

International GCSE in Mathematics A – Paper 3H mark scheme

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

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

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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	$(x \pm 6)(x \pm 2)$	$9e^2f(2e + 5f^3)$	2	AO1	M1 A1 Any correct partially factorised expression
b	$(x - 6)(x + 2)$			AO1	M1 or correct substitution into quadratic formula (condone one sign error)
					M1 $4 \pm \frac{\sqrt{64}}{2}$
7		$6, -2$	3		A1 dep. on at least M1
	$\cos 35 = \frac{PR}{17.6}$			AO2	M1
	$17.6 \times \cos 35$				M1
		14.4	3		A1 14.4 ~ 14.42
8	$22.50 \div 15 (=1.5)$ or $100 \div 15 (=6.6\dots)$ "1.5" $\times 100 (=150)$ or "6.6..." $\times 22.5(0)$			AO1	M1 M2 for $22.5 \div 0.15$
		150	3		M1 dep A1

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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 oe	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 $\frac{1}{2} \times 7.6 \times 5.7$ 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	AO2	M1
					A1
					M1
					M1
					dep on first M1 or e.g. $ACB = \sin^{-1}\left(\frac{7.6}{9.5}\right)$ (= 53.1...) and $\frac{1}{2} \times 9.5 \times 5.7 \times \sin 53.1^\circ$ dep on first M1
					for answer rounding to 34.4 ($\pi \rightarrow 34.4187\dots$ 3.14 \rightarrow 34.4123...)

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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) ft for at least 3 correct terms in second expansion A1
12	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			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	3 1	AO3	A1 cao B1 ft from (a) Carmelo - he has a lower IQR oe (IQR must be part of the statement)

Question	Working	Answer	Mark	AO	Notes
13 a	$m = \frac{5-2}{-3-1}$ or $-\frac{3}{4}$ oe			AO1	M1 for gradient M1 for method to find c
	eg. $2 = -\frac{3}{4} \times 1 + c$ or $y - 2 = -\frac{3}{4}(x - 1)$ $y = -\frac{3}{4}x + \frac{11}{4}$				
b	$y = \frac{1-2x}{6}$ or $m = -\frac{1}{3}$ oe	$3x + 4y = 11$	4	AO1	M1 found values of m and c substituted in $y = mx + c$ A1 M1
14	$26 \div 20 (=1.3)$ or 3.6×10 or 3.3×10 or 1×30 or 36 or 33 or 30 or $\frac{26}{130} \left(= \frac{1}{5} \right)$	shown	2	AO3	A1 for conclusion from correct gradients
	$26 + 3.6 \times 10 + 3.3 \times 10 + 1 \times 30$ or $26 + 36 + 33 + 30$ or $625 \times \frac{1}{5}$ or $(130 + 180 + 165 + 150) \times \frac{1}{5}$				M1 Any 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
		125	3		A1

Question	Working	Answer	Mark	AO	Notes
15	a			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.
	b	$6x^2 + 7x - 98 = 0$ * $(3x + 14)(2x - 7) (= 0)$ $x = 3.5$ (Area =) $6 \times '3.5'^2$ or $(3 \times '3.5') \times (2 \times '3.5')$	2	AO1	A1 Accept $6x^2 + 7x + 2 = 100$ if M1 awarded * Answer given 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 $(x =) \frac{-7 \pm \sqrt{7^2 - 4 \times 6 \times -98}}{2 \times 6}$ A1 M1 ft A1 Dependent on at least M1 Ignore negative root Dependent on at least M1 and $x > 0$
		73.5	5		

Question	Working	Answer	Mark	AO	Notes
18	$\frac{(3x+2)}{(x-1) \times \frac{(x^2-1)}{(x^2-1)}}$ $\frac{(x+1)(x-1)}{3(x+1) - (3x+2)}$ eg $\frac{1}{(x+1)}$	$\frac{1}{x+1}$	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 $l = 9.1956$ $\sin(A/O) = 4.5 / 9.20$ (= 0.489..)			AO2	M1 For exact expression or answer which rounds to 9.2
20		58.6 (0, 5) (3, 10) (1, 5) translation $\begin{pmatrix} 0 \\ -4 \end{pmatrix}$	4	AO1	M1 For a correct expression for $\sin A/O$ or $\cos AVB$ $\cos(A/B) = (9.2)^2 + 9.2^2 - 9^2 / (2 \times 9.2 \times 9.2)$ (= 0.521...) awrt 58.6 B1 B1 B1 B1
ai			1	AO1	B1
aii			1		B1
aiii			1		B1
b			1	AO1	B1

Question	Working	Answer	Mark	AO	Notes
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 $u_{50} = 155$ $\frac{1}{2} \times 50(8 + 155)$