Mark Scheme (Results)

Summer 2014

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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   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)		$3x^2 - 4x - 4$	2	M1 for at least 3 correct terms within 4 terms A1 cao
(b)		x^{-6}	1	B1 for x^{-6} (accept $\frac{1}{x^6}$)
(c)		$2y$	1	B1 for $2y$ (accept $2y^1$)
(d)	$\dfrac{(x-3)(x+3)}{(x-3)(x-1)}$	$\dfrac{x+3}{x-1}$	3	B1 for $(x-3)(x+3)$ B1 for $(x-3)(x-1)$ B1 cao
2 (a)		$-4, 0, (-2), (-4), 0, 16$	2	B2 for all values correct (B1 for at least 2 correct values)
(b)		Graph	2	M1 (dep B1) for all points correctly plotted A1 cao
(c)		$2.2 - 2.4$	2	M1 for $y = 3$ drawn or marks on the graph A1 ft

Question	Working	Answer	Mark	Notes
3 (a)	$3y = 2x + 24$	$y = \dfrac{2}{3}x + 8$	2	M1 $3y = 2x + 24$ or $y - \dfrac{2}{3}x = \dfrac{24}{3}$ A1 cao
(b)		$y = \dfrac{2}{3}x + 1$	2	M1 for use of correct gradient in the equation of a straight line in any form, eg $y = \dfrac{2}{3}x + c$, $3y = 2x + c$ A1 for $y = \dfrac{2}{3}x + 1$ oe
4 (a)		54	2	M1 for substitution A1 cao
(b)		$\dfrac{-3 \pm \sqrt{21}}{2}$	4	M1 for a correct quadratic equation in the form $at^2 + bt + c\ (= 0)$, eg $t^2 + 3t - 3\ (= 0)$, $3t^2 + 9t - 9\ (= 0)$, $9t^2 + 27t - 27\ (= 0)$ M1 (dep M1) for stating the quadratic formula or for correctly completing the square M1 (dep M2) for correct substitution in formula or method to rearrange the equation in completed square form to solve the equation, eg $x = \pm\sqrt{5.25} - 1.5$ A1 for correct answer in the form $\dfrac{p \pm \sqrt{q}}{r}$ where p, q and c are integers, eg $\dfrac{-9 \pm \sqrt{189}}{6}$
5		Graph	5	M3 for drawing all 3 lines correctly (M2 for drawing 2 lines correctly) (M1 for drawing 1 line correctly) A2 for correctly shading required region (A1 for correct shading for 2 inequalities)

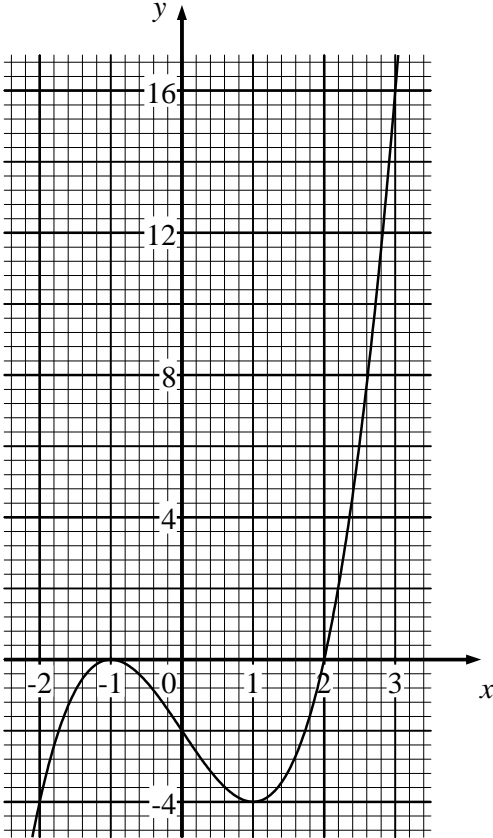| Question	Working	Answer	Mark	Notes
6 (a)		$3n + 5$	2	M1 for $3n + c$ A1 for $3n + 5$ oe (If M0, SC B1 for $n = 3n + 5$ oe)
(b)		3	1	B1 cao
(c)	$\frac{20}{2}(2 \times 8 + 19 \times 3)$ OR $\frac{20}{2}(8 + 65)$	730	2	M1 for $\frac{n}{2}\{2a + (n-1)d\}$ or $\frac{n}{2}\{a + l\}$ or correct substitution into the formula A1 cao
7 (a)		$7a^2b(2b^2 - 3a)$	2	B2 cao (B1 for a partial correct factorisation which shows a product of at least 3 factors)
(b)		$(x - 2)(y + 5)$	2	M1 for $x(y + 5)$ and $2(y + 5)$ or $y(x - 2)$ and $5(x - 2)$ A1 for $(x - 2)(y + 5)$

Question	Working	Answer	Mark	Notes
8	$2y = 26 - x^2$ $x + 2(26 - x^2) = 7$ $x + 52 - 2x^2 = 7$ $2x^2 - x - 45 = 0$ $x = 5$ or $-\frac{9}{2}$ $5 + 4y = 7$ $4y = 2$ $y = \frac{1}{2}$ $-\dfrac{9}{2} + 4y = 7$ $y = \frac{23}{2}$	$5, \frac{1}{2}$ and $-\frac{9}{2}, \frac{23}{8}$	6	M1 for a correct rearrangement of one variable in terms of the other M1 for substitution into the quadratic equation M1 for $2x^2 - x - 45 \ (= 0)$ or $16y^2 - 54y + 23 \ (= 0)$ oe (must be in the form "= 0") A1 $x = 5, -\frac{9}{2}$ oe or $y = \frac{1}{2}, \frac{23}{8}$ oe M1 for substitution to find both corresponding y or x values or starts again to eliminate the other variable A1 for $x = 5, y = \frac{1}{2}$ and $x = -\frac{9}{2}, y = \frac{23}{8}$ OR M2 for a correct method to eliminate one variable, eg equation (i) $-2 \times$ equation (ii) (M1 for correct method to make the coefficients of y equal) M1 for $2x^2 - x - 45 \ (= 0)$ or $16y^2 - 54y + 23 \ (= 0)$ A1 $x = 5, -\frac{9}{2}$ oe or $y = \frac{1}{2}, \frac{23}{8}$ oe M1 for substitution to find both corresponding y or x values or starts again to eliminate the other variable A1 for $x = 5, y = \frac{1}{2}$ and $x = -\frac{9}{2}, y = \frac{23}{8}$
9	$(x - 4)(x - 1) < 0$	$1 < x < 4$	3	M1 for correct factorisation or correct use of the quadratic formula. A1 for establishing critical values A1 cao

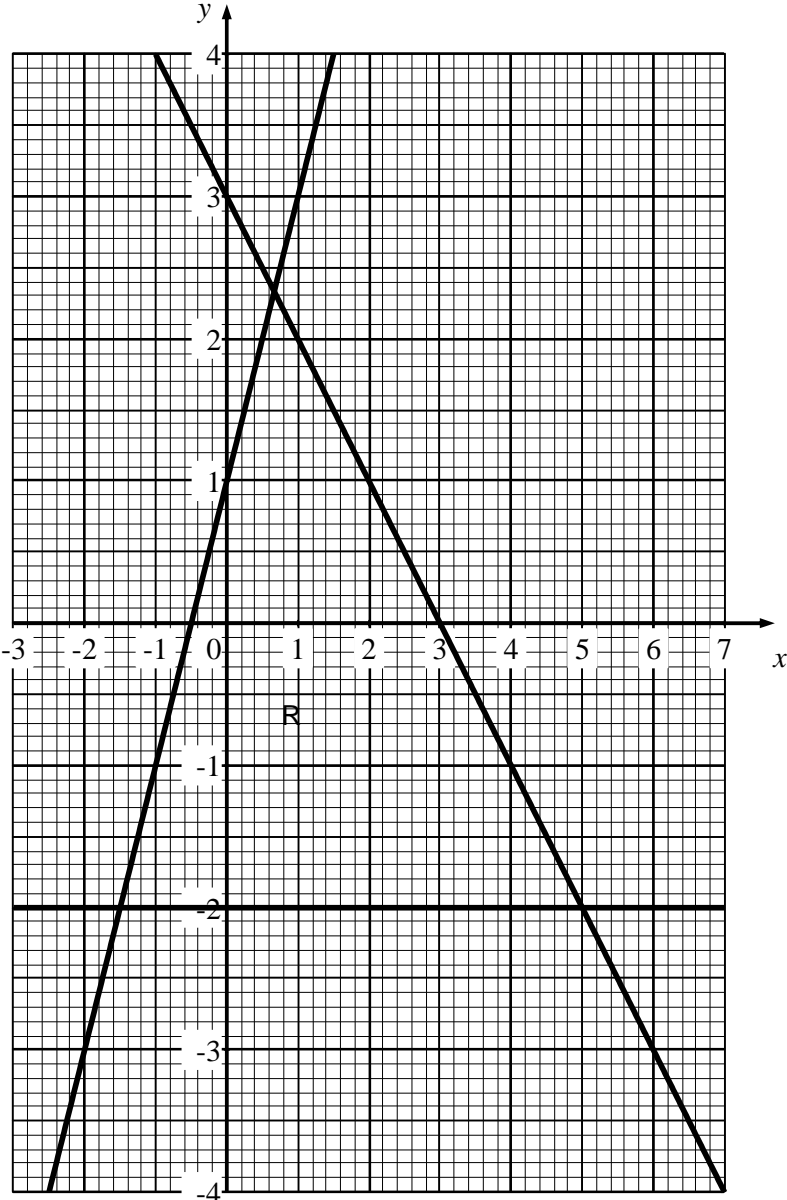| Question	Working	Answer	Mark	Notes
10	$\dfrac{-b}{a} = -\dfrac{5}{2}$ $\dfrac{c}{a} = \dfrac{7}{2}$	$2x^2 + 5x + 7 = 0$	3	M1 for $\dfrac{-b}{a} = -2.5$ and $\dfrac{c}{a} = 3.5$ A2 for $2x^2 + 5x + 7 = 0$ oe with integers (A1 for correct equation but not in required form, eg $x^2 + 2.5x + 3.5 = 0$ or $2x^2 + 5x + 7$) (If M0, SC B1 for $2x^2 - 5x + 7 = 0$ or $x^2 + 2.5x + 3.5$)
11 (a)		$\left(x - \dfrac{7}{2}\right)^2 - \dfrac{25}{4}$	2	B1 $a = -\dfrac{7}{2}$ oe B1 $b = -\dfrac{25}{4}$ oe
(b)		Graph sketch	3	M1 1 and 6 labelled on x-axis M1 6 or -6.25 labelled as y intercept and minimum value of y respectively A1 fully correct graph drawn with all labels
12	$h(g - 4) = 3g + 2$ $hg - 4h = 3g + 2$ $hg - 3g = 4h + 2$ $g(h - 3) = 4h + 2$ $g = \dfrac{4h + 2}{h - 3}$	$g = \dfrac{4h+2}{h-3}$	4	M1 for multiplying by $g - 4$ M1 (dep M1) for isolating terms in g on one side of the equation. M1 (dep M2) for correct factorisation of the two terms in g A1 for $g = \dfrac{4h+2}{h-3}$ oe
13 (a)	$5^2 - 4 \times 3 \times 8$ $25 - 96$ -71	-71	3	M1 for $3x^2 + 5x + 8 \ (= 0)$ or $a = 3, b = 5, c = 8$ M1 for $b^2 - 4ac$ (accept $\sqrt{b^2 - 4ac}$) may be implied by substitution A1 cao
(b)		No real roots	1	B1 for "no real roots" oe

Question	Working	Answer	Mark	Notes
14	$\dfrac{40}{2}(2 \times 4 + 39 \times d) = 2500$ $20(8 + 39d) = 2500$ $8 + 39d = 125$ $39d = 117$ $d = 3$	3	3	M1 for use of a correct formula for the sum M1 for establishing a correct equation in d A1 cao
15		Circle centre the origin radius 3 drawn	3	M1 for drawing a circle or $x^2 + y^2 = 9$ seen M1 for using the origin as the centre A1 for correct circle
16		13.25	3	M1 for using values $(y_0 =)$ 6, $(y_1 =)$ 5.5, $(y_2 =)$ 4, $(y_3 =)$ 1.5 (condone 1 error) M1(dep) for substituting "values" and $h = 1$ into trapezium rule, eg $\frac{1}{2}\times 1\{(6 + 1.5) + 2(5.5 + 4)\}$ A1 for answer in the range 12.9 to 13.3
17 (a)		$\dfrac{5 + \sqrt{5}}{5}$	3	M1 for writing as a single fraction M1 for multiplying by $\frac{\sqrt{5}}{\sqrt{5}}$ A1 cao
(b)		$8 - 2\sqrt{6}$	3	M1 for multiplying by $\frac{4-\sqrt{6}}{4-\sqrt{6}}$ oe M1 for $80 - 20\sqrt{6}$ and $16 - 6$ A1 $8 - 2\sqrt{6}$

PAPER: AAL30_01				
Question	Working	Answer	Mark	Notes
18 (a)		3	2	M1 for a complete method to find the gradient by using a right angled triangle or using the formula or using $\frac{6(m/s)}{2(s)}$ A1 cao
(b)	$(\frac{1}{2} \times 2 \times 6) + (\frac{1}{2} \times 6)$ $+ (\frac{1}{2} \times (6 + 7) \times \frac{1}{2})$ (oe) $= 6 + 3 + 3.25$	12.25	3	M1 for a correct method to calculate a relevant area M1 for a complete and correct method A1 for 12.25 oe
19 (a)	Translation by +2 units parallel to the *y* axis	Correct graph	2	M1 for a translation by 2 units parallel to the *y*-axis A1 cao
(b)	Reflection in *y*-axis	Correct graph	2	M1 for a reflection in an axis A1 cao
20	$0.75 = \frac{k}{16}$ $k = 12$	$12, 3, \frac{4}{3}$	4	M1 $y = \frac{k}{x^2}$ oe M1 for substitution to find k A1 $k = 12$ A1 for a complete table (If M0, then SC B3 for two correct entries)

Question 2

Question 5

Question 11

y

6

O

1

6

x

$\left(\frac{7}{2}, -\frac{25}{4}\right)$