International GCSE in Mathematics B - Paper 1 mark scheme

Question	Working	Answer	Mark	AO	Sub-total	Total
1	$\frac{22.5}{60}\times 100$	37.5(%)	M1 A1	1.1		**2**
2	$\frac{25}{8}\times\frac{10}{41}$ or $3.125 \div 4.1$ **N.B.** No working scores M0 A0	$\frac{125}{164}$ (cao)	M1 A1	1.1		**2**
3	$\frac{1}{2}x = 1 - 1.25$ or $2x = 4\times 1 - 5$	$-\frac{1}{2}$	M1 A1	1.3		**2**
4	$42 = 2 \times 3 \times 7$ $84 = 2 \times 2 \times 3 \times 7$ $154 = 2 \times 7 \times 11$ Prime factors of two of 42, 84 and 154 or $42 = 3 \times 14$ $84 = 6 \times 14$ $154 = 11 \times 14$ Two of above or Attempt at factor tree for two of the numbers	HCF = 14	M1 A1	1.1		**2**

Question	Working	Answer	Mark	AO	Sub-total	Total
5		–2, 1, 4	B2 (–1 eeoo)	1.3		**2**
6(a)		1	B1	2.6	1	
6(b)		2	B1		1	**2**
7	$\overrightarrow{OC} = \begin{pmatrix} 3 \\ -4 \end{pmatrix} + \begin{pmatrix} -5 \\ 7 \end{pmatrix}$	$\begin{pmatrix} -2 \\ 3 \end{pmatrix}$	M1 A1	2.8		**2**
8	85 mm or 35 mm	240	M1 A1	1.1 2.7		**2**
9	P(1, 1) + P(1, 2) = $\frac{1}{6} + \frac{1}{6}$ (oe)	$\frac{2}{6}$, $\frac{1}{3}$, 0.333, 33.3%	M1 A1	3.10		**2**
10	$x + 3 + 2\sqrt{3x} = y + 6\sqrt{2}$ $\sqrt{3x} = 3\sqrt{2}$	$x = 6, y = 9$	M1 M1 (DEP) A1	1.3		**3**
11(a)		*e*	B1	1.2	1	
11(b)		*i, j*	B1		1	
11(c)		*g, h, i, j*	B1		1	**3**

Question	Working	Answer	Mark	AO	Sub-total	Total
12	$\left(\frac{2}{5}\right)^3$ or $\left(\frac{5}{2}\right)^3$ seen **N.B.** accept ratio or decimal form $\frac{500}{V}=\left(\frac{5}{2}\right)^3$ (oe) (or $\sqrt[3]{500}$ seen $\left(\frac{2}{5}\times\sqrt[3]{500}\right)^3$ (oe))	 32 (cao)	B1 M1 (B1) (M1) A1	2.6		**3**
13 **(a)** **(b)**	$y=\frac{x-4}{3}$ **N.B.** The M marks is awarded once only	 $(m=)\frac{1}{3}$ $-\frac{4}{3}$	M1 A1 A1	1.4	 2 1	 **3**
14(a) **14(b)**	 0.76×600	0.24, $\frac{6}{25}$, 24% 456	 B1 M1 A1	 3.10	 1 2	 **3**

Question	Working	Answer	Mark	AO	Sub-total	Total
15	$\frac{y-4}{x-1}=\frac{-5-4}{-2-1}$ (oe) $y-4=(3)(x-1)$ (oe, removing denominators)	$y=3x+1$	M1 M1 DEP A1	1.4		**3**
16(a)		$\begin{pmatrix}24 & -10\\ 13 & 11\end{pmatrix}$	B2 (–1eeoo)	1.5	2	
16(b)		$\begin{pmatrix}-9 & 7\\ -10 & 0\end{pmatrix}$	B2 (–1eeoo)		2	**4**
17	$\begin{pmatrix}\because \angle EDG = \angle ADC = 90^\circ\\ \text{and } \because \angle ADG \text{ is common}\end{pmatrix}$ $\angle EDA = \angle CDG$ $\therefore \Delta s \begin{matrix}EDA\\GDC\end{matrix}$ are congruent (SAS) Hence $AE = CG$ Two reasons (those in brackets above)	(cc)	B1 B1 B1 B1	2.6		**4**

Question	Working	Answer	Mark	AO	Sub-total	Total
18	Rearranging st coefficient of x or y is the same in both equations or isolating x or y Subtract or adding equations or substituting expression for x or y to obtain y or x **N.B.** Allow a total of 1 slip in both M marks.	 $x = 3$ $y = 4$	M1 M1 DEP A1 A1	1.3		**4**
19	$52 = k\sqrt{169}$ (oe) $x = \left(\frac{68}{"4"}\right)^2$ (or $52 = \cancel{k}\sqrt{169}$ and $68 \quad k\sqrt{x}$ $\frac{\sqrt{x}}{\sqrt{169}} = \frac{\sqrt{x}}{13} = \frac{68}{52}$ (oe)) **N.B.** Just seeing above line without sight of the first line earns both M marks	$k = 4$ (oe, can be implied) $\left(\sqrt{x} = \frac{68}{4} \quad \text{(oe)}\right)$ $x = 289$ (cao)	M1 A1 M1 DEP (M1) (M1 DEP) (A1) A1	1.4		**4**

Question	Working	Answer	Mark	AO	Sub-total	Total
20(a)	$\angle CAD = 90^\circ$, $\angle ACD = 28^\circ$	62	B1, B1 B1	2.6	3	
20(b)		118	B1 ft		1	**4**
21(a)		$x = n - 4$, $y = n - 2$	B1	1.3	1	
21(b)	$3n - 6$ n even ∴ $3n - 6$ is divisible by 6	(cc)	M1 A1	1.1	2	
21(c)		10, 12, 14 (oe)	B1		1	**4**
22(a)	$\frac{75}{360} \times r^2 \times \pi = 200$	17.5 (17.48077…)	M1 A1	2.7 1.3	2	
22(b)	$\frac{75}{360} \times 2 \times \pi \times '17.5'$ $+2 \times '17.5'$	57.9 (57.84678…)	M1 M1 DEP A1	2.7	3	**5**

Question	Working	Answer	Mark	AO	Sub-total	Total
23(a)		4	B1	3.10	1	
23(b)	Rearranging the number of minutes in order		M1			
		5	A1		2	
23(c)	$\frac{6+4+11+9+4+5+6+5+4}{9}$		M1			
	$\left(=\frac{54}{9}\right)$	6	A1		2	**5**
24(a)	$(r+6)^2 = r^2 + 72$		B1	2.6	1	
	or $r = \sqrt{(r+6)^2 - \left(\sqrt{72}\right)^2}$					
	or $6\times(6+2r) = 72$ (oe)					
24(b)	$r^2 + 12r + 36 = r^2 + 72$ (oe)		M1	1.3		
	or $36 + 12r = 72$					
		$r = 3$ (cao)	A1	1.3	2	
24(c)	$\sin\angle OPC = \frac{'3'}{'3'+6}$ (oe)		M1	2.9		
		$\angle OPC = 90°$	A1	2.9	2	**5**

Question	Working	Answer	Mark	AO	Sub-total	Total
25(a)	$90 + 28t - 3t^2$ (2 terms correct)	(cao)	M1 A1	1.4 1.4	2	
25(b)	'$90 + 28t - 3t^2$' = 0 (oe)		M1	1.4		
	$\frac{+28 \pm \sqrt{(-28)^2 - 4\times(3)\times(-90)}}{2\times 3}$ (Solving 3 term quadratic)		M1 DEP	1.3		
	$\sqrt{1864}$, 43.17	awrt 11.9	B1 A1	1.3 1.4	4	**6**
26(a)	$2\times(-1.5)^3 - 3\times(-1.5)^2 - 17\times(-1.5) - 12$ (substitute)		M1	1.3		
		= 0	A1		2	
26(b)	$x^2 - 3x$		M1			
		$x^2 - 3x - 4$	A1			
	$(x-4)(x+1)$ (solving trinomial quadratic)		M1 INDEP			
		$(2x+3)(x-4)(x+1)$	A1		4	**6**

Question	Working	Answer	Mark	AO	Sub-total	Total
27(a)	Rewriting (or solving) $x^2 - x - 6 < 0$ as $(x-3)(x+2)$ (solving trinomial quadratic marking rules)		M1	1.3		
		$x = 3$ and $x = -2$	A1			
		$x < 3$ $x > -2$ (or $-2<x<3$)	A1ft A1ft (A2 ft)		4	
27(b)	Open circles at '$x = -2$ and $x = 3$' Line joining '$x = -2$ and $x = 3$'		B1 ft B1 ft		2	**6**
28(a)	**Penalise ncc ONCE only in question** $\frac{5}{\sin 30} = \frac{CD}{\sin 140}$		M1	2.9		
	$CD = \frac{5 \times \sin 140}{\sin 30}$		M1 DEP			
		6.43	A1		3	
28(b)	$\frac{AC}{'6.428'} = \tan 30$ $(AC \quad 3.711)$		M1	2.9		
	$\angle BCA = 80^\circ$		M1	2.6		
	$\Delta ABC = \frac{1}{2} \times 'AC' \times 5 \times \sin '80'$		M1 DEP			
		9.14	A1	2.7	4	**7**