

International GCSE in Mathematics B – Paper 2 mark scheme

Question	Working	Answer	Mark	AO	Sub-total	Total
1	$\frac{65}{100} \times 80 \times 100 \text{ (}=\text{£}5200\text{)}$ $+ \frac{55}{100} \times 80 \times 50 \text{ (}=\text{£}2200\text{)}$ $\frac{45}{100} \times 80 \times (280 - '150') \text{ (}=\text{£}4680\text{)}$ '£5200' + '£2200' + '£4680' £12 080.00	£12 080.00	M1 M1 DEP M1 DEP A1	1.1		4
2(a)	$(2x - 5y)(2x + 5y)$ (at least one correct)	$(2x - 5y)(2x + 5y)$	M1 A1	1.3	2	
2(b)	$\frac{x^2 - 11x + 24}{x + 5} \times \frac{2x^2 + 7x - 15}{x - 3}$ Attempt at factorising a quadratic NB: For method, the two bracketed terms, when multiplied out, must give at least two of the three terms from the trinomial quadratic equation	$(x - 8)(x - 3)$ $(2x - 3)(x + 5)$ $(x - 8)(2x - 3)$	M1 M1 A1 A1 A1	1.3	5	7

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3(a)		10, 45 and 8	B1	1.2		
3(b)		$25 - x$, $13 - x$	B1	1.2	2	
3(c)		c's six terms = 90	B1 ft	1.2	1	
3(d)(i)		11 (cao and correctly obtained)	B1	1.3	1	
3(d)(ii)		35 (cao)	B1	1.2		
4(a)	$66 - '11'$ or $90 - '35'$	55	B1 ft	1.2	2	6
4(b)(i)	$\frac{dy}{dx} = -1 - 4x = 0$ (1 term correct in a linear exp in x) Substitute ' x ' in y .	$\therefore x = -\frac{1}{4}$ $\therefore y = 6\frac{1}{8}$ $\frac{dy}{dx} (x = -1) = +3$, and $\frac{dy}{dx} (x = 0) = -1$	M1 A1 M1 A1 B1	1.4	4	

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4(b)(ii)	Since gradients are +3, 0 and -1 at $x = -1$, $-\frac{1}{4}$ and 0 respectively, $\therefore \left(-\frac{1}{4}, 6\frac{1}{8}\right)$ is a maximum (cc)	(cc)	B1		2	6
5	$x^2 + (x+1)^2 = 5$ (substitute $y = x + 1$) $(x+2)(x-1) = 0$ (solving trinomial quadratic) Substituting $x = -2$ and $x = 1$ in $y = x + 1$ for the value of y (or $(y-1)^2 + y^2 = 5$ (subst. $y = x + 1$) $(y-2)(y+1) = 0$ (solving trinomial quadratic) Substituting $y = 2$ and $y = -1$ in $y = x + 1$ for the value of x)	$x^2 + x - 2 = 0$ $x = -2$ and $x = 1$ $(y^2 - y - 2 = 0)$ $(y = 2$ and $y = -1)$ $x = -2, y = -1$ and $x = 1, y = 2$ (cc)	M1 A1 M1 INDEP A1 M1 DEP (M1) (A1) (M1) (A1) (M1 DEP) A1	1.3	6	6

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6(a)	<p>N.B. Second B1 ft is for a correct horizontal line, of correct length, drawn from the end of the first line segment.</p> <p>Third B1 ft is for their line, starting where their horizontal line finishes and terminates at Northampton at 11 : 45</p>	each correct section of journey	B1, B1 ft, B1 ft	1.4	3	
6(b)	<p>11 : 45 – ‘10:09’ (96 minutes)</p> <p>NB: For method, the mark is awarded from 11 : 45 minus the start time from Bradford</p>	70 km/h	M1 A1		2	
6(c)	<p>NB: For ft, must finish at Manchester, 2 hours after leaving Northampton.</p>	one straight line, correct starting point correct finishing point	B1 B1 ft		2	
6(d)(i) 6(d)(ii)		10.33 (±2 min) 28 km (±1 km)	B1 ft B1 ft		2	9

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7(a)	<p>Penalise not rounded correctly ONCE only in question</p> $AC^2 = 12^2 + 9^2 - 2 \times 12 \times 9 \times \cos 100$ $AC^2 = 225 + 37.5 \dots$		M1 M1 DEP	2.9		
7(b)	$\frac{9}{\sin \angle CAB} = \frac{16.2}{\sin 100}$ $\sin \angle CAB = \frac{9 \times \sin 100}{16.2}$ <p>(or $9^2 = 12^2 + 16.2^2 - 2 \times 12 \times 16.2 \times \cos \angle CAB$)</p> $\cos \angle CAB = \frac{12^2 + 16.2^2 - 9^2}{2 \times 12 \times 16.2}$	16.2m (16.2020...)	A1 M1 M1 DEP	2.9	3	
7(c)	$\sin 33.16^\circ = \frac{BD}{12} \quad (BD = 6.565)$ $\Delta ABD = \frac{1}{2} \times 12 \times 6.565 \times \sin(180 - (90 + 33.16^\circ))$ <p>(or $\cos 33.16^\circ = \frac{AD}{12} \quad (AD = 10.04524)$)</p> $\Delta ABD = \frac{1}{2} \times 12 \times 10.04524 \times \sin(33.164492^\circ)$	$\angle CAB = 33.2^\circ$ (33.164492...)	A1 M1 M1 DEP	2.9 2.7 (2.9)	3	
		$\Delta ABD = 32.97 \rightarrow$ 33 m ²	(M1) (M1 DEP) A1	(2.7) 2.7	3	9

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8(a)		1.25, 3.75, 2.25 [-2.75, 0.25, 1.25] (oe)	B1, B1, B1	1.4	3	
8(b)	Curve -1 mark for straight line segments each point missed each missed segment each point not plotted each point incorrectly plotted tramlines very poor curve N.B. Accuracy for both plotting and drawing is $\pm \frac{1}{2}ss$	$x = 1.15 (\pm 0.05)$ (from 'graph') $x = 4.35 (\pm 0.05)$ (from 'graph')	B3 ft (-1 eeo)		3	
8(c)	N.B. Accept (1.15, -2.18) B1 ft and (4.35, -0.57) B1 ft SC: $1.15 < x < 4.35$ scores B1 B0		B1 ft B1 ft		2	
8(d)	Reading off y values at $x = '1.15'$ and $'4.35'$ or choosing two points on AB and reading off the corresponding Δx and Δy $\text{gradient} = \frac{\Delta y}{\Delta x} = \frac{(-2.18) - (-0.57)}{4.35 - 1.15}$ ($\pm \frac{1}{2}ss$ for each coordinate element)	gradient = -0.5 (+/-0.05 allowing $\pm \frac{1}{2}ss$) (cao)	M1 M1 DEP		3	11

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9(a)		$1 - p$	B1	3.10	1	
9(b)		for each correct pair	B1 ft, B1, B1		3	
9(c)	$P(\text{pass}) = 5 \times (1 - P(\text{pass}))$ $P(\text{pass}) = \frac{5}{6}$ awrt 0.838		M1 A1			
	$P(\text{pass}) = \frac{5}{6} = \text{one of } p \times 0.8' \text{ or } (1 - p) \times 0.9'$ $P(\text{pass}) = \frac{5}{6} = p \times 0.8' + (1 - p) \times 0.9'$		M1			
		$p = \frac{2}{3}, 0.667$	M1 DEP A1		5	
9(d)	any probability \div ('5/6') $\frac{(\frac{2}{3} \times 0.8')}{(\frac{5}{6})}$	$\frac{48}{75}$ (oe), 0.64	M1 M1 DEP A1		3	12

Question	Working	Answer	Mark	AO	Sub-total	Total
10(a)	Working Penalise labelling ONCE only Triangle <i>A</i>	triangle <i>A</i> drawn	B1	1.4	1	
10(b)		$y = -1$ drawn	B1	1.4	1	
10(c)		triangle <i>B</i> drawn	B1	2.8	1	
10(d)	At least two construction lines through $(0, -2)$		M1	2.8		
10(e)	$\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} -1 & -2 \\ 1 & -1 \end{pmatrix}$	triangle <i>C</i> drawn	A2 ft (-1 ee)	1.5	3	
		$\begin{pmatrix} 1 & 2 & 3 \\ 1 & -1 & -1 \end{pmatrix}$	M1	1.5		
		triangle <i>D</i> drawn	A1 ft			
10(f)		reflection $x = 0$ or y -axis	A1 B1 B1	1.5	3 2	
10(g)	More than one transformation scores B0, B0, B0	enlargement scale factor 2 centre $(0, -4)$	B1 B1 B1	2.8	3	14

Question	Working	Answer	Mark	AO	Sub-total	Total
11(a)(i)		$a + 2b$	B1	2.8		
11(a)(ii)	$\overline{CB} = -(a + 2b) + 4b$ $\overline{CG} = \frac{3}{5}(2b - a)$	$\frac{3}{5}(2b - a)$	M1	2.8		
11(b)(i)	$\overline{FG} = \frac{3}{5}(a + 2b) + \frac{3}{5}(2b - a)$	$\overline{FG} = \frac{12}{5}b$	A1	2.8	4	
11(b)(ii)		$\lambda = \frac{12}{5}$	A1	1.3		
11(c)(i)	From given ratios and (b), Δ^s_{FCG} are similar $\therefore \frac{FC}{OC} = \frac{CG}{CB} = \frac{FG}{OB} = \frac{3}{5}$ or give reasons for AAA or give reasons for SAS		B1 ft	2.8	3	
11(c)(ii)	As Δ^s_{FCG} are similar, Δ^s_{OCB} are similar, $\therefore \Delta OCB : \Delta FCG = 5^2 : 3^2$	(cc)	A1	2.6		
			M1	2.6		

Question	Working	Answer	Mark	AO	Sub-total	Total
11(c)(ii) (cont'd)	<p>or</p> $\frac{\text{area } VO CB}{\text{area } VFCG} = \frac{\frac{1}{2} \cdot CO' \cdot CB' \cdot \sin C}{\frac{1}{2} \cdot CF' \cdot CG' \cdot \sin C}$ $= \frac{\frac{1}{2} \cdot CO' \cdot CB' \cdot \sin C}{\frac{1}{2} \cdot \frac{3}{5} CO' \cdot CB' \cdot \sin C} = \frac{25}{9}$	25 : 9	(M1) A1	(2.7) 2.7	4	
11(d)(i)	$ AO CB = \frac{25}{9} \times AF CG = \frac{25}{9} \times 18 (=50)$	$ AO CB = 50$	M1	1.1		
11(d)(ii)	$ AO CO = \frac{1}{2} AO CB \quad (= "25")$ $\left(\because \angle ACO = \angle COB \text{ and } AC = \frac{1}{2} OB \right)$ $\therefore OACB = AO CO + AO CB = "25" + "50"$	75 (cm ²) (cao)	A1 M1 DEP A1	1.1 1.1 2.7 2.7	5	16