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Mark Scheme (Results)

January 2014

Pearson Edexcel International GCSE Mathematics A (4MA0/3H) Paper 3H

Pearson Edexcel Certificate Mathematics A (KMA0/3H)

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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 anothe

Apart from Question 11 (where the mark scheme states otherwise), the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
1 (a)	$900 \times \frac{13}{6}$		2	M1 for $\frac{900}{6}$ or 150 or $\frac{13}{6}$ (= 2.16…) oe or 900×13 or 11 700
		1950		A1 cao
(b)	$6 \times \frac{1250}{750}$ or $1250 \div \frac{750}{6}$		2	M1 for $\frac{1250}{750}$ oe(= 1.66…) or $\frac{750}{1250}$ oe (= 0.6) or $\frac{750}{6}$ oe (=125)
		10		A1 cao
				Total 4 marks

Question	Working	Answer	Mark	Notes
2	852×10.75 **or** $10\frac{3}{4} \times 852$ **or** $\frac{645 \times 852}{60}$		3	M2 M1 for 852×10.45 or 8903.4 or 852×645 or 549 540
		9159		A1 cao
				Total 3 marks

Question	Working	Answer	Mark	Notes		
3	sin 43 used		3	M1	or M1 for $7.8\cos 43°$ (5.704...) **and** $7.8^2 - "5.704"^2$ (28.298) M1 for $\sqrt{"28.298"}$	or M1 for correct statement of Sine Rule eg $\frac{7.8}{\sin 90°} = \frac{x}{\sin 43°}$ M1 for correct expression for x eg $x = \frac{7.8\sin 43°}{\sin 90°}$
	$7.8\sin 43°$			M1		
		5.32		A1	for ans rounding to 5.32 (5.319587...)	
						Total 3 marks

Question		Working	Answer	Mark	Notes
4	(a)		2^7	1	B1 cao
	(b)	$\frac{280}{35}$ **or** $\frac{280}{5\times 7}$ **or** 8 **or** $280 = 8 \times 5 \times 7$ **or** 2^3 **or** fully correct factor tree or repeated division or 2, 2, 2, 5, 7 or $2 \times 2 \times 2 \times 5 \times 7$		2	M1
			3		A1 cao
					Total 3 marks

Question	Working	Answer	Mark	Notes
5 (a)		$20c^2$	1	B1 Also accept $c^2 20$
(b)		$x(x + 4)$ or $x(4 + x)$	2	B2 Award B2 also for $(x \pm 0)(x + 4)$ oe B1 for factors which, when expanded and simplified, give two terms, one of which is correct except B0 for $(x + 2)(x - 2)$
(c)	$2^3 + 5 \times 2$ or $8 + 10$		2	M1
		18		A1 cao
				Total 5 marks

Question	Working	Answer	Mark	Notes
6	$\angle POT = 58°$		3	M1 May be stated or marked on diagram
	$\angle OTP = 90°$			M1 May be stated or marked on diagram
		32		A1 cao
				Total 3 marks

Question	Working	Answer	Mark	Notes
7 (a)		$-1 < x \leq 4$	2	B2 Also accept both $x > -1$ **and** $x \leq 4$ or $4 \geq x > -1$ B1 for a double-ended inequality which is correct at one end (ignore the other end) eg. $-1 \leq x \leq 4$, $-1 < x > 4$ **or** $-1 \leq x < 4$, **or** award B1 for an answer of $x > -1$ **or** $x \leq 4$
(b)(i)	$2y - 6 \geq 1$		3	M1 M2 for $y - 3 \geq \frac{1}{2}$
	$2y \geq 7$			M1 For method marks condone use of $>$ instead of $\geq$
		$y \geq 3\frac{1}{2}$ oe		A1
(ii)		4	1	B1 cao
				Total 6 marks

Question	Working	Answer	Mark	Notes
8 (a)	$\frac{32+14+6}{80}\times 100$ oe		2	M1 for $\frac{32+14+6}{80}$ or 0.65
		65		A1 cao
(b)	2.85 × 2 + 2.95 × 4 + 3.05 × 22 + 3.15 × 32 +3.25 × 14 + 3.35 ×6 or 5.7 + 11.8 + 67.1 + 100.8 + 45.5 + 20.1		3	M1 for at least two products $f \times x$ consistently within intervals (inc end points)
				M1 for complete correct method (condone any one error) NB. products do **not** need to be evaluated
		251		A1 cao
(c)	Use of $w = 3.25$ on graph		2	M1 for correct use of $w = 3.25$ on graph or implied by any value in the range 68 – 70 stated
		10 or 11 or 12		A1 accept any value in range 10-12 inc
(d)	20 and 60 or 20¼ and 60¾ indicated on cumulative frequency axis or stated		2	M1 or 3.2 and 3.07 indicated on graph or in working space
		0.13		A1 accept an answer that follows through from their correct lines on graph and correct readings
				Total 9 marks

Question		Working	Answer	Mark	Notes	
9	(a)	Enlargement scale factor 3 centre (4, 3)		3	B3	B1 for enlargement, enlarge etc B1 for 3, ×3, three, $\frac{3}{1}$ B1for (4, 3) Condone omission of brackets but do not accept $\begin{pmatrix}4\\3\end{pmatrix}$ These marks are independent but award no marks if the answer is not a single transformation
	(b)	**R** correct [vertices at (5, 8) (5, 14) and (2, 8)]		1	B1	Condone omission of label
	(c)	Enlargement scale factor $\frac{1}{3}$ centre (8, 2)		2	B2	B1 for enlargement, enlarge etc **and** $\frac{1}{3}$, $\times\frac{1}{3}$, 0.33(3….) B1for (8, 2) Condone omission of brackets but do not accept $\begin{pmatrix}8\\2\end{pmatrix}$ **<u>These marks are independent but award no marks if the answer is not a single transformation</u>**
						Total 6 marks

Question	Working		Answer	Mark	Notes	
10	eg $\frac{15}{100}\times 16000$ oe or 2400	OR 16000×0.85^3		3	M1 for eg $\frac{15}{100}\times 16000$ oe or 2400	OR M2 for 16000×0.85^3 (M1 for 16000×0.85 or 13600 or 16000×0.85^2 or 11560 or 16000×0.85^4)
	$\frac{15}{100}\times(16000-"2400")$ = 2040 $\frac{15}{100}\times(16000-"2400"-"2040")$ = 1734 $16000-"2400"-"2040"-"1734"$				M1 for completing method	
					Accept $(1-0.15)$ as equivalent to 0.85 throughout	
					SC: If no other marks gained, award M1 for 16000×0.55 oe or 8800	
			9826		A1 cao	
						Total 3 marks

Question	Working	Answer	Mark	Notes
11	Eg. $\frac{4(6x-1)}{4}-\frac{4(5-2x)}{2}=1\times 4$ or $6x-1-2(5-2x)=4$ or $\frac{6x-1-2(5-2x)}{4}\ (=1)$ or $\frac{6x-1}{4}-\frac{2(5-2x)}{4}(=1)$ or $1.5x-0.25-(2.5-x)=1$		4	M1 for clear intention to multiply all terms by 4 or a multiple of 4 or to express LHS as a single fraction with a denominator of 4 or a multiple of 4 or to express LHS as the sum of two fractions with denominators of 4 or a multiple of 4 May be implied by first B1
	Eg. $6x-1-10+4x\ (=4)$ or $\frac{6x-1-10+4x}{4}(=1)$ or $1.5x-0.25-2.5+x\ (=1)$			B1 Expanding brackets
	Eg. $10x=15$ or $10x-11=4$ or $10x-1-10=4$ or $6x+4x-11=4$ or $10x-15=0$			B1 for correct rearrangement of a correct equation with terms in x isolated
		1½ oe		A1 Award full marks for a correct answer if at least M1 scored.
				Total 4 marks

Question	Working	Answer	Mark	Notes
12	$\sqrt{9.5^2-7.6^2}$ **or** $\sqrt{90.25-57.76}$ **or** $\sqrt{32.49}$ **or** $\sqrt{32.5}$		5	M1
	(*BC* =) 5.7			A1
	$\frac{1}{2}\times 7.6\times "5.7"$ **or** 21.6(6) **or** 21.7			M1 dep on first M1 or eg. $ACB=\sin^{-1}\left(\frac{7.6}{9.5}\right)(=53.1...)$ **and** $\frac{1}{2}\times 9.5\times "5.7"\times \sin "53.1"$
	$\frac{1}{2}\times\pi\times\left(\frac{"5.7"}{2}\right)^2$ **or** 12.7(587...) **or** 12.8			M1 dep on first M1
		34.4		A1 for answer rounding to 34.4 ($\pi\rightarrow$ 34.4187... 3.14$\rightarrow$34.4123...)
				Total 5 marks

Question	Working	Answer	Mark	Notes
13 (a)(i)	5 + 2 or 7 or $\frac{5}{20} + \frac{2}{20}$		2	M1
		$\frac{7}{20}$ oe		A1 accept answer written as an equivalent fraction or 0.35 or 35%
(ii)			2	M1 for $\frac{9}{a}$ with $a > 9$ **or** $\frac{b}{20}$ with b < 20 **or** 9 and 20 used with incorrect notation (eg. 9 : 20)
		$\frac{9}{20}$ oe		A1 accept answer written as an equivalent fraction or 0.45 or 45%
(b)(i)	$\frac{2}{20} \times \frac{2}{20}$ oe and no other terms		2	M1 SC M1 for $\frac{2}{20} \times \frac{1}{19}$
		$\frac{4}{400}$ oe		A1 accept answer written as an equivalent fraction eg $\frac{1}{100}$ or 0.01 or 1%
(ii)	$\frac{5}{20} \times \frac{8}{20}$ or $\frac{8}{20} \times \frac{5}{20}$ or $\frac{4}{20} \times \frac{4}{20}$		3	M1 SC M1 for $\frac{5}{20} \times \frac{8}{19}$ or $\frac{8}{20} \times \frac{5}{19}$ or $\frac{4}{20} \times \frac{3}{19}$
	$\frac{5}{20} \times \frac{8}{20} + \frac{8}{20} \times \frac{5}{20} + \frac{4}{20} \times \frac{4}{20}$			M1 for $\frac{5}{20} \times \frac{8}{19} + \frac{8}{20} \times \frac{5}{19} + \frac{4}{20} \times \frac{3}{19}$
		$\frac{96}{400}$ oe		A1 accept answer written as an equivalent fraction eg $\frac{6}{25}$ or 0.24 or 24%
				Total 9 marks

Question	Working	Answer	Mark	Notes
14 (a)	$D = kt^2$		3	M1 for $D = kt^2$ but not for $D = t^2$
	$8 = k \times 16$ oe or $8 = k \times 4^2$			M1
		$D = \frac{1}{2}t^2$		A1 for $D = \frac{1}{2}t^2$ oe with D the subject Award 3 marks if answer is $D = kt^2$ and k is evaluated as $\frac{1}{2}$ in part (a) or part (b)
(b)	$t^2 = 100$		2	M1
		10		A1 Also accept ± 10 ft from $kt^2 = 50$ with $k \neq 1$
				Total 5 marks

Question	Working		Answer	Mark	Notes
15	$\frac{1}{2} \times 8.9 \times 6.7 \times \sin 74°$ or 28.6(600...)	$h = 6.7 \sin 74°$ or 6.44(0...)		3	M1 or a complete correct method to find the perpendicular height
	× 2	8.9×"6.44(0...)"			M1 (dep) for a complete method to find area of parallelogram
			57.3		A1 for answer rounding to 57.3 (57.320...)
					Total 3 marks

Question	Working	Answer	Mark	Notes
16	$y^2 = ay^2 + n$		5	M1
	$y^2 - ay^2 = n$ **or** $1 = a + \frac{n}{y^2}$ **or** $1 - a = \frac{n}{y^2}$			M1 isolate terms in y^2 **or** divide through by y^2
	$y^2(1-a) = n$			M1 take out y^2 as a common factor
	$y^2 = \frac{n}{1-a}$			M1 y^2 as subject
		$\sqrt{\frac{n}{1-a}}$		A1 accept $\sqrt{\frac{-n}{a-1}}$
				Total 5 marks

Question	Working	Answer	Mark	Notes
17	$5^2 - 5\sqrt{x} - 5\sqrt{x} + (\sqrt{x})^2$ oe		3	M1 for correct expansion
		(x =) 8		A1 cao
		(y =) 33		A1 cao
				Total 3 marks

Question	Working	Answer	Mark	Notes
18 (a)		3×10^m	2	B2 B1 for $3\times\sqrt{10^{2m}}$ **or** 3×10^{km} where $k \neq 1$ **or** $a \times 10^m$ where $a \neq 3$
(b)	$\left((9)^{\frac{3}{2}} = \right)27$ **or** 2.7		3	B1
	27×10^{3n} oe			M1
		$2.7\times10^{3n+1}$		A1
				Total 5 marks

Question	Working	Answer	Mark	Notes
19		$8(4x-y)(4x+y)$	2	B2 B2 for $8(4x-y)(4x+y)$ oe B1 for correct, incomplete factorisation eg $(16x-4y)(8x+2y)$ **or** eg $8(16x^2-y^2)$ **or** correct use of difference of two squares eg. $(12x-y-(4x-3y))(12x-y+4x-3y)$
				Total 2 marks

Question		Working		Answer	Mark	Notes
20	(a)			11	1	B1 cao
	(b)	$y = 2x + 5$ $y - 5 = 2x$	$x = 2y + 5$ $x - 5 = 2y$		2	M1 for a correct first stage – subtract 5 from both sides or divide all terms by 2 NB Accept f(x) in place of y
				$\frac{x-5}{2}$ oe		A1
	(c)			-16	1	B1 cao
	(d)(i)	$(2x+5)^2 - 25$			5	M1
		$4x^2 + 10x + 10x + 25$ oe				B1 for correct expansion of $(2x + 5)^2$
				$4x^2 + 20x$		A1 or a correct fully or partially factorised expression
	(ii)	$4x(x + 5) (= 0)$ or $x(4x + 20) (=0)$ or $2x(2x + 10) (=0)$ or $x(x + 5) (=0)$				M1 or for eg $\frac{-20 \pm \sqrt{20^2 - 4 \times 4 \times 0}}{2 \times 4}$
				$x = 0,\ x = -5$		A1 for both solutions
						Total 9 marks

Question	Working	Answer	Mark	Notes
21 (a)(i)		$12\mathbf{a} - 3\mathbf{b}$ oe	3	B1 Accept correct, unsimplified expression
(ii)		$4\mathbf{a} - \mathbf{b}$ oe		B1 Accept correct, unsimplified expression
(iii)		$4\mathbf{a} + 2\mathbf{b}$ oe		B1 Accept correct, unsimplified expression
(b)	$\overrightarrow{BC} = 6\mathbf{a} + 3\mathbf{b}$ oe		2	M1 Accept correct, unsimplified expression eg. $-12\mathbf{a} + 3\mathbf{b} + 18\mathbf{a}$
		$\overrightarrow{BC} = \frac{3}{2}\overrightarrow{AE}$		A1 Also award A1 if this relationship is clearly implied by expressions for $\overrightarrow{BC}$ and $\overrightarrow{AE}$ eg $\overrightarrow{AE} = 2(\mathbf{b} + 2\mathbf{a})$ and $\overrightarrow{BC} = 3(\mathbf{b} + 2\mathbf{a})$ **NB** Correct expressions for $\overrightarrow{BC}$ and $\overrightarrow{AE}$ must be given
				Total 5 marks

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