

International GCSE in Mathematics A - Paper 1H mark scheme

Question	Working	Answer	Mark	AO	Notes
1	$7800 \div 9.75$ or $7800 \div 585 \times 60$	800	3	AO2	M2 M1 for $7800 \div 9.45$ or $7800 \div 585$ or $13.3\dots$ A1
2	$28 \div (6 - 4)$ (=14) '14' \times 3 (=42)	42	3	AO1	M1 or use of cancelled ratios (e.g. $3 : 6 : 4 = 0.75 : 1.5 : 1$) M1 (dep) $28 \div 0.5$ (=56) or cancelled ratios, (e.g. 56×0.75) or M2 for $28 \div \frac{2}{3}$ oe A1
3	a b $(12 \times 2.5) + (6 \times 7.5) + (4 \times 12.5) + (6 \times 17.5) + (14 \times 22.5) + (18 \times 27.5)$ or $30 + 45 + 50 + 105 + 315 + 495$ or 1040 '1040' \div 60	$25 < d \leq 30$ $17\frac{1}{3}$	1 4	AO3 AO3 AO3	B1 B1 identifies 25 \rightarrow 30 class M2 M1 for frequency \times consistent value within interval NB. Products do not need to be added Condone one error M1 A1 accept 17.3(33...) M1 for $\frac{a}{60}$ with $a < 60$ or $\frac{32}{b}$ with $b > 32$ A1
c		$\frac{32}{60}$ oe	2		

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4	<p><u>Working with all 12 boxes</u></p> $12 \times 15 (=180) \text{ or } 12 \times 12 (=144)$ $12 \times 12 \times \frac{3}{4} \times 1.6 \text{ oe } (=172.8)$ $12 \times 15 \times 1.15 \text{ oe } (=207) \text{ or}$ $180 \times 0.15 \text{ oe } (=27)$ $\frac{'207' - '172.8'}{36} \text{ or } \frac{34.2}{36} \text{ or}$ $\frac{'27' + ('180' - '172.8')}{36}$	0.95	5	AO1	<p>M1 for correct total cost or correct total number of melons (either may appear as part of another calculation)</p> <p>M1 for revenue from all full price melons sold</p> <p>M1 for total revenue or total profit</p> <p>M1 dep on M3</p> <p>A1 cao</p>
	<p><u>Alternative – working with one box</u></p> $15 \div 12 (=1.25) \text{ or } 12 \times \frac{3}{4} (=9)$ $12 \times \frac{3}{4} \times 1.6 \text{ oe } (=14.4)$ $15 \times 1.15 (=17.25)$ $\frac{'17.25' - '14.4'}{3} \text{ or } \frac{2.85}{3}$	0.95	5		<p>M1 for price of 1 melon or number of full price melons</p> <p>M1 for revenue from all full price melons sold</p> <p>M1 for total revenue from one box</p> <p>M1 dep on M3</p> <p>A1 cao</p>

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5	Circular arc, centre B , to intersect both lines AB and BC Equal length arcs, from intersections on each line, meeting to give a point on the bisector	correct bisector	2	AO2	M1 A1 dep on M1 Full construction shown.
6					
a		$9e^2f(2e + 5f^3)$	2	AO1	M1 Any correct partially factorised expression A1
b	$(x \pm 6)(x \pm 2)$ $(x - 6)(x + 2)$			AO1	M1 or correct substitution into quadratic formula (condone one sign error) M1 $\frac{4 \pm \sqrt{64}}{2}$ A1 dep. on at least M1
7	$\cos 35 = \frac{PR}{17.6}$ $17.6 \times \cos 35$	$6, -2$	3	AO2	M1 M1 A1 $14.4 \sim 14.42$
8	$22.50 \div 15 (=1.5)$ or $100 \div 15$ (=6.6...) "1.5" $\times 100 (=150)$ or "6.6..." $\times 22.5(0)$	150	3	AO1	M1 M1 dep A1 } M2 for $22.5 \div 0.15$

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9	a	140 000	1	AO1	B1
	b	Mars	1	AO1	B1
	c	$1.2 \times 10^5 - 5 \times 10^4$ or 120000 – 50000 or 70000 or	2	AO1	M1
	d	$3.5 \times 10^3 : 1.4 \times 10^6$	2	AO1	A1 M1 A1
10	$\sqrt{9.5^2 - 7.6^2}$ or $\sqrt{90.25 - 57.76}$ or $\sqrt{32.49}$ or $\sqrt{32.5}$ (BC =) 5.7			AO2	M1
	$\frac{1}{2} \times 7.6 \times 5.7$ or 21.6(6) or 21.7 $\frac{1}{2} \times \pi \times \left(\frac{5.7}{2}\right)^2$ or 12.7(587...) or 12.8	34.4	5		A1 M1 M1 M1 A1 M1 M1 A1

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11	e.g. $(x^2 + 5x - 3x - 15)(x + 3)$ or $(x^2 + 2x - 15)(x + 3)$ or $(x - 5)(x^2 + 3x - 3x - 9)$ or $(x - 5)(x^2 - 9)$ E.g. $x^3 + 3x^2 + 2x^2 + 6x - 15x - 45$ or $x^3 + 5x^2 - 9x - 45$			AO1	M1 expansion of any two of the three brackets – at least 3 correct terms M1 (dep) fit for at least 3 correct terms in second expansion A1
12 a	14 16 17 18 20 21 22 23 23 24 24 (14 16 17 18 20 <u>21</u> 22 23 23 24 24) (14 16 <u>17</u> 18 20) and (22 23 <u>23</u> 24 24) 23 - 17		3	AO3	M1 arrange in order or One of 21(median), 17(LQ), 23(UQ) identified M1 Identify any two of 21, 17 and 23
b		Carmelo and reason using IQR	6 3 1	AO3	A1 cao B1 fit from (a) Carmelo - he has a lower IQR oe (IQR must be part of the statement)

Question	Working	Answer	Mark	AO	Notes
13 a	$m = \frac{5-2}{-3-1} \text{ or } -\frac{3}{4} \text{ oe}$ <p>eg. $2 = -\frac{3}{4} \times 1 + c$ or</p> $y - 2 = -\frac{3}{4}(x - 1)$ $y = -\frac{3}{4}x + \frac{11}{4}$			AO1	M1 for gradient M1 for method to find c
b	$y = \frac{1-2x}{6} \text{ or } m = -\frac{1}{3} \text{ oe}$	$3x + 4y = 11$	4	AO1	M1 found values of m and c substituted in $y = mx + c$ A1 M1
14	$26 \neq 20 (=1.3) \text{ or}$ $3.6 \times 10 \text{ or } 3.3 \times 10 \text{ or } 1 \times 30 \text{ or}$ $36 \text{ or } 33 \text{ or } 30 \text{ or } \frac{26}{130} \left(= \frac{1}{5} \right)$ $26 + 3.6 \times 10 + 3.3 \times 10 + 1 \times 30 \text{ or}$ $26 + 36 + 33 + 30 \text{ or } 625 \times \frac{1}{5} \text{ or}$ $(130 + 180 + 165 + 150) \times \frac{1}{5}$	<p>shown</p> <p>125</p>	2	AO3	A1 for conclusion from correct gradients M1 Any one frequency density (without contradiction) or, e.g. $1 \text{ cm}^2 = 5$ or clear association of area with frequency M1 Any fully correct complete method; condone one error in bar width or bar height
			3		A1

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15 a	$(3x + 2)(2x + 1) = 100$			AO1, AO2	M1 or $(2x \times 3x) + 2(2x + 1) + 3x = 100$ oe or $(2x \times 3x) + (2 \times 2x (\times 1)) + 1 + 3x + 1 + 1 = 100$ oe other partitions are acceptable but partitioning must go on to form a correct equation.
		$6x^2 + 7x - 98 = 0$ *	2		A1 Accept $6x^2 + 7x + 2 = 100$ if M1 awarded * Answer given
b	$(3x + 14)(2x - 7) (= 0)$			AO1	M2 or $(x =) \frac{-7 \pm \sqrt{49 + 2352}}{12}$ or $(x =) \frac{-7 \pm \sqrt{2401}}{12}$ If not M2 then M1 for $(3x \pm 14)(2x \pm 7)$ or $(x =) \frac{-7 \pm \sqrt{7^2 - 4 \times 6 \times -98}}{2 \times 6}$
	$x = 3.5$ (Area =)				A1 Dependent on at least M1 Ignore negative root
	$6 \times '3.5'^2$ or $(3 \times '3.5') \times (2 \times '3.5')$	73.5	5		M1 ft Dependent on at least M1 and $x > 0$ A1

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16	$180 - 77 - 39$ or $\angle BAD = 77^\circ$ and $\angle ABD = 39^\circ$ or $\angle BA'X'' = 64^\circ$ where X is on PA produced or a fully correct method to find angle ADB	64	5	AO2	M2 also accept 103 –39 M1 for $\angle BAD = 77^\circ$ or $\angle ABD = 39^\circ$ (angles may be stated or marked on diagram) B1 Opposite angles in a cyclic quadrilateral add up to 180° B1 Alternate segment theorem oe A1 cao
17	41.5 or 42.5 or 24.5 or 23.5 or 14.5 or 13.5 $(y =) \frac{2 \times 41.5}{24.5 - 13.5}$	7.5	3	AO1	B1 M1 A1 A1 accept $\frac{83}{11}$ or 7.55 or $7.\dot{5}\dot{4}$ (depending on M1) NB. Answer must come from correct working

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18	$\frac{(x-1) \times (3x+2)}{(x^2-1)}$ $(x+1)(x-1)$ eg $\frac{3(x+1) - (3x+2)}{(x+1)}$	$\frac{1}{x+1}$	4	AO1	M1 correct method for division M1 correct factorisation of $x^2 - 1$ M1 correct single fraction A1
19	$130 = \pi \times 4.5 \times l$ $l = \frac{130}{4.5\pi}$ or $l = 9.1956$ $\sin(AVB) = 4.5 / 9.20$ (= 0.489..)	58.6	4	AO2	M1 For exact expression or answer which rounds to 9.2 M1 For a correct expression for $\sin AVO$ or $\cos AVB$ $\cos(AVB) = (9.2^2 - 9^2) / (2 \times 9.2 \times 9.2)$ (= 0.521...) A1 awrt 58.6
20	ai aii aiii b	(0, 5) (3, 10) (1, 5) translation $\begin{pmatrix} 0 \\ -4 \end{pmatrix}$	1 1 1 1	AO1 AO1	B1 B1 B1 B1

Question	Working	Answer	Mark	AO	Notes
21	$\left(\frac{dy}{dx}\right) = 2 \times 8x - 2x^{-2}$ $2 \times 8x - 2x^{-2} = 0$ $x^3 = \frac{1}{8} \text{ or } x = 0.5 \text{ oe}$	(0.5, 6)	5	AO1	M2 (M1 for one term differentiated correctly) M1 dep on M1 M1 A1
22	$\overrightarrow{AE} = \overrightarrow{AD} + \overrightarrow{DE} \text{ oe}$ $\text{eg. } \overrightarrow{DE} = \frac{1}{3}\overrightarrow{DB} \text{ or } \overrightarrow{BE} = \frac{2}{3}\overrightarrow{BD}$ $\overrightarrow{AE} = 2\mathbf{b} + 4\mathbf{a}$ $\overrightarrow{BC} = \overrightarrow{BA} + \overrightarrow{AD} + \overrightarrow{DC} (=3\mathbf{b} + 6\mathbf{a})$	$\text{eg. } \overrightarrow{AE} = 2(\mathbf{b} + 2\mathbf{a})$ $\text{and } \overrightarrow{BC} = 3(\mathbf{b} + 2\mathbf{a})$	5	AO2	M1 may be fully or partially in terms of \mathbf{a} and/or \mathbf{b} M1 correct use of ratio A1 M1 may be fully or partially in terms of \mathbf{a} and/or \mathbf{b} A1 NB Correct expressions for \overrightarrow{BC} and \overrightarrow{AE} must be given

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23	$a + 3d = 17$ or $a + 9d = 35$ or $35 - 17 = 6d$ $d = 3$ $a = 8$ $\frac{50}{2}(2 \times '8' + (50 - 1) \times '3')$ oe	4075	5	AO1	M1 for $17 = 4p + q$ and $35 = 10p + q$ $p = 3$ and $q = 5$ $u_1 = 8$ and $u_{50} = 155$ $\frac{1}{2} \times 50(8 + 155)$