3	B1 cao
	(ii)	$\frac{1}{2} \times 26 \times (2 \times 2 + (26 - 1) \times 8)$ OR Last term = $2 + 8 \times 25 = 202$ Sum = $\frac{1}{2} \times 26 \times (2 + 202)$ = 26×102	2652		M1 for $S = \frac{1}{2}n(2a + (n - 1)d)$ A1 ft from (i) OR M1 for $S = \frac{1}{2}n(a + l)$ A1 ft from (i)
	(b)	$a + d = 40$ $a + 5d = 12$ $a = 47, d = -7$ $47 + 14 \times -7$	-51	3	M1 for writing down 2 simultaneous equations, eg $a + d = 40$ and $a + 5d = 12$ or for $4d = 12 - 40$ A1 for $a = 47, d = -7$ A1 cao
17	(a)		correct sketch	2	M1 for stretch parallel to y axis A1 cao
	(b)		correct sketch	2	M1 for translation parallel to the x axis A1 cao
18	(a)		circle drawn	2	M1 for circle centre (0, 0) A1 for circle centre (0, 0), radius 5
	(b)		4	2	B1 for correct sketch of parabola B1 for 4 points of intersection or B1 for correct use of simultaneous equations B1 for 4 points of intersection

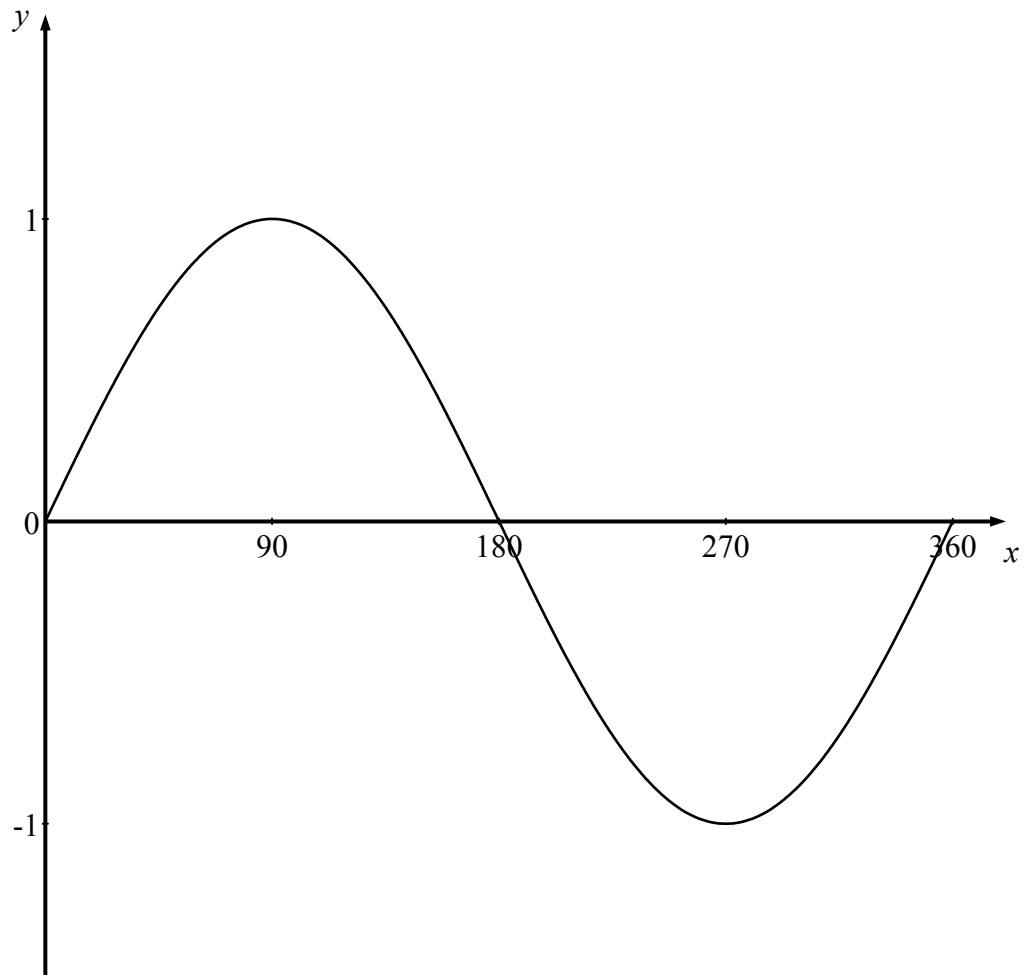
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Question		Working	Answer	Mark	Notes
19		Line drawn from (0, 0) to (1.2, 36) Line drawn from (1.2, 36) to (5, 0)	graph drawn	3	M1 for suitable scaling of axes to include ranges 0 to 5 seconds and 0 to 30 m/s M1 for line with correct gradient to represent acceleration or line with correct gradient to represent deceleration or line with negative gradient to the point (5, 0) A1 fully correct graph

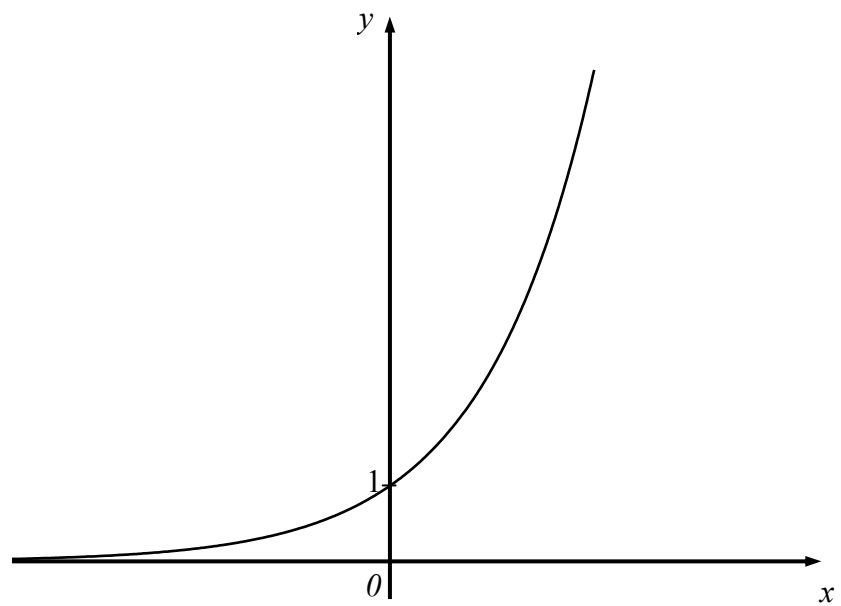
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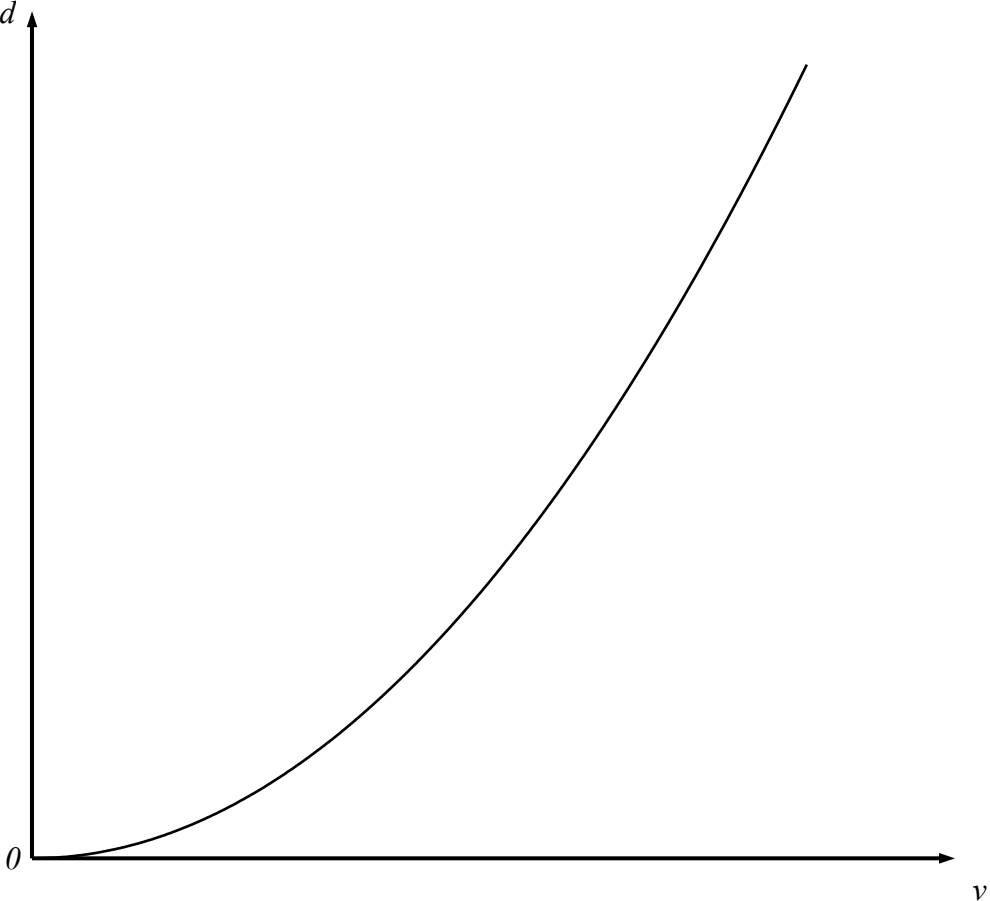
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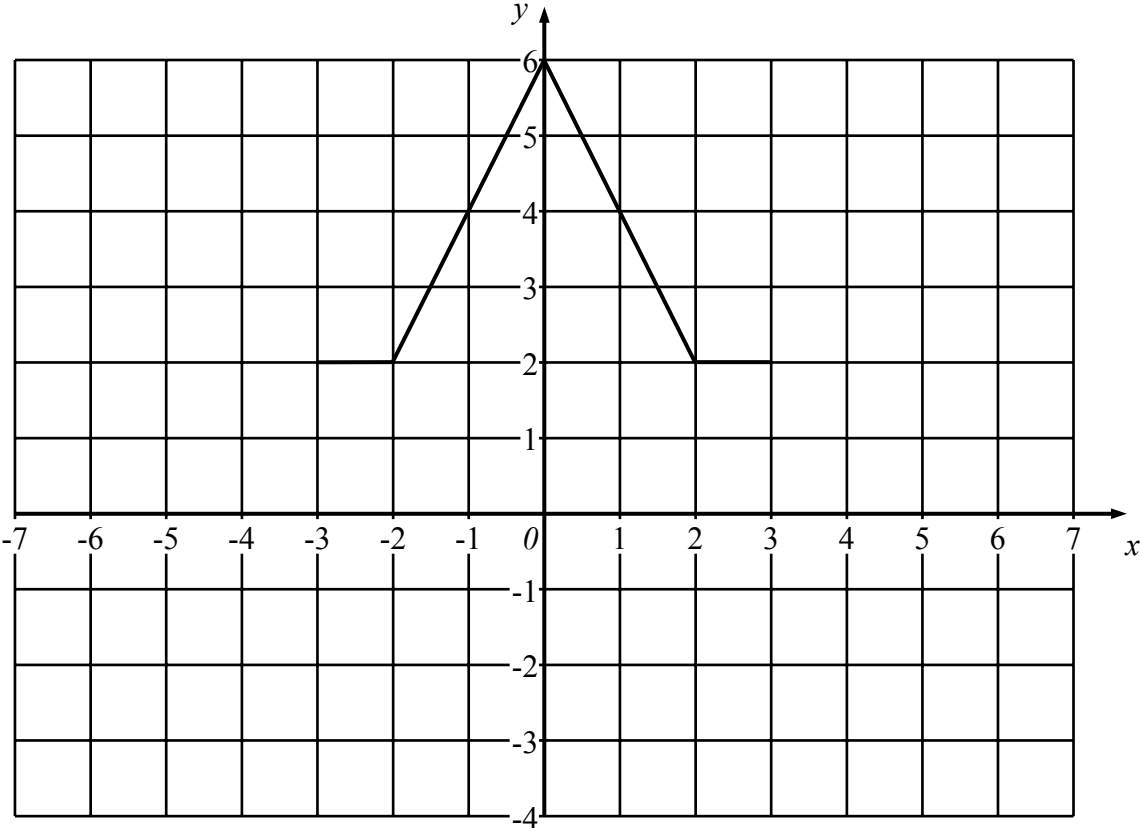
10(b)



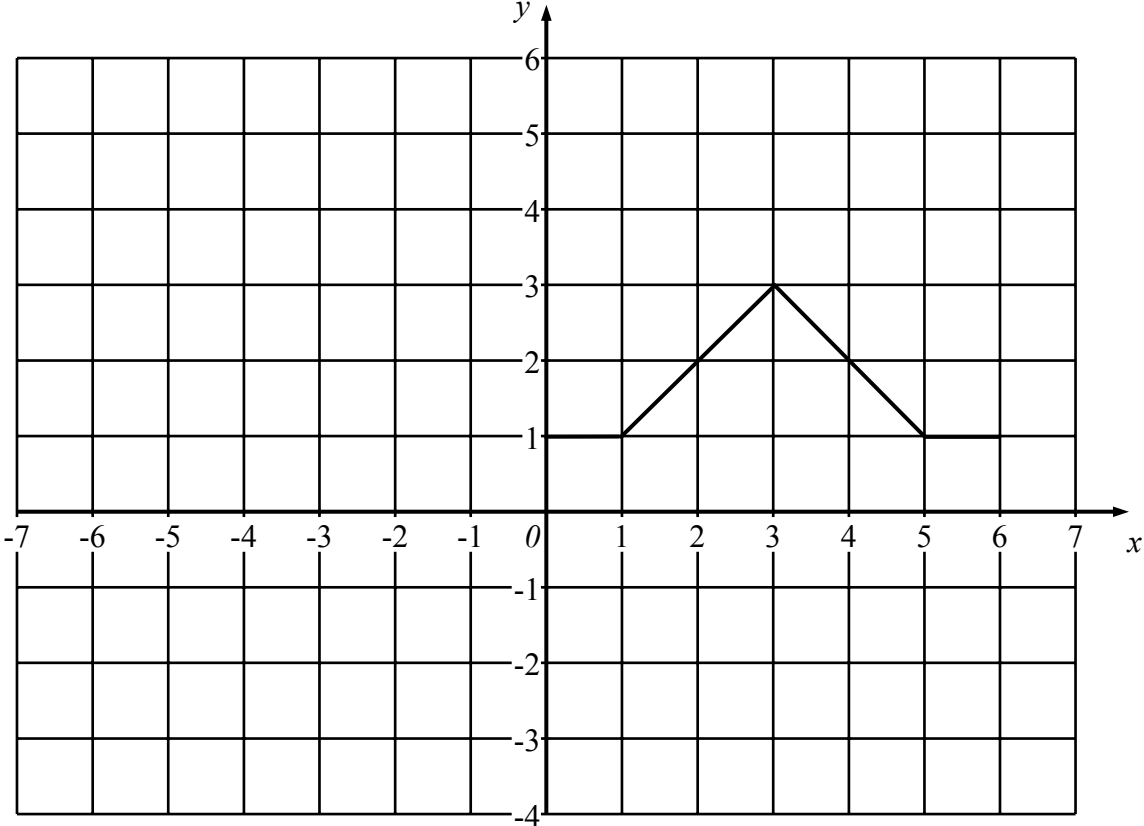
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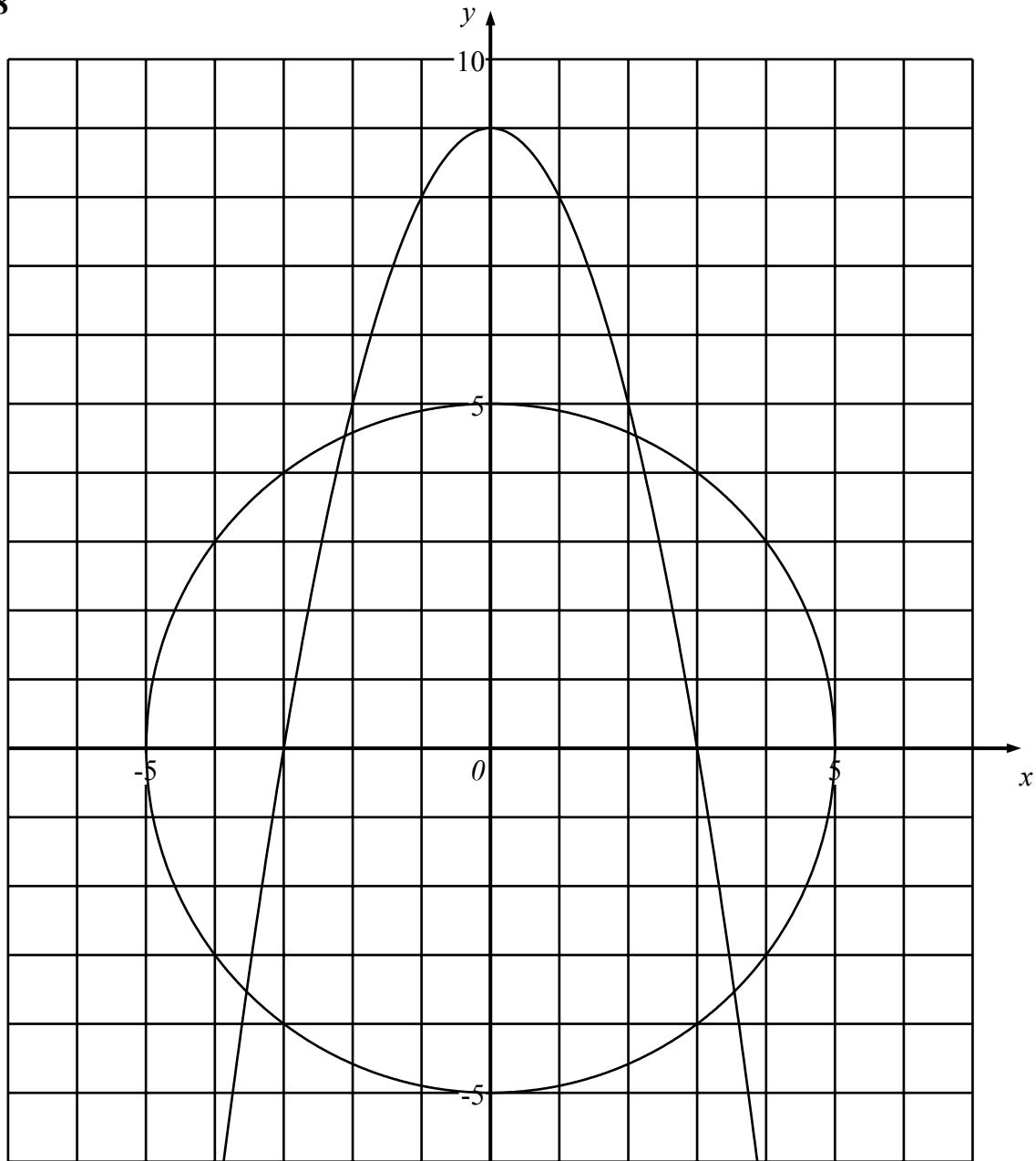


17(a)

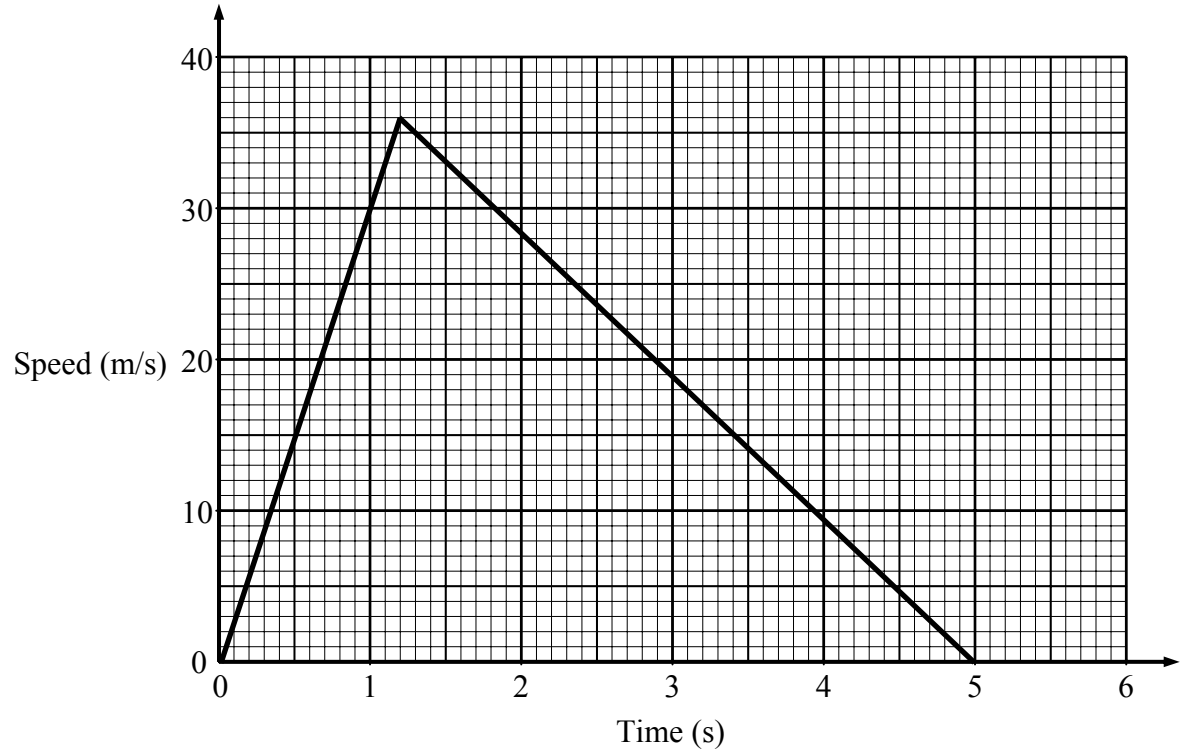


17(b)





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