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Mark Scheme (Results)

January 2015

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

Pearson Edexcel Level 1/Level 2 Certificate
Mathematics A (KMA0)
Paper 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
  - awrt –answer which rounds to

- **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.

Apart from Questions 6, 12, 18b and 22, 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.	$50 \times 1.2 \times 120$ or 50×1.2 or 60 or 1.2×120 or 144		**2**	M1 Allow $\frac{50 \times 1.2}{120}$
		7200		A1 **Note:** SCB1 for 5000 or $\frac{50 \times 120}{1.2}$ oe or $41.6(66666) \times 120$ oe with 41.6(66666) rounded or truncated to at least 3SF
				Total 2 marks

Question	Working	Answer	Mark	Notes
2. (a)	$\frac{451.4}{24.4}$		2	M1 for 24.4
		18.5		A1 Accept $18\frac{1}{2}$ or 37/2 but not unsimplified fractions Accept equivalent decimals (eg 18.50)
(b)	$\sqrt{60.84-51.84} = \sqrt{9}$ or $\sqrt{\frac{1521}{25} - \frac{1296}{25}}$		2	M1 for $60.84 - 51.84$ or $\frac{1521}{25} - \frac{1296}{25}$ or 9
		3		A1 Accept -3 or ± 3
				Total 4 marks

Question	Working	Answer	Mark	Notes
3. (a)		$7(2x-5)$	1	B1
(b)	$6c-15-2c+8$		2	M1 Any three terms correct.
		$4c-7$		A1
(c)		$16e^6$	2	B2 B1 for 16 or e^6 as part of a product or B1 for $4^2 \times e^{2\times3}$
(d)	$2a^2+10a-a-5$		2	M1 Any three terms correct or $2a^2+9a+...$ or $...+9a-5$
		$2a^2+9a-5$		A1
				Total 7 marks

Question	Working	Answer	Mark	Notes
4.	eg $((15\times12)+(\frac{1}{2}\times12\times10)-(\frac{1}{2}\times12\times4)$ or 180 + 60 – 24 or $(10 + 15) \times 12 - (\frac{1}{2} \times 12 \times 4) + (\frac{1}{2} \times 10 \times 6) + (\frac{1}{2} \times 10 \times 6)$ or 300 – (24 + 30 + 30) or $2 \times \frac{1}{2}(15+21)\times6$ or 2×108 eg $(\frac{1}{2} \times 4 \times 12)$ and $(\frac{1}{2} \times 10 \times 6)$ (24 and 30) or $(\frac{1}{2} \times 4 \times 12)$ and $(\frac{1}{2} \times 10 \times 12)$ (24 and 60) or $(\frac{1}{2} \times 4 \times 6)$ and $(\frac{1}{2} \times 10 \times 6)$ (12 and 30) or $(\frac{1}{2} \times 4 \times 6)$ and $(\frac{1}{2} \times 10 \times 12)$ (12 and 60) or $\frac{1}{2}(15+21)\times6$ or 108 or $\frac{1}{2}(15 + 11) \times 6$ or 78 eg $(\frac{1}{2} \times 4 \times 6)$ or 12 or $(\frac{1}{2} \times 4 \times 12)$ or 24 or $(\frac{1}{2} \times 10 \times 6)$ or 30 or $(\frac{1}{2} \times 10 \times 12)$ or 60 or $(\frac{1}{2} \times 11 \times 6)$ or 33 or $(\frac{1}{2} \times 11 \times 12)$ or 66 or $(\frac{1}{2} \times 15 \times 6)$ or 45 or 15×6 or 90 or 15×12 or 180 or 25×6 or 150 or 25×12 or 300 or 10×6 or 60 or 10×12 or 120 or 11×6 or 66 or 11×12 or 132 or 4×12 or 48 or 4×6 or 24		4	M3 For a <u>complete</u> method. If not M3 then M2 for 2 different but non overlapping triangles or 1 trapezium If not M2 then M1 for a correct area of a triangle or rectangle. **Note: The lists of examples are not exhaustive.**
		216		A1
				Total 4 marks

Question	Working	Answer	Mark	Notes
5. (a) (i)	0.08 + 0.25		2	M1
		0.33		A1 oe e.g. accept 33/100 0.33/1
(a) (ii)	$1-0.08-0.1$ or 1 – (0.25 + 0.1 + 0.08) + 0.25 or 0.57 + 0.25 or (1 – ("0.33" + 0.1)) + 0.25		2	M1 ft if their answer to (a)(i) is $0 < (a)(i) < 1$
		0.82		A1 oe eg accept 82/100 ft for $0 <$ answer < 1
(b)	0.08×0.25		2	M1
		0.02		A1 oe eg accept 1/50
(c)	$\frac{20}{100}\times60$ oe		2	M1
		12		A1 Accept 12 out of 60 **Note**: M1A0 for 12/60
				Total 8 marks

Question	Working	Answer	Mark	Notes
6.	$20y-4=18y+21$		3	M1 for $20y-4$ **or** $18y+21$
	$20y-18y=21+4$ or $2y=25$			M1 For a correct equation with the *y* terms collected on one side of the equation and the non *y* terms on the other side.
		$12\frac{1}{2}$		A1 oe dep on at least M1
				Total 3 marks

Question	Working	Answer	Mark	Notes
7. (a)	153 – 125 or 28 "28" ÷ 125 (= 0.224)		3	M1 153 ÷ 125 (= 1.224) | 153 ÷ 125 (= 1.224) M1dep "1.224" – 1 (= 0.224) | "1.224" × 100 (= 122.4)
		22.4		A1 cao
(b)	$\frac{153}{85} \times 100$ or $\frac{153}{0.85}$ oe		3	M2 M1 for $\frac{153}{85}$ or 1.8 or 85% = 153 or $0.85x = 153$ oe
		180		A1
				Total 6 marks

Question	Working	Answer	Mark	Notes
8. (a)	$15^2 - 10^2$ or $225 - 100$ or 125		3	M1 | M2 for any complete and correct method
	$\sqrt{"125"}$ or $5\sqrt{5}$			M1 dep on M1 |
		11.2		A1 awrt 11.2
(b)	$\tan C = \frac{10}{12.5}$ or $\tan C = 0.8$		3	M1 | M2 for any complete and correct method
	$\tan^{-1}\left(\frac{10}{12.5}\right)$ oe			M1 |
		38.7		A1 Accept 38.6(5980825.....) rounded or truncated to at least 3 SF.
				Total 6 marks

Question	Working	Answer	Mark	Notes
9. (a)	$(2 \times 7 - 4) \times 90$ or $(7 - 2) \times 180$ or $7\left(180 - \frac{360}{7}\right)$ or $720 + 180$		2	M1 For the sum of the interior angles or an interior angle Eg Allow M1 for $\frac{(7-2)\times 180}{7}$ oe or 128.(571428.....) correctly rounded or truncated to at least 3SF.
		900		A1 Mark the final answer
(b)	$\frac{1}{2}\left(180 - \frac{900}{7}\right)$ or $0.5 \times (360/7)$ or $\frac{128.(571428...)}{5}$		2	M1ft For a complete and correct method
		25.7		A1 Accept 25.5 – 25.72 Allow $\frac{180}{7}$ or $25\frac{5}{7}$ oe
				Total 4 marks

Question	Working	Answer	Mark	Notes
10. (a)	$y=\frac{2x+6}{3}$ or $y=\frac{2}{3}x+2$ e.g. $\frac{4-2}{3-0}$		2	M1 For a correct equation with y the subject or $\frac{\text{diff of } y \text{ values}}{\text{diff of } x \text{ values}}$ for any two correct points on the line. Allow 0.666(66666....) rounded or truncated to at least 3SF instead of $\frac{2}{3}$
		$\frac{2}{3}$		A1 Allow M1A1 if $\frac{2}{3}$ follows an equation with an incorrect constant. Eg y = $\frac{2}{3}x$ + 3 followed by an answer of $\frac{2}{3}$ M1A0 for $\frac{2}{3}x + 2$ or $\frac{2}{3}x$ Allow 0.666(66666....) rounded or truncated to at least 3SF instead of $\frac{2}{3}$
(b)	$5=-3\times2+c$ or $c=5+3\times2$		2	M1
		$y=-3x+11$		A1 Allow ISW oe [e.g. $y-5=-3(x-2)$]
				Total 4 marks

Question	Working	Answer	Mark	Notes
11. (a)			2	M1 For identifying 2^2, 3^3, and 5 or any product of integer powers of 2 and 3 and 5 where at least two powers are correct and the third is greater than 0 or 540
		$2\times2\times3\times3\times3\times5$		A1 Accept $2^2\times3^3\times5$
(b)			2	M1 For identifying 2^3, 3^4, 5 and 7 or any product of integer powers of 2 and 3 and 5 and 7, where at least three powers are correct and the fourth is greater than 0. Accept a product that includes 2,3 and 5 and 7 and multiplies to 22680 (Eg $2^3\times3^2\times5\times7\times9$) or $22\,680$
		$2\times2\times2\times3\times3\times3\times3\times5\times7$		A1 Accept $2^3\times3^4\times5\times7$
				Total 4 marks

Question	Working	Answer	Mark	Notes
12.	Eg $9y = 36$ or $9x = 27$ or $5(7 - x) - 4x = 8$ or $5y - 4(7 - y) = 8$		3	M1 For a correct method to find an equation in x or y. Condone 1 arithmetic error.
		$x = 3,\ y = 4$		A2 Dep on M1 A1 for each value
				Total 3 marks

Question	Working	Answer	Mark	Notes
13. (a)	Eg $80 - 10$		2	M1 for two CF values obtained using IQ values of 85 and 115 ($\pm \frac{1}{2}$ square)
		69 – 73		A1 Accept answer in range 69 – 73 unless clearly obtained by incorrect working
(b)	CF = 75		2	M1 for CF value of 75 or 75.75 stated or marked on the graph.
		108 – 112		A1 Accept answer in range 108 – 112 unless clearly obtained by incorrect working
				Total 4 marks

Question	Working	Answer	Mark	Notes
14.	$(ST =)\ 5+2$ or 7 or $(OT =)\ 2$		2	M1 Accept ST or OT marked correctly on diagram
	PT × 6 = (5+2) ×3 or $PT \times 6 = "7" \times 3$ or $\frac{"7"}{6} \times 3$ oe			M1 dep
		$3\frac{1}{2}$ oe		A1
				Total 3 marks

Question	Working	Answer	Mark	Notes
15.	$\left(\frac{h}{32}\right)^3 = \frac{500}{2000}$ or $\sqrt[3]{\frac{500}{2000}}$ oe or $\sqrt[3]{\frac{2000}{500}}$ or $\frac{2000}{500}$ or 4 or $\frac{500}{2000}$ or $\frac{1}{4}$ or 500 : 2000 oe or 2000 : 500 oe		3	M1 Accept 1.58(7401052.....) or 0.629(9605249.....) rounded or truncated to at least 3 SF
	Eg $(h =)\sqrt[3]{\frac{500}{2000} \times 32^3}$ or $\sqrt[3]{\frac{1}{4} \times 32768}$ or $\sqrt[3]{8192}$ or $\sqrt[3]{\frac{1}{4}} \times 32$ oe			M1 for any correct expression for *h*.
		20.2		A1 for awrt 20.2
				Total 3 marks

Question	Working	Answer	Mark	Notes
16. (a)	$\frac{4}{9}\times\frac{3}{8}$		2	M1
		$\frac{1}{6}$		A1 oe , eg $\frac{12}{72}$ Allow 0.16(666...) rounded or truncated to at least 2dp
(b)	$\frac{5}{9}\times\frac{4}{8}+\frac{4}{9}\times\frac{5}{8}$ or $\frac{20}{72}+\frac{20}{72}$ oe or $1-\frac{4}{9}\times\frac{3}{8}-\frac{5}{9}\times\frac{4}{8}$ or $1-\frac{"1"}{6}-\frac{5}{9}\times\frac{4}{8}$ oe		3	M2 M1 for $\frac{4}{9}\times\frac{5}{8}$ or $\frac{5}{9}\times\frac{4}{8}$ or $\frac{20}{72}$ oe Accept fractions evaluated $\frac{20}{72}=0.277\dot{}$, $\frac{12}{72}=0.166\dot{}$ rounded or truncated to at least 2dp.
		$\frac{5}{9}$		A1 oe, eg $\frac{40}{72}$ or $\frac{20}{36}$ Allow 0.55(5555....) rounded or truncated to at least 2dp
	<u>Alternative: with replacement</u> $\frac{5}{9}\times\frac{4}{9}+\frac{4}{9}\times\frac{5}{9}$ or $\frac{40}{81}$ oe			M2 M1 for $\frac{5}{9}\times\frac{4}{9}$ or $\frac{4}{9}\times\frac{5}{9}$ or $\frac{20}{81}$ oe Accept fractions evaluated $\frac{20}{81}=0.24(691358...)$ $\frac{40}{81}=0.49(382716....)$ rounded or truncated to at least 2dp
				Total 5 marks

Question	Working	Answer	Mark	Notes
17. (a)	$P = kq^3$		3	M1 Allow $kP = q^3$ oe Do not allow $P = q^3$
	$270 = k(7.5)^3$ oe or $k = \frac{270}{7.5^3}$ oe			M1 for correct substitution in a correct equation. Implies first M1
		$P = \frac{16}{25}q^3$		A1 $P = 0.64q^3$ oe with P the subject Award M2A1 if $P = kq^3$ on answer line and k evaluated as $\frac{16}{25}$ in part (a) or part (b)
(b)	Eg $q^2 = \frac{25}{16}$ or $\frac{1}{q^2} = \frac{16}{25}$ or $1 = \frac{16}{25}q^2$ or $q^2 = \frac{1}{0.64}$ Or $P^2 = \frac{25}{16}$ or $\frac{1}{P^2} = \frac{16}{25}$ or $1 = \frac{16}{25}P^2$ or $P^2 = \frac{1}{0.64}$		2	M1 Correct equation involving q^2 or p^2 ft k from an equation of the form $P = kq^3$ if $k \neq 1$
		$1\frac{1}{4}$		A1 $\frac{5}{4}$, 1.25 [ignore 0 or negative value.]
				Total 5 marks

Question	Working	Answer	Mark	Notes
18. (a)			2	M1 For any two of $3x^2$, $-8x$, or 4
		$3x^2-8x+4$		A1 Do not ISW
(b)	$(3x-2)(x-2)\,(=0)$ or $(x=)\dfrac{-(-8)\pm\sqrt{(-8)^2-4\times3\times4}}{2\times3}$		4	M2 For correct factors or correct substitution into the quadratic formula. ft for a 3 term quadratic if M1 scored in (a) Accept + instead of ±. If M2 not scored: M1 for (a) = 0 if M1 scored in (a)
	$x=2$			A1 dep on M2
		(2, 3)		A1 dep on M2
(c)			2	M1 For $x <$ " 2 " or $x >$ "$\frac{2}{3}$" ft positive values from (b) if M1 scored in (b)
		$\dfrac{2}{3}<x<2$		A1 ft positive values from (b) if M1 scored in (b). Accept $\frac{2}{3}$ – 2 or $\frac{2}{3}$ to 2 Do not penalise ≤ or ≥
				Total 8 marks

Question	Working	Answer	Mark	Notes
19. (a)		1, 4, 5, 6, 7	1	B1
(b)		8	1	B1
(c)		1, 4, 7, 8, 9	1	B1
(d)		5, 6, 7	1	B1
				Total 4 marks

Question	Working	Answer	Mark	Notes
20. (a)	Eg $\frac{2(2x^2+1)}{(2x^2+1)-1}$		2	M1 For a correct expression
		$\frac{(2x^2+1)}{x^2}$		A1 Accept $2+\frac{1}{x^2}$ or $2+x^{-2}$ M1A0 for $\frac{4x^2+2}{2x^2}$
(b)	$y(x-1)=2x$ or $yx-y=2x$		3	M1 $x(y-1)=2y$ or $xy-x=2y$
	$x(y-2)=y$			M1 $y(x-2)=x$
		$\frac{x}{x-2}$		A1 Allow $\frac{-x}{2-x}$
				Total 5 marks

Question	Working	Answer	Mark	Notes
21.	$\frac{1}{3}\pi r^2 \times 15 = 320\pi$		5	M1
	$(r=)\sqrt{\frac{3\times320\pi}{15\pi}}$ or $(r=)\sqrt{\frac{320}{5}}$ or $(r=)\sqrt{64}$ or $(r=)\ 8$			M1 For any correct expression for r
	$l=\sqrt{15^2+"8"^2}$ or $l=17$			M1 dep on M2
	$S=\ \pi\times"8"\times\sqrt{15^2+"8"}$ or $S=\pi\times8\times"17"$			M1 ft for r and l if all M marks scored. Allow M1 for $\pi\times"8"\times\sqrt{15^2+"8"}\ +\pi\times"8"^2$
		427		A1 for awrt 427 Accept 136π
				Total 5 marks

Question	Working	Answer	Mark	Notes
22.	$(2\sqrt{7})^2=(2x+1)^2+(2x-1)^2-2(2x+1)(2x-1)\cos60^\circ$ or $\cos60=\frac{(2x+1)^2+(2x-1)^2-(2\sqrt{7})^2}{2(2x+1)(2x-1)}$		3	M1 Accept 5.29 (1502622...) in place of $2\sqrt{7}$ rounded or truncated to at least 3SF Condone $2\sqrt{7}^2$
	$28=4x^2+4x+1+4x^2-4x+1-2(4x^2-1)\frac{1}{2}$ or (e.g.) $28=4x^2+4x+1+4x^2-4x+1-4x^2+1$ or $28=4x^2+3$ or $25=4x^2$			M1 Correct simplification as far as the first expression shown, or better.
		$2\frac{1}{2}$		A1 oe dep on at least M1
				Total 3 marks

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