Mark Scheme (Results)

Summer 2017

Pearson Edexcel Level 3 Award
In Algebra (AAL30)

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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   ft – follow through
isw – ignore subsequent working   SC: special case
oe – or equivalent (and appropriate)   dep – dependent
indep - independent

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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   **Linear equations**
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

8   **Parts of questions**
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

9   **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)		$7xy(5xy + 2)$	2	M1 for a correct but not full factorisation including three factors A1 for $7xy(5xy + 2)$
(b)		$(d + 3)(e - 3)$	2	M1 for $d(e - 3)$ and $3(e - 3)$ or $e(d + 3)$ and $-3(d + 3)$ A1 for $(d + 3)(e - 3)$
(c)		$(2x - 5)(2x + 5)$	1	B1 for $(2x - 5)(2x + 5)$
2 (a)	$14x^2 + 10x - 21x - 15$	$14x^2 - 11x - 15$	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 $14x^2 - 11x - 15$
(b)		$\dfrac{5x^2 - 6x - 12}{(3x + 4)(2x - 1)}$	3	M1 for using a correct common denominator A1 for $\dfrac{x(2x-1)+(x-3)(3x+4)}{(3x+4)(2x-1)}$ A1 for $\dfrac{5x^2-6x-12}{(3x+4)(2x-1)}$ or $\dfrac{5x^2-6x-12}{6x^2+5x-4}$

Question	Working	Answer	Mark	Notes
3 (a)		$16t^{12}$	1	B1 cao
(b)		$w^{5/2}$	1	B1 oe
(c)		p^2	1	B1 cao
(d)		$\frac{1}{2}, \frac{3}{2}$	3	M1 for a first step eg division throughout by q or removal of $q^{\frac{3}{2}}$ as a factor A1 for $a = \frac{1}{2}$ oe A1 for $b = \frac{3}{2}$ oe
4		Circle centre (2,0) radius 3 drawn	2	M1 for using (2, 0) as the centre of a circle or a circle of radius 3 drawn A1 cao
5 (a)		23	2	M1 for substitution of values into the formula A1 cao
(b)		$c = \frac{ab}{2p-a}$	3	M1 for a correct first step M1 for isolating terms in c on one side of the equals sign A1 for $c = \frac{ab}{2p-a}$ oe

Question	Working	Answer	Mark	Notes
6		$-\frac{9}{4}$, $-\frac{5}{4}$	3	M1 for sum $=-\frac{b}{a}$ or product $=\frac{c}{a}$ (may be implied by at least one correct answer) A1 for sum $=-\frac{9}{4}$ oe A1 for product $=-\frac{5}{4}$ oe
7		Shaded region	5	M3 for drawing all 3 lines correctly (M2 for drawing 2 lines correctly) (M1 for drawing 1 line correctly) A2 for fully correct shading of region (A1 for correct shading for 2 inequalities)
8	$(2x-1)(x+3)=0$ $x=\frac{1}{2}$ or $x=-3$ Or use of formula $\dfrac{-5\pm\sqrt{5^2-4\times2\times(-3)}}{2\times2}$	$x=\frac{1}{2},\ y=-7\frac{1}{4}$ $x=-3,\ y=1\frac{1}{2}$	5	M1 for correct method to eliminate one variable M1 (dep M1) for simplifying to get a quadratic ($=0$) in one variable M1 (dep M2) for correct method to solve their quadratic A1 $x=\frac{1}{2}$, $x=-3$ or $y=-7\frac{1}{4}$, $y=1\frac{1}{2}$ oe A1 $x=\frac{1}{2}$, $y=-7\frac{1}{4}$ and $x=-3$, $y=1\frac{1}{2}$ oe

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Question	**Working**	**Answer**	**Mark**	**Notes**
9 (a)	−18, −2, 2, 0, −2, 2, 18	Correct curve	4	M1 for calculating points for values of x from $x = -2$ to 4 with at least 4 correct M1 (dep M1) for drawing suitable axes on grid A1 for at least 6 points correct A1 cao
(b)		−0.5 to −0.6 or 0.6 to 0.7 or 2.8 to 2.9	2	M1 for correct method, eg line from 1 on y-axis across to graph or $x^3 - 3x^2 + 2 = 1$ A1 ft from a cubic curve
10 (a)(i)		2, 2, −43	5	M1 for recognising a as 2, maybe seen in appropriate working M1 for $2(x + 2)^2 + k$ A1 for 2, 2, −43
(ii)		$-2 \pm \sqrt{\dfrac{43}{2}}$		M1 for "$(x + 2)^2 = \dfrac{43}{2}$" A1 ft for "$-2 \pm \sqrt{\dfrac{43}{2}}$" (If M0 scored, SCB1 for correct solution in the form $p \pm \sqrt{\dfrac{q}{r}}$)
(b)		(−2, −43)	1	B1 for (−2, −43) or ft from (a)

Question	Working	Answer	Mark	Notes
11 (a)		$W = \dfrac{252}{t^2}$	3	M1 for $W \propto \dfrac{1}{t^2}$ or $W = \dfrac{k}{t^2}$ M1 (dep M1) for method to establish k (= 252) A1 for $W = \dfrac{252}{t^2}$
(b)		± 3	2	M1 ft for substituting into formula of form $W = \dfrac{k}{t^2}$ A1 ± 3
12 (a)		$\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	1	B1 cao
(b)		$\dfrac{3 \pm \sqrt{93}}{6}$	2	M1 for correct substitution into the formula A1 for $\dfrac{3 \pm \sqrt{93}}{6}$
(c)	$144 - 4 \times 9 \times d = 0$	4	2	M1 for setting $b^2 - 4ac = 0$ (maybe implied by equation in d) or for $(2x + 3)(2x + 3)$ A1 cao

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Question	Working	Answer	Mark	Notes
13 (a)		$-\dfrac{1}{4}$	2	M1 for method to find the gradient of line **T** or use of $m_1m_2 = -1$ A1 for $-\dfrac{1}{4}$ oe
(b)		$12x - 3y + 11 = 0$	3	M1 for recognition of $m = 4$ M1 for method to find equation, ie use of $y - y_1 = m(x - x_1)$ or $y = mx + c$, with complete method to find c A1 $12x - 3y + 11 = 0$ oe
14 (a)		Sketch drawn	3	M1 for a sketch of a parabola in 4 quadrants with correct orientation A1 for $(-3, 0)$ and $(2, 0)$ labelled or $(0, -6)$ labelled A1 for fully correct sketch with labels M1 for critical values 2 and -3
(b)		$x < -3$ or $x > 2$	2	A1 cao Note do not accept $x < -3$ and $x > 2$

| Question	Working	Answer	Mark	Notes
15		$n > -11$	2	M1 for a correct method to isolate term in n eg $-2n < 22$ or critical value, -11 A1 cao
16 (a)		40.5	2	M1 for $4.5 + (n-1) \times 1.5$ oe used, eg $1.5n + 3$ A1 cao
(b)	½×40×(8+39×7) ½×40×281 OR ½×40×(4+277) ½×40×281	5620	3	B1 for $a = 4$ and $d = 7$ M1 for substituting into $S = \frac{1}{2}n(2a + (n-1)d)$ A1 cao OR B1 for $a = 4$ and $l = 277$ M1 for substituting into $S = \frac{1}{2}n(a + l)$ A1 cao
17 (a)		11.2	1	B1 11.2
(b)		acceleration	1	B1 acceleration (at $t = 50$)
(c)	$\frac{30}{2}(8 + 8 + 2(12 + 12))$ 15×64	960	3	M1 for reading off values from the graph 8, 12, 12, 8 and $h = 30$ used M1 for substituting values into trapezium rule A1 cao
(d)		Distance travelled	1	B1 distance travelled (between $t = 30$ and $t = 120$)

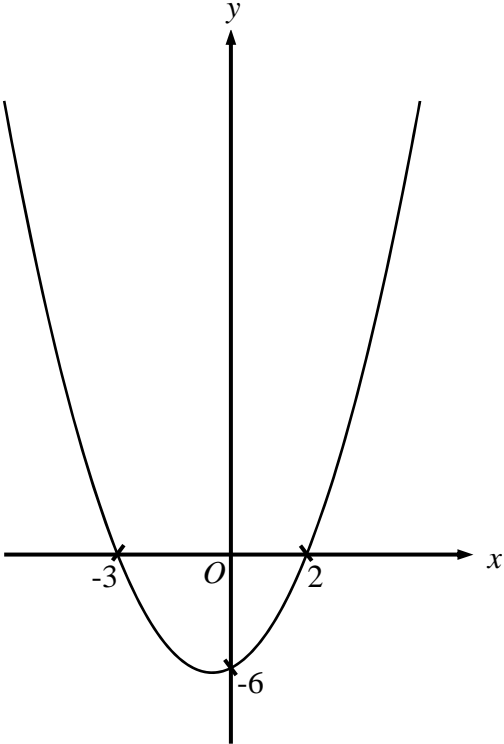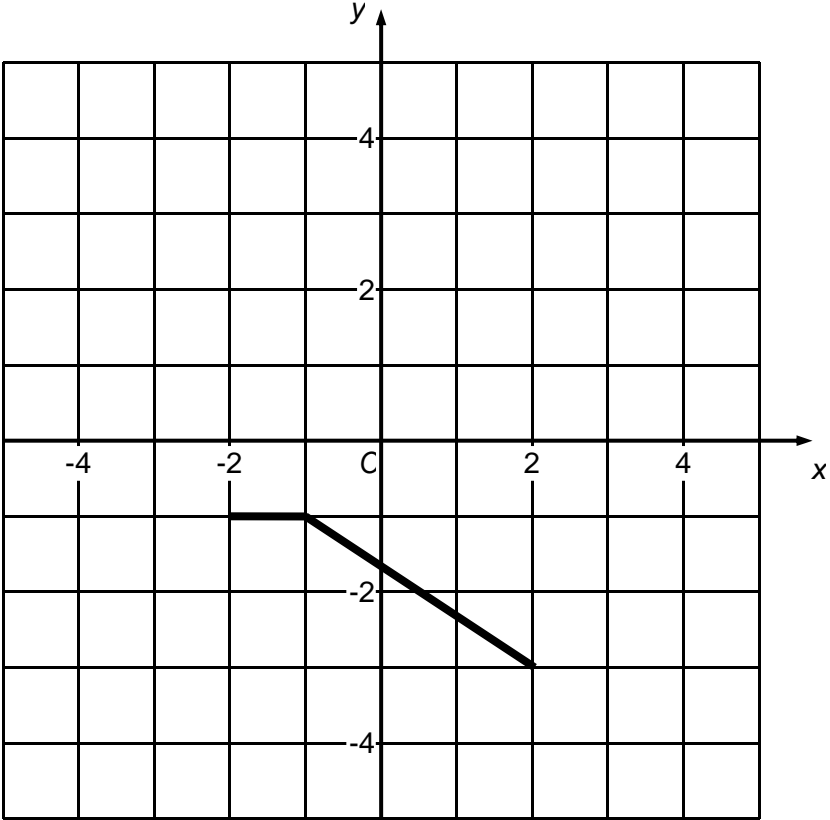| PAPER: AAL30_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
18		Graph drawn	2	B1 for line from (0, 0) to (30, 20) B1 for a complete and fully correct graph
19		$3 + \sqrt{5}$	3	M1 for multiplying by $\frac{3+\sqrt{5}}{3+\sqrt{5}}$ M1 for $12 + 4\sqrt{5}$ and $9 - 3\sqrt{5} + 3\sqrt{5} - 5$ or $\frac{4(3+\sqrt{5})}{4}$ A1 $3 + \sqrt{5}$
20 (a)		Graph drawn	2	M1 for translation parallel to the y-axis A1 cao
(b)		Graph drawn	2	M1 for a translation parallel to the x-axis A1 cao

Question 7
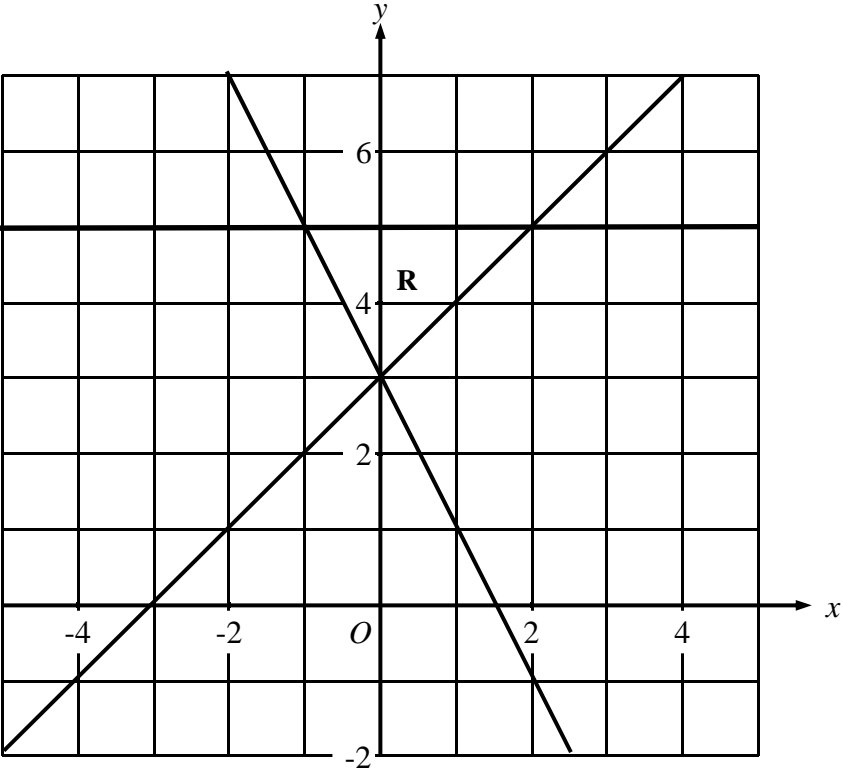
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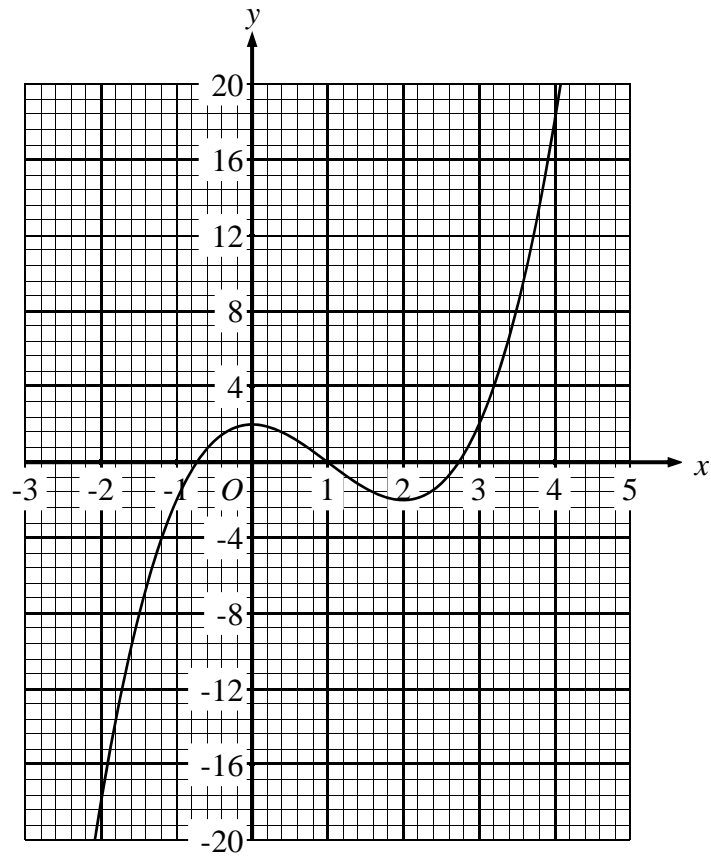
Question 14(a)

Question 20(a)

Question 20(b)