

Mark Scheme (Results)

January 2015

Pearson Edexcel International GCSE
Mathematics A (4MA0)
Paper 4H

Pearson Edexcel Level 1/Level 2 Certificate
Mathematics A (KMA0)
Paper 4H

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- **Types of mark**
 - M marks: method marks
 - A marks: accuracy marks
 - B marks: unconditional accuracy marks (independent of M marks)
- **Abbreviations**
 - cao – correct answer only
 - ft – follow through
 - isw – ignore subsequent working
 - SC - special case
 - oe – or equivalent (and appropriate)
 - dep – dependent
 - indep – independent
 - eeoo – each error or omission

- **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.

- **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 it is clear from the working that the “correct” answer has been obtained from incorrect working, award 0 marks.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks.

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 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.

If there is no answer on the answer line then check the working for an obvious answer.

- **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: eg. 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 eg algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

- **Parts of questions**

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

International GCSE Maths January 2015 – Paper 4H Mark scheme

Apart from Questions 8, 12e, 17b, and 22b where the mark scheme states otherwise, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Q	Working	Answer	Mark	Notes
1	$45 \times 3 + 46 \times 7 + 47 \times 12 + 48 \times 23 + 49 \times 4 + 50 \times 1$ or $135 + 322 + 564 + 1104 + 196 + 50$ or 2371		3	M1 for at least 3 correct products and summing them
	"2371" ÷ 50 or $\frac{45 \times 3 + 46 \times 7 + 47 \times 12 + 48 \times 23 + 49 \times 4 + 50(\times 1)}{50}$			M1 (dep) for division by 50 NB. If division by something other than 50 this must clearly come from adding the frequency column
		47.42		A1 Accept 47, 47.4 if $2371 \div 50$ seen accept $47\frac{21}{50}$ but not $\frac{2371}{50}$
				Total 3 marks

Q	Working	Answer	Mark	Notes
2	32×17 or 544 or $\pi \times 8^2$ oe or $200.9 - 201.602$		3	M1
	$32 \times 17 - \pi \times 8^2$			M1 dep for the complete, correct method
		343		A1 for awrt 343
				Total 3 marks

Q	Working	Answer	Mark	Notes
3	$1 - 0.3$ oe or 0.7 oe		3	M1 accept $100(\%) - 30(\%) = 70(\%)$
	$"0.7" \div 2$ oe			M1 dep accept $70(\%) \div 2$
		0.35		A1 for 0.35 or 35% or $\frac{35}{100}$ oe
				Total 3 marks

Q	Working	Answer	Mark	Notes														
4	<table><tr><td>x</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>y</td><td>-10</td><td>-7</td><td>-4</td><td>-1</td><td>2</td><td>5</td></tr></table>	x	-2	-1	0	1	2	3	y	-10	-7	-4	-1	2	5	$y = 3x - 4$ drawn from $x = -2$ to $x = 3$	4	B4 For a correct line between $x = -2$ and $x = 3$
x	-2	-1	0	1	2	3												
y	-10	-7	-4	-1	2	5												
				B3 For a correct straight line segment through at least 3 of $(-2, -10)$ $(-1, -7)$ $(0, -4)$ $(1, -1)$ $(2, 2)$ $(3, 5)$ OR for all of $(-2, -10)$ $(-1, -7)$ $(0, -4)$ $(1, -1)$ $(2, 2)$ $(3, 5)$ plotted but not joined														
				B2 For at least 2 correct points plotted OR for a line drawn with a positive gradient through $(0, -4)$ and clear intention to use of a gradient of 3 (eg. a line through $(0, -4)$ and $(0.5, -1)$)														
				B1 For at least 2 correct points stated (may be in a table) OR for a line drawn with a positive gradient through $(0, -4)$ but not a line joining $(0, -4)$ and $(3, 0)$ OR a line with gradient 3														
				Total 4 marks														

Q	Working	Answer	Mark	Notes	
5 (a)		Enlargement	3	B1	These marks are independent but award no marks if the answer is not a single transformation
		(scale factor) 2		B1	
		(centre) (1, 3)		B1 condone missing brackets around (1, 3); do not accept $\begin{pmatrix} 1 \\ 3 \end{pmatrix}$	
(b)		Triangle at (9,2) (9,4) (8,2)	1	B1	
				Total 4 marks	

Q	Working	Answer	Mark	Notes	
6 (a) (i)		5, 15	2	B1	
(ii)		4, 5, 8, 10, 12, 15, 16		B1	
(b)		No ticked and 5 is a prime number (and a multiple of 5)	1	B1	oe explanation eg. 5 is in both sets
				Total 3 marks	

Q	Working	Answer	Mark	Notes	
7	$240 \times \frac{3}{3+4+8}$ or 48 or $240 \times \frac{8}{3+4+8}$ or 128		3	M1	M2 for
	"128" – "48"			M1 dep	$240 \times \frac{5}{3+4+8}$
		80		A1	
				Total 3 marks	

Q	Working	Answer	Mark	Notes
8	$3x - 5 + 3x + 4x + 2$ ($=10x - 3$)		4	M1 correct expression for perimeter (may be seen in an equation)
	$3x - 5 + 3x + 4x + 2 = 62$ or “ $10x - 3$ ” = 62			M1 dep
	eg. $10x - 3 = 62$			M1 (dep) correct method to collect x terms in a correct equation
		6.5 or $6\frac{1}{2}$		A1 dep on all method marks
				SC : B2 for $x = 6.5$ and $3 \times 6.5 - 5 + 3 \times 6.5 + 4 \times 6.5 + 2 = 62$ (B1 for a value for x substituted into correct expression for perimeter eg. $3 \times 6 - 5 + 3 \times 6 + 4 \times 6 + 2$)
				Total 4 marks

Q	Working	Answer	Mark	Notes
9		1, 8, 9	2	B2 B1 for 2, 8, 8 or 0, 8, 10 or for three numbers with a mean of 6 or a median of 8 or $6 \times 3 (=18)$
				Total 2 marks

Q	Working	Answer	Mark	Notes
10 (a)	$3x < 35 - 8$ or $3x < 27$		2	M1 allow $3x = 35 - 8$ or $3x = 27$ condone incorrect inequality sign
		$x < 9$		A1 for $x < 9$ or $9 > x$ NB: Final answer must be an inequality SC : B1 for $x \leq 9$ or $x = 9$ or 9 as an answer
(b)		$-2 < x \leq 4$ oe	2	B2 B1 for one end of inequality correct ie. $-2 < x$ or $x \leq 4$ OR $-2 \leq x < 4$ condone the use of a variable other than x but not O
				Total 4 marks

Q	Working	Answer	Mark	Notes
11 (a)	Angle between <u>tangent</u> and <u>radius</u> is 90°		1	B1 Accept perpendicular or right angle for 90°
(b)	angle $POT = 180 - 90 - 46 (=44)$ or $2y + 90 + 46 = 180$		3	M1 May be on diagram
	$(y =) "44" \div 2$ or $(180 - (180 - 44)) \div 2$ or $(y =) (180 - 90 - 46) \div 2$			M1
		22		A1
				Total 4 marks

Q		Working		Answer	Mark	Notes
12	(a)		$c(c - 5)$	2	B2	Award B2 also for $(c \pm 0)(c - 5)$ or $c \times (c - 5)$ B1 for factors which, when expanded and simplified, give two terms, one of which is correct
	(b)		d^{12}	1	B1	
	(c)		$(x + 6)(x - 5)$	2	B2	B1 for $(x \pm 6)(x \pm 5)$

Q	Working		Answer	Mark	Notes
12 (d)	$\frac{2P}{a} = b^2$		2	M1	oe with b^2 as the subject
		$b = \sqrt{\frac{2P}{a}}$		A1	oe with b as the subject or $b = \pm \sqrt{\frac{2P}{a}}$
(e)	eg. $2(2x + 1) + 3(x - 5) = 6 \times 4$ or $\frac{2(2x+1)}{6} + \frac{3(x-5)}{6} = 4$		4	M1	for clear intention to multiply both sides by 6 or by a multiple of 6 or write both fractions with a common denominator
	eg. $4x + 2 + 3x - 15 = 24$ or $\frac{4x+2}{6} + \frac{3x-15}{6} = 4$			M1	for correct expansion of brackets in a correct equation
	eg. $4x + 3x = 37$ or $-4x - 3x = -37$ or $7x = 37$ or or $-7x = -37$ $7x = 24 + 15 - 2$ or $-7x = 2 - 24 - 15$			M1	for isolating terms in x in a correct equation or $7x - 37 = 0$ or $37 - 7x = 0$
		$5\frac{2}{7}$		A1	oe eg. $\frac{37}{7}$ Award 4 marks if answer is correct and at least one method mark scored Accept 5.285714... rounded or truncated to 3 or more sig figs
					Total 11 marks

Q	Working	Answer	Mark	Notes
13 (a)		7.6×10^{-5}	1	B1
(b)		160 000 000	1	B1
(c)	$\frac{1.6 \times 10^8}{1.4 \times 10^7}$ or $\frac{16}{1.4}$ or $\frac{80}{7}$ or $\frac{160000000}{14000000}$ or 11.428...		2	M1
		11		A1 cao
				Total 4 marks

Q	Working	Answer	Mark	Notes
14	$0.025 \times 40\,000 (=1000)$ or $1.025 \times 40\,000 (=41000)$ or 3000		3	M1
	"41000" $\times 0.025 (=1025)$ and "42025" $\times 0.025 (=1050.625)$ OR 3075.62 or 3075.625 or 3075.63			M1 (dep) method to find interest for year 2 and year 3
		43075.63		A1 accept 43075.62 or 43075.625 NB. An answer of 3075.62 or 3075.625 or 3075.63 score M2A0
				Total 3 marks

Q	Working	Answer	Mark	Notes
15 (a)			2	M1 line $y = 2$ drawn
		-1, 3		A1 SC: B1 for (-1, 2) and (3, 2)
(b)	$x^2 + 5x - 7 + 6 = 6$ or $x^2 + 5x - 7 - 7x = -7x$ or $x^2 - 2x - 1 = -7x + 6$		2	M1 addition of 6 to both sides or subtraction of $7x$ from both sides or $a = -7$ or $b = 6$
		$a = -7, b = 6$		A1 SC : B1 for $a = 7$ and $b = -6$
				Total 4 marks

Q	Working	Answer	Mark	Notes
16 (a)		0.1oe for Chris fail or 0.35 oe for Sunil fail	3	B1 stated or in correct position
		correct binary structure		B1 4 branches needed on RHS
		ALL labels and values correct		B1 accept P and F
(b)	$0.9 \times "0.35" \text{ or } "0.1" \times 0.65 \text{ or}$ $0.9 \times 0.65 \text{ and } 0.1 \times 0.35$		3	M1
	$0.9 \times "0.35" + "0.1" \times 0.65 \text{ or}$ $1 - (0.9 \times 0.65 + 0.1 \times 0.35)$			M1 complete method
		0.38		A1 for 0.38 oe eg. $\frac{19}{50}$
				Total 6 marks

Q	Working	Answer	Mark	Notes
17 (a)	$\frac{1}{2} \times 2x \times (x + x + 7)$ or $2x \times x$ or $\frac{1}{2} \times 7 \times 2x$ or $2x \times (x + 7)$		3	M1 for area of trapezium or any relevant area Allow 2x in place of $x + x$
	$\frac{1}{2} \times 2x \times (x + x + 7) = 17$ or $2x \times x + \frac{1}{2} \times 7 \times 2x = 17$ or $2x \times (x + 7) - \frac{1}{2} \times 7 \times 2x = 17$			M1 Allow 2x in place of $x + x$
		show		A1 for deriving the given answer $2x^2 + 7x - 17 = 0$ correctly
(b)	$\frac{-7 \pm \sqrt{7^2 - 4 \times 2 \times -17}}{2 \times 2}$		3	M1 for correct substitution; condone one sign error in substitution Accept + in place of $\pm$ NB. Terms may be simplified eg. accept 4 in place of 2x2 in denominator
	$\sqrt{185}$ or $\sqrt{49+136}$ or 13.6....			M1 (independent) for correct simplification of discriminant (if evaluated at least 3sf rounded or truncated)
		1.65		A1 dep on 1 st M mark scored for value rounding to 1.65 given as final answer Award 3 marks if first M1 scored and answer correct
				Total 6 marks

Q	Working	Answer	Mark	Notes
18	400.5 or $400.4\dot{9}$ or 399.5 or 50.25 or 50.15 or $50.24\dot{9}$			B1 any correct UB or LB
	$\frac{400.5}{50.15}$ or $\frac{400.4\dot{9}}{50.15}$			M1
		7.99		A1 or 7.986...
				Total 3 marks

Q	Working	Answer	Mark	Notes
19 (a)		$\begin{pmatrix} 10 \\ -4 \end{pmatrix}$	1	B1
(b)	$3\begin{pmatrix} 1 \\ 7 \end{pmatrix} - \begin{pmatrix} -7 \\ 0 \end{pmatrix}$ or $\begin{pmatrix} 3 \\ 21 \end{pmatrix}$		2	M1 or $\begin{pmatrix} x \\ 21 \end{pmatrix}$ or $\begin{pmatrix} 10 \\ y \end{pmatrix}$
		$\begin{pmatrix} 10 \\ 21 \end{pmatrix}$		A1
(c)	$5^2 + (-2)^2$ or $5^2 + 2^2$ or 29		2	M1 accept $5^2 + -2^2$
		$\sqrt{29}$		A1 accept answers in the range 5.38 - 5.385
				Total 5 marks

Q	Working	Answer	Mark	Notes
20	$26 \div 20 (=1.3)$ or 3.6×10 or 3.3×10 or 1×30 or 36 or 33 or 30 or $\frac{26}{130} \left(= \frac{1}{5} \right)$		3	M1 Any one frequency density (without contradiction) or, eg. $1\text{cm}^2 = 5$ or clear association of area with frequency
	$26 + 3.6 \times 10 + 3.3 \times 10 + 1 \times 30$ or $26 + 36 + 33 + 30$ or $625 \times \frac{1}{5}$ or $(130 + 180 + 165 + 150) \times \frac{1}{5}$			M1 Any fully correct complete method; condone one error in bar width or bar height
		125		A1
				Total 3 marks

Q	Working	Answer	Mark	Notes
21	$\frac{4}{3} \times \pi \times (2r)^3$		3	M1 condone omission of brackets
	$\pi \times r^2 \times h = \frac{4}{3} \times \pi \times (2r)^3$			M1 dep brackets must be present or $8r^3$ seen
		$\frac{32}{3}r$		A1
				Total 3 marks

Q	Working	Answer	Mark	Notes
22 (a)		2^{-5}	2	B2 B1 for $\frac{1}{2^5}$ or $\left(\frac{1}{2}\right)^5$ or 2^5
(b)	$20 - 4\sqrt{3} + 5\sqrt{12} - \sqrt{3}\sqrt{12}$ or $20 - 4\sqrt{3} + 5\sqrt{12} - \sqrt{36}$ or $20 - 4\sqrt{3} + 5\sqrt{12} - 6$		3	M1 for at least 3 correct terms with correct signs or all 4 terms correct without signs
	$\sqrt{12} = \sqrt{4 \times 3}$ or $\sqrt{12} = 2\sqrt{3}$ or $5\sqrt{12} = 5\sqrt{4 \times 3}$ or $5\sqrt{12} = 10\sqrt{3}$			M1 NB. This may be seen before the expansion of the brackets
		show		A1 dep on both method marks for deriving the given answer
				Total 5 marks

Q	Working	Answer	Mark	Notes
23	$x^2 - 4 = (x + 2)(x - 2)$		4	B1 independent
	$[5-](x+2) \times \frac{(x-3)}{(x^2-4)} \text{ or }$ $[5-](x+2) \times \frac{(x-3)}{(x-2)(x+2)}$			M1 for dealing with division of $(x+2)$ by $\frac{x^2-4}{x-3}$
	$\frac{5(x-2)}{(x-2)} - \frac{(x-3)}{(x-2)} \text{ or }$ $\frac{5(x-2)(x+2)}{(x-2)(x+2)} - (x+2) \times \frac{(x-3)}{(x-2)(x+2)} \text{ or }$ $\frac{5(x^2-4)}{x^2-4} - (x+2) \times \frac{(x-3)}{x^2-4}$			M1 For two correct fractions with a common denominator or a correct single fraction
		$\frac{4x-7}{x-2}$		A1 from fully correct algebra
				Total 4 marks

Q	Working	Answer	Mark	Notes	
24	$\frac{x}{360} \times \pi \times r^2 = 5\pi$		6	M1	for this mark only condone an incorrect value for r
	$x = 50$			A1	cao for angle $AOB = 50$
	$(AB^2 =) 6^2 + 6^2 - 2 \times 6 \times 6 \times \cos("50")$			M1	dep on first M1 or $6 \times \sin("50"/2)$
	$(AB =) \sqrt{25.7...}$ or 5.07....			M1	dep or $2 \times 6 \times \sin("50"/2)$
	$\frac{"50"}{360} \times 2 \times \pi \times 6$ or $\frac{5\pi \times 2\pi \times 6}{\pi \times 6^2}$ or $\frac{5}{3}\pi$ or 5.23...			M1	dep on first M1 if “50” used but indep if angle not used
		10.3		A1	for answer in range 10.2 – 10.31
				Total 6 marks	

