GCSE

Mathematics B (MEI)

General Certificate of Secondary Education **B294**

Paper 4 Higher Tier

Mark Scheme for June 2010

If answers clearly come from totally incorrect working, do not award the marks.

SECTION A

Question		Expected Answers	Marks	Notes
1	(a)	135°	2	**M1** for 6 x 180 or 1080 or 180 – 360/8 seen
	(b)(i)	135 + 135 soi by 270 seen Evidence of remainder considered	**B1FT** **B1FT**	Ft dep on obtuse angle ≠ 120 360 is not divisible by 135 scores 2 **SC1** for 135 is not divisible by 360
	(ii)	Square	1	
2		$\frac{2}{3}$ and $\frac{1}{6}$ only	2	**B1** for 1 only or both right and 1 wrong
3	(a)	$x + x + 3 + 4x + 4x - 5 = 128$ oe	2	**B1** for any 2 of $x + 3$, $4x$ and $4x - 5$ seen
	(b)	13, 16, 52, 47	3	Condone wrong order **M1 ft** for simplifying to $ax + b = 128$ **A1** $x = 13$
4	(a)	No , insufficient throws oe	1	
	(b)	450	3	**M2** for 30/200 × 3000 oe Or **M1** for 30/200 or 1 step in equivalent ratio method eg 100: 15
5	(a)	0.1 oe	2	**M1** for 0.3 + 0.6 oe seen
	(b)	0.09 oe	2	**M1** for 0.3 × 0.3 oe
6	(a)	$1.32(2) \times 10^9$	1	
	(b)	1.195 (or 1.19 or 1.2) $\times 10^9$	3	**B2** for figs 1.195 or 1.19 or 1.2 or **M1** for 1322000000 – 127000000 or 0.127×10^9 or 13.22×10^8

Question		Expected Answers	Marks	Notes
7	(a)(i)	t^8	1	
	(ii)	$9x^{-3}$ or $\dfrac{9}{x^3}$ WWW	2	**B1** for $18x^2$ seen or $9x^2/x^5$ or $3x^2 \times 3x^{-5}$ or ans k/x^3 or kx^{-3} **SC1** for $9x^{-2}$ or $9/x^2$
	(b)	8/9 WWW	3	**B1** for 8 WWW + **B1** for /9 or × 1/9 WWW
	(c)	$\dfrac{15 + 2\sqrt{3}}{3}$	3	**B2** for $\dfrac{a + b\sqrt{3}}{c}$ with two of a, b, c correct and integers or **M1** for × $\sqrt{3}/\sqrt{3}$
8	(a)	$x = -1$ drawn $y = 2x + 1$ drawn $2x + 3y = 12$ drawn Correct region Indication of $x = -1$ and $y = 2x + 1$ included and $2x + 3y = 12$ not included	1 1 2 1FT 1	**B1** for line with negative gradient through (6, 0) or (0, 4) Ft dep on lines with correct gradient sign and $x = k$ eg $2x + 3y = 12$ dotted line, others full
	(b)	-2	1	
9		AP = AQ (same radius oe) and PR = QR (same radius oe) AR is common oe $\triangle$ APR ≡ $\triangle$AQR (SSS) ∴ ∠ PAR = ∠ QAR oe	1 1 1 1	Condone 'given' Condone 'given' Or AR = AR This mark dep on the three statements with no others (but may omit reasons)
10		$1\frac{1}{2}\mathbf{a}$ oe $\mathbf{a} - \mathbf{b}$ oe $-\mathbf{b} + 4\mathbf{a}$ oe $-3\mathbf{a} + 2\mathbf{b}$ oe	1 1 2 2	**B1** for $-\mathbf{b} + k\mathbf{a}$, $k \neq 0$ or $\mathbf{b} - 4\mathbf{a}$ **B1** for $-k\mathbf{a} + 2\mathbf{b}$, k +ve, $k \neq 0$ or $3\mathbf{a} - 2\mathbf{b}$

SECTION B

Question		Expected Answers	Marks	Notes
11	(a)	$n = 50 - 4d$ oe	2	**B1** for $4d$ $n/4$ *seen*
	(b)	Correct line or line of points or step function starting at (0, 50) or (0, 46)	2	Ignore to right of $n = 12$ **B1** any line or line of points or step function going down in 4s
	(c)	$12 < x ≤ 13$	1	
12	(a)	20 – 30	1	Acept 'to' $20 < x < 30$ etc
	(b)	<u>Two from</u> James' mode (average) higher oe Becky's spread less oe Becky's is positively skew and James' isn't AND Comparison of one interval OR Range is the same for both	1 + 1	Accept eg, iqr, sd bigger Do not accept James' is more even ie cannot have both the last two to score 2
	(c)(i) (ii)	Limited types of people to choose from or that he does choose or general statement about randomness Arrival in group/at same time restricts choice or general statement about randomness	1 1	eg age, friends year group etc eg not varied, not random eg likely to live close (together) eg everyone is not equally likely to be selected
13	(a)	Reflection $x = -1$ oe	1 1	
	(b)	(–5, 3), (1, 3), (1, 6)	3	Give **B2** for two correct vertices **SC1** for enlargement centre (4, 0) sf k, k ≠ 1 or any enlargement sf 3
14	(a)	(£) 6400 or 6450	4	**M2** for 9460 $\times 0.88^3$ oe or **M1** for 9460 × 0.88 oe **A1** for 6446 to 6447 + **SC1** for seeing rounding of their answer to nearest 50 or 100
	(b)	(£) 10750	3	**M2** for 9460 ÷ 0.88 oe or **M1** for 88% = 9460

Question		Expected Answers	Marks	Notes
15	(a)	$x(x-9)$ oe	1	
	(b)(i)	$(x=)$ $5y-a$ oe	2	**M1** for $5 \times y = x + a$ or $y - \dfrac{a}{5} = \dfrac{x}{5}$
	(ii)	$xy - ax = -ab$ oe $x(y-a) = -ab$ $(x=)$ $\dfrac{-ab}{y-a}$	M1 M1 FT A1FT	
16	(a)	378.3(33…) or 378 363.6 to 363.7 or 364	1 2	**M1** for (405 + 336 + 350) / 3
	(b)	7 points plotted at correct height in middle of interval (FSTFSTF)	B2 FT B1	**B1 FT** for 5 or 6 pts correct
	(c)	down then up	1	Must be about trend over weeks not within week
17	(a)	135 (N)	2	**M1** for 9 soi by eg $9v^2$
	(b)	C	1	
18		AB = $\sqrt{(195^2 + 350^2 - 2 \times 195 \times 350 \times \cos 115)}$ 467 – 467.2 (195 + 350 – their 467.13) ÷ 1.2 oe 64.8 – 65 (s)	M2 A1 M1 A1	or **M1** for clear attempt at cosine rule
19		$x^2 + (x+2)^2 = 5$ $2x^2 + 4x - 1 = 0$ substitution in formula or reaching $(2)[x+1]^2 = k$ $x = -2.22$, $x = 0.22$ $y = -0.22$, $y = 2.22$	M1 A2 M1 FT A1 + A1 A1 FT	or **A1** for $x^2 + 4x + 4$ allow 1 sign error **ft** from their 3 term quadratic or $\dfrac{-2 \pm \sqrt{6}}{2}$ **ft** their x values (both) + 2

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