GCSE

Mathematics B (MEI)

Mark Schemes for the Units

June 2007

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GCSE Mathematics B MEI (1968)

MARK SCHEMES FOR THE UNITS

Mark Scheme 2311
June 2007

SECTION A

		MARKS	NOTES	
1.	(a) 30,22,20	B1		
	(b) 3,2,1½ symbols	B2	B1 1 error	
	(c) Thursday	B1		4
2.	(a)(i) 5850	B1		
	(ii) 5800	B1		
	(b) 5/20 and 9/36	B1B1	-1 each extra	4
3.	(a)(i) 150g	B1		
	(ii) 68kg	B1		
	(b) arrow pointing to 55	B1	+/- 2mm	3
4.	(a) 21	M1A1	M1 56 ÷ 8 × 3 oe **or** SC1 for 7 seen	
	(b) 16870	M2A1	Any correct full method M2 1 arithmetic error M1 2 arithmetic errors After M0 B1 2410 or 14460 seen	5
5.	(a) V (4, 5)	B1		
	W (1, -2)	B1		
	(b) Z plotted at (-2,-3)	B1		3
6.	(a)(i) 10	B1		
	(ii) 7	B1		
	(b) 8*r*	B1		
	(c) even or multiple of 2,4 or in the 4 times table	B1		4
7.	(a)(i) 0.08	B1		
	(ii) 2.48	B1		
	(b) 36%	B2	M1 for 9 × 4 or figs 36 seen	4
8.	10, , 1000	B1		
	4, 16 ,	B1		
	, 25 , 125	B1	After 0 scored SC1 for 2 correct entries	3
9.	(a) 6	B1		
	(b) 1	M1A1	M1 −1 × 5 **or** 2 × 3 soi	3
10.	9m	B3	After M0 B2 for 900 seen in working provided figs 9 in answer space or blank answer space M1 15 × 60 (implied by figs 9 seen) M1 (indep) ÷ 100 soi	3

SECTION B

		MARKS	NOTES	
11.	(a) £5.60	B1		
	5	M1A1	M1their £3(.00) ÷ 60p implied by figs 5	
	£8.60ft	A1ft	Their £5.60 + £3.00	
	(b) £9.53	M1A1	M1 £20 – their £10.47	6
12.	(a) 49	B1		
	(b) 6	B1		
	(c)A6,B3given,C7,D5,E1	B1B1B1B1		6
13.	(a) 892	B1		
	(b) £62.44ft	B1ft	ft their (a) × 0.07	4
	£81.04	M1A1ft	M1 their £62.44 + 18.60ft A1ft correct to 2 dp's	
14.	52.25 rounded or truncated	M2A1	M1 75 + 62 +…+ 68 or 418 implied by 358.5 **and** M1 their 418 ÷ 8 358.5 implies M2	3
15.	(a)(i) £105.50	M1A1	M1 100 × 0.20 + 85.50	
	(ii) 262	M1A1	M1 (£137.90 - £85.50) ÷ 0.20 implied by -289.6	
	(b) 46	M2A1	M2 69 ÷ 1.5 oe **or** M1 for 69 ÷ their time After M0, SC1 for 1.5 seen	7
16.	(a)(i) P on circumference	B1		
	(ii) chord drawn	B1		
	(b) ans in range 77.5 to 79	M1A1	M1 π × 25, π = 3.1 or better	
	cm²	U1	Mark separately	5
17.	(a) 14.4	B1	Penalise once throughout for error in key interpretation	
	(b) 5.2	B1	Accept 5.3 for use of upper/lower bounds only	3
	(c) 15.1	B1		
18.	Should be × by 3.5 She did not ÷ by 2	B1 either reason		
	12.8 × 3.5 ÷ 2 oe	B1		2

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SECTION A

		MARKS	NOTES	
1	(a) Any sum that gives an answer of 1024	**1**	971 + 53, 951 + 73, 973 + 51, 953 + 71	**2**
	(b) 1024	**1**	f.t. from their (a) providing answer > 1000	
2	(a) 24	**2**	M1 for 48 ÷ 2	**4**
	(b) 12	**2**	M1 for 48 ÷ 4 or ¼ of 48 or *their* (a) ÷ 2	
3	(a) 1.48	**2**	M1 for 1.17 + 0.31	**4**
	(b) 0.23	**2**	M1 for 1.17 - 0.94 *soi by digits 23*	
4	(a) Completes rectangle	**1**		**2**
	(b) Completes parallelogram	**1**	*cao*	
5	(a) Draws diagonals correctly	**3**	M1 for finding midpoint of AC M1 for drawing lines perpendicular to AC (ind) accuracy 'by eye' M1 for drawing 2 lines 2.8 cm long (ind) *Allow marks if 2nd diagonal missing but rhombus drawn*	**7**
	(b) a rhombus the same (length)	**1** **1**		
	(c)(i) Plots C at (3,6) (ii) Isosceles	**1** **1**		
6	(a)(i) 4,-2	**2**	1 mark each. *Allow ft for 2nd value being (1st value – 6) iff negative* *sc 1 when (a)(i) 34,40 condone "add 6"*	**7**
	(ii) Subtract 6 o.e.	**1**		
	(b)(i) 30 (ii) Because you multiply by 2 o.e	**1** **1**	M1 for subtracting 1 and dividing by 3 in any order *soi by 4.33*.	
	(c) 5	**2**		

7				
	(a) ½	1	Accept 0.5 or 50%	
	(b)⅛	1	Accept 0.125 or 12.5% SC 1 mark for 'evens' **and** 'unlikely' *Or for 50 **and** 12.5 without % sign*	2

8				
	(a) 18	2	M1 for 9	
	(b)110	2	M1 for 40 × 2 + 30	
	(c) 3	3	M1 for subtracting 20 *soi by 150* M1 for dividing by 50	7

9				
	(a) [2] 3 4 5 6 7 3 4 5 6 [7] 8 4 [5] 6 7 8 9 5 6 7 [8] 9 10	2	1 for 3 rows or 3 columns correct	

	(b)(i) 4/24 o.e. ft from
	     table.*isw*
	   (ii) 0
	
	   (iii) 6/24 o.e. ft from table.
	     isw
		1
		1
		
		1
			SC1 for (i) 4/*n* and (iii) 6/*n, same n ≠ 24*
			condone 0/24 or 0/their *n*; no ft from wrong
			table
			allow fractional, decimal or % equivs in
			(b); 0 for ratios; −1 for 'in' *or 'out of'*
			     note: do not allow b(i) 1/6 or (iii) ¼
			     without table or other evidence
				5

10				
	(a) correct reflection of shape	1		
	(b) correct rotation of shape	3	M1 for any rotation centre the origin M1 for any rotation of 90˚ clockwise about any centre SC2 rotation of 90˚ anticlockwise about O	4

11				
	(a) 0.65	2	1 for 13÷20 attempted *or digits 65 seen* [0 for saying 13÷20 but doing 20÷13]	4
	(b) 1/18	2	1 for 2/36 or 2/(9 × 4) attempted *eg 1 for 72/ (36 × 36). Zero for decimals*	

12				
	100	2	M1 for 500 ÷ 5	2

SECTION B

		MARKS	NOTES	
13	(a) 3/5	**1**	Accept equivalent fractions	**2**
	(b) 60 (%)	**1**		
14	(a)(i) 21	**1**		
	(ii) 9	**1**		
	(iii) 45	**1**		**4**
	(b) 48	**1**		
15	(a) Line of symmetry drawn	**1**	At least 5 cm long	**6**
	(b)(i) 4.3cm	**1**	± 1mm	
	(ii) 50º	**1**	± 2º	
	(iii) 145º	**1**	± 2º	
	(c) obtuse	**1**		
	(d) AB and DE	**1**		
16	(a)(i) unlikely	**1**		
	(ii) certain	**1**		
	(iii) likely	**1**		**5**
	(b)(i) 1/6	**1**	Accept 0.17 or 17%	
	(ii) 3/6 or ½	**1**	Accept 0.5 or 50%	
17	0.21 (m)	**3**	M1 for $2 \times 0.65 + 3 \times 0.83$ or digits 379 seen M1 for 4 - *their* (3.79) Or SC2 for 21	**3**
18	(a) 4 000 000	**1**		**3**
	(b) 1.24 (million) or 1 240 000	**2**	M1 for multiplying by 0.31 *soi by digits 124* or dividing by 100 and multiplying by 31	

		MARKS	NOTES	
19	2 4	**1** **1**		**2**

20	(a)(i) $x = 133º$
	      angles on a straight line
	      add up to 180º o.e.
	    (ii) $y=47º$
	      alternate angles
	
	 (b) 68º
		1
		 1
		
		 1
		 1
		
		 3
			
			 Or allied angles total 180
			
			 M1 for 180-115 (= 65)
			 M1 for 180- (47+*their* 65)
				7

21	(a)(i) 4566
	    (ii) 3.74 or 3.75 or 3.745…
	
	 (b) 9
		2
		 2
		
		 2
			M1 for 300 × 15.22
			 Allow unrequired rounding on answer line
			 supported by correct answer in body.
			 M1 for 57 ÷ 15.22 or 3.7.
			  allow 1 for 3.8(0) [from 57 ÷ 15]
			
			 M1 for 3/5 × 15 *or for 9/15* or for 15/5 = 3
			 seen
				6

22	(a) $x + 10$
	
	 (b) Showing perimeter is
	     4x + 20
	
	 (c) $4x + 20 = 55$
	     $4x = 35$
	     8.75
		1
		
		 2
		
		 M1
		 M1
		 A1
			
			 M1 for $2x + 2 ×$ (*their* $x + 10$)
			 M1 for multiplying out brackets (o.e.) and
			 simplifying
			
			 M1 for *their* expression = 55
			 DM1 for subtracting 20
				6

23	(a) 0.62(0) or 620 kg or g as appropriate (b) 0.2	**3** **U1** **2**	M1 for 2.91 – [4×0.34 or 1.36] or 1.55 or 155; then M1 for their 1.55 ÷2.5 digits 62 imply M2 allow g if conversion *seen or* attempted or 500 ≤ their ans <1000 M1 for 1 – (0.45 + 0.15 + 0.2) soi by 0.38 Allow M1 for 0.2 in body, other on answer line	**6**

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SECTION A

		MARKS	NOTES	
1	(a)(i) 0.08 cao	**B1**		
	(ii) 2.48 cao	**B1**		
	(iii) 42 cao	**B1**		
	(iv) $\dfrac{5}{12}$ o.e. i.s. cancelling	**B2**	M1 $\dfrac{2}{12}$ seen or for correct conversion of both fractions to a common denominator other than 12	**7**
	(b) 36	**B2**	M1 for 9 × 4 or figs 36 seen	
2	Correctly labelled pie chart with angles 100°, 160°, 56°, 44° (2° accuracy)	**B4**	B3 for unlabelled/wrong labels but otherwise correct. **or** B2 for 3 correct angles shown in working or 3 correct on pie chart **or** B1 for two correct in working or on chart After B0, SC1 for 360 ÷ 90 (4) s.o.i. e.g. 25/90×360	**4**
3	(a) Second row 10 1000	**B1**		
	Third row 4 16	**B1**		
	Fourth row −125	**B1**	If 0 scored, SC1 for 2 correct entries	
	(b) 0.3 35 % $\dfrac{3}{5}$ o.e. with correct working		At least 1 of the values must be converted to a comparable form www	
		B3	B2 for correct order with no working or errors seen **or** B1 for one of 60%, 30%, 0.35 seen or **2** values converted to fractions of same denominator	**7**
	(c) Gives an odd non-prime **and** explains why it is not a prime number	**B1**	e.g. 15 because it is divisible by 3 9 ÷ 3 = 3	

		MARKS	NOTES	
4	(a) Correct plan view (6 by 2 rectangle split into 2 by 2 and 4 by 2) ┌──┬──────┐ │ 2 │ 4 │ └──┴──────┘	**B2**	B1 for 6 × 2 outline **or** one correctly sized part rectangle alone or within a **rectangular** plan	**5**
	(b) 8	**B1**		
	(c) 5600	**B2**	M1 for 1 cm² = 100 mm² s.o.i. e.g. 56 × 100	
5	9(.0(0))	**B3**	M1 for figs15 × figs60 (implied by figs 9) **and** M1indep for division by 100 s.o.i. After M0, B2 for 900 seen unless further error	**3**
6	(a) 11x + 1 final ans	**B2**	M1 for 11x **or** 1, **or** 5x + 5, **or** 6x − 4	**5**
	(b) –2	**B3**	M2 for − x = (5 × 3) − 13 o.e. **or** M1 for 13 − x = 5 × 3 Embedded answer scores 2 marks only	
7	(a) $\dfrac{17-2}{3-0}$ o.e.	**E1**	Minimally 15 / 3 or −15 / −3	**5**
	(b) $y = 5x + 2$ o.e.	**B2**	SC1 for no '$y =$' **or** B1 for $y = 5x+c$ or $y = mx+2$ ($m \neq 0$)	
	(c) $y = 5x + 3$ Gradient is 5 soi or equal to AB	**B1** **B1**	dep on first B1. Allow coordinate comparison type argument	

SECTION B

		MARKS	NOTES	
8	(a)(i) 5.4 (ii) 1.52 (b) 2.66 or f.t their (a)(ii) × 1.75 evaluated	**B1** **B2** **B2ft**	 M1 for 0.8 × 1.9 M1 for 0.8 × 1.9 × 1.75 or their (a)(ii) × 1.75 ft to 3 sf or better if necessary After M0, SC1 for 1.75³ (5.35…)	**5**
9	(a) 14.4 (b) 5.2 (c) 15.1	**B1** **B1** **B1**	Penalise once throughout for error in key interpretation Accept 5.3 for use of upper/lower bounds only	**3**
10	(a) 17 (b) 30 (c) 22	**B1** **B1** **B3**	 M2 for [50 – their (a)] ÷ 1.5 o.e **or** M1 for [50 – their (a)] ÷ their time difference in hours or mins **or** 36 ÷ 1.5 **or** (0.36..) seen Allow ÷1.3 (25.4), 150 etc for M1	**5**
11	38.25	**B3**	M2 for 0.85 × 45 o.e. **or** M1 for 0.15 × 45 (6.75) or 1.15 × 45 (51.75)	**3**
12	10020	**B4**	M3 for 751500/75 or $\sum fx / \sum f$ with correct mid-values allow 1 slip on mid-values/products/addition **or** M2 for 751500 **or** 4 of 130000, 342000, 112500, 93000 or 74000 seen or sum of frequencies × x, where x is in the correct range **or** M1 for 4 of mid values 6500, 9500, 12500, 15500, 18500 seen	**4**

		MARKS	NOTES	
13	501 to 501.3	**B4**	M3 for $(\pi \times 39.8 \times 2) + (2 \times 125.6)$ (art 250) + 251.2 **or** M2 for $\pi \times 39.8 \times 2$ ($\div 2$) (art 250 or art 125) seen **or** M1 for 2×125.6 (251.2) seen	**4**
14	(a) $3x + 5y$ final answer	**B2**	B1 for $3x$ or $5y$	
	(b) -1	**B3**	M2 for $6x - 3x = 8 - 11$ **or** M1 for $6x - 3x$ ($3x$) or $8 - 11$ (-3) seen within an equation	**8**
	(c)(i) $4(x + 2)$	**B1**	Condone lack of last bracket in (c)(i), (c)(ii)	
	(ii) $3x(2x + 3y)$ final ans	**B2**	B1 for $3(2x^2 + 3xy)$ or $x(6x + 9y)$ or $3x(\dots + \dots)$	
15	3.7 to 3.71	**B4**	M3 for $\sqrt{475 \div (11 \times \pi)}$ **or** M2 for $475 \div 11\pi$ www (13.8) **or** M1 for $475 \div 11$ s.o.i. (rounds to 43.2) or $475 \div \pi$ (151..) or correct implicit equation in r seen e.g. $11 \times \pi \times r^2 = 475$	**4**

SECTION A

		MARKS	NOTES	

1	(a)
	 [2] 3 4 5 6 7
	 3 4 5 6 [7] 8
	 4 [5] 6 7 8 9
	 5 6 7 [8] 9 10
	
	 (b)(i) 4/24 o.e. ft from table isw
	    (ii) 0
	
	    (iii) 6/24 o.e. ft from table
	       isw
		2
		
		 1
		 1
		
		 1
			1 for 3 rows or 3 columns correct
			
			 SC1 for (i) 4/n and (iii) 6/n o.e., $n \neq 24$ condone 0/24 or 0/their n; no ft from wrong table
			 allow fractional, decimal or % equivs in (b); 0 for ratios; −1 for 'in' or 'out of'
				5

2	5110 or 5124 or 5096 or 5100	**4**	M2 for 14 × 365 or 14 × 366 or 14 × 7 × 52 or M1 for 14 × 7 or 14 × 52 or 14 × 360 then M1 for correct method for long multiplication o.e. SC3 for 5040 or 4704 or for double the accepted answers	**4**
3	(a) 0.65 (b) 1/18 (c) 3	**2** **2** **3**	1 for 13÷20 attempted or for digits 65 [0 for saying 13 ÷ 20 but doing 20 ÷ 13] 1 for 2/36 or 2/(9 × 4) attempted eg 1 for 72/ (36 × 36) M1 for 15/4 seen and M1 for (15 × 4)/(4 × 5) o.e. (ft for top-heavy fraction only) <u>or</u> M1 for 3.75 × 0.8	**7**
4	(a) −1, −2 (b) their pts plotted smooth curve through all 7 points	**1+1** **P1** **C1**	 tol 1 mm; must be all 4 pts correct or ft tol < 2 mm; allow through all their points if only six plotted	**4**

		MARKS	**NOTES**	
5	(a)(i) correct reflection drawn	**2**	1 for reflection in other $x = k$ or in $y = 4$ or for reflection of B in $x = 4$ (need not label their image if no others drawn)	
	(ii) translation $\begin{pmatrix} 4 \\ -4 \end{pmatrix}$	**1** **1+1**	0 for 'move' condone coords; or 1 for 4 right, 1 for 4 down; allow 1 out of 2 for $\begin{pmatrix} -4 \\ 4 \end{pmatrix}$ o.e.	**7**
	(b) correct enlargement drawn	**2**	1 for enlargement correct size, wrong position; or for 2 vertices correct, one wrong; mark intent for position	
6	(a) $\frac{9}{2}$, $4\frac{1}{2}$ or 4.5	**2**	1 for 36 or 8 seen	
	(b)(i) y^{10} (ii) x^4	**1** **1**		**6**
	(c) $3x(4 + 3y)$	**2**	1 for $3x$(other $a + b$) or $x(12 + 9y)$ or $3(4x + 3xy)$	
7	perp bisector of WL drawn with two sets of arcs	**2**	condone mid-point of LW marked and joined to one set of arcs; 1 mark if no arcs; allow M1 for 2 correct sets of arcs but no line drawn	
	circle centre P rad 3 cm drawn	**1**	tol generous 1 mm; accept freehand if within tol.; at least relevant part drawn	**4**
	correct shading	**1**	dep on circle intended and attempt at perp bisector	

		MARKS	**NOTES**	
8	(a) 5/2 or 2.5 oe	**2**	M1 for $2x = 5$	
	(b) $6x + 9y = 33$ o.e.	**M1**	or $4x + 6y = 22$ condone one error	
	$\quad\;\; 6x - 4y = 20$ o.e.	**M1**	$\quad\; 9x - 6y = 30$ condone one error	
	$\quad\;\; 13y = 13$	**M1**	or $13x = 52$ condone one error; for appropriate addn / subn ft their method	
			for substn method:	
			M2 for $3\left(\dfrac{11-3y}{2}\right) - 2y = 10$ or	**6**
			$2x + 3\left(\dfrac{3x-10}{2}\right) = 11$ [condone one error	
			then M1 for rearranging to $ay = a$ or $bx = 4b$ (condone one error)	
	$\quad\;\; x = 4, y = 1$	**1**	indep of method; but allow 4 marks for qn only if no errors	
9	(a) 0.6 on first branch + suitable labels on 2nd branches	**1**	accept equiv fractions or % throughout	
	0.3, 0.7 on both sets of 2nd branches	**1**		
	(b)(i) 0.42	**2**	M1 for their 0.6 × their 0.7	**7**
	(ii) 0.46	**3**	M2 for 0.4 × their 0.7 + 0.3 × their 0.6 or for 1 – their (b)(i) – 0.3 × 0.4 or M1 for one of these products or both sets of branches identified	

SECTION B

		MARKS	NOTES	
10	(a)(i) 4566	**2**	M1 for 300 × 15.22	
	(ii) 3.74 or 3.75 or 3.745…	**2**	M1 for 57 ÷ 15.22 or 3.70; allow 1 for 3.8(0) [from 57 ÷ 15]	
	(b) 9	**2**	M1 for 3/5 × 15 or for 15/5 = 3 seen	
	(c) lines 1 0 order 1 1 (condone 1 2)	**2**	condone 0 consistently used instead of 1 for rotational symmetry; allow 1 mark for one row or column correct NB error in printed paper – last diagram does not have rotational symmetry 2 as it should	**8**
11	(a) 0.62(0) or 620	**3**	M1 for 2.91 − [4×0.34 or 1.36] or 1.55 or 155; then M1 for their 1.55 ÷2.5 digits 62 imply M2	
	kg or g as appropriate	**U1**	allow g if conversion seen or attempted or 500 ≤ their ans < 1000	**6**
	(b) 0.2 o.e.	**2**	M1 for 1 − (0.45 + 0.15 + 0.2) soi allow answer of 0.38 to imply M1	
12	(a) 15*ab*	**2**	1 for 15 × *ab* or 5 × 3 *ab* or 15*a* × *b* or 15(*ab*)	
	(b) 21 add 4 each time o.e	**1** **R1**	e.g. accept '4 lines of stars and 1 in middle' 'next odd number but one' 'adds two stars to both lines every time' or 4*n* + 1 o.e. seen	**6**
	(c) 6*n* − 4 o.e. eg 2 + 6(*n* − 1)	**2**	1 for 6*n* seen; condone other letters	

		MARKS	NOTES	
13	(a) 32	**1**		**10**
	[base angles in] isosceles [triangle are equal]	**R1**	0 for just 'triangle has two equal sides' oe	
	angles in triangle [add to 180]	**R1**	for both reasons, condone omission of 180 if angle is correct; condone omission of 'triangle' if triangle already mentioned	
	106	**1**		
	angles on straight line [add to 180]	**R1**	or exterior angle [of triangle] = sum of interior opposites	
	(b) 72°	**2**	M1 for 360/5 seen	
	(c) 126	**3**	M1 for known angles added [= 414] and M1 for angle sum of pentagon = 540 or 3 × 180 soi <u>or</u> M1 for exterior angles found and M1 for exterior angles add to 360 soi	
14	(a) $C = 120 + 4m$ o.e.	**2**	1 for $4m$ seen	**5**
	(b) $120 + 4m = 436$	**1**	or ft their (a)	
	79	**2**	M1 for $4m = 436 - 120$ (no ft from wrong eqn) NB if no eqn, or starting again, give 2 for ans 79 [eqn reqd for 3 marks]	
15	trial between 2 and 3 with correct outcome rot to 1 dp or more	**1**	2.1 -4.039 2.41 -0.23248 2.2 -2.952 2.42 -0.08751 2.3 -1.733 2.43 0.058907 2.4 -0.376 2.44 0.206784	**4**
	trial of 2.4 to 2.5 inclusive with correct outcome rot to 1 dp or more	**1**	2.5 1.125 2.45 0.356125 2.6 2.776 2.46 0.506936 2.7 4.583 2.47 0.659223	
	trial of 2.42 <u>and</u> 2.43 with correct outcome rot to 2 dp or more [or closer trials with pos and neg outcomes]	**1**	2.8 6.552 2.48 0.812992 2.9 8.689 2.49 0.968249 2.425 -0.01448	
	answer 2.43	**1**	accept trials of $x^3 - 3x$ compared with 7	

		MARKS	NOTES	
16	(a) 960	**3**	M2 for 768 ÷ 0.8 o.e. or M1 for 0.8 seen (80% not sufft)	
	(b) 8×10^{10}	**2**	1 if poor notation used eg 8^{10} or 8^{x10} or for 80 000 000 000 or 80×10^9 or 0.8×10^{11}	
	(c) 18.8... or 19	**3**	M1 for sin $y = 9.2 \div 28.5$ (condone poor notation) M1 for use of inv trig fn soi eg answer of 71.1… (from cos) or 17.8 to 17.9 (from tan) M2 for answer of 20.9(25…) from grads or 0.32(86…) from rads scale drawing: give 0 marks	**8**
17	3.9	**3**	M2 for EF = $6.5 \times 7.2/12$ o.e. (implied by $3.8 <$ answer < 3.9) or M1 for sf = $7.2/12$ [=0.6] or 12/7.2 o.e (accept 1.66 to 1.7) or for $\dfrac{EF}{6.5} = \dfrac{7.2}{12}$ or $\dfrac{6.5}{EF} = \dfrac{12}{7.2}$ but NB M0 for 1.7 without evidence of scale factor (eg comes from $12 - 7.2 = 4.8$ then $6.5 - 4.8 = 1.7$)	**3**

Mark Scheme 2313
June 2007

SECTION A

		MARKS	NOTES	
1	(a) $11x + 1$ (b) -2	**B2** **B3**	M1: $11x$ or 1 or $5x + 5$ or $6x - 4$ M2: $-x = 15 - 13$ oe or -2 embedded M1: $13 - x = 5 \times 3$	**5**
2	(a) $2^2 \times 3^3$ cao (b) $\frac{2}{3}$	**B3** **B2**	M1: factor tree oe (allow 1 arithmetical error) A1: $2\times2\times3\times3\times3$ M1: $1/1\cdot5$ soi	**5**
3	(a) $x > 2\cdot4$ oe accept $x > \frac{12}{5}$ isw (b) $\frac{s-12}{4}$ or $\frac{s}{4} - 3$	**B2** **B2**	M1: $5x = 12$ or better soi M1: $s - 12 = 4t$ or $^s/_4 = t + 3$ correct first step only	**4**
4	(a) $7\cdot32 \times 10^7$ (b) $5\cdot83 \times 10^6$	**B1** **B2**	 M1: 583 seen (ignore decimal) or $0\cdot23\times10^6$ or 56×10^5	**3**
5	(a) $\frac{17-2}{3-0}$ oe (b) $y = 5x + 2$ (c) $y = 5x + 3$ Gdt = 5 or gdt = gdt of AB soi	**E1** **B2** **B1** **B1**	Minimally: 15/3 or -15/-3 B1: $y = 5x + c$ or $y = mx + 2$ (m≠0) or $5x + 2$ <u>Dependent</u> on gradients equal in (b) and (c) equations	**5**
6	77·5 [Accept 77 or 78 www] Accept 75 / 80 if B2 earned.	**B3**	B1: for 31 or 775 B1: for 40 or 1000	**3**

		MARKS	**NOTES**	
7	10, –2 with evidence of algebraic method	**B4**	M1: $\begin{cases} 15x+6y=138 \\ 4x-6y=52 \end{cases}$ or $\begin{cases} 10x+4y=92 \\ 10x-15y=130 \end{cases}$ (c1e) M1: $19x = 190$ or $19y = –38$ or f.t. correct and consistent elimination B1: $x = 10$ B1: $y = –2$ (c1e ≡ condone one error)	**4**
8	7	**B2**	M1: $3^2 + 2^2 + 6^2$ oe	**2**
9	(a) 6	**B2**	M1: $\sqrt{36}$ or $\sqrt{2} \times \sqrt{2} \times \sqrt{9}$ or better	**5**
	(b) $\frac{1}{8}$ oe	**B3**	M1: $\sqrt[4]{16} = 2$ soi or 8 seen M1: appropriate reciprocal attempted	

SECTION B

		MARKS	NOTES	
10	10020	**B4**	M3: $\underline{751500}$ or $\underline{\Sigma fx}$ 75 Σf using mid-values, allow 1 slip on mid-values or products. M2: for 751500 **or** 4 of 130000, 342000, 112500, 93000 **or** 74000 seen **or** sum of frequencies x x (x in correct range) M1: 4 of mid values 6500, 9500, 12500, 15500, 18500 seen	**4**
11	501 to 501·3	**B4**	M3: $(\pi \times 39\cdot8 \times 2) + (2 \times 125\cdot6)$ (art 250) + 251·2 M1: $\pi \times 39\cdot8 \times 2$ (art 250) oe allow for 1 semi circle (art 125) M1: 2 x 125.6 (251.2)	**4**
12	$3x(2x + 3y)$ final ans	**B2**	B1: $3(2x^2 + 3xy)$ or $x(6x + 9y)$ or $3x(…+...)$	**2**
13	3·7 to 3.71	**B4**	M3: $\sqrt{475 \div (11 \times \pi)}$ M2: $475 \div 11\pi$ ($\approx 13\cdot75$) **www** M1: $475 \div 11$ ($\approx 43\cdot18$) or correct implicit equation in r seen e.g. $11 \times \pi \times r^2 = 475$ or $475 \div \pi$ (≈ 151.1)	**4**

14	(a) March & September, February & August
	
	(b) 221·14 Accept answer in
	      [221, 221·3]
	   Accept 221140
		B2
		
		 B2
			B1: either pair
			
			M1: (243·8–217)/12 ($\approx 2\cdot2…$)
			or (12×218·91 + 243·8–217)/12
			or digits 22114 seen
				4

15	(a)(i) $15x$ oe (ii) 30×75/3 = 750; 15×50= 750 (b) 31·0	**B1** **B2** **B4**	eg 30x/2 Alt: M1: $15x = 30\times75/3$ DM1: $x = (30\times75/3)/15$ B3: Answers in [30·9, 31] or M1: selects tangent DM1: 30/50 A1: 31 or 30·96(…)	**7**
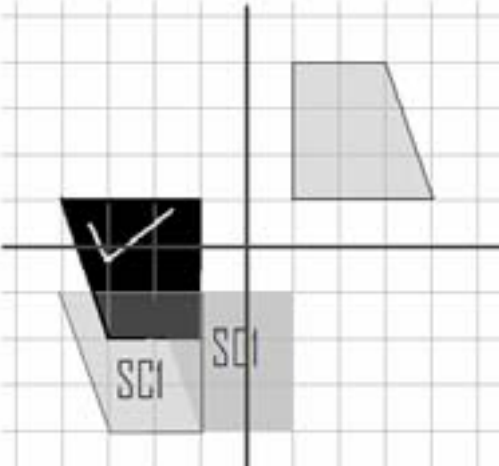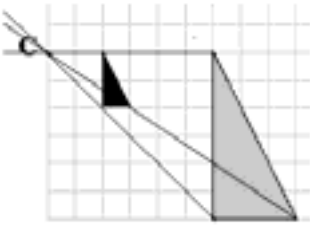
16	$y = 45/x^2$	**B3**	M2: $5 = k/3^2$ or better; or M1: $y = k/x^2$ oe B2: $45/x^2$ SC2: y α $45/x^2$ SC1: 45 seen	**3**
17	$\dfrac{2x+1}{x+1}$ without wrong working	**B4**	M1: Attempts to factorise one expression A1: $(2x + 1)(x - 3)$ A1: $(x + 1)(x - 3)$	**4**
18	(a) Mention of sim. figs. or enlargement (b) 387 Accept answers in [386·5, 388·5]	**E1** **B3**	 M1: vol = $\frac{1}{3}\pi \times 4^2 \times 40$ $(\approx 670\cdots)$ or $\frac{1}{3}\pi \times 3^2 \times 30$ $(\approx 282\cdots)$ DM1: subtracts volumes or scale factor $1 - \left(\frac{3}{4}\right)^3 (\approx 0\cdot57\ldots)$ seen	**4**

Mark Scheme 2316
June 2007

SECTION A

			MARKS	NOTES	
1	(a)	y^{10}	**1**		
	(b)	x^4	**1**		
	(c)	z^7	**1**		**3**
2	(a) **(i)**	translation $\begin{pmatrix} 4 \\ -4 \end{pmatrix}$	**1** **1** **1**	No credit for "move" Condone coordinates or **1** for "4 right" (across not sufficient must have direction),**1** for "4 down" SC1 $\begin{pmatrix} -4 \\ 4 \end{pmatrix}$ o.e. (i.e. correct but transposed) Condone 4x, -4y etc.	
	(ii)	Correct rotation	**2**	**SC1** for half turn about (0, 0)or about (1, 0)	
	(b)	Correct enlargement	**2**	**1** for correct size enlargement but wrong position **OR** **1** for 2 correct vertices; Mark intent for position.	**7**
3	(a)	$2 \leq p < 7.5$	**3**	Clearly intended as answer 2 for $2 \leq p$ **or** $p < 7.5$ seen but for all above, including the "right answer" $2 < p$ results in the loss of 1 mark.	
	(b)	2, 3, 5, 7	**1**		**4**
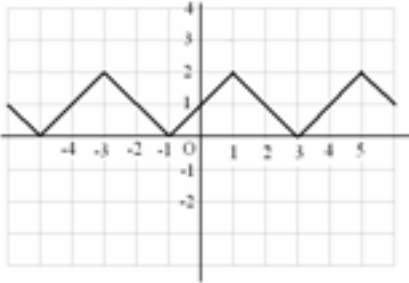
SECTION A

		MARKS	NOTES	
4	Perpendicular bisector of *WL* drawn with two sets of arcs.	2	1 if 0 or 1 set of arcs, allow M1 for 2 correct sets of arcs but no line drawn	
	Circle centre P radius 3 cm drawn	1	Tolerance generous 1 mm; accept freehand if within tolerance.	
	Correct shading	1	about 25% of circle shown sufficient.	4
			Dependent on circle intended and attempt at perpendicular bisector	
5	(a) 1.355×10^{14}	2	**M1** for 135.5×10^{12} or full number.	
	(b) (i) 10^{-12} or 1×10^{-12} o.e.	1	Does not need to be standard form.	
	(ii) 5×10^{-15}	1	Allow $\frac{1}{10^{12}}$ o.e.	4
6	(a) $n(n+1)$ or $n^2 + n$	2	M1 each for n^2 (or $n \times n$) or n	
	(b) "odd x even = even" **and** "even x odd = even" **or** equivalent covering all possibilities from $n^2 + n$ o.e.	2	Relatively tight argument needed, with all possibilities taken account of.	
			Condone clear statement of "starts on an even number, then even number added each time".	
			M1 for mention of **any** true fact regarding addition or product of even or odd numbers seen	4

SECTION A

			MARKS	NOTES	
7	(a)	$y^2 = (x-1)^2$ or $x^2 = (y+1)^2$ or better	1	Clear attempt at substitution	
		$x^2 + x^2 - 2x + 1 = 25$	1		
		$2x^2 - 2x - 24 = 0$	1	Condone $x^2 - x - 12 = 0$ iff evidence of intermediate steps.	
				Condone working for (b) in (a) area and vice versa	
	(b)	$(x-4)(x+3)$ $(= 0)$ o.e.	1	If formula used award the first mark	
		$x = 4$, $x = -3$ or $(4, 3)$ or $(-3, -4)$ Second coordinate	1www	for $\dfrac{1 \pm \sqrt{1^2 - 4 \times -12}}{2}$ or better then	
		$(-3, -4)$ or $(4, 3)$	1www	continue as for factorisation.	
				SC1 - reversing signs in brackets and points given as $x=-4$ and $x = 3$ i.e. follow through solution	
				For T&I 1 for each correct point i.e. 1 each for $(4, 3)$, $(-3, -4)$	6
				Mark (a) and (b) as whole page.	
8	(a)	$\dfrac{1}{4}$ $\dfrac{1}{4}$ $\dfrac{1}{2}$ or equivalent	2	1 for two correct.	
	(b)	$\dfrac{1}{4}$ or $\dfrac{2}{8}$ or 0.25 or 25%	2	M1 for $\dfrac{1}{8}$ seen	
	(c)	(i) $(0.5)^n$ or equivalent	2	SC1 $\dfrac{n}{2}$, $\dfrac{1}{2n}$ or $0.5n$	
		(ii) $1 - (0.5)^n$ or equivalent	2	M1 for $1 -$ "their" incorrect (a) soi	
				Some possible equivalent answers are	8
				(i) $\dfrac{1}{2^n}$ (ii) $\dfrac{2^n - 1}{2^n}$	

SECTION A

			MARKS	NOTES	
9	(a)	$8x^3y^6$	**2**	M1 for any two of: 8 x^3 y^6 ignore additional errors	
	(b)	$\frac{x}{x-1}$	**3**	$\dfrac{x(x+1)}{(x-1)(x+1)} \rightarrow \begin{matrix}\text{M1}\\\text{M1}\end{matrix}$ **Or** $\dfrac{x}{(x-1)} \rightarrow \begin{matrix}\text{M1}\\\text{M1}\end{matrix}$ **but zero** for $\dfrac{x}{-1}$ or $\dfrac{2x}{x-1}$ or similar	**5**
10	$a = 18$, $b = -12$ or $18 - 12\sqrt{2}$		**1+1**	M1 for $\sqrt{144} - \sqrt{72} - \sqrt{72} + \sqrt{36}$ or better such as $12 - \sqrt{72} - \sqrt{72} + 6$ $12 - \sqrt{12} \times \sqrt{6} - \sqrt{12} \times \sqrt{6} + 6$ etc. (i.e. correct expansion)	**2**
11	(a)	Correct (one cycle at minimum) 	**1**		
	(b) (i)	$y = 3\sin x$	**1**	Condone $(\sin x)3$	
	(ii)	$y = \sin 2x$	**1**	Condone $\sin(2x)$, $\sin x2$ but not $\sin x \times 2$	**3**

SECTION B

			MARKS	NOTES	
12	(a)	$\pi b^2 - \pi a^2$	**M1**	Explicit sight of πb^2 **and** πa^2 (not as the given expression)	
		$= \pi(b^2 - a^2)$	**A1**	{Words or algebra to effect that shaded region = big area – small area (or $\pi b^2 - \pi a^2$)} {which is equal to $= \pi(b^2 - a^2)$} Need {both parts}	
	(b)	19.(…)% or 20%	**B3**	M1 for 0.41(25) or 1.29(59 …) seen M1 for 2.10(25) or 6.60(519 …) seen	**5**
13	(a)	(i) (-)3.2 to 3.3 (s) (ii) (-)0.9 to 1.1 (s) (iii) 0.4 to 0.6 (s) (iv) 32000 to 34000 (kiloN)	**1** **1** **1** **1**		
	(b)	2882/2880/2883	**B4**	**M1**: 94% = 2710 seen (or implied) **or** **M1**: 2710 ÷ 94 (i.e. digits "94") seen **or** **M2**: 2710 ÷ 0.94 **or** B3 for 2882.9(787 …) or 2900 inappropriate accuracy www	
	(c)	Upper: 10975 Lower: 10945	**3**	2 for any correct answer Condone 10974.9 shown using recurring decimal notation. If zero SC1 for any one of these seen: 5005, 2895, 3045, 5015, 2905, 3055 (Look for the fives.) SC2 correct but reverse order.	**11**

SECTION B

				MARKS	NOTES	
14	(a)		"not all letters equally likely" or equivalent	1	"vowels/consonants .. are more frequent /not as frequent/different frequency/more common/used as much" or similar - can almost use likely/probable/frequent inter-changeably.	
	(b)	(i)	0.13 0.66	1		
		(ii)	0.57 x 0.34 0.19(38) o.e.	M1 A1		
		(iii)	0.43x0.87 (= 0.3741) + 0.57x0.66 (= 0.3762) = 0.75(03) o.e.	M1 A1	Need correct multiplication and addition, but follow through on their "0.66".	
		(iv)	"Probability of second choice/letter different to first/changes/depends" or equivalent. (e.g. changes)	1	Do not accept pure definition of dependent/independent unless reference made to "letter" or "picking letter" as opposed to just "event"	7
15	Trial between 2 and 3 (exclusive) with correct outcome rot to 1 dp or more Trial of 2.4 to 2.5 inclusive with correct outcome rot to 1 dp or more Trial of 2.42 and 2.43 with correct outcome rot to 2 dp or more or closer trials with positive and negative outcomes Answer 2.43				1 1 1 1	<table><tr><td>2.1</td><td>-4.039</td><td>2.41</td><td>-0.23248</td></tr><tr><td>2.2</td><td>-2.952</td><td>2.42</td><td>-0.08751</td></tr><tr><td>2.3</td><td>-1.733</td><td>2.43</td><td>0.058907</td></tr><tr><td>2.4</td><td>-0.376</td><td>2.44</td><td>0.206784</td></tr><tr><td>2.5</td><td>1.125</td><td>2.45</td><td>0.356125</td></tr><tr><td>2.6</td><td>2.776</td><td>2.46</td><td>0.506936</td></tr><tr><td>2.7</td><td>4.583</td><td>2.47</td><td>0.659223</td></tr><tr><td>2.8</td><td>6.552</td><td>2.48</td><td>0.812992</td></tr><tr><td>2.9</td><td>8.689</td><td>2.49</td><td>0.968249</td></tr><tr><td></td><td></td><td>2.425</td><td>-0.01448</td></tr></table> Allow trials of $x^3 - 3x$ compared with 7	4

SECTION B

			MARKS	NOTES	
16	(a)	(i) $q - 2p$ o.e.	1	Condone $1q - 2p$ for (i) and (ii).	
		(ii) $q - 2p$ o.e. or (i)	1	Allow follow through from (i) but must involve ps and/or qs.	
	(b)	Parallelogram Sight of either of: $\overrightarrow{RU} = \overrightarrow{ST}$ o.e. **or** $\overrightarrow{RS} = \overrightarrow{UT}$ o.e. Allow full non-vector statement	1 1	Dependent on first part. Must have reference in words or symbolically that RS and UT are parallel **and** equal (or RU and ST) Abstract definition of a parallelogram not sufficient. Beware candidates focusing on ABCD.	**4**
17	(a)	100^0	2	M1: for any one of these seen $360 - 80 - 90 - 90$ $720 - 320$ 400 $\div 4$	
	(b)	(i) $\angle P = \angle R$ stated PQ = QR or PT=RS stated SAS (or SSS if mention made of QT = QS)	1 1 1	Allow "QT=QS" iff reason mentions "symmetry" or "isosceles" Dependent on at least 1 from previous (i.e. one or more equal sides = 1, equal angle = 1 – reason not required – only congruency condition)	
	(c)	$WZ^2 =$ $4^2 + 2^2 - 2 \times 4 \times 2 \times \cos(80)$ $= 17.(221629 \dots)$ $= 4.1(49 \dots)$	M1 A1 A1	Clear attempt to use cosine rule – with appropriate sides and angle. $\Rightarrow$ M1 also Or 3 with correct working	**8**
18	(a)	(i) $(n =)$ 7 (ii) $(n=)$ 19	1 1	Condone embedded (e.g. $2^7(-1)$) " "	
	(b)	(i) $d = 0.3 (\dots) n$ or $\dfrac{n}{3}$ o.e.	2	M1 for evidence of $386 \div 1279$ etc.	
		(ii) 7 700 000 - 9 100 000	1	No follow through	**5**

SECTION B

			MARKS	NOTES	
19	(a)	$x = -3$	**2**	M1 for any one of these seen: $2^x = \frac{1}{8}$ $2^{-x} = 8$ $0.5 = \sqrt[x]{8}$ $\frac{1}{2} = \sqrt[x]{8}$ Accepted embedded answer e.g. $0.5^{-3} = 8$	
	(b)	$a = \dfrac{-3b^2}{b^2 - 1}$ or $\dfrac{3b^2}{1 - b^2}$	**4**	M1 for each of these seen $b^2 = \dfrac{a}{a+3}$ $b^2(a + 3) = a$ or better $a(b^2 - 1) = -3b^2$ 3 for $a = -$ (correct) Penalise further incorrect working. (look for M marks)	**6**

General Certificate of Secondary Education
Mathematics B (MEI) (Specification Code 1968)
June 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	52	42	32	22	0
	UMS	71	NA	NA	NA	NA	60	48	36	24	0
2312	Raw	72	NA	NA	53	40	28	16	NA	NA	0
	UMS	95	NA	NA	84	72	60	48	NA	NA	0
2313	Raw	72	65	50	35	20	NA	NA	NA	NA	0
	UMS	120	108	96	84	72	NA	NA	NA	NA	0
2314	Raw	100	NA	NA	NA	NA	69	56	44	32	0
	UMS	119	NA	NA	NA	NA	100	80	60	40	0
2315	Raw	100	NA	NA	68	50	36	22	NA	NA	0
	UMS	159	NA	NA	140	120	100	80	NA	NA	0
2316	Raw	100	70	54	38	23	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
2318	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
1968	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
F	NA	NA	NA	NA	4.88	27.15	60.35	84.38	100	512
I	NA	NA	14.19	45.61	78.82	93.77	NA	NA	100	1445
H	34.10	67.01	90.51	99.04	NA	NA	NA	NA	100	1349
All	13.91	27.34	43.13	60.34	75.62	85.60	90.74	94.46	100	3306

For a description of how UMS marks are calculated see;
http://www.ocr.org.uk/exam_system/understand_ums.html

Statistics are correct at the time of publication

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