

International GCSE in Mathematics A - Paper 2H mark scheme

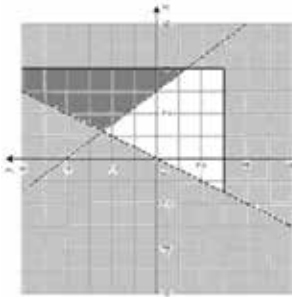
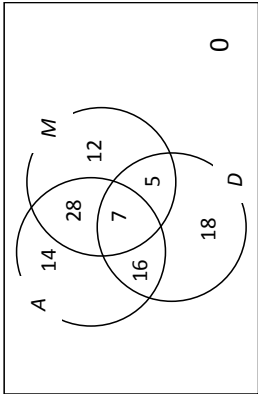
Question	Working	Answer	Mark	AO	Notes
1	$2 \times 2 \times 5$ or $2 \times 3 \times 5$ or $3 \times 3 \times 5$ or two of 20, 40, 60 ... 30, 60, 90 ... 45, 90, 105 $2 \times 2 \times 5$ and $2 \times 3 \times 5$ and $3 \times 3 \times 5$ or all of 20, 40, 60, 80 ... 180 30, 60, 90 ... 180 45, 90, 105 ... 180	180	3	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 M1
2		$7n - 5$ oe 180	2	AO1	M1 for $7n + k$ (k may be zero) A1 for 180 or $2 \times 2 \times 3 \times 3 \times 5$ oe
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	a	p^9	1	AO1	B1
	b	m^{-12}	1	AO1	B1
	c	1	1	AO1	B1
	d	$2^{\frac{1}{3}}$	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		-15	3		M1 for isolating x terms in a correct equation
				AO1	A1 dep on M1
					M1 NB. multiplication by 4 may occur before or after percentage decrease
					M1 (dep)
		51 800	4		A1

Question	Working	Answer	Mark	AO	Notes
6 a b		triangle with vertices (3, -1) (3, -4) (5, -4)	1	AO2	B1
		Rotation centre (-3, 0)		AO2	B1
		90° anticlockwise	3		B1
					accept +90°, 270° clockwise, -270° NB. If more than one transformation then no marks can be awarded
7 a b	$4 \times 15 (=60)$ or $\frac{a+b+c+d}{4} = 15$ or $4 \times 15 - 39$			AO3	M1
	$d - a = 10$ 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 $b + c = 28$)
		14	2		A1 cao
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	42448.32	3	AO1	M1 M1 (dep) method to find interest for year 2 and year 3

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	$\frac{14}{3} \div \frac{32}{9}$ $\frac{14}{3} \times \frac{9}{32}$ or $\frac{126}{27} \div \frac{96}{27}$ or $\frac{42}{9} \div \frac{32}{9}$	answer given	3	AO1	M1 M1
11	$(6 - 2) \times 180 (=720)$ '720' - $(86 + 123 + 140 + 105)$ $(=266)$ or '720' - 454 (=266) '266' $\div 2$	133	4	AO2	M1 correct answer from correct working 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	8, 25, 50, 90, 112, 120	1	AO3	B1 cao	
	b			AO3	M1 $\pm \frac{1}{2}$ 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.	
	c		2			M1 for 60 (or 60.5) indicated on cf axis or stated
				2		A1 If M1 scored, ft from cf graph 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 Isolate term in b	
					M1 Isolate b^2	
					A1 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		AO1	M1
			2		A1
	b	 <p>Correct region</p>	3	AO1	B3 Correct region B2 for $x = 4$ and $y = -3$ drawn and consistent shading correct for at least two inequalities B1 for $x = 4$ and $y = -3$ drawn
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 ($k = 375$)				M1 implies first M1
		$M = \frac{375}{3^3}g$	3		A1 accept $M = \frac{k}{g^3}$ with $k = 375$ stated elsewhere in question
	b			AO1	M1
	$(g =) \sqrt[3]{375 \div \left(\frac{1}{9}\right)}$ oe or $\sqrt[3]{3375}$	15	2		A1
17 a b c		-3	1	AO1	B1
		2	1	AO1	B1
	$g(2) = 6$			AO1	M1
		0.75 oe	2		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	<p>a</p> $\frac{4}{9} \times \frac{3}{8}$ <p>b</p> $\frac{5}{9} \times \frac{4}{8} + \frac{4}{9} \times \frac{5}{8} \text{ or } \frac{20}{72} + \frac{20}{72} \text{ oe}$ $\text{or } 1 - \frac{4}{9} \times \frac{3}{8} - \frac{5}{9} \times \frac{4}{8} \text{ or } 1 - \frac{11}{6} - \frac{5}{9} \times \frac{4}{8}$ <p>oe</p>	$\frac{1}{6}$ $\frac{5}{9}$	2	AO3	<p>M1</p> <p>A1 oe, eg $\frac{12}{72}$</p> <p>Allow 0.16(666...) rounded or truncated to at least 2dp</p> <p>M2 $\frac{4}{9} \times \frac{5}{8}$ or $\frac{5}{9} \times \frac{4}{8}$ or $\frac{20}{72}$ oe</p> <p>Accept fractions evaluated</p> $\frac{20}{72} = 0.27\dot{7}, \frac{12}{72} = 0.1\dot{6}\dot{6}$ <p>rounded or truncated to at least 2dp</p> <p>A1 oe, e.g. $\frac{40}{72}$ or $\frac{20}{36}$</p>

Question	Working	Answer	Mark	AO	Notes
21	$\frac{\sin 47}{13.8} = \frac{\sin MLN}{8.5}$ $MLN = \sin^{-1}\left(\frac{\sin 47 \times 8.5}{13.8}\right)$ $MLN = 26.7(73\dots)$ $LMN = 180 - 47 - '26.7\dots'$ or $106(.2260622\dots)$ $\frac{1}{2} \times 8.5 \times 13.8 \times \sin('106')$	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 $LMX = 63.232$</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> $2(x^2 - 4x) + 9$ or $2(x^2 - 4x + \frac{9}{2})$ $2((x - 2)^2 - 2^2) + 9$ or $2((x - 2)^2 - 2^2 + \frac{9}{2})$			AO1	M1
b		$2(x - 2)^2 + 1$ <p>explanation</p>	3	AO1	<p>A1</p> <p>B1 E.g. Because minimum is at (2, 1)</p>

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