Pearson
Edexcel

Mark Scheme (Results)

Summer 2019

Pearson Edexcel Award
In Algebra (AAL30)
Paper 01

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Summer 2019
Publications Code AAL30_01_1906_MS

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

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)		$8wy^2(3wy-1)$	2	B2 cao (B1 for a partial correct factorisation which shows a product of at least 3 factors, eg $8wy(3wy^2-y)$, $4y(6w^2y^2-2wy)$)
(b)		$(3e+2)(f-1)$	2	M1 for $3e(f-1)$and $2(f-1)$ or $f(3e+2)$and $-1(3e+2)$ A1 $(3e+2)(f-1)$ oe
(c)		$(5-2x)(5+2x)$	1	B1 for $(5-2x)(5+2x)$ oe, eg $-(2x-5)(2x+5)$
2 (a)		$y<\frac{1}{4}$	2	M1 for isolating terms in y or $\frac{1}{4}$ as the critical value A1 oe
(b)		$-5<x<\frac{1}{2}$	3	M1 for factorising to $(x+5)(2x-1)$ oe or correct substitution into the quadratic formula M1 (dep M1) for critical values of -5 and $\frac{1}{2}$ or $-5<x$ or $x<\frac{1}{2}$ A1 cao
3 (a)		$b=\frac{Pc^2}{4a^2}$	2	M1 for multiplying both sides by c^2, eg $Pc^2=4a^2b$ A1 oe
(b)		$c=\pm\sqrt{\frac{4a^2b}{P}}$	2	M1 for multiplying both sides by c^2 and dividing both sides by P, eg $c^2=\frac{4a^2b}{P}$ A1 oe

PAPER: AAL30_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
4 (a)		Circle centre the origin radius 6 drawn	2	M1 for drawing a circle, centre (0, 0) or circle radius 6 or $x^2 + y^2 = 36$ seen A1 for correct circle
(b)(i)		Line drawn	1	B1 for correct line drawn
(ii)		$x=-1.0$, $y=-5.9$ $x = 4.2$, $y = 4.3$ (from graph)	2	M1 (dep M1 B1) for points of intersection highlighted or one correct answer A1 for $x = -0.8$ to -1.1, $y=-5.8$ to -6.1 $x =$ 4.0 to 4.3, $y = 4.2$ to 4.5 or ft accuracy of their graph
5		$\frac{2 \pm \sqrt{22}}{9}$	3	M1 for stating the quadratic formula or correct substitution into the formula A1 for $\frac{-4 \pm \sqrt{88}}{-18}$ or $\frac{4 \pm \sqrt{88}}{18}$ or further simplified answer A1 cao (accept reverse order in numerator)
6		$k \leq -6,\ k \geq 6$	3	M1 for correct substitution into $b^2 - 4ac$ or $b^2 = 4ac$ (accept substitution into $\sqrt{b^2 - 4ac}$) M1 for… $b^2 - 4ac \geq 0$, eg $k^2 - 36 \geq 0$ A1 cao

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Question	**Working**	**Answer**	**Mark**	**Notes**
7 (a)		$2x^2 - 7x - 4$	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 $2x^2 - 7x - 4$
(b)		$9x^2 - 30xy + 25y^2$	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 $9x^2 - 30xy + 25y^2$
8		Region drawn	5	M1 for drawing $x = -1$ correctly M1 for drawing $2x + y = 6$ correctly M1 for drawing $y = 4 - x$ correctly A2 for correctly shading required region (A1 for correct shading for 2 inequalities)
9 (a)		$h = 4x^3$	3	M1 $h = kx^3$ oe, or $h \propto x^3$ may be implied by substitution M1 for substitution to find k, eg $108 = k \times 3^3$ A1 cao
(b)		-2	2	M1 for substituting -32 into equation of the form $h = kx^3$ A1 cao
(c)		sketch	1	B1 for sketch

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Question	**Working**	**Answer**	**Mark**	**Notes**
10 (a)		$4x + 3y - 12 = 0$	3	M1 for method to find gradient of **L**, eg $-\frac{4}{3}$ M1 for complete method to find the value of c (= 4) A1 $4x + 3y - 12 = 0$ oe in correct form
(b)		$-\frac{4}{3}$	1	B1 ft their gradient from (a)
11 (a)(i)		$-\frac{6}{5}$	1	B1 oe
(ii)		$-\frac{8}{5}$	1	B1 oe
(b)		$(x-4)^2 - 9$	2	M1 for $(x-4)^2$ A1 for $(x-4)^2 - 9$
12 (a)		0	1	B1 cao
(b)		Distance covered	1	B1 explanation
(c)		20	1	B1 cao
13 (a)		$y = -\frac{2}{5}x + \frac{26}{5}$	3	M1 for use of the gradient of $-\frac{2}{5}$ in an equation of a straight line M1 (dep M1) for method to find c A1 $y = -\frac{2}{5}x + \frac{26}{5}$
(b)		$y = \frac{5}{2}x - \frac{7}{2}$	2	M1 for using $mn = -1$ eg gradient of perpendicular line shown as $\frac{5}{2}$ A1 for $y = \frac{5}{2}x - \frac{7}{2}$ oe

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Question	**Working**	**Answer**	**Mark**	**Notes**
14 (a)		$64x^2$	2	B2 for $64x^2$ (B1 for 64 or x^2)
(b)		$a = \frac{1}{8}$, $b = -9$	2	B1 for $a = \frac{1}{8}$ B1 for $b = -9$
15	$49 - 28x + 4x^2$ $147 - 84x + 12x^2 + 4x^2 = 43$ $104 - 84x + 16x^2 = 0$ $4x^2 - 21x + 26 = 0$ $(4x - 13)(x - 2) = 0$ Or $49 - 14y + y^2$ $49 - 14y + y^2 + 3y^2 = 43$ $2y^2 - 7y + 3 = 0$ $(2y - 1)(y - 3) = 0$	$x = 2$, $y = 3$ and $x = 3.25$, $y = 0.5$	5	M1 for substitution of $y = 7 - 2x$ or $2x = 7 - y$ oe into the quadratic equation to eliminate one variable M1 (dep on M1) for expansion of brackets within the quadratic M1 (dep on M2) for equation of the form $ax^2 + bx + c$ (= 0) A1 $x = 2$, 3.25 oe or $y = 3$, 0.5 oe A1 for $x = 2$, $y = 3$ and $x = 3.25$, $y = 0.5$
16		$\frac{20x - 3}{4x^2 - 9}$	3	M1 for using $(2x - 3)(2x + 3)$ as the common denominator M1 (dep M1) for a complete method to simplify to a single fraction A1 $\frac{20x-3}{4x^2-9}$ or $\frac{20x-3}{(2x-3)(2x+3)}$

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Question	**Working**	**Answer**	**Mark**	**Notes**
17		Graph sketched with labels	3	M1 for a parabola in the correct orientation M1 for (2, −4) labelled at turning point or 0 and 4 labelled as intercepts on the *x*-axis A1 fully correct graph drawn with all labels
18 (a)		2.3	2	M1 for correct substitution, eg $\frac{4\times4+7}{16-3\sqrt{4}}$ A1 oe
(b)		$\frac{65+6\sqrt{7}}{29}$	3	M1 for multiplying by $\frac{6+\sqrt{7}}{6+\sqrt{7}}$ oe M1 (dep M1) for $72-6\sqrt{7}+12\sqrt{7}-7$ (= $65+6\sqrt{7}$) used as the numerator A1 for $\frac{65+6\sqrt{7}}{29}$
19	$\frac{50}{2}((12+2)+2(7+4+2.4))$ 25 (14 + 26.8) = 40.8 × 100 ÷ 4	1020	3	M1 for stating values (y_0 =) 12, (y_1 =) 7, (y_2 =) 4,(y_3 =) 2.4, (y_4 =) 2, (condone 1 error) M1(dep) for substituting "values" and h = 50 into trapezium rule, eg $\frac{50}{2}((12+2)+2(7+4+2.4))$ A1 for 1020
20 (a)(i)		Correct Graph	2	M1 for a reflection in a line of the form $y = c$ A1 correct graph
(ii)		(−1, 1)	1	B1 for (−1, 1) or ft provided M1 scored in (a)(i)
(b)		Correct Graph	2	M1 for a graph translated parallel to the *x*-axis A1 correct graph

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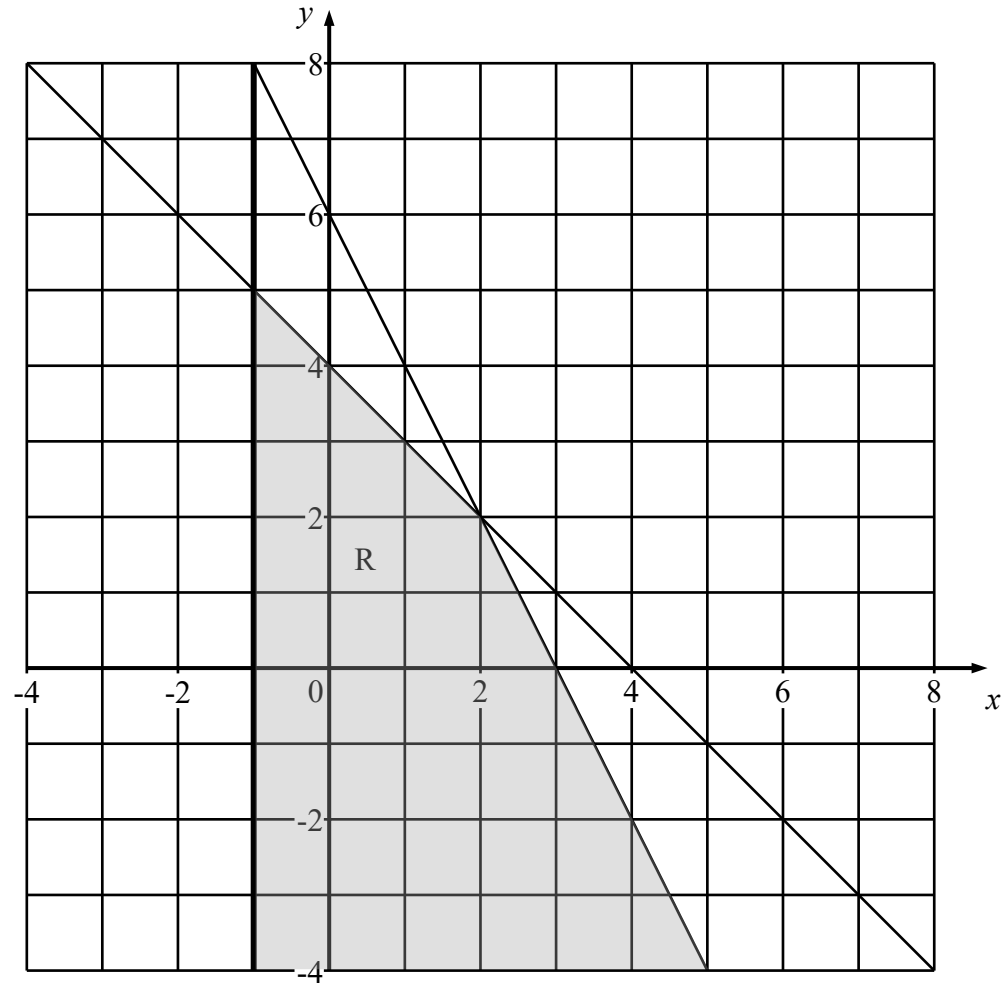
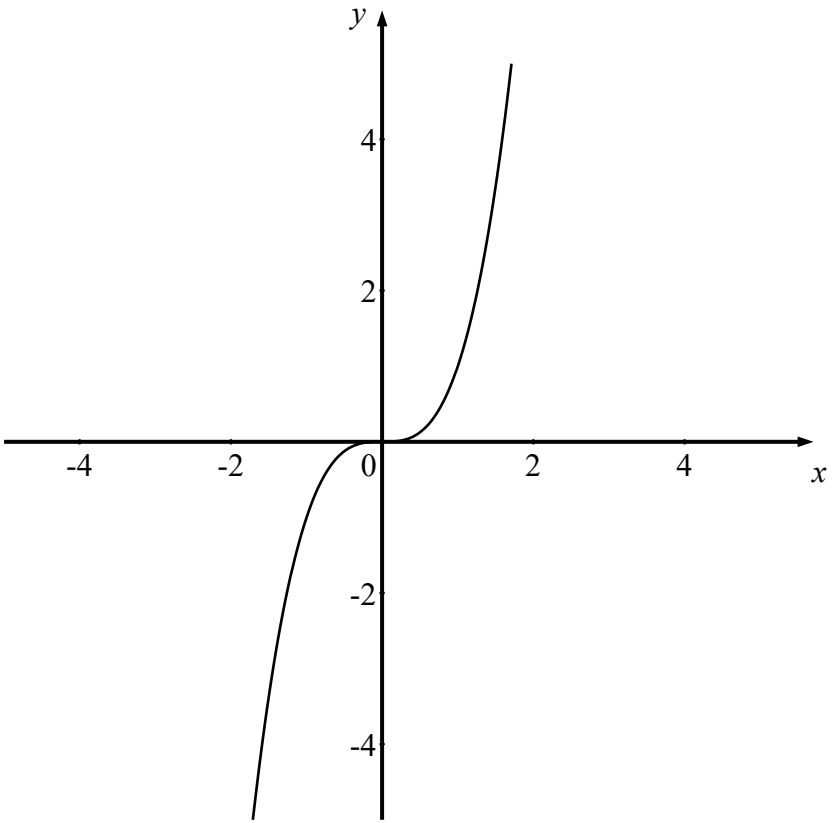
Question	**Working**	**Answer**	**Mark**	**Notes**
21 (a)		$17k + 34$	3	M1 for finding the difference of $2k + 3$, may be seen separately or $17k$ or 34 M1 (dep M1) for a complete method A1 for $17k + 34$ oe
(b)		2650	3	B1 for using $n = 50$, $a = 4$ and $d = 2$ or $n = 50$, $a = 4$ and $l = 102$ M1 for using $S = \frac{n}{2}\{2a + (n - 1)d\}$ or $S = \frac{n}{2}\{a + l\}$, may be implied by substitution A1 cao

Qu 8



Qu 9c



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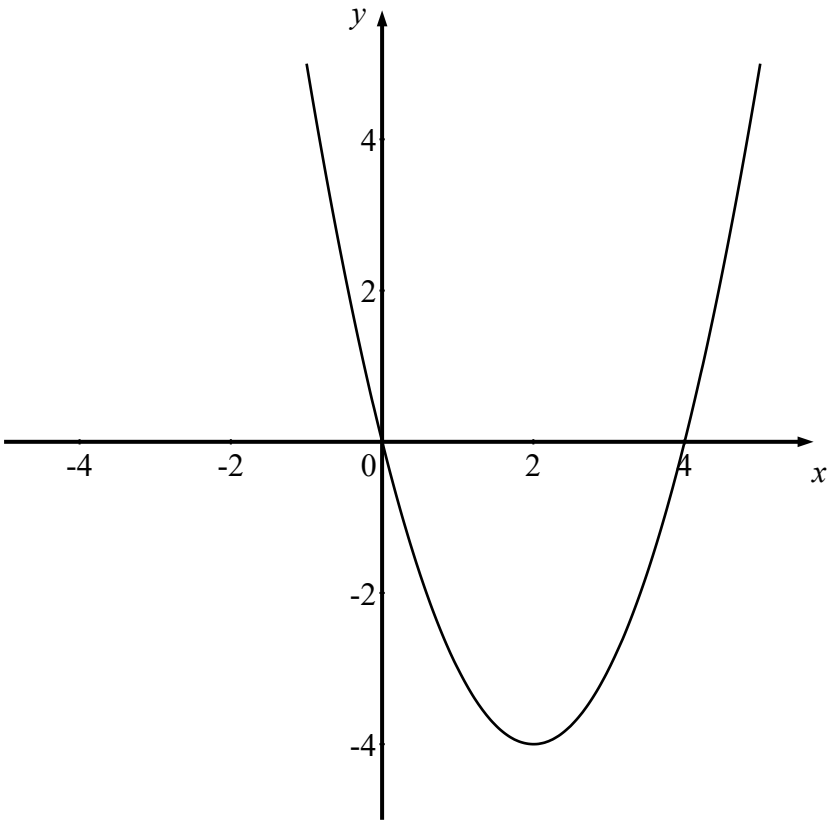
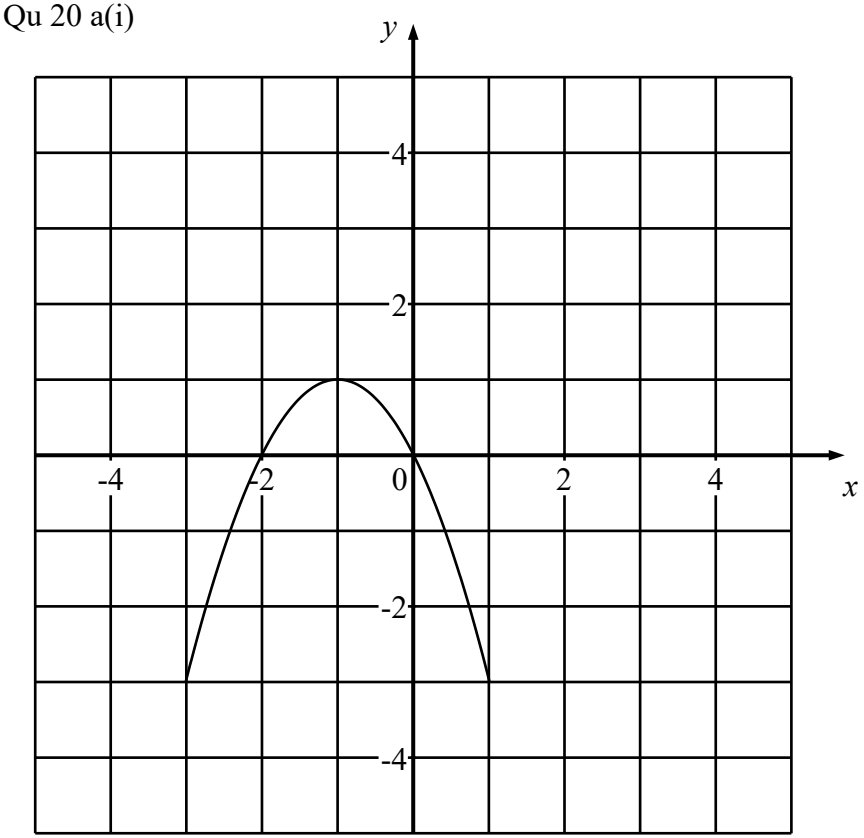
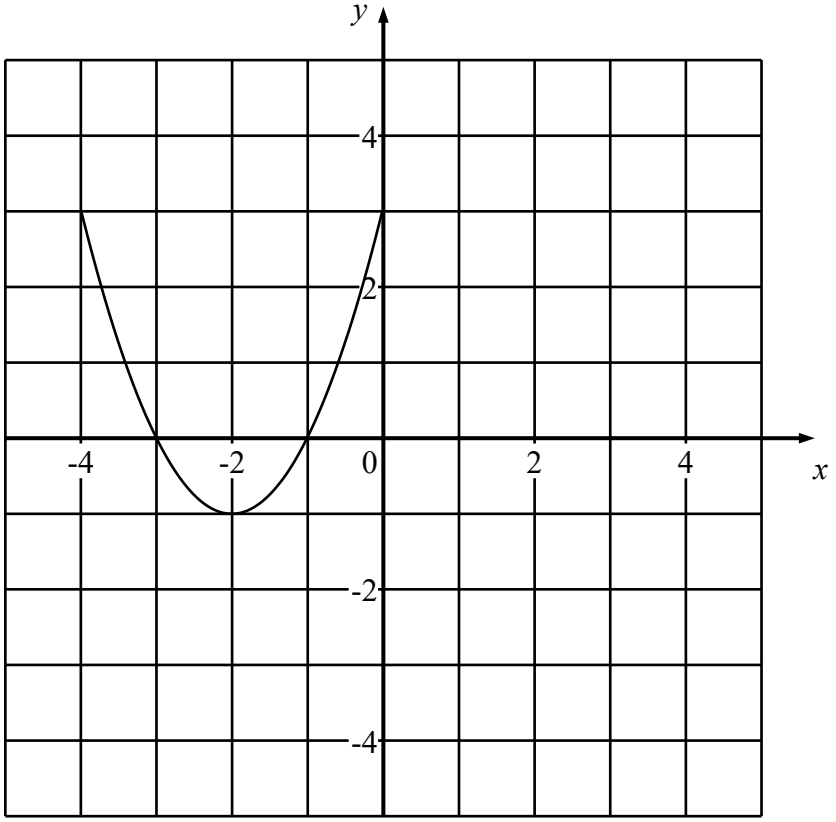


Qu 20 a(i)



Qu 20 b



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