

**Mathematics B (MEI)**

General Certificate of Secondary Education **B294**

Paper 4 Higher Tier

**Mark Scheme for June 2010**

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OCR Publications  
PO Box 5050  
Annesley  
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NG15 0DL

Telephone: 0870 770 6622  
Facsimile: 01223 552610  
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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 $30/200 \times 3000$ 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 $0.3 \times 0.3$ 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 $0.127 \times 10^9$ or $13.22 \times 10^8$

Question	Expected Answers	Marks	Notes
7	(a)(i) $t^8$	1	
	(ii) $9x^3$ or $\frac{9}{x^3}$ WWW	2	<b>B1</b> for $18x^2$ seen or $9x^2/x^5$ or $3x^2 \times 3x^5$ or ans $k/x^3$ or $kx^3$ <b>SC1</b> for $9x^2$ or $9/x^2$
	(b) $8/9$ WWW	3	<b>B1</b> for 8 WWW + <b>B1</b> for $/9$ or $\times 1/9$ WWW
	(c) $\frac{15 + 2\sqrt{3}}{3}$	3	<b>B2</b> for $\frac{a + b\sqrt{3}}{c}$ with two of $a, b, c$ correct and integers or <b>M1</b> for $\times \sqrt{3}/\sqrt{3}$
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 <b>1FT</b> 1	<b>B1</b> 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 $\triangle APR \equiv \triangle AQR$ (SSS)  $\therefore \angle PAR = \angle QAR$ 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	$1\frac{1}{2}a$ oe $a - b$ oe $-b + 4a$ oe $-3a + 2b$ oe	1 1 2 2	<b>B1</b> for $-b + ka$ , $k \neq 0$ or $b - 4a$ <b>B1</b> for $-ka + 2b$ , $k +ve$ , $k \neq 0$ or $3a - 2b$

## SECTION B

Question	Expected Answers	Marks	Notes	
11	(a)	$n = 50 - 4d$ oe	2	<b>B1</b> 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 $n = 12$ <b>B1</b> any line or line of points or step function going down in 4s
	(c)	$12 < x \leq 13$	1	
12	(a)	20 – 30	1	Accept '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)	Limited types of people to choose from or that he does choose	1	eg age, friends year group etc
	(ii)	or general statement about randomness  Arrival in group/at same time restricts choice or general statement about randomness	1	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 <b>B2</b> for two correct vertices <b>SC1</b> for enlargement centre (4, 0) sf k, $k \neq 1$ or any enlargement sf 3
14	(a)	(£) 6400 or 6450	4	<b>M2</b> for $9460 \times 0.88^3$ oe or <b>M1</b> for $9460 \times 0.88$ oe  <b>A1</b> for 6446 to 6447 + <b>SC1</b> for seeing rounding of their answer to nearest 50 or 100
	(b)	(£) 10750	3	<b>M2</b> for $9460 \div 0.88$ oe or <b>M1</b> 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 $y - \frac{a}{5} = \frac{x}{5}$
	(ii)	$xy - ax = -ab$ oe $x(y - a) = -ab$ $(x =) \frac{-ab}{y - a}$	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 $(195 + 350 - \text{their } 467.13) \div 1.2$ 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 $\frac{-2 \pm \sqrt{6}}{2}$ ft their x values (both) + 2

**OCR (Oxford Cambridge and RSA Examinations)**  
**1 Hills Road**  
**Cambridge**  
**CB1 2EU**

**OCR Customer Contact Centre**

**14 – 19 Qualifications (General)**

Telephone: 01223 553998

Facsimile: 01223 552627

Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

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**OCR (Oxford Cambridge and RSA Examinations)**  
Head office  
Telephone: 01223 552552  
Facsimile: 01223 552553

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