GCSE (9-1)

Paper 1H (Non-calculator)

Practice set A

CM GCSE Practice Papers / Set A / Paper 1H (V4 FINAL)

Question		Working	Answer	Mark	Notes
1		$\begin{array}{r}050\\12\overline{)610}\\\underline{60}\\10\\\underline{\quad 0}\\0\end{array}$	50.83	3	M1 : sight of ‘50’, ’60’ or ‘10’ arising from a long division method M1 : sight of 10/12 A1 : cao
2	(a)	Arithmetic	Correct term	1	B1 : correct term circled. Accept other markings if unambiguous, i.e. a tick. Multiple ticks/circles score B0 if their final response is not made clear
	(b)	$2 - 6 = -4$ $-4(1) + c = 6$ implies $c = 10$	$-4n+10$	2	M1 : $4n$ or $-4n$ seen A1 : correct nth term
3	(a)	$8 - 5 = 3$ $\sqrt{5^2 - 3^2} = 4$ $AE = 3+4 = 7$ (cm) *	Shows result	3	P1 : formation a right-angled triangle with base 3, may be on diagram and can be implied P1 : sight of $\sqrt{5^2 - 3^2}$ A1 : complete and convincing proof

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	(b)	e.g. area of triangle = $\frac{1}{2}(3)(4)=6$ $\{\text{cm}^2\}$ area of rectangle = $8\times 3=24$ $\{\text{cm}^2\}$ total area = 24 + 6 = 30 cm^2		4	M1 : partitions the compound shape into two simpler shapes, i.e. rectangle and triangle or trapezium and rectangle **and** attempts to calculate one relevant area
					M1 : combines their two (or more) areas correctly
					A1, A1 : value of 30, correct units cm^2
4	(a)	$2a^2-2ab+ab-b^2$	$2a^2-ab-b^2$	2	M1 : expands the brackets and generates 4 terms, with at least two correct
					A1 : cao
	(b)		$2e^2f^8$	2	M1 : sight of '2' **and** either index of *e* **or** *f* correct
					A1 : cao
	(c)		$(x+1)(x+1)$	1	B1 : correct factorisation. Accept $(x+1)^2$
	(d/i)		expln.	1	C1 : e.g. 'the **whole** negative numbers, zero and the **whole** positive numbers', '…, –2, –1, 0, 1, 2, …'. **Condone** e.g. 'the whole numbers, including whole negative numbers'.

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	(d/ii)		No + reason	1	C1 : no + explains with (at least) one of the following: • *idea that* 1 and x^2+2x+1 are not the only factors • uses a counter-example, i.e. when $x = 1$, $x^2+2x+1=4$, which is not prime
5	(a)		1	1	B1 : cao
	(b)		3	1	B1 : cao
	(c)		No + reason	1	C1 : no + *idea that* the **gradients** are not the same. If candidates use illustration, they must make clear that they are referring to the gradients of the line. For example, 'no, since $1 \neq -1$' is **not** enough, as they must mention the word gradient.
	(d)		1	1	B1FT: if answer to (c) is no, then they should give 1. If answer to (c) is yes, then they should give 0.
6	(a)		Yes + reason	1	C1 : yes + explains with (at least) one of the following: • probability of B and C occurring is 0 • the events/circles B and C do not overlap/intersect
	(b)		10	1	B1 : cao

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	(c)		14	1	B1 : cao
	(d)		1 / 100%	1	B1 : correct probability oe, so 1 or 100% or 9/9 etc.
7		Volume of prism = $\frac{1}{2}(6)(8)(5)$ = 120 cm^3 $\therefore$ density is $\frac{288}{120} = 2.4$ g/cm^3, so it is solid A	Solid A + working	4	B1 : $0.288\text{ kg} = 288\text{ g}$ OR converts between kg/cm^3 to g/cm^3
					P1 : process to work out volume of the prism using 'area of cross section x length'. Condone omission of ½ in formula for area of a triangle
					P1 : uses density = $\frac{\text{mass}}{\text{volume}}$ with some value for mass and their 120 in the denominator
					A1 : obtains density as 2.4 g/cm^3 and chooses solid A. Solution must be fully correct with no errors seen
8	(a)		example	1	B1: any valid example, i.e. 1 and 2
	(b)	$\frac{15}{4} : \frac{25}{8} \Rightarrow \frac{30}{8} : \frac{25}{8} \Rightarrow 30 : 25 \Rightarrow 6 : 5$	6:5	3	M1 : writes the mixed fractions as improper fractions
					M1: attempting a common denominator
					A1 : correct ratio in the required form

Question		Working	Answer	Mark	Notes
9	(a)	23 ; 6	23 , 6	2	B1: for 23 corresponding to 10–20 B1 : for 6 corresponding to 50–60
	(b)	12 + 23 + 18 = 53 $\frac{53}{100} \times \frac{52}{99} = \frac{2756}{9900}$	$\frac{2756}{9900}$	3	M1 : adds 12 + 23 + their 23 dM1 : $\frac{\text{their '53'}}{100} \times \frac{(\text{their } 53) - 1}{99}$ A1 : correct probability oe
	(c)		Box plot	3	B1 : whiskers at 8 and 54 M1 : any one of: median = 28 s, LQ = *a value between* 15.5 – 16, UQ = *a value between* 36.5 – 37.5 A1 : fully correct box plot (same tolerance with LQ and UQ as above permitted)
10	(a)		$x = 60$	2	M1 : interior angle is 120 or exterior angle is 60 A1 : $x = 60$. Condone $x = 60^{\circ}$ or just 60 on the answer line

Question		**Working**	**Answer**	**Mark**	**Notes**
	(b)	$y = 120 - 90 = 30°$ $BF = 2 \times 10\cos 30 = 10\sqrt{3}$	$10\sqrt{3}$	5	M1 : correct value of y M1 : considers $10\cos(\text{their } 30)$ B1 : sight of $\cos 30 = \frac{\sqrt{3}}{2}$, $\sin 30 = \frac{1}{2}$ or $\tan 30 = \frac{\sqrt{3}}{3}$ oe (whichever is relevant to their 10cos30) M1 : $BF =$ $2 \times$ their 10cos30 A1 : $BF = 10\sqrt{3}$
11		Let w = no. of written qs, m = no. of mc qs $m + w = 40$ $3w + 5m = 170$ $2m = 50 \Rightarrow m = 25$ $\Rightarrow w = 40 - 25 = 15$	15 written qs, 25 multiple choice qs	5	P1 : any one correct equation (accept any variables) P1 : a second correct equation with variables that are consistent with the first M1 : attempts to solve the equations simultaneously (i.e. makes coefficients the same and subtracts/adds or uses substitution) A1 : either m = 25 or w = 15 A1 : both m = 25 and w = 15

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12	(a)		$a_n = 3a_{n-1}$	1	B1 : cao
	(b)		interpretation	1	C1 : any correct interpretation, e.g. ‘initial number of bacteria (in colony)’, ‘number of bacteria at the beginning / at 0 hours’
	(c)	$a_1 = 3(100) = 300$	2700	3	P1 : substitutes 100 into their iterative formula
		$a_2 = 3(300) = 900$			P1 : uses their value of a_1 to find a_2
		$a_3 = 3(900) = 2700$			A1 : correct value of $a_3 = 2700$
13		Total number of balls in bag is $x + 5x + 20x = 26x$ for some integer x	$\frac{2}{65}$	4	P1 : attempts to use proportions correctly to deduce relationship between number of balls in the bag.
		so $\text{P(green)} = \frac{5}{26}$			A1 : Correct (expression for) total number of balls in bag, e.g. 26, 52, …, or 26x, 52x, …, etc.. Can be implied by correct probability
		$\therefore\ \text{P(two greens)} = \frac{5}{26} \times \frac{4}{25}$			A1 : correct probability for taking one green from bag oe
		$= \frac{1}{5} \times \frac{2}{13} = \frac{2}{65}$			A1: correct final probability oe
					SC: inverted proportions, i.e. 5 red balls for every green, etc., scores 0/4.

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14	(a)	$(x+2)(x-4)=x^2-2x-8$	$a=-2$, $b=-8$	3	M1 : $(x+2)$ or $(x-4)$ as a factor (must see another linear factor)
					M1 : expands brackets
					A1 : correct values
	(b)		description	1	C1 : translation by $\begin{pmatrix}-1\\-1\end{pmatrix}$
15	(a)	$y=\dfrac{2x+1}{x}$ $xy=2x+1$ $x(y-2)=1$ $x=\dfrac{1}{y-2}$ so $\mathrm{f}^{-1}(x)=\dfrac{1}{x-2}$	$\mathrm{f}^{-1}(x)=\dfrac{1}{x-2}$	2	M1 : sets $y=\mathrm{f}(x)$ and attempts to make x the subject
					A1 : correct final expression oe. In particular, $\mathrm{f}^{-1}(x)=-\dfrac{1}{2-x}$ is a common correct alternative

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15	(b)	$\frac{2\left(x^2-5\right)+1}{x^2-5}=0 \Rightarrow 2\left(x^2-5\right)+1=0$ $2x^2-9=0$ $x^2=\frac{9}{2} \Rightarrow x=\pm\sqrt{\frac{9}{2}}=\pm\frac{3}{\sqrt{2}}=\pm\frac{3\sqrt{2}}{2}$	$\pm\frac{3}{2}\sqrt{2}$	4	M1 : substitutes x^2-5 for x in f(x) dM1 : obtains $2x^2-9=0$ and attempts to solve it for x A1 : for $x=(\pm)\sqrt{\frac{9}{2}}$ oe (condone omission of ±) A1 : $x=\pm\frac{3}{2}\sqrt{2}$, cao

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16	(a)		$\mathbf{b}-\mathbf{a}$	1	B1 : cao
	(b)	e.g. $\overrightarrow{DB}=\frac{1}{4}(\mathbf{b}-\mathbf{a})=\frac{1}{4}\mathbf{b}-\frac{1}{4}\mathbf{a}$ $\overrightarrow{BC}=\overrightarrow{BD}+\overrightarrow{DC}=\frac{1}{4}\mathbf{a}-\frac{1}{4}\mathbf{b}-\mathbf{c}$ $\therefore\overrightarrow{AC}=\mathbf{b}+\frac{1}{4}\mathbf{a}-\frac{1}{4}\mathbf{b}-\mathbf{c}$ $=\frac{1}{4}\mathbf{a}+\frac{3}{4}\mathbf{b}-\mathbf{c}$ $=\frac{1}{4}(\mathbf{a}+3\mathbf{b}-4\mathbf{c})$ since $\overrightarrow{AC}$ is a multiple of $\mathbf{a}+3\mathbf{b}-4\mathbf{c}$, it is parallel to it	proof	4	B1 : $\overrightarrow{AC}=\overrightarrow{AB}+\overrightarrow{BC}$ or $\overrightarrow{AC}=\overrightarrow{AO}+\overrightarrow{OC}$ seen or implied at any stage M1 : correct expression for $\overrightarrow{OD}$ **or** $\overrightarrow{DB}$ in terms of **a** and **b** dM1 : attempts to find $\overrightarrow{BC}$ or $\overrightarrow{OC}$ in terms of **a** and **b** C1 : convincingly obtains that $\overrightarrow{AC}=\frac{1}{4}(\mathbf{a}+3\mathbf{b}-4\mathbf{c})$ **and** explains that it is parallel to $\mathbf{a}+3\mathbf{b}-4\mathbf{c}$ because it is a multiple of it