

International GCSE in Mathematics A – Paper 4H mark scheme

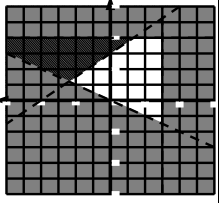
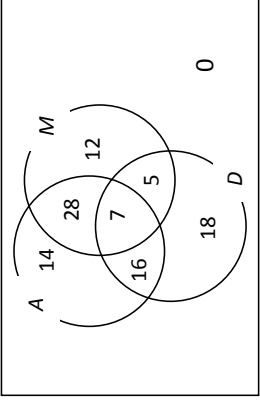
Question	Working	Answer	Mark	AO	Notes
1	$2 \times 2 \times 5$ or $2 \times 3 \times 5$ or $3 \times 3 \times 5$ or two of 20, 40, 60 ... 30, 60, 90 ... 45, 90, 105 $2 \times 2 \times 5$ and $2 \times 3 \times 5$ and $3 \times 3 \times 5$ or all of 20, 40, 60, 80 ... 180 30, 60, 90 ... 180 45, 90, 105 ... 180			AO1	M1 for one of 20, 30, 45 written as product of prime factors or list of at least 3 multiples of any two of 20, 30, 45
2		180	3		A1 for 180 or $2 \times 2 \times 3 \times 3 \times 5$ oe
3		$7n - 5$ oe	2	AO1	M1 for $7n + k$ (k may be zero) A1
3	$\frac{1}{2} \times (10 + 14) \times 9$ oe (= 108) '108' $\times 6$ (=648) '648' $\times 0.7$	453.6	4	AO2	M1 for area of cross section M1 (dep on previous M1) for volume of prism M1 (independent) A1 accept 454

Question	Working	Answer	Mark	AO	Notes
4		p^9 m^{-12} 1	1	AO1	B1
				AO1	B1
				AO1	B1
d		$\frac{1}{2^3}$	1	AO1	B1
e	$5x + 35 = 2x - 10$ or $x + 7 = \frac{2x}{5} - \frac{10}{5}$ eg. $5x - 2x = -10 - 35$ or $7 + \frac{10}{5} = \frac{2x}{5} + x$			AO1	M1 for removing bracket or dividing all terms by 5
5	$14000 \times 4 (=56000)$ $0.075 \times '56000' (=4200)$ or $0.075 \times 14000 (=1050)$ $'56000' - '42000'$ or $14000 - '1050'$	-15	3		M1 for isolating x terms in a correct equation
		51 800	4	AO1	A1 dep on M1
					M1 NB, multiplication by 4 may occur before or after percentage decrease
					M1 (dep)
					A1

Question	Working	Answer	Mark	AO	Notes
6 a		triangle with vertices (3, -1) (3, -4) (5, -4)	1	AO2	B1
b		Rotation centre (-3, 0) 90° anticlockwise	3	AO2	B1 B1 B1 accept +90°, 270° clockwise, -270° NB. If more than one transformation then no marks can be awarded
7 a	$4 \times 15 (=60)$ or $\frac{a + b + c + d}{4} = 15$ or $4 \times 15 = 39$			AO3	M1
b	$d - a = 10$ or $a = 11$ or $a = "21" - 10$ or $b + c = 39 - 11 = 28$	21	2	AO3	A1 M1 ft from (a) (can be implied by 11, b, c, 21 OR a, b, c, d with $b + c = 28$)
8	$0.02 \times 40\,000 (=800)$ or $1.02 \times 40\,000 (=40800)$ or 2400 "40800" $\times 0.02 (=816)$ and "41616" $\times 0.02 (=832.32)$ OR 2448.32	14	2	AO1	A1 cao M1 M1 (dep) method to find interest for year 2 and year 3
		42448.32	3		A1

Question	Working	Answer	Mark	AO	Notes
9	$3x + y = 13$ or $6x + 2y = 26$ $- 3x - 6y = 27$ + $x - 2y = 9$ eg. $3x - 2 = 13$ or $15 + y = 13$	5, -2	3	AO1	M1 multiplication of one equation with correct operation selected or rearrangement of one equation with substitution into second M1 (dep) correct method to find second variable A1 for both solutions dependent on correct working
10	$\frac{14}{3} + \frac{32}{9}$ $\frac{14}{3} \times \frac{9}{32}$ or $\frac{126}{27} + \frac{96}{27}$ or $\frac{42}{9} + \frac{32}{9}$	answer given	3	AO1	M1 M1 A1 correct answer from correct working
11	$(6 - 2) \times 180 (=720)$ $'720' - (86 + 123 + 140 + 105)$ $(=266)$ or $'720' - 454 (=266)$ $'266' \div 2$	133	4	AO2	M1 complete method to find sum of interior angles M1 dep on 1 st method mark M1 dep on 1 st method mark A1

Question	Working	Answer	Mark	AO	Notes
12 a b c		8, 25, 50, 90, 112, 120	1	AO3	B1 cao
	Plotting points from table at ends of interval Points joined with curve or line segments		2	AO3	M1 A1 $\pm \frac{1}{2}$ sq ft from sensible table ie clear attempt to add frequencies ft from points if 4 or 5 correct or if all points are plotted consistently within each interval at the correct heights Accept cf graph which is not joined to the origin NB A bar chart, unless it has a curve going consistently through a point in each bar, scores no points. for 60 (or 60.5) indicated on cf axis or stated If M1 scored, ft from cf graph
	60 (or 60.5) indicated on cf graph or stated	approx 33	2	AO3	A1 If no indication of method, ft only from correct curve & if answer is correct ($\pm \frac{1}{2}$ sq tolerance) award M1 A1
13	$p - c = \frac{1}{2}ab^2$ $\frac{2(p - c)}{a} = b^2$	$b = \sqrt{\frac{2(p - c)}{a}}$	3	AO1	M1 M1 A1 Isolate term in b Isolate b^2 oe with b as the subject

Question	Working	Answer	Mark	AO	Notes
14	a	2 correct points plotted eg (0, 4) and (3, 0) $4x + 3y = 12$ drawn	2	AO1	M1
	b	correct region 			3
15	a		3	AO1	B3 Correct diagram B2 for 3 over-lapping circles with 7 in intersection and at least 2 other correct numbers B1 for 3 over-lapping circles with 7 in intersection
	b	$\frac{34}{100} \text{ oe}$	1	AO3	B1 ft from diagram
	c	$\frac{23}{46} \text{ oe}$	1	AO3	B1 ft from diagram

Question	Working	Answer	Mark	AO	Notes
16 a	$M = \frac{k}{g^3}$ or $M \propto \frac{k}{g^3}$			AO1	M1
	$24 = \frac{k}{2.5^3}$ oe or ($k = 375$)	$M = \frac{375}{g^3}$	3		M1 implies first M1 A1 accept $M = \frac{k}{g^3}$ with $k = 375$ stated elsewhere in question
b	$(g =)^3 \sqrt[3]{375 + \left(\frac{1}{9}\right)}$ oe or $\sqrt[3]{3375}$	15	2	AO1	M1
17 a b c		-3	1	AO1	B1
	$g(2) = 6$	2	1	AO1	B1
		0.75 oe	2	AO1	M1 A1
18	correct length scale factor			AO2	M1
	eg $\sqrt[3]{\frac{384}{864}}$ or $\frac{2}{3}$ or $\frac{3}{2}$ $\left(\frac{2}{3}\right)^3 \times 2457$	728	3		M1 for complete method A1

Question	Working	Answer	Mark	AO	Notes
19		E, B, D, A	3	AO1	B3 All correct B2 for 3 correct B1 for 2 correct
20					
a	$\frac{4}{9} \times \frac{3}{8}$			AO3	M1
b	$\frac{5}{9} \times \frac{4}{8} + \frac{4}{9} \times \frac{5}{8} - \frac{20}{72} + \frac{20}{72}$ oe or $1 - \frac{4}{9} \times \frac{3}{8} - \frac{5}{9} \times \frac{4}{8}$ or $1 - \frac{11}{6} - \frac{5}{9} \times \frac{4}{8}$ oe	$\frac{1}{6}$ $\frac{5}{9}$	2	AO3	A1 oe, eg $\frac{12}{72}$ Allow 0.16(666...) rounded or truncated to at least 2dp 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 $\frac{20}{72} = 0.277\dot{7}$, $\frac{12}{72} = 0.16\dot{6}$ rounded or truncated to at least 2dp
			3		A1 oe, e.g. $\frac{40}{72}$ or $\frac{20}{36}$

Question	Working	Answer	Mark	AO	Notes
21	$\frac{\sin 47}{13.8} = \frac{\sin MLN}{8.5}$ $MLN = \sin^{-1}\left(\frac{\sin 47 \times 8.5}{13.8}\right)$ $MLN = 26.7(73\dots)$ $LMN = 180 - 47 - '26.7\dots' \text{ or } 106(2260622\dots)$ $\frac{1}{2} \times 8.5 \times 13.8 \times \sin('106\dots')$	56.3	6	AO2	<p>M1 Or method using a right angled triangle to find length MX (MX is perpendicular to LN)</p> $\sin 47 = \frac{MX}{8.5}$ <p>M1 Or $\cos^{-1} = \frac{8.5 \sin 47}{13.8}$</p> <p>A1 $LMN = 63.232$</p> <p>M1 $LMN = 63.232 + (180 - (90+47))\dots$ or $106(2260622\dots)$</p> <p>M1</p> <p>A1 Accept an answer that rounds to 56.3 or 56.4 unless clearly obtained from incorrect working.</p>
22	<p>a</p> $2(x^2 - 4x) + 9 \text{ or}$ $2(x^2 - 4x + \frac{9}{2})$ $2((x - 2)^2 - 2^2) + 9 \text{ or}$ $2((x - 2)^2 - 2^2 + \frac{9}{2})$			AO1	M1
b		$2(x - 2)^2 + 1$ explanation	3	AO1	A1
			1	AO1	B1 E.g. Because minimum is at (2, 1)

Question	Working	Answer	Mark	AO	Notes
23	$BC = BA + AC \quad \text{or}$ $\begin{pmatrix} -2 \\ -3 \end{pmatrix} + \begin{pmatrix} 9 \\ 4 \end{pmatrix} \quad \text{or} \quad \begin{pmatrix} 7 \\ 1 \end{pmatrix}$ $\sqrt{7^2 + 1^2}$	$\sqrt{50}$ oe	3	AO2	<p>M1</p> <p>M1 dep</p> <p>A1 accept 7.07(06...)</p>
24	$\frac{(\sqrt{12} - 1)(2 + \sqrt{3})}{(2 - \sqrt{3})(2 + \sqrt{3})}$ $\frac{2\sqrt{12} - 2 + \sqrt{12}\sqrt{3} - \sqrt{3}}{4 - 3}$ $\sqrt{12} = 2\sqrt{3}$	shown	4	AO1	<p>M1 method to rationalise</p> <p>M1 correct expansion of brackets</p> <p>B1 may be seen before expansion</p> <p>A1 answer from fully correct working with all steps seen</p>
25	$(v =) 3t^2 - 5 \times 2t - 8$ $3t^2 - 10t - 8 = 0$ $(3t + 2)(t - 4) = 0$	4	4	AO1	<p>M1 for 2 out of 3 terms differentiated correctly</p> <p>A1 correct equation</p> <p>M1 for method to solve quadratic</p> <p>A1 $t = 4$ only</p>