GCSE
Paper 2H

Practice Set A (AQA Versions)

Question		Working	Answer	Mark	Notes
1			(–2, –3)	1	
2			2(*m*+1)(*m*+3)	1	
3			**D**	1	
4	(a)		(1,0)	1	B1 : cao
	(b)		rotation	3	B1 : orientation of the shape correct
					B2 : all the vertices of the shape correct at (0, –2), (0, –6) and (–3, –2). (B1 for one vertex wrong **or** all vertices consistently shifted by ± 1 unit).
					NB: candidates do not need to label the coordinates of *P*'.

CM GCSE Practice Papers / Set A / Paper 2H (AQA VERSION)

CM GCSE Practice Papers / Set A / Paper 2H (AQA VERSION)				
Question	Working	Answer	Mark	Notes
5		£4.10	3	P1 : attempts to find the subtotal. This may be seen through dividing 22.50 by 1.2 **or** the equation $x + 0.2x = 22.50$ **or** stating that 120% of subtotal = 22.50 followed by an attempt to work 100%
				A1 : subtotal either £18.75 or 1875p (condone omission of units)
				A1 : correct price of drinks
6	$BC = 6\tan 52 = 7.679...$ $MC = \dfrac{1}{2}BC = 3.8398...$ $CD = \sqrt{5^2 - (3.839...)^2}$ $= 3.202...$	3.20 cm	4	P1 : attempting to find BC using tan ratio (6/tan(52) is P1)
				A1 : length of BC correctly evaluated
				P1 : for $CD = \sqrt{5^2 - \left(\text{their } \dfrac{BC}{2}\right)^2}$
				A1ft : correct length of CD (ft their BC)
7	Total goals scored in 25 rounds $=2.80 \times 25 = 70$ A mean of 3.00 in 26 rounds would require total number of goals to be $=3 \times 26=78$ The team need to score 8 goals.	8	3	M1 : for an attempt to calculate the total number of goals scored by the team in 25 rounds
				M1 : for an attempt to calculate the total number of goals required by the team after 26 rounds to obtain a mean of 3
				A1 : cao

CM GCSE Practice Papers / Set A / Paper 2H (AQA VERSION)				
Question	Working	Answer	Mark	Notes
8		construction	2	M1 : for one side of a triangle drawn with length 3 cm
				A1 : fully correct construction with clear construction lines
9	If x is prob. of landing 1, $$x+x+x+2x=1 \Rightarrow x=\frac{1}{5}$$ so prob. of landing on 4 is $\frac{2}{5}$ Prob. of score being 8 = P(4 and 4) $$=\frac{4}{25}$$ In 100 rounds, expectation is $$100 \times \frac{4}{25} = 16$$	16	4	P1 : correct process to find probability the die lands on 4
				A1 : correct probability of the die landing on 4
				P1 : attempts to find probability of getting two 4s **and** multiplies this probability by 100
				A1 : 16 cao

CM GCSE Practice Papers / Set A / Paper 2H (AQA VERSION)				
Question	**Working**	**Answer**	**Mark**	**Notes**
10 (a)		description	2	B1 : Comment on size e.g. same size / magnitude / length
				B1 : Comment on direction e.g. (point in) opposite direction(s) / anti-parallel
(b)		$\begin{pmatrix} -6 \\ -13 \end{pmatrix}$	2	M1 : correct expression for 3**b**
				A1 : correct answer oe
11 (a/i)		interval	1	B1 : correct error interval: $2.05 \leq x < 2.15$
(a/ii)		interval	1	B1 : correct error interval: $4.67 \leq y < 4.68$
(a/iii)		interval	1	B1 : correct error interval: $2.52 < y - x < 2.63$
(b)	Upper bound of *S*: $\dfrac{3(2.15)-2}{4.67} = 0.9528...$ Lower bound of *S*: $\dfrac{3(2.05)-2}{4.68} = 0.8867...$	UB = {awrt} 0.95 LB = {awrt} 0.89	4	M1 : use of $x = 2.15$ and $y = 4.67$ in a formula
				A1 : correct upper bound, awrt 0.95
				M1 : use of $x = 2.05$ and $y = 4.68$ in a formula
				A1 : correct lower bound, awrt 0.89

CM GCSE Practice Papers / Set A / Paper 2H (AQA VERSION)					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)	Gradient of tangent at $t = 4$ is $\dfrac{6.125 - 0.625}{4.6 - 3.4} = 6.25$ m/s	6.25	3	P1 : considers tangent line at $t = 4$ (can be implied) and links its gradient to the velocity at $t = 4$
					P1 : correct expression for gradient of their tangent line at $t = 4$
					A1 : correct velocity at $t = 4$. Accept answers in $5.90 \leq v \leq 6.60$
	(b)		Under-estimate	2	B1 : under-estimate
					C1 : reason, i.e. 'tangent line lies beneath the curve at $t = 4$', 'tangent line not as steep as curve $t = 4$', etc.
13		$0^3 + 2(0)^2 + 3(0) - 4 = -4 \ \{<0\}$ $1^3 + 2(1)^2 + 3(1) - 4 = 2 \ \ \{>0\}$ since there has been a change of sign {between (0,1) and the curve $y = x^3 + 2x^2 + 3x - 4$ is continuous on (0,1)}, the equation $x^3 + 2x^2 + 3x - 4 = 0$ has a solution in (0,1)	proof	3	M1 : substitutes 0 into $x^3 + 2x^2 + 3x - 4$ and evaluates expression
					M1 : substitutes 1 into $x^3 + 2x^2 + 3x - 4$ and evaluates expression
					A1 : fully correct workings and a conclusion that mentions that there is a solution because of a '<u>change of sign</u>' – any other details in the conclusion are **<u>not</u>** required for the mark

CM GCSE Practice Papers / Set A / Paper 2H (AQA VERSION)				
Question	Working	Answer	Mark	Notes
14	$a = 4, b = -5, c = -1$ $x = \dfrac{-(-5) \pm \sqrt{(-5)^2 - 4(4)(-1)}}{2(4)}$ $x = \dfrac{5 \pm \sqrt{41}}{8}$, so $x = 1.43$ or -0.18	1.43, –0.18	3	M1 : substitutes correctly into the quadratic formula with $a = \pm4$, $b = \pm5$ and $c = \pm1$ OR extracts factor of 4 and completes the square (need to see halving coefficient of x and subtraction of unwanted term) -------- A1: sight of $x = \dfrac{-(-5) \pm \sqrt{(-5)^2 - 4(4)(-1)}}{2(4)}$ or $\left(x - \dfrac{5}{8}\right)^2 - \left(\dfrac{5}{8}\right)^2 = \dfrac{1}{4}$ (or better) -------- A1 : correct values of x to two decimal places
15	From A to B, Area scale factor = $\times 2$ Length scale factor = $\times\sqrt{2}$ So volume scale factor = $\times\left(\sqrt{2}\right)^3$ $\therefore$ volume of B = $1000 \times \left(\sqrt{2}\right)^3 = 2828.42...$	2800 (cm^3)	4	P1 : attempts to find length or volume scale factor -------- A1 : correct volume scale factor -------- dP1 : uses their volume scale factor correctly to find volume of B -------- A1 : awrt 2800

Question		Working	Answer	Mark	Notes
16			E A C B D	5	B5 : all 5 graphs correctly identified (B1 for each correct identification)

Question		Working	Answer	Mark	Notes
17	(a)		diameter	1	B1 : correct term identified. Accept unambiguous identifications. Multiple ticks/circles score B0 unless their final response is made clear
	(b)	Area of entire circle is 25π cm^2	35	4	B1 : correct area of entire circle (25π) seen or implied. Condone omission of units
		Length of $AB = 10\cos35$ So area of $ABC =$ $\frac{1}{2}(10)(10\cos35)\sin35 = 23.492...$ cm^2			P1 : method to work out area of ABC or BCD
					A1 : area of ABC or BCD correct
		Similarly area of $BCD = 20.225...$ cm^2 So area of shaded region is $25\pi - 23.492... - 20.225... = 34.822...$			A1 : correct final area, awrt 35 (cm^2)

CM GCSE Practice Papers / Set A / Paper 2H (AQA VERSION)				
Question	**Working**	**Answer**	**Mark**	**Notes**
18 (a)	$m\sqrt{1-\dfrac{v^2}{c^2}} = m_0$ $\sqrt{1-\dfrac{v^2}{c^2}} = \dfrac{m_0}{m}$ $1-\dfrac{v^2}{c^2} = \left(\dfrac{m_0}{m}\right)^2$ $\dfrac{v^2}{c^2} = 1-\left(\dfrac{m_0}{m}\right)^2$ $c^2 = \dfrac{v^2}{1-\left(\dfrac{m_0}{m}\right)^2}$ $c = \dfrac{v}{\sqrt{1-\left(\dfrac{m_0}{m}\right)^2}}$	$c = \dfrac{v}{\sqrt{1-\left(\frac{m_0}{m}\right)^2}}$	4	M1 : multiplies by $\sqrt{1-\dfrac{v^2}{c^2}}$ or divides by m_0 correctly A1 : obtains $1-\dfrac{v^2}{c^2} = \left(\dfrac{m_0}{m}\right)^2$ dM1 : attempts to make c^2 the subject A1 : correctly makes c the subject. Accept equivalent expressions, i.e. $c = \sqrt{\dfrac{v^2}{1-\left(\frac{m_0}{m}\right)^2}}$, $c = \dfrac{v}{\sqrt{\left(1-\frac{m_0}{m}\right)\left(1+\frac{m_0}{m}\right)}}$ etc.

Question	Working	Answer	Mark	Notes
(b)	Way 1: $c = \dfrac{2.85 \times 10^8}{\sqrt{1 - \left(\dfrac{1.67}{5.35}\right)^2}} \approx 3.00 \times 10^8$ $\therefore$ at 2.31×10^8, $m = \dfrac{1.67 \times 10^{-27}}{\sqrt{1 - \left(\dfrac{2.31}{3}\right)^2}} = 2.62 \times 10^{-27}$ Way 2: $\dfrac{2.85}{\sqrt{1 - \left(\dfrac{1.67 \times 10^{-27}}{5.35}\right)^2}} = \dfrac{2.31}{\sqrt{1 - \left(\dfrac{1.67}{m}\right)^2}}$ $\Rightarrow 1 - \left(\dfrac{1.67 \times 10^{-27}}{m}\right)^2 = 0.5929...$ $\Rightarrow m = \dfrac{1.67 \times 10^{-27}}{\sqrt{1 - 0.5929...}} = 2.62 \times 10^{-27}$	{awrt} 2.6×10^{-27} (kg)	4	**Way 1 :** M1 : substitutes correct values into their formula for c A1 : correct value of c seen or implied dM1 : substitutes correct values into formula for m with their c A1 : awrt 2.6×10^{-27} **Way 2:** M1 : correct **expression** on LHS (no need to see RHS). Condone inclusion/omission of $\times 10^8$ on numerator and $\times 10^{-27}$ in denominator A1 : for $\dfrac{2.85}{\sqrt{1 - \left(\dfrac{1.67 \times 10^{-27}}{5.35}\right)^2}} = \dfrac{2.31}{\sqrt{1 - \left(\dfrac{1.67}{m}\right)^2}}$ oe dM1 : attempts to make m the subject A1 : awrt 2.6×10^{-27}

Question		Working	Answer	Mark	Notes
19	(a)		25	1	B1 : cao
	(b)	y coordinate of P is 4 Gradient of OP is $\dfrac{4}{3}$ So gradient of tangent is $-\dfrac{3}{4}$	$-\dfrac{3}{4}$	4	M1 : substitutes 3 into $x^2 + y^2 = k$ with a numerical value for k
					A1 : y coordinate of P is 4
					dM1 : gradient of OP as 'their 4'/3
					A1 : correct gradient of tangent line l
	(c)	Equation of tangent of the form $y = -\dfrac{3}{4}x + c$ Since tangent passes through P, $c = 4 + \dfrac{3}{4}(3) = \dfrac{25}{4}$ $\therefore$ equation of l is $y = -\dfrac{3}{4}x + \dfrac{25}{4}$	$y = -\dfrac{3}{4}x + \dfrac{25}{4}$	3	M1 : equation tangent of the form $y = '-\dfrac{3}{4}'x + c$
					M1 : substitutes coordinates of P in and attempts to find c
					A1 : correct equation of tangent line l oe

Question	Working	Answer	Mark	Notes
20	$\sqrt{125} = \sqrt{25 \times 5} = \sqrt{25}\sqrt{5} = 5\sqrt{5}$ $\dfrac{5\left(1-\sqrt{5}\right)}{\sqrt{5}} = \sqrt{5}\left(1-\sqrt{5}\right) = \sqrt{5} - 5$ $\sqrt{125} - 2\sqrt{5} + \dfrac{5\left(1-\sqrt{5}\right)}{\sqrt{5}} \equiv \ldots$ $\ldots \equiv 5\sqrt{5} - 2\sqrt{5} - 5 + \sqrt{5}$ $\equiv -5 + 4\sqrt{5}$ so $a = -5,\ b = 4$	$-5 + 4\sqrt{5}$	5	B1 : $\sqrt{125} = 5\sqrt{5}$ M1 : expands $5\left(1-\sqrt{5}\right)$ or multiplies top **and** bottom of $\dfrac{5}{\sqrt{5}}\left(1-\sqrt{5}\right)$ by $\sqrt{5}$ A1 : obtains $\dfrac{5\left(1-\sqrt{5}\right)}{\sqrt{5}} = \sqrt{5} - 5$, may be implied dM1 : puts all simplified terms from original expression together and collects like terms A1 : cao. Accept $-5 + 4\sqrt{5}$ or values of a and b stated. A0 if candidates give final answer and values of a and b and they contradict