Mark Scheme (Results)

Summer 2016

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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)		Circle centre (0,0) radius 5 drawn	2	M1 for using (0,0) as the centre of a circle or a circle of radius 5 drawn A1 cao
(b)(i)		Tangent drawn	2	B1
(ii)		$90°$ or $\frac{\pi}{2}$ radians		B1
2		$t = \pm\sqrt{\frac{-2w}{w-4}}$	3	M1 for multiplying by $t^2 + 2$ M1 for $t^2 = \frac{-2w}{w-4}$ oe A1 for $t = \pm\sqrt{\frac{-2w}{w-4}}$ oe
3		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)

Question		Working	Answer	Mark	Notes
4	(a)	$2x^2 + 6x - 4x - 12$	$2x^2 + 2x - 12$	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 cao
	(b)		$5de^2(2d + 3e)$	2	B2 cao (B1 for any correct partial factorisation with at least two of the factors 5, d, e.)
	(c)		$3(p - 2q)(p + 2q)$	2	M1 for a correct partial factorisation with 2 linear factors A1 cao
5	(a)		$2x - y + 1 = 0$	3	M1 for a $\frac{-1-3}{-1-1}$ or $\frac{3--1}{1--1}$ or gradient $= 2$ or setting up a pair of simultaneous equations . M1 for complete method. A1 oe
	(b)		$y = -4x + c$	2	M1 for use of product of gradient equals -1 A1 oe
6	(a)		$T = \frac{1}{2x^3}$	3	M1 for $T = \frac{k}{x^3}$ or $T \propto \frac{1}{x^3}$ oe M1 for substitution to find k A1 oe
	(b)		0.5	2	M1 for substitution of 4 into their formula A1 for 0.5 oe

Question	Working	Answer	Mark	Notes
7 (a)		e^{-1}	1	B1 oe
(b)		$\dfrac{n^6}{4}$	2	M1 for inverting the fraction, or squaring the fraction A1 cao
(c)	$\dfrac{2x(x-3)+7(x+3)}{(x+3)(x-3)}$	$\dfrac{2x^2+x+21}{(x+3)(x-3)}$	3	M1 for using a correct common denominator, eg $(x+3)(x-3)$ M1 for $\dfrac{2x(x-3)+7(x+3)}{(x+3)(x-3)}$ oe A1 for $\dfrac{2x^2+x+21}{(x+3)(x-3)}$ or $\dfrac{2x^2+x+21}{x^2-9}$
8	$y = x - 3$ $x^2 - 2x - 3 = 0$ $(x-3)(x+1)=0$ $x = 3$ or -1 $y = 0$ or -4 OR $x = y + 3$ $y = (y+3)^2 - (y+3) - 6$ $y^2 + 4y = 0$ $y = 0$ or -4 $x = 3$ or -1	$x = 3,\ y = 0$ and $x = -1, y = -4$	5	M1 for 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 $x = 3,\ x = -1$ or $y = 0,\ y = -4$ A1 $x = 3,\ y = 0$ and $x = -1,\ y = -4$
9		$\dfrac{-4 \pm \sqrt{76}}{6}$	2	M1 Stating the quadratic formula or substitution into formula A1 $\dfrac{-4\pm\sqrt{76}}{6}$ oe

Question	Working	Answer	Mark	Notes
10 (a)		$y > -1$	2	M1 for isolating the term in y, eg $-3y < 3$, $3y > -3$ A1 cao
(b)		$-4 < x < 1$	3	M1 $(x-1)(x+4)$ M1 for critical values 1 and -4 A1 cao
11	$0.5(2 + 2(1.3 + 1 + 0.8) + 0.6)$ to $0.5(2 + 2(1.4 + 1 + 0.8)+ 0.7)$	4.4 - 4.6	3	M1 for reading off values from the graph 2, 1.3 to 1.4, 1, 0.8, 0.6 to 0.7 oe M1 for substituting values into trapezium rule A1 4.4 - 4.6
12 (a)		28	1	B1 cao
(b)		$9\sqrt{3}$	2	M1 for correct first step, eg $12\sqrt{3}$, $3\sqrt{3}$ A1 cao
(c)		$\dfrac{7 - \sqrt{3}}{23}$	3	M1 for multiplying by $\frac{7-\sqrt{3}}{7-\sqrt{3}}$ M1 for $14 - 2\sqrt{3}$ and $49 - 3$ A1 cao

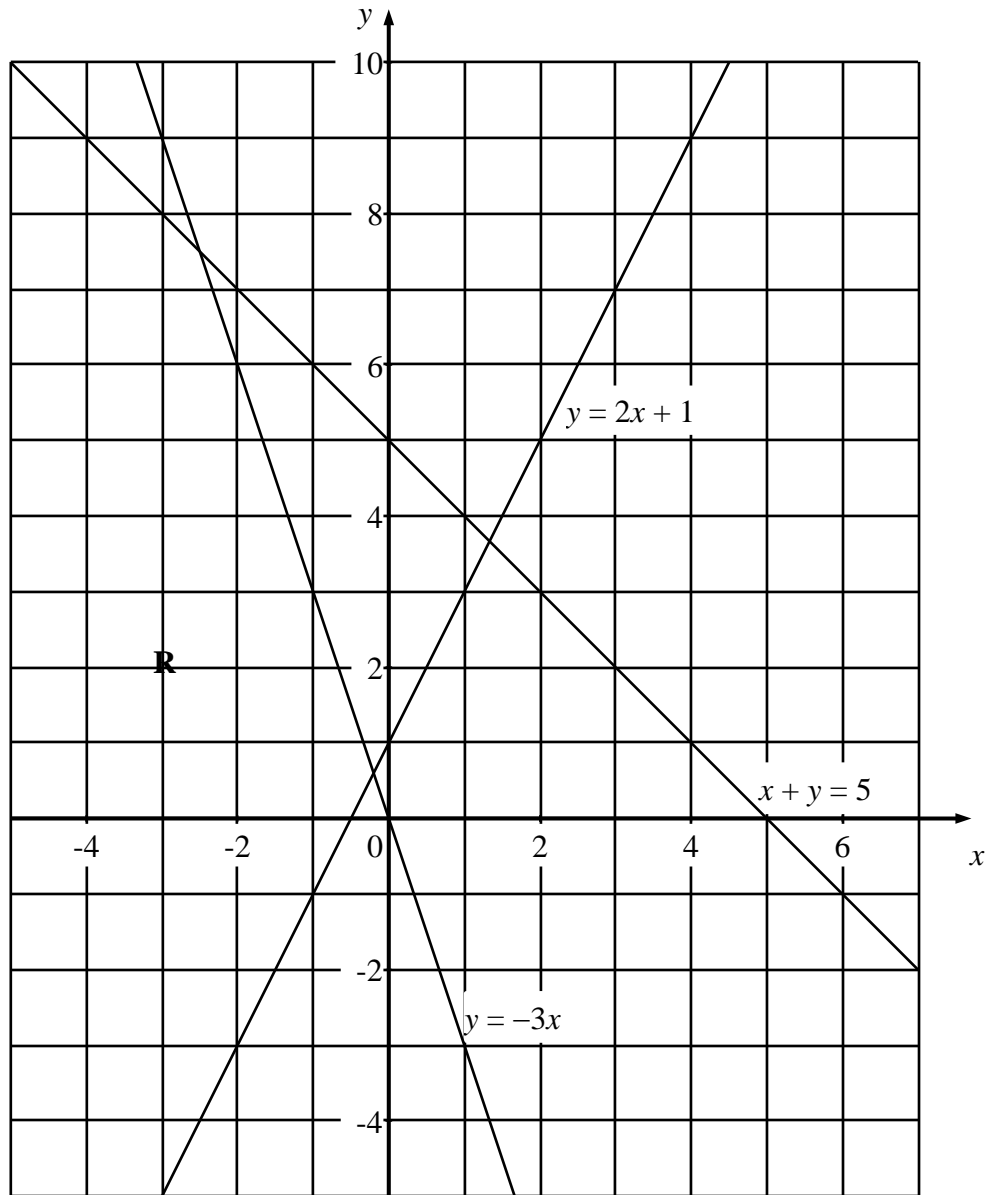| Question		Working	Answer	Mark	Notes
13	(a)		9 4	3	M1 for $39 = \frac{3}{2}\{2a + (3 - 1)d\}$ oe or $a + 8d = 41$ oe A1 for $a = 9$ A1 for $d = 4$
	(b)		$\frac{n}{2}(1 + 13n)$	3	B1 for $a = 7$ M1 for $\frac{n}{2}\{2 \times \text{"7"} + (n - 1) \times \text{"13"}\}$ oe or $\frac{n}{2}\{\text{"7"} + 13n - 6\}$ oe A1 for $\frac{n}{2}(1 + 13n)$ or $\frac{13n^2 + n}{2}$
14	(a)		Graph drawn	2	B2 fully correct graph drawn (B1 for a translation parallel to the y-axis)
	(b)		Graph drawn	2	B2 fully correct graph drawn (B1 for a translation parallel to the x- axis)
15	(a)	$(-4, \frac{1}{8})$ $(-3, \frac{1}{4})$ $(-2, \frac{1}{2})$ $(-1, 1)$ $(0, 2)$ $(1, 4)$ $(2, 8)$ $(3, 16)$	Correct curve	4	B1 for drawing suitable axes on grid M1 for calculating at least 4 points for values of x from $x = -4$ to 3 A1 for all correct points calculated A1 for correct curve drawn
	(b)		2.5 - 2.7	1	B1

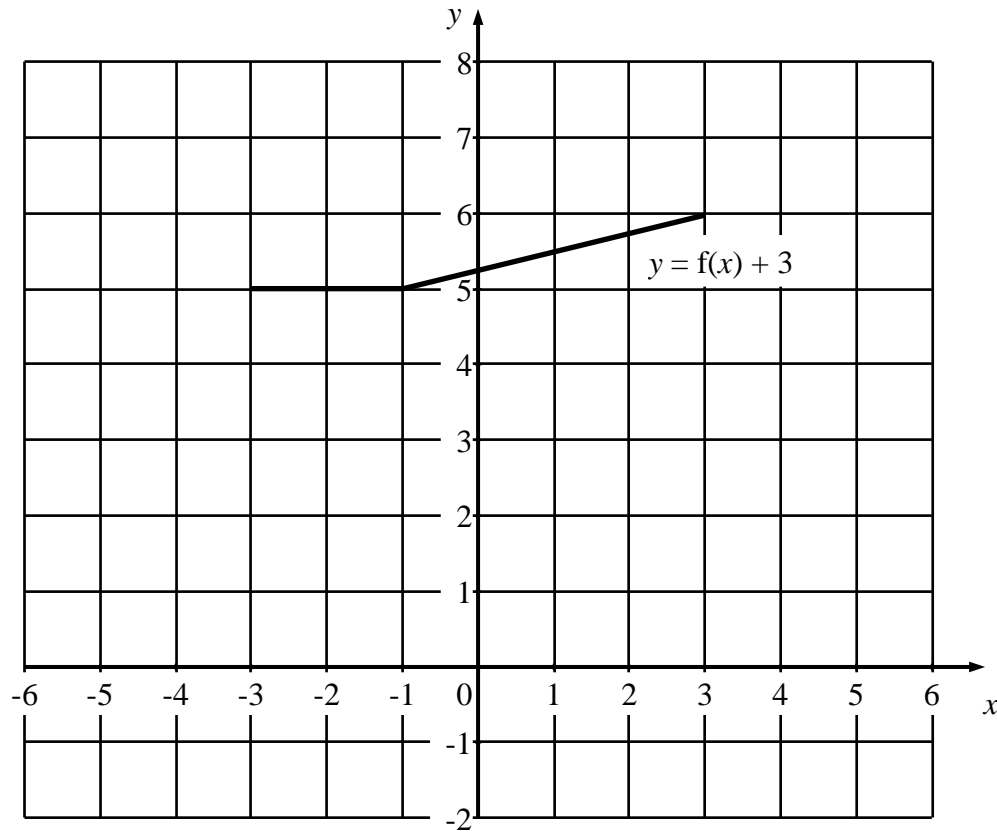| Question		Working	Answer	Mark	Notes
16	(a)		$c \leq 4$	2	M1 for use of $b^2 - 4ac \geq 0$ or $b^2 - 4ac > 0$ A1 cao
	(b)		Graph drawn	3	B3 fully correct graph drawn with labels at $(3, 0)$ and $(0, 9)$ (B2 correct shape of graph drawn with one label) (B1 correct shape of graph or for $(3, 0)$ and $(0, 9)$ indicated)
17	(a)		$\begin{array}{c} 2 \\ -3 \end{array}$	2	M1 for $(x + 2)^2$ or $p = 2$ A1 for $p = 2$ and $q = -3$
	(b)		$-\frac{1}{2}$ and 3	2	M1 for a complete method A1 cao
18		$-\dfrac{b}{a} = -\dfrac{6}{7}$ $\dfrac{c}{a} = -\dfrac{3}{7}$	$-\dfrac{6}{7} \quad -\dfrac{3}{7}$	2	B1 for sum of roots $= -\dfrac{6}{7}$ B1 for product of roots $= -\dfrac{3}{7}$
19			Graph drawn	4	B1 for asymptote of $x = -2$ B1 for intercept at $(0, \frac{1}{2})$ M1 for correct shape A1 for fully correct graph.

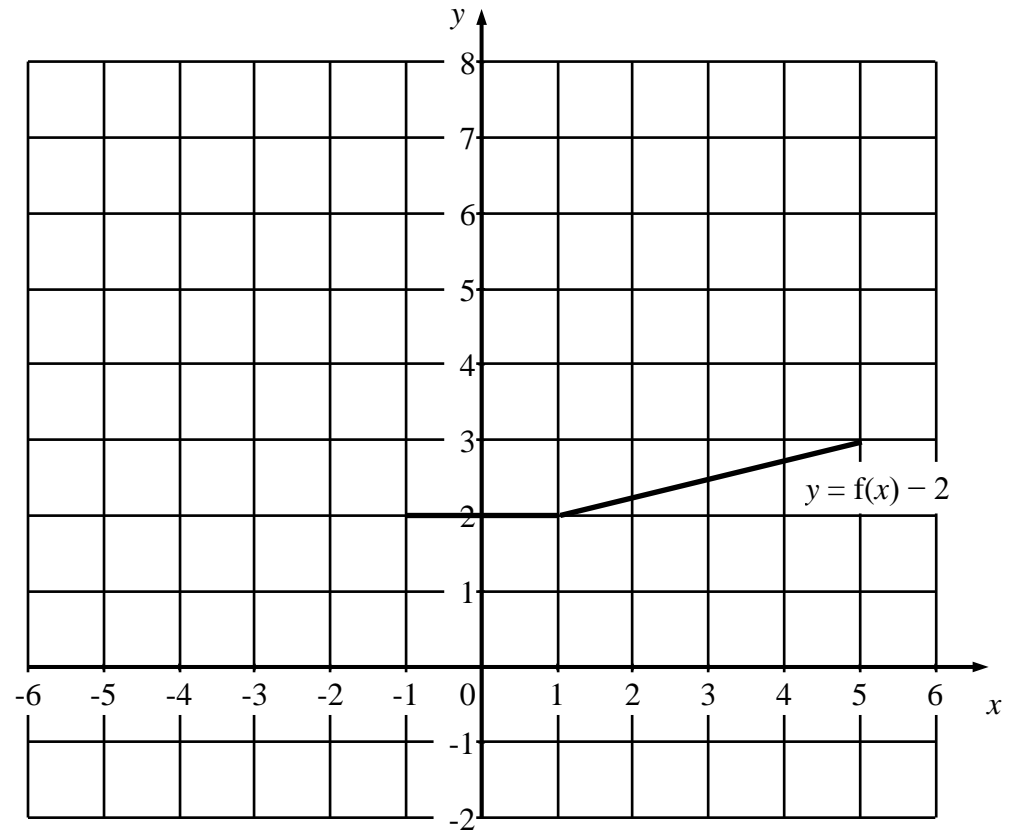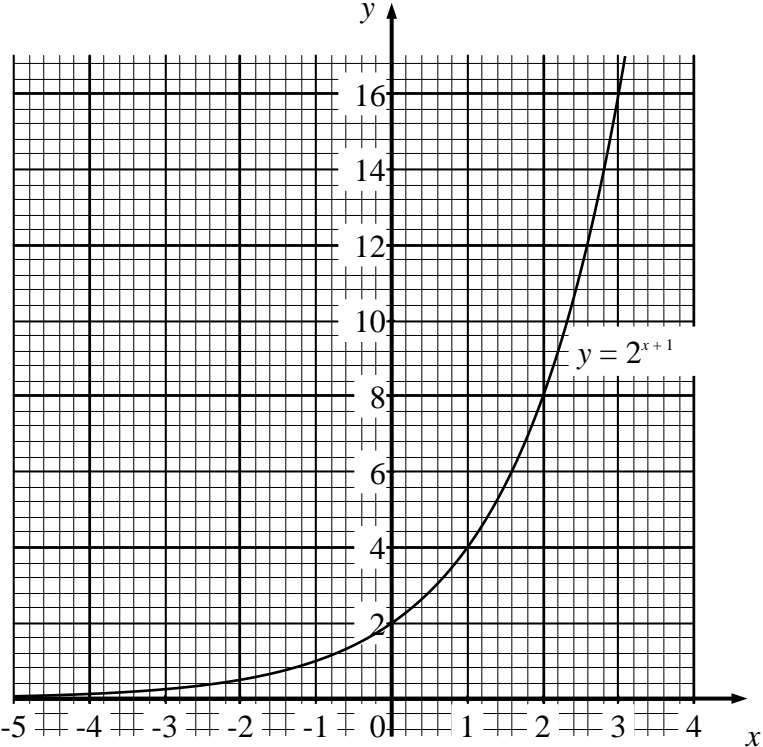| Question	Working	Answer	Mark	Notes
20 (a)		10 30 to 10 45	1	B1 cao
(b)		360	2	M1 for a method to find the gradient, eg $\frac{90}{0.25}, \frac{90}{15}$ A1 cao
(c)	$\frac{1}{2} \times 90 \times \frac{1}{4} + \frac{1}{2}(90 + 120) \times \frac{1}{2}$ $= 11.25 + 52.5$ or $\frac{1}{2} \times 90 \times \frac{1}{4} + \frac{1}{2} \times 90 + \frac{1}{2} \times 30 \times \frac{1}{2}$ $= 11.25 + 45 + 7.5$	63.75	2	M1 a complete method to find the correct area A1 cao

Question 3

$y = 2x + 1$

$x + y = 5$

$y = -3x$

R

y

x

10

8

6

4

2

-2

-4

-4

-2

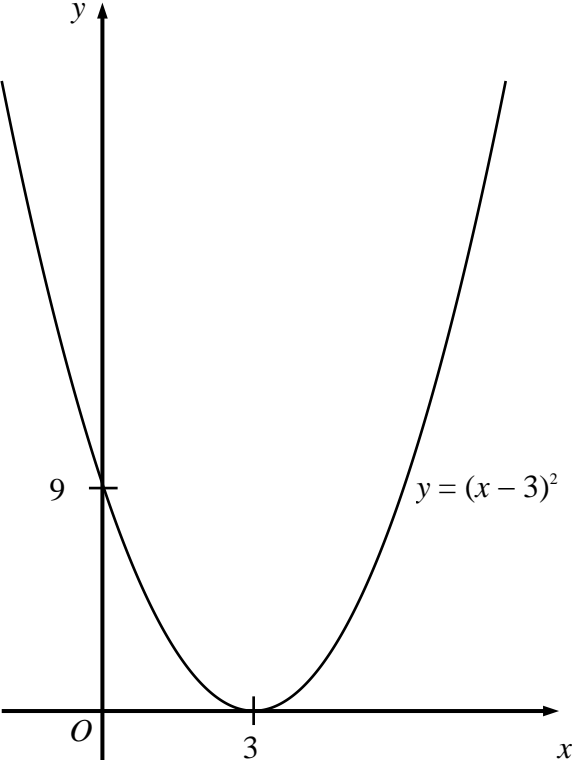0

2

4

6

Question 14

(a)

$y = f(x) + 3$

(b)

$y = f(x) - 2$

Question 15(a)

Question 16(b)

Question 19