GCSE
Paper 2H

Practice Set B

CM GCSE Practice Papers / Set B / Paper 2H (V1 FINAL)					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		1	1	B1 : a circle around the number 1. Any ambiguities in selection or additional sections is B0
	(b)	12 numbers in total 2 in intersection so prob is $\frac{2}{12}=\frac{1}{6}$	$\frac{2}{12}$	2	M1 : 12 numbers in total, seen or implied (i.e. by denominator) A1 : correct probability oe
2	(a)	$5(8)-3=37$	37	1	B1 : cao
	(b)	$148=5n-3$ $\Rightarrow 5n=151$ $\Rightarrow n=\frac{151}{5}(=30.2)$ so n is not a term in the sequence (since n must be an integer)	No + justification	2	M1 : sets $148 = 5n - 3$ A1 : concludes 'no' + suitable justification, i.e. conveys idea that n must be an integer, finding the 30^{th} value and 31^{st} value, etc. **[Special case – use of listing:** M1 – for first 30 terms in sequence correctly listed, A1 – concludes 'no' + explanation]

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3		$\frac{x}{y+2}=\frac{1}{3}$ $\Rightarrow 3x=y+2$ $\Rightarrow y=3x-2$	proof	3	M1: for $\frac{x}{y+2}=\frac{1}{3}$ or equivalent dM1: attempts to remove fractions, i.e. multiplies by 3 and $y + 2$ A1 : complete and convincing proof
4		$\sqrt{7.2^2+3.4^2}=7.962...$ amount of material needed is $2(7.2)+2(3.4)+7.962...=29.162...$ for material **A**, need to buy 30 m = $10.32+8.26+8.26=$ £26.84 for material **B**, need to buy 20 m = £27.18	Material **A** + working	5	P1 : for sight of $\sqrt{7.2^2+3.4^2}$ P1 : method to find total amount of material required using some value for the length of the diagonal A1 : 29.16… m needed P1 : process to find which material is be cheaper A1 : states material **A** + working

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5				5	**NB: There are two possible answers.** **If credit is given for Way 1 (resp. Way 2) in (i), can only score for Way 1 (resp. Way 2) in (ii)**
	(i)				**Way 1** : B1, B1, B1 : enlargement, scale factor 2, centre (0,0)
					Way 2: B1, B1 : translation, (by) $\begin{pmatrix} -1 \\ 1 \end{pmatrix}$
	(ii)				**Way 1:** B1, B1 : translation, (by) $\begin{pmatrix} -1 \\ 1 \end{pmatrix}$
					Way 2: B1, B1, B1 : enlargement, scale factor 2, centre (–1, 1)
6		$\sin(BCA) = \frac{3.1}{4.6}$ $BCA = 42.369...$ so $BCD = 180 - 42.369... - 58 = 79.63...$	79.6	4	M1 : sight of the ratio $\frac{3.1}{4.6}$
					A1 : correct size of *BCA* or *ABC*
					M1 : method to use properties about angles on a straight line to find *BCD*
					A1 : correct answer. Awrt 80^o

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7		$(0.1)(0.2)\left(\frac{40}{120}\right)+(0.1)(0.3)(0.4)+$ $+(1-x)(0.1)(0.5)=0.04$ $x=0.573...$	57%	5	P1 : for $0.2\times\frac{4}{12}$ or $0.2\times\frac{8}{12}$ or 0.3×0.4 or 0.3×0.6 A1 : correct percentage lost or gained of 1st year from module 1 **and** 2 P1 : multiplies percentage lost/gained from m1 or m2 in 1st year by 0.1 OR idea that losing 4% overall means not losing 40% in 1st year. This mark can be implied by an equation or appropriate subtraction P1 : forms a correct equation using their percentage losses/gains to find % needed in m3. [Condone if their % gives an upper bound of what they can lose as opposed to what they need to gain] A1 : awrt 57%

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8		$(2h+3)^2 = 4h^2+6h+6h+9$ $(h+1)^2 = h^2+h+h+1$ $(2h+3)^2-(h+1)^2$ so $=4h^2+12h+9-(h^2+2h+1)$ $=3h^2+10h+8$	proof	4	M1 : expands one of the brackets correctly (need not simplify) A1 : both brackets expanded correctly M1 : attempts to collect like terms ft their expansions. Condone incorrect distribution of negative sign in second bracket A1 : obtains correct quadratic convincingly or states values of a, b and c with convincing working
9	(a)		Sahil is correct	1	B1 : 'sahil is correct' unambiguously circled or unambiguously made clear that that is their answer
	(b)		(0,1)	1	B1 : cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
10		$y = \frac{360}{15} = 24$ An interior angle in **B** is $2y = 48$ So exterior angle in **B** is 132 If **B** is regular then $\frac{360}{x} = 132 \Rightarrow x = 2.72...$, which is not possible	proof	4	P1 : for $(y =)\frac{360}{15}$ A1 : $2y = 48$ P1 : process to show that **B** cannot be regular, i.e. by considering exterior angle of **B**. Can also look at interior angles of **B** by considering $180(x-2) = 48x$ (sight of this scores the P1) A1 : convincing proof

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11	(a)		suggestion	1	C1 : it is an outlier / much higher than the other temperatures
	(b)			2	B1 : correct cumulative frequencies: 3 18 35 40 [NB: may be implied and/or seen near the table]
					B1: fully correct CF graph
	(c)		81	1	B1 : answer between $80 \leq T \leq 82$
	(d/i)		limits	3	M1 : method to find lower or upper quartile, i.e. correct markings on graph
					A1 : lower quartile between $75 \leq T \leq 77$
					A1 : upper quartile between $85 \leq T \leq 97$
	(d/ii)		Inter-quartile (range)	1	C1 : interquartile (range)
	(e)		explanation	1	C1 : e.g. only used 40 days, 40 days may not represent temperature distribution for the whole year [Sample size too small is C0 without reference to 'days' or 'temperature']

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12		$y=\left(x-\frac{7}{2}\right)^2-\left(\frac{7}{2}\right)^2+10$ $y=\left(x-\frac{7}{2}\right)^2-\frac{9}{4}$	(3.5, – 2.25)	3	M1 : for $\left(x-\frac{7}{2}\right)^2-\left(\frac{7}{2}\right)^2$. Sight of $\left(x-\frac{7}{2}\right)-\left(\frac{7}{2}\right)^2$ is M1 BOD A1: for $\left(x-\frac{7}{2}\right)^2-\frac{9}{4}$. A1ft : Correct coordinates ft their completing the square
13		$(4-2\sqrt{3})\times r=x$ $x\times r=16-8\sqrt{3}$ $x\times\left(\frac{x}{4-2\sqrt{3}}\right)=16-8\sqrt{3}$ $\Rightarrow x^2=4(4-2\sqrt{3})^2$ $\Rightarrow x=8-4\sqrt{3}$	$8-4\sqrt{3}$	4	P1 : links all the terms by a constant ratio P1 : forms an equation to find x or r A1 : $x^2=4(4-2\sqrt{3})^2$ or $r=2$ A1 : $x=8-4\sqrt{3}$

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14	(a)	$2^2 + 4(2) - 2^3 = 4 > 0$ $3^2 + 4(3) - 3^3 = -6 < 0$ since there has been a change of sign, the equation has a solution between $x = 2$ and $x = 3$	proof	2	M1 : substitutes 2 and 3 into the equation and evaluates it to be some number C1 : explanation
	(b)	$x^3 = x^2 + 4x$ $x = \frac{x^2 + 4x}{x^2} = \frac{x^2}{x^2} + \frac{4x}{x^2} = 1 + \frac{4}{x}$	proof	1	B1 : shows the result convincingly

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	(c)	$x_1 = 1 + \frac{4}{2.5} = 2.6$ $x_2 = 1 + \frac{4}{2.6} = 2.5384615...$ $x_3 = 1 + \frac{4}{2.5384615...} = 2.57575757...$	2.57576	3	B1: $x_1 = 2.6$ M1 : attempts to use their x_1 to find x_2 A1 : correct value of x_3
			6	1	B1 : $k = 6$
15		$x = 0.999...$ $\underline{10x = 9.99...}$ $9x = 9$ $x = \frac{9}{9} = 1$	proof	3	M1 : finds $10x$ M1 : finds $9x$ A1 : complete and convincing proof

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16		$\frac{\sin 73}{BC} = \frac{\sin 51}{8}$ so $BC = 9.84427\ldots$ so area of triangle is $\frac{1}{2}(8)(9.84...)\sin 56$ so area of shaded region is $36\pi - \frac{1}{2}(8)(9.84...)\sin 56$	80	3	B1 : area of circle 36π B1 : angle $CAB = 73^o$ (seen or implied) P1 : $\frac{\sin 73}{BC} = \frac{\sin 51}{8}$ or $\frac{\sin 56}{AC} = \frac{\sin 51}{8}$ A1 : $BC = 9.84\ldots$ or $AC = 8.53\ldots$ P1 : area of triangle = $\frac{1}{2}(8)(9.84...)\sin 56$ or $\frac{1}{2}(8)(8.53...)\sin 73$ A1 : 80.452… Awrt 80 cm^2. Must have working to support answer
17	(a)	$g(x) = a\left(\frac{1}{2}x - \frac{1}{2}\right) + b$ $= \frac{1}{2}ax - \frac{1}{2}a + b$	proof	1	B1 : substitutes $\frac{1}{2}x - \frac{1}{2}$ and obtains the result
	(b)	$g(1) = 4 \Rightarrow \frac{1}{2}a + b - \frac{1}{2}a = 4$	4	1	B1 : $b = 4$ [Alt: put $x = 0$ into g(2x +1)]

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	(c)	$y = 3x - 2 \Rightarrow x = \frac{y+2}{3}$ so $f^{-1}(x) = \frac{y}{3} + \frac{2}{3}$ $f^{-1}(2) = g(0) \Rightarrow \frac{4}{3} = 4 - \frac{1}{2}a$ $\frac{1}{2}a = \frac{8}{3} \Rightarrow a = \frac{16}{3}$	$\frac{16}{3}$	4	M1 : attempts to find $f^{-1}(x)$ A1 : correct $f^{-1}(x)$ dM1 : uses $f^{-1}(2) = g(0)$ with their $f^{-1}(x)$. [Can also put – 1/2 into $g(2x + 1)$] A1: correct value of a
18	(a)		1: k	1	B1 : cao
	(b)	$\overrightarrow{DE} = \overrightarrow{DA} + \overrightarrow{AC} + \overrightarrow{CE}$ $\overrightarrow{DA} = -k\mathbf{q}$ $\overrightarrow{CB} = \mathbf{q} - \mathbf{p}$, so $\overrightarrow{CE} = k(\mathbf{q} - \mathbf{p})$ so $\overrightarrow{DE} = -k\mathbf{q} + \mathbf{p} + k(\mathbf{q} - \mathbf{p})$ $= (1 - k)\mathbf{p}$ so DE is parallel to AC	proof	3	B1 : $\overrightarrow{DE} = \overrightarrow{DA} + \overrightarrow{AC} + \overrightarrow{CE}$ or $\overrightarrow{DE} = \overrightarrow{DB} + \overrightarrow{BE}$ P1 : attempts to use the ratios to find one of the required paths (excl. AC) A1ft : complete and convincing proof, showing that DE is a multiple of **p** and with a conclusion