

**Mathematics B (MEI)**

General Certificate of Secondary Education **GCSE 1968**

**Mark Schemes for the Units**

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**January 2007**

**1968/MS/R/07J**

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### GCSE Mathematics B (1968)

#### MARK SCHEMES FOR THE UNITS

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**Mark Scheme 2311  
January 2007**

## SECTION A

			MARKS	NOTES	
1	a b c	8 and 72 28 and 78 5 and 12	B1 B1 B1	Either order	3
2	a b	30 42	B1 M1A1	M1 attempt to split into 2 rectangles eg 27 and 15 seen or annotation on diagram	3
3		diameter tangent chord	B1 B1 B1		3
4	a b c	3/5 £12 700 or hundreds	M1A1 M1A1 B1	M1 6/10 M1 for $48 \div 4$ o.e.	5
5		13, 18 or 31 seen Compares 13 with 18 or 31  Wrong	B1 M1  A1	M1 13 is less than half of 31 o.e. Words or numbers Correct conclusion dep.	3
6	a i a ii b c	22 4 11a 4	B1 B1 B1 M1A1	M1 for $7 + 5 \div 3$	5
7	a b	P( 1, 3) Q( 5, -1) R plotted at (-2, 2)	B1 B1 B1		3
8		Sectors of 60°, 90°, 160°, 30° and 20° Labelled (acc 2°)	M2A2	M1 $360 \div 180 (=2)$ M1 at least two (30, 45, 80, 15 or 10) $\times 2$ Two correctly labelled sectors implies M2 A1 3 labelled sectors correct After M0, B3 for correct chart unlabelled	4
9		27	B2	M1 for correct multiplication method attempt – allowing 1 arithmetic slip. Not for repeated addition.	2
10		16000	B2	B1 16 or 1000 seen	2
11		34 cm <sup>2</sup>	B2 U1	M1 for $(10+7) \times 4/2$ o.e.	3

## SECTION B

			MARKS	NOTES	
12	a b	1,3,7 and 21 2 from $1 \times 40$ $4 \times 10$ $5 \times 8$ or reverse including $20 \times 2$	<b>B2</b> <b>B1, B1</b>	B1 1 error or 1 extra	4
13		£206	<b>M2A1</b>	M1 $112 \times 3$ (=336) M1 for their $336 - (50 + 80)$	3
14		Correct net	<b>B3</b>	B2 one dimension error one or correct closed box B1 any correct rectangle	3
15	a a c	6 22.75 or 23 55 or 50	<b>M1A1</b> <b>M1A1</b> <b>M1A1</b>	M1 $30 \div 4.49$ o.e. or 6.6(815...)seen M1 $4.55 \times 5$ M1 $25 \times 2.2$ or $25 \times 2$	6
16	a b	860 32.56	<b>B2</b> <b>B3</b>	M1 for $500 \times 1.72$ M2 for 32.55..., 32.6(0), or 32.56 seen M1 for $56 \div 1.72$ implied by 32.5(0) If 0 scored SC1 for answer of 33	5
17	a i a ii  b	8.94 14  37mph	<b>B2</b> <b>B3</b>  <b>M1A1</b>	M1 for $0.92 \times 7 + 2.5$ M2 for $(15.38 - 2.5) \div 0.92$ o.e. M1 for $(15.38 - 2.5)$ or 12.88 seen M1 $111 \div 3$	7
18		5.966 to 5.97 or 6.0 www	<b>B2</b>	M1 $3.14(2.....) \times 1.9$ (implied by 5.96 or 6)	2
19		56%	<b>B2</b>	M1 for $42 \div 75$ o.e.	2
20	a b	1 2.7	<b>B1</b> <b>M2A1</b>	M1 multiplying frequencies by scores M1 their $(7+10+6+8+5+18) \div$ 20	4





**Mark Scheme 2312  
January 2007**

## SECTION A

1	a	20	<b>B3</b>	M2 for $120 \div 6$ o.e. <b>or</b> alt $60 \div 3$ . Allow arithmetic error on angle provided working clear.	5
	b	20	<b>B2</b>	B1 for $60^\circ$ o.e. in working or on diagram <b>or</b> for 1 student = $3^\circ$ s.o.i. M1 for $72 \div 360$ ( $\times 100$ ) o.e. ( $1/5$ , $0.2$ etc) seen or 20% seen in working.	
2		27	<b>B2</b>	M1 for a correct <b>multiplication</b> strategy attempt allowing 1 arithmetic slip. Not for repeated addition.	2
3	a i	parallelogram	<b>1+1dep</b>	<b>Two</b> pairs of parallel sides o.e. isw	7
	a ii	square	<b>1+1dep</b>	4 equal sides <b>and</b> 4 right/equal angles or RS order 4 or 4 lines of symmetry isw	
	b	34 cm <sup>2</sup>	<b>B2</b> <b>U1</b>	M1 for $(10 + 7) \times \frac{4}{2}$ o.e.	
4	a	$\frac{13}{24}$ o.e.	<b>B2</b>	M1 for correct conversion of <b>one</b> fraction to a common denominator eg 24ths $\frac{16}{24}$ or $\frac{3}{24}$	5
	b	$\frac{2}{3}$ c.a.o.	<b>B3</b>	B2 for $14/21$ o.e. eg $98/147$ (not $2/3$ ) M1 for $12/21$ seen <b>or</b> correct conversion of <b>both</b> fractions to denominator of other multiple of 21	
5		28.8(0)	<b>B3</b>	M2 for $0.80 \times 36$ o.e. <b>or</b> $7.2(0)$ seen M1 for $0.20 \times 36$ o.e. If 0, SC1 scored multiplier of 0.8 used	3
6	a	4800	<b>B3</b>	M2 for $2400/0.5$ M1 for two of 600, 4 and 0.5 shown in working.	5
	b	5 or $5/1$	<b>B2</b>	M1 for $1/0.2$ o.e. seen	
7	a	$x^3 + 7x$ final answer	<b>B2</b>	B1 for answer $x^3$ or $7x$ dep. on 2 terms in answer or correct answer seen	7
	b i	$4(2x - 3)$ final answer	<b>B1</b>	Condone omission of final bracket in (i) and (ii)	
	b ii	$3x(x + 3y)$ final answer	<b>B2</b>	B1 for ans $3(x^2 + 3xy)$ or $x(3x + 9y)$ or correct answer seen or ans $3x(\dots + \dots)$	
	c	$\frac{r+7}{4}$ o.e. final answer	<b>B2</b>	M1 for $r + 7 = 4p$ or division throughout by 4 or correct ft division by 4 after wrong first step eg $(r - 7) / 4$	
8	a	9.4 cao	<b>B1</b>		2
	b	3.2 cao	<b>B1</b>		

## SECTION B

9	a	860	<b>B2</b>	M1 for $500 \times 1.72$	5
	b	32.56 cao	<b>B3</b>	M2 for 32.55 ....., 32.6(0), or 32.56 seen M1 for $56 \div 1.72$ o.e. implied by answer 32.5(0) If 0 scored SC1 for ans 33	
10	a	8.94	<b>B2</b>	M1 for $0.92 \times 7 + 2.5$	5
	b	14	<b>B3</b>	M2 for $(15.38 - 2.5) \div 0.92$ o.e. M1 for 15.38 - 2.5 or 12.88 in working	
11		5.966 to 5.97 or 6.0	<b>B2</b>	M1 for $\pi \times 1.9$ (implied by answer 5.96 or 6)	2
12		600	<b>B2</b>	M1 for $30 \times 20$ or $6 \times 10^2$ o.e.	2
13	a	13	<b>B2</b>	M1 for correct first step. Accept embedded in (a) and (b)	5
	b	0.6 o.e.	<b>B3</b>	M2 for $6x + 4x = 7 - 1$ M1 for 1 correct step at any stage	
14		4.1 cao	<b>B3</b>	M2 for $\sqrt{4^2 + 0.9^2}$ M1 for $4^2 \pm 0.9^2$ Accept correct longer trig methods	3
15	a	$60 < t \leq 70$ o.e.	<b>B1</b>	Allow <b>72</b> after correct method seen M1 for mid values 55, 65, 75, 85, 95 seen condone 1 slip <b>and</b> M1 for sum of frequencies $\times x$ , where $x$ is in the correct range condone 1 further slip. (5750) <b>and</b> M1 for their total $\div 80$ <b>dep</b> on 2 <sup>nd</sup> M1	5
	b	71.875, 71.87, 71.88 or 71.9 isw	<b>B4</b>		
16	a	0.625 or 0.63 o.e. i.s.r.	<b>B2</b>	M1 for $y$ step/ $x$ step attempted from diagram Implied by answer in range 0.5 to 0.75 o.e. f.t their gradient from (a)	4
	b	$y = '0.625' x + 2$ o.e. final ans.	<b>B2f.t</b>	B1 for $y = '0.625'x + k$ ( $k \neq 2$ ) or $y = mx + 2$ or loss of ' $y =$ '	
17		(Area =) 57220 to 57270 or 5.72 to 5.73 seen	<b>B2</b>	Accept 18225 $\pi$ for B2 M1 for $\pi \times \text{figs}135^2$	5
		Converts litres to $\text{cm}^3$ at any stage	<b>C1</b>	eg 845000 seen or $\times 1000$ clearly implied (eg 57.220 - 57.270 seen)	
		Digits 845 $\div$ their area of cross section	<b>M1</b>	Accept their area as an attempt at $\pi r^2$ (could be in stages)	
		14.7 to 14.8	<b>A1</b>	www5 ans with figs 147 to 148 implies B2	



**Mark Scheme 2313  
January 2007**

1	a b	4800 5 or $\frac{5}{1}$	B3 B2	M2: $\frac{2400}{0.5}$ M1: <b>two of</b> 600, 4 or 0.5 shown in working. M1: $\frac{1}{0.2}, \frac{10}{2}$ o.e. seen.	5
2	a b c	$x^3 + 7x$ final answer $x + 16$ final answer $3x(x + 3y)$ final answer	B2 B2 B2	B1: $x^3$ or $7x$ dependent on two terms in answer. B1: each term OR M1 for $3x + 6$ or $-2x + 10$ B1: $3(x^2 + 3xy)$ OR $x(3x + 9y)$ OR correct answer seen OR $3x(\text{anything})$	6
3		$\frac{r+7}{4}$	B2	M1: $r + 7 = 4p$ or division throughout by 4 OR correct ft division by 4 after wrong first step e.g. $\frac{r-7}{4}$ or $\frac{7r}{4}$	2
4	a b	9.4 cao 3.2 cao	B1 B1		2
5	a b	$\frac{4r}{3\pi}$ $\frac{pqr}{6}$	B1 B1		2
6		$\frac{9}{10}$ [condone unsimplified fractions such as $\frac{63}{70}$ , but isw, perhaps errors in attempts to simplify]	B3	M1: $\frac{21}{8}$ OR $\frac{35}{12}$ M1: $\times \frac{12}{35}$ OR successful attempt to create a division with fractions having same denominator. [M0 if both fractions inverted] such as $\frac{63}{24} \div \frac{70}{24}$	3
7	a b c	10, 10 curve within 1 mm of 7 correctly plotted points ( $\pm 1$ mm) Answer in $[-3.5, -2.5]$ iff correct curve drawn.	B1 B2 B1	P1: 7 points plotted correctly ( $\pm 1$ mm) (ft table) C1: curve within 1 mm of at least 5 points (ft plots) [P1 and C1 are independent marks] Condone if coordinates given.	4
8		1.4, -5 and correct factors seen [condone $1\frac{2}{5}$ or $\frac{7}{5}$ ]	B3	M2: $(5x - 7)(x + 5)$ OR M1: $(5x - \dots)(x + \dots)$ or $(5x + \dots)(x - \dots)$ <b>But if non-factor method employed.</b> B1 for both correct roots M1 for evidence of correct substitution into the formula or completion of square (before square rooting)	3

9	a	$\frac{6}{25}$ or 0.24	<b>B3</b>	M1: $\sqrt{36}$ soi (eg 6 seen) <b>and</b> M1: $\frac{1}{5^2}$ soi B2 : $6 \times \frac{1}{25}$ (an incomplete answer)	6
	b	$\frac{1}{10}$ or 0.1	<b>B3</b>	M1: $\sqrt[3]{}$ soi <b>and</b> M1: reciprocal soi B2 : $\sqrt{\frac{1}{100}}$	
10		105  "30cm <sup>2</sup> represents 300 vehicles so 10.5cm <sup>2</sup> represents 105 vehicles" (Accept "squares" or "boxes")	<b>B2</b>  <b>E1</b>	105 seen. B1: Required area = 10.5cm <sup>2</sup> / squares  States that each square represents 10 vehicles  300 ÷ 30 is not a sufficient explanation "Each square = 10" – Just.	3

## Section B

11	a	99	<b>B3</b>	M1: $0.5 \times 3 \times 16.5 (= 24.75)$ M1: dependent on gaining M1 above "x 4" SC1 : Answer of 198	
	b	4.1	<b>B3</b>	M2: $\sqrt{(4^2 + 0.9^2)}$ or M1: $4^2 + 0.9^2 (= 16.81)$	6
12	a	$60 < t \leq 70$	<b>B1</b>		
	b	71.875, 71.87, 71.88 or 71.9 isw  <i>Allow 72 after correct method seen</i>	<b>B4</b>	B2 for 5720 ( $\Rightarrow$ M1 and M1 below) ---- OR ---- M1: mid values 55, 65, 75, 85, 95 seen condone 1 slip  M1: for sum of frequencies $\times x$ , where $x$ is in the correct range condone 1 further slip.  [660 / 1950 / 1200 / 1275 / 665 ( $\Rightarrow$ 5750)] -----  M1 : for their total $\div 80$ <b>dep</b> on 2 <sup>nd</sup> M1 (or B2) A1 : correct answer – see left-hand	5
13	a	$\frac{5}{8}$ or 0.625 or 0.63 oe, (ignore subsequent rounding)	<b>B2</b>	M1: $\delta y / \delta x$ attempted – from diagram – can be implied from answer in range 0.5 to 0.75 o.e.	
	b	$y = \frac{5}{8}x + 2$ oe f.t their gradient from (a) ( $m = 0.625$ or 0.63)	<b>B2</b>	Do not condone $m=0.6$ unless follow through from (a). M1: $y = \frac{5}{8}x + k$ , $k \neq 2$ (or written as a "c" rather than an actual number) <b>OR</b> $y = mx + 2$ <b>OR</b> loss of " $y =$ " but correct	4
14		(Area =) 57220 to 57270 or 5.72 to 5.73 seen  Converts litres to $\text{cm}^3$ at any stage  Digits 845 $\div$ their area of cross section  14.7 to 14.8	<b>B2</b>  <b>U1</b>  <b>M1</b>  <b>A1</b>	Accept 18225 $\pi$ for B2 M1 for $\pi \times \text{figs}135^2$  e.g. 845000 seen <b>OR</b> $\times 1000$ clearly implied (e.g. by 57.220 – 57.270 seen)  Accept their area as an attempt at $\pi r^2$ <b>(could be in stages)</b>  www5  <b>Digits "147..... to 148....." <math>\Rightarrow</math> B2 M1</b>	5



15	a b	$25x^4y^6$ $y = 50/\sqrt{x}$ oe	<b>B2</b> <b>B3</b>	B1: two correct factors (in a single expression) M2: $10 = k/\sqrt{25}$ or better OR M1: $y = k/\sqrt{x}$ oe OR SC2 : Correct expression but no “ y = “ SC1 : $y^2 = \frac{2500}{x}$	5
16		Answer in [24, 25]	<b>B5</b>	M1: $C = \pi \times 11$ o.e. A1 : $C = 34$ to $35$ s.o.i  M2 : “ $\theta$ ” = $\tan^{-1}\left(\frac{16}{C}\right)$ [C = 34 to 35 or 11] (or other trig. equivalent) OR M1 : “ $\theta$ ” = $\tan^{-1}\left(\frac{C}{16}\right)$ [C = 34 to 35 or 11] (or other trig. equivalent)  A1 : $(24 \text{ to } 25)^0$  If zero SC1 : a correct trig. ratio from the figure or their diagram – must be angle with horizontal.	5
17		86	<b>B2</b>	M1: 86.1 OR $1000 \times 5062011 / 58789194$ Condone rounding for M1	2
18		$\frac{x-3}{2x-3}$ Do not ignore subsequent work	<b>B4</b>	M1: $(x-3)(x+3)$ M2: $(x+3)(2x-3)$ OR M1: $(x-3)(2x+3)$	4



**Mark Scheme 2315  
January 2007**

<b>1</b>	a b	11/30 23/30	<b>1</b> <b>2</b>	1 for at least 3 of 5, 4, 11, 3 used or for 23 or for 7/30. SC2 for qn for 11/n and 23/n, $n \neq 30$ or for 11/n and $(n - 7)/n$	<b>3</b>
<b>2</b>		96 base angles of isos triangle equal angle sum [of triangle] is $180^\circ$  58 corresponding angles [equal]	<b>1</b> <b>R1</b> <b>R1</b>  <b>1</b> <b>R1</b>	180 may be implied by correct answer of 96  condone 'F angles'; 'parallel lines' not sufft	<b>5</b>
<b>3</b>	a b	(10.4, -3) [x numbers] increase by 2.1 each time [y numbers] decrease by 3 each time	<b>2</b>  <b>R1</b>  <b>R1</b>	1 for each coordinate  or $2.1n$ seen  or $-3n$ seen	<b>4</b>
<b>4</b>	a b	$10x - 6$ $15 = 10x - 6$ or ft their (a) $x = 2.1$ cao	<b>2</b>  <b>1</b> <b>2</b>	1 for each term or for unsimplified correct version NB eqn required for full marks M1 for $10x = 21$ or ft their eqn if comparable difficulty	<b>5</b>
<b>5</b>	a b c	180 5:4 or 1.25:1 or 1:0.8 100	<b>2</b>  <b>2</b>  <b>2</b>	M1 for $240 \div 4$ or 60  M1 for correct partial simplification. condone £ signs, condone 4:5  M1 for $40 \div 2$ or 20 used	<b>6</b>
<b>6</b>	a b	9/10 32	<b>2</b>  <b>2</b>	condone 0.9; M1 for $3/5 \times 3/2$ or for $9/15 \div 10/15$ o.e.  M1 for $2^5$ or for $512 \div 16$	<b>4</b>
<b>7</b>	a b	perp bisector of AB drawn correctly  circle centre B radius 5 cm line parallel and 2 cm away correct region shaded	<b>2</b>  <b>1</b> <b>1</b> <b>1</b>	1 if accurately drawn but no compasses used or for common tangent drawn to touching circles; M1 for two sets of arcs of equal radius intersecting at least 2 cm apart but not joined  tol 2 mm allow either side of road line ft for their circle and relevant line	<b>5</b>

<b>8</b>		sketch of isos. trapezium [isosceles] trapezium stated	<b>1</b> <b>1</b>	reasonably isosceles by eye	<b>2</b>
<b>9</b>	a	27/5 or 5.4 o.e., .isw	<b>3</b>	M1 for $6x - 15 [= 12 + x]$ and M1 ft for collecting terms and simplifying: $5x = 27$	<b>12</b>
	b	$[r] = \sqrt{\frac{A}{\pi}}$	<b>2</b>	M1 for $r^2 = A/\pi$	
	c	$(x + 5)(x - 2)$ $x = -5$ or $2$ , correct or ft from their factors	<b>2</b> <b>1</b>	M1 if error in signs both answers required	
	d	mult both eqn to make coeffts of one variable same addn or subtn as appropriate  $x = 3$ $y = -2$	<b>M1</b> <b>M1</b> <b>A1</b> <b>A1</b>	condone one error in each eqn condone one error, but must be attempt at correct operation  if no working, allow W2 only, for both $x$ and $y$ correct	
<b>10</b>		OCA = 16 or CXB = 144 ACB = 10  26	<b>M1</b> <b>M2</b>  <b>A1</b>	or M1 for $COB = 180 - 32 - 20$ and M1 for $(180 - COB) / 2$	<b>4</b>

## SECTION B

<b>11</b>		11.6(93..) isw	<b>2</b>	M1 for $1941 \div 165.99$	<b>2</b>																																				
<b>12</b>		600 + g or 0.6 + kg	<b>3+</b> <b>U1</b>	M1 for $\pounds 20 - 8.12 - 3 \times 1.99$ or 5.91 and M1 for (their $\pounds 20 - \text{something}$ ) $\div$ digits 985 allow U1 for kg with answer of any size; allow g with ans 500 – 1000 or if attempted conversion from g to kg seen (even if wrong)	<b>4</b>																																				
<b>13</b>	a	94d 4h 0m 25s	<b>2</b>	1 for 2 or 3 of 4 correct	<b>4</b>																																				
	b	30600 to 30700 or 31 000	<b>2</b>	M1 for $13.58 \times 2260$ or digits 3069(...)																																					
<b>14</b>	a	correct reflection	<b>2</b>	1 if two vertices correct or if reflected in $y = 4$ or in $x = k, k \neq 4$	<b>7</b>																																				
	b	correct rotation	<b>3</b>	2 for clockwise rotation through $90^\circ$ about origin or 1 for any rotation																																					
	c	reflection in $y = -x$	<b>1</b> <b>1</b>	eqn stated or line drawn																																					
<b>15</b>	a	0.18, 0.2	<b>3</b>	2 for one of these or M1 for $9/50$ or $16/80$	<b>5</b>																																				
	b	0.16 [accept 0.16 to 0.17]	<b>2</b>	M1 for $1/6$ used or for digits 16... or 17																																					
<b>16</b>	a	-8.8	<b>2</b>	1 for -12 or 3.2 seen	<b>8</b>																																				
	b i	45	<b>1</b>																																						
	b ii	$x \geq 0.5$	<b>2</b>	1 for $2x \geq 1$ or for $x = 0.5$ etc																																					
	c	any trial between 1 and 2 exclusive trial of 1.6 and 1.7 or closer, one positive, one negative answer 1.7 [for first two marks, outcomes must agree with correct outcomes rot to at least 1 dp]	<b>1</b>	<table border="1"> <tbody> <tr> <td>1.1</td> <td>-1.069</td> <td>1.61</td> <td>-0.26672</td> </tr> <tr> <td>1.2</td> <td>-1.072</td> <td>1.62</td> <td>-0.22847</td> </tr> <tr> <td>1.3</td> <td>-1.003</td> <td>1.63</td> <td>-0.18925</td> </tr> <tr> <td>1.4</td> <td>-0.856</td> <td>1.64</td> <td>-0.14906</td> </tr> <tr> <td>1.5</td> <td>-0.625</td> <td>1.65</td> <td>-0.10788</td> </tr> <tr> <td>1.6</td> <td>-0.304</td> <td>1.66</td> <td>-0.0657</td> </tr> <tr> <td>1.7</td> <td>0.113</td> <td>1.67</td> <td>-0.02254</td> </tr> <tr> <td>1.8</td> <td>0.632</td> <td>1.68</td> <td>0.021632</td> </tr> <tr> <td>1.9</td> <td>1.259</td> <td>1.69</td> <td>0.066809</td> </tr> </tbody> </table>		1.1	-1.069	1.61	-0.26672	1.2	-1.072	1.62	-0.22847	1.3	-1.003	1.63	-0.18925	1.4	-0.856	1.64	-0.14906	1.5	-0.625	1.65	-0.10788	1.6	-0.304	1.66	-0.0657	1.7	0.113	1.67	-0.02254	1.8	0.632	1.68	0.021632	1.9	1.259	1.69	0.066809
			1.1	-1.069		1.61	-0.26672																																		
1.2			-1.072	1.62	-0.22847																																				
1.3			-1.003	1.63	-0.18925																																				
1.4	-0.856	1.64	-0.14906																																						
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18	a i	0.4 on first branch and consistent labels throughout 0.05 and 0.95 on both sets of second branches	1 1	accept equiv fractions or % for probs throughout qn	7
	a ii	0.38	2	M1 for $0.4 \times 0.95$	
	b	$0.6 \times 0.05$ ans $\times 500$  15	M1 dep M1 A1	or eg M1 for $500 \times 0.05$ or 25 prize packs and M1 dep for $0.6 \times 25$ [and similarly for 300 mint packs then 5% of 300 found]	
19	a	$3.4 \times 10^{-7}$	2	1 for correct answer with poor notation or not in standard form; M1 for $340 \times 10^{-9}$	4
	b	40	2	M1 for $4 \times 10^{-8} \div 10^{-9}$ o.e.	
20		$0.98 \times 6000$ o.e. or 5880 $1.28 \times$ their 5880 o.e. or 7526.(40) [or showing total increase = 1526.40]  $1.12^2 \times 6000$ o.e. = 7526.(40) [or showing total increase = 1526.40]	M1 M1  M2	or M2 for $0.98 \times 1.28 = 1.2544$  both years, with completion or M2 for $1.12^2 = 1.2544$ and completion; or M1 for attempt at finding 12% or 112% of 6720  If M0 in qn, allow SC1 for 2% or 12% of 6000 found (120 or 720, implied by 6720)	4





**Mark Scheme 2316**  
**January 2007**

## SECTION A

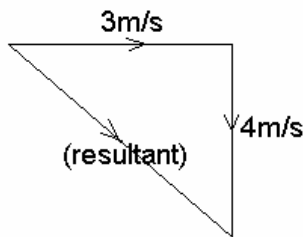
1	a	$\frac{9}{10}$	2	Condone 0.9; M1 for $\frac{3}{5} \times \frac{3}{2}$ or for $\frac{9}{15} \div \frac{10}{15}$ o.e.	
	b	32	2	M1 for $2^5$ or for $512 \div 16$	
	c	$2\frac{1}{8}$	3	M1 for $\frac{3}{4}$ seen M1 for $1\frac{3}{4} + \frac{3}{8}$ or better <b>or</b> M2 for evidence of $(1\frac{3}{4} + \frac{3}{8}) \div 2$ B2 for $\frac{17}{8}$	7
2	a	$\frac{27}{5}$ or 5.4 or equivalent (isw)	3	M1 for $6x - 15 [= 12 + x]$ <b>and</b> M1 ft for collecting terms and simplifying: $5x = 27$	
	b	$\frac{22}{7} \times \frac{14}{5} = \frac{44}{5} = 8\frac{4}{5} = 8.8$	2	Full credit for $\frac{44}{5}$ or $8\frac{4}{5}$ or 8.8 M1 for $\frac{22}{7} \times \frac{14}{5}$ or better seen, eg $\frac{308}{35}$	5
3		Multiply both equations to make coefficients of one variable the same  addition or subtraction as appropriate  $x = 3$ $y = -2$	M1  M1  1 1	Condone one error in each equation (If substitution used M1 for first (correct) and M1 for second – allow ft from first. Condone one error in each case)  Condone one error, but must be attempt at correct operation  If no working, allow W2 <b>only if</b> both $x$ and $y$ correct	4
4		$\angle OCA = 16$ <b>or</b> $\angle CXB = 144$ $\angle ACB = 10$  26	M1 M2  A1	<b>or</b> M1 for $COB = 180 - 32 - 20 (= 128)$ <b>and</b> M1 for $(180 - COB) / 2$	4
5		All three points within 2 mm radius circles on the OHT/tracing	3	2 for two points SC1 for correct but rotation in wrong direction or $180^\circ$ rotation	3
6		$3 - x^2 = x + 1$ $x^2 + x - 2 (=0)$  $(x - 1)(x + 2) (=0)$  A (-2, -1) B (1, 2)	M1 M1 M1  A1 A1	Or $x^2 + x = 2$ $\Rightarrow$ previous M1 Or correct coefficients in the formula.  Allow B1, B1 for answers with no algebraic method seen. Condone if coordinates for A, B swapped.	5

7	<p>a SSS (or equivalent)</p> <p>b Given (or equivalent)</p> <p>c Corresponding angles (or equivalent)</p> <p>SAS</p> <p><math>\angle AXD = \angle AXB</math> corresponding angles</p> <p><math>(\angle AXD = \angle AXB = 90^\circ)</math> angles on a straight line</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>Do not accept just “all sides equal”</p> <p>Condone “isosceles triangles”.</p> <p>Condone “in congruent triangles”.</p> <p>Must have reason. Condone “in congruent triangles”.</p> <p>Must have reason.</p>	6
8	<p>a <math>2n - 1</math> is (always) odd o.e. <math>n</math> is odd <math>\times</math> odd = odd o.e. <math>n</math> is even <math>\times</math> odd = even o.e.</p> <p>b i <math>(n + 1)(2n + 2 - 1)</math> <math>= (n + 1)(2n + 1)</math></p> <p>b ii <math>4n + 1</math></p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>2</p>	<p>Or <math>2n^2</math> is even</p> <p>If <math>n</math> odd “even – odd = odd” If <math>n</math> even “even – even = even”</p> <p>M1 for <math>2n^2 + 3n + 1</math> seen</p>	6
9	<p>a <math>4\sqrt{2}</math> or <math>a = 4</math></p> <p>b <math>2 + \sqrt{3}</math> (or <math>s = 2, t = 1</math>)</p> <p><math>2 - \sqrt{3}</math> (or <math>s = 2, t = -1</math>)</p>	<p>3</p> <p>2</p> <p>1</p>	<p>M1 for <math>\frac{\sqrt{2}}{\sqrt{2}} \times \frac{2}{\sqrt{2}}</math> or better seen</p> <p>M1 for <math>3\sqrt{2} + \sqrt{2}</math></p> <p>2 for first correct (+1 for second)</p> <p>Condone for full marks: <math>2 \pm \sqrt{3}</math></p> <p>M1 for ‘a’ = 1, ‘b’ = -4 and ‘c’ = 1 seen or implied in equation method or</p> <p>M2 for <math>\frac{4 \pm \sqrt{12}}{2}</math></p> <p>If completion of square used: M1 for <math>(x - 2)^2 - 3 = 0</math> or M2 for <math>x - 2 = \sqrt{3}</math></p>	6
10	<p>a smallest: <math>\left(\frac{1}{3}\right)^3</math></p> <p>b largest: <math>3^{\frac{1}{2}}</math></p> <p>2.5 o.e.</p>	<p>1</p> <p>1</p> <p>2</p>	<p>Do not accept <math>3^{\frac{1}{2}}</math> unless some evidence that <math>3^{\frac{1}{2}}</math> has been considered.</p> <p>M1 for <math>2^{2x} = 32</math> or <math>(2^2)^x = 32</math> o.e. seen</p>	4

## SECTION B

11	a b c	12 to 14 6 to 7 $40 \pm 2$	1 1 1		3																																				
12	a b	$x \geq 0.5$ Any trial between 1 and 2 exclusive Trial of 1.6 and 1.7 or better, one positive, one negative answer 1.7 [For first two marks, outcomes must agree with correct outcomes rot to at least 1 dp.]	2 1 1 1	M1 for $2x \geq 1$ or for $(x =) 0.5, \geq 0.5$ o.e. <table border="1"> <tbody> <tr><td>1.1</td><td>-1.069</td><td>1.61</td><td>-0.26672</td></tr> <tr><td>1.2</td><td>-1.072</td><td>1.62</td><td>-0.22847</td></tr> <tr><td>1.3</td><td>-1.003</td><td>1.63</td><td>-0.18925</td></tr> <tr><td>1.4</td><td>-0.856</td><td>1.64</td><td>-0.14906</td></tr> <tr><td>1.5</td><td>-0.625</td><td>1.65</td><td>-0.10788</td></tr> <tr><td>1.6</td><td>-0.304</td><td>1.66</td><td>-0.0657</td></tr> <tr><td>1.7</td><td>0.113</td><td>1.67</td><td>-0.02254</td></tr> <tr><td>1.8</td><td>0.632</td><td>1.68</td><td>0.021632</td></tr> <tr><td>1.9</td><td>1.259</td><td>1.69</td><td>0.066809</td></tr> </tbody> </table>	1.1	-1.069	1.61	-0.26672	1.2	-1.072	1.62	-0.22847	1.3	-1.003	1.63	-0.18925	1.4	-0.856	1.64	-0.14906	1.5	-0.625	1.65	-0.10788	1.6	-0.304	1.66	-0.0657	1.7	0.113	1.67	-0.02254	1.8	0.632	1.68	0.021632	1.9	1.259	1.69	0.066809	5
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13	a i a ii b	0.4 on first branch and consistent labels throughout 0.05 and 0.95 on both sets of second branches 0.38 $0.6 \times 0.05$ ans $\times 500$ 15	1 1 2 M1 dep M1 A1	<i>Accept equivalent fractions or % for probabilities s throughout question.</i> M1 for $0.4 \times 0.95$ Or eg M1 for $500 \times 0.05$ or 25 prize packs and M1 dep for $0.6 \times 25$ [and similarly for 300 mint packs then 5% of 300 found]	7																																				
14		$0.98 \times 6000$ o.e. or 5880 $1.28 \times$ their 5880 o.e. or 7526.(40) [or showing total increase = 1526.4(0)] $1.12^2 \times 6000$ o.e. = 7526.(40) [or showing total increase = 1526.4(0)]	M1 M1 M2	Or M2 for $0.98 \times 1.28 = 1.2544$ Both years, with completion or M2 for $1.12^2 = 1.2544$ and completion; or M1 for attempt at finding 12% or 112% of 6720 <i>If M0 in question, allow SC1 for 2% or 12% of 6000 found (120 or 720, implied by 6720)</i>	4																																				

<b>15</b>		$x = \frac{d-b}{a-c}$	<b>3</b>	M2 for $x(a-c) = d-b$ <b>or</b> M1 for $x(a-c)$ seen	<b>3</b>
<b>16</b>	a	14.(1421 ...) or $10\sqrt{2}$	<b>3</b>	M1 for $(RT^2) = 10^2 + 10^2$ or better M1 for $(RT) = \sqrt{200}$	
	b	$131.(409 \dots)^0$	<b>4</b>	M3 for $41.(409 \dots)^0$ <b>or</b> M1 for implied use of cosine rule in triangle RUT or use of right-angled trig. in half triangle RUT. M1 for $\cos(\angle URT) = 0.75$ o.e.  (If RT taken as 14: half $\angle RUT = 20.9249 \dots$ and $\angle VRT = 131.8496$ .)	
<b>17</b>	a	$\frac{393}{8435}$ or equivalent, i.s.w	<b>2</b>	1 each for correct numerator or denominator	
	b	$\frac{448}{4069}$ or equivalent, i.s.w	<b>2</b>	1 each for correct numerator or denominator	
	c	<b>2%</b>	<b>4</b>	M3 for 1.99 (.....) or 0.0199 ...  or M3 for $2 \times \frac{41}{4069} \times \frac{4028}{4068}$ seen  Condone: $2 \times \frac{41}{4069} \times \frac{4028}{4069}$  (M2 for either above with one error and M1 for above with two errors)	
<b>18</b>		A: $y = x^2$  B: $y = (x-2)^2 + 2$ or $y = x^2 - 4x + 6$	<b>1</b>  <b>2</b>	  1 each for $(x-2)^2$ and 2 SC2 for correct right-hand side in both but omission of "y = "	<b>3</b>

19	<p>a</p> <p>b i</p> <p>b ii</p> <p>b iii</p>	<p><math>(10t)^2 = 20d</math> o.e. so <math>d = 5t^2</math></p>  <p>5 (<math>\pm 0.1</math>) m/s</p> <p>36.(869 ...)°</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>2</p>	<p>Accept <math>10t \times 10t = 20d</math></p> <p>SC1 for <math>d = \frac{t^2}{2}</math> (from <math>10t^2 = 20d</math>)</p> <p>Must have arrows and labels on all three vectors.</p> <p>Calculation or scale drawing ie condone scale drawing.</p> <p>Accept 143.(13 ...)</p> <p>M1 for 53.(869 ...)</p> <p>or sight of <math>\tan \dots = 0.75</math></p>	6
20		1540	<p>4</p> <p>M1 for <math>\frac{1}{2} \times 9 \times 10 \sin(A) = 20</math> o.e. seen</p> <p>Or M2 for <math>\sin A = \frac{20}{45}</math> o.e. seen</p> <p>A1 for 26.(387 ...)°</p> <p>Or A2 for 154° or 153.6(122 ...)°</p>	4	

**General Certificate of Secondary Education  
Mathematics B (MEI) (Specification Code 1968)  
January 2007 Assessment Series**

### Unit Threshold Marks

Unit		Maximum Mark	a*	a	b	c	d	e	f	g	u
2311	Raw	72	NA	NA	NA	NA	50	41	32	23	0
	UMS	71	NA	NA	NA	NA	60	48	36	24	0
2312	Raw	72	NA	NA	50	38	26	14	NA	NA	0
	UMS	95	NA	NA	84	72	60	48	NA	NA	0
2313	Raw	72	53	41	29	17	NA	NA	NA	NA	0
	UMS	120	108	96	84	72	NA	NA	NA	NA	0
2315	Raw	100	NA	NA	63	42	30	18	NA	NA	0
	UMS	159	NA	NA	140	120	100	80	NA	NA	0
2316	Raw	100	62	47	32	17	NA	NA	NA	NA	0
	UMS	200	180	160	140	120	NA	NA	NA	NA	0
2317	Raw	48	43	37	31	26	22	18	14	10	0
	UMS	80	72	64	56	48	40	32	24	16	0

### Specification Aggregation Results

Overall threshold marks in UMS (i.e. after conversion of raw marks to uniform marks)

	Maximum Mark	A*	A	B	C	D	E	F	G	U
	400	360	320	280	240	200	160	120	80	0

The cumulative percentage of candidates awarded each grade was as follows:

Tier	A*	A	B	C	D	E	F	G	U	Total No. of Cands
I	NA	NA	5.5	46.2	86.9	91.0	NA	NA	100	145
H	15	35	90	95	NA	NA	NA	NA	100	20
All	1.82	4.24	15.76	52.12	87.88	91.52	NA	NA	100	165

165 candidates were entered for aggregation this series  
For a description of how UMS marks are calculated see;  
[http://www.ocr.org.uk/exam\\_system/understand\\_ums.html](http://www.ocr.org.uk/exam_system/understand_ums.html)

Statistics are correct at the time of publication





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