

Mark Scheme (Results) January 2008

GCE O Level

O Level Mathematics B (7361_02)

Mathematics Syllabus B 7361

Paper 2

1. (a)	$(x - 4)^2 - 2$ $x^2 - 8x + 14$	(o.e) M1 A1	2	
(b)	$\frac{x^2 - 8x + 14}{2} = x^2 - 2$	(o.e) M1 A1	2	4
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2. (a)	substituting 1 for x correct conclusion	M1 A1	2	
(b)	$x^2 - x$ (*) $(x + 3), (x - 4)$ (one of) $(x - 1)(x + 3)(x - 4)$	M1 A1 A1	3	5
(*) However obtained (division, table etc so coef of $x^2 = 1$ and coef of $x = -1$) SC: Trial & Error: $f(4) = 0$ (eg) and stops earns M1 A0A0				
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3. (a)	$\frac{1}{14} \begin{pmatrix} 2 & 1 \\ -4 & 5 \end{pmatrix} = \begin{pmatrix} 0.143 & 0.071 \\ -0.236 & 0.357 \end{pmatrix}$	B2 (-1eeoo)	2	
(b)	"(a)" $\begin{pmatrix} 5 & -1 \\ 4 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \text{"(a)" } \begin{pmatrix} 2 \\ 1 \end{pmatrix}$ Multiplying "(a)" $\begin{pmatrix} 5 & -1 \\ 4 & 2 \end{pmatrix}$ Multiplying "(a)" $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$	M1 M1 (DEP) M1 (DEP)		
	$x = \frac{5}{14} = 0.357, y = -\frac{3}{14} = -0.214$	A1	4	
OR	$5x - y = 2$ $4x + 2y = 1$ Multiplying simul. eqns to eliminate 1 variable Substitution	M1 M1 (DEP) M1 (DEP)		
	$x = \frac{5}{14} = 0.357, y = -\frac{3}{14} = -0.214$	A1	4	
OR	$\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{14} \begin{pmatrix} 2 & 1 \\ -4 & 5 \end{pmatrix} \begin{pmatrix} 2 \\ 1 \end{pmatrix}$ attempt at matrix multiplication	M2 M1 (DEP)		
	$x = \frac{5}{14} = 0.357, y = -\frac{3}{14} = -0.214$	A1	4	6

4. (a)	108		B1	1
(b)	$\frac{180-108}{2}$	(o.e)	M1	
	36		A1	2
(c)	$\angle CED = 36$, $\triangle ABE$, $\triangle DCE$ congruent or $\triangle CDE$ is isos. \triangle or $CD = DE$ or base angles		B1	
	$\angle CEB = 108 - 2 \times 36 = 36$		B1 (INDEP)	
	c.c		B1 (DEP on 1 st B)	3
OR	Consider circle through A, B, C, D and E Equal arcs are subtended by equal chords		B1	
	$\therefore AB = BC = CD$		B1 (DEP)	
	$\therefore \angle AEB = \angle CED = \angle BEC$		B1 (DEP)	3
S.C.:	No or insufficient reasons with correct numerical values for the angles			
	B0 B1 B0			6

5. (a) (i)	$\tan \angle ECB = \tan \angle AED = \frac{3}{3}$		M1	
	$\tan 45 = \frac{AD}{2}$		M1 (DEP)	
	2		A1	
OR	$\frac{AD}{2} = \frac{AD+3}{5}$		M1	
	$5AD = 2(AD+3)$		M1 (DEP)	
	2		A1	
(ii)	5		B1	4
(b)	one of $\frac{1}{3} \times \pi \times 5^2 \times "5"$ or $\frac{1}{3} \times \pi \times 2^2 \times "2"$		M1	
	$\frac{1}{3} \times \pi \times 5^2 \times "5" - \frac{1}{3} \times \pi \times 2^2 \times "2"$		M1 (DEP)	
	123		A1	3 7

N.B.: Volume of frustrum = $\frac{1}{3}\pi h[a^2 + b^2 + ab]$ leads to 123 (h is the height of the frustrum and a and b are the radii of the two bases.)

6. (a)	histogram drawn and labelled with heights respectively proportional to 9, 8, 6.7, 12.7, 8, 7, 2.7, 0.5 (Ages axis clearly labelled)	B4 (-1eeoo)	4	
(b)	$35 \leq a < 50$	B1	1	
(c)	5 of mid-pts 5, 15, 27.5, 42.5, 52.5, 60, 72.5, 90	B1		
	$\frac{9 \times 5 + 8 \times 15 + 10 \times 27.5 + 19 \times 42.5 + 4 \times 52.5 + 7 \times 60 + 4 \times 72.5 + 1 \times 90}{62}$	(o.e) M1 (1 slip)		
	36 years 5 months	A1 A1	4	9
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7. (a) a		B1	1	
(b)	$\angle OAP = \angle QCP$ (corresponding angles) and $\angle APO = \angle CPQ$ (same angle)	B1		
	AAA c.c	B1(DEP)	2	
(c) (i)	$\frac{AP}{CP} = \frac{4}{1}$	(o.e) M1		
	$AC = 3 CP$	(o.e) M1 (DEP)		
	2b	A1		
	(ii) 8b	B1	4	
(d)	factor "16" or 4^2 multiplying $ \Delta CPQ $	B1		
	$ \Delta APO = "16"$ or $4^2 \times 4$	B1 (DEP)		
	$ \Delta CQO = 60$	B1 (DEP)	3	10
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8. (a)	ΔABC drawn and labelled	B1	1	
(b)	$\begin{pmatrix} 3 & 4 & 6 \\ 1 & 0 & 2 \end{pmatrix}$	B2 (-1eeoo)	2	
(c)	$\Delta A'B'C'$ drawn and labelled	B1	1	
(d)	$\begin{pmatrix} 0.5 & 0 & 1 \\ -0.5 & -1 & -1 \end{pmatrix}$	B2(-1eeoo)		
	$\Delta A''B''C''$ drawn and labelled	B1 ft (-1eeoo)	3	
(e)	one of clockwise, 90° , clockwise, -270, anticlockwise, -90 anticlockwise, 270 -90 270	B2		
	scale factor $\frac{1}{2}$, centre (0, 0)	B1, B1	4	11
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9. (a)	3	4	6		
	3	4	6		
		6	7	8	
	5	6	8		
				B2 (-1 per erroneous row)	2
(b)	$3x + x + 4x + 5x + 2x = 1$				M1
	$x = \frac{1}{15}$				A1
					2
(c) (i)	0				B1
(ii)	$\frac{1}{4} \times \binom{1}{15} + \frac{1}{4} \times 3 \binom{1}{15}$				M1
	$\frac{1}{15}$				A1
(iii)	one of $\frac{1}{4} \times 2 \binom{1}{15}, \frac{1}{4} \times 4 \binom{1}{15}, \frac{1}{4} \times \binom{1}{15}, \frac{1}{4} \times 5 \binom{1}{15}$				B1
	2 probabilities added				M1
	$\frac{1}{4} \times 2 \binom{1}{15} + \frac{1}{4} \times 4 \binom{1}{15} + \frac{1}{4} \times \binom{1}{15} + \frac{1}{4} \times 5 \binom{1}{15}$				A1
	$\frac{1}{5}$				A1
					7
					11

10. (a) (i)	$25 = \frac{22}{7} \times r + (2r + 2PQ)$	M1		
	answer	(c.w.o)A1		
(ii)	$A = \frac{22}{7} \times \frac{r^2}{2} + 2r \left(\frac{25 - \frac{36r}{7}}{2} \right)$	M1		
	answer	(c.w.o)A1	4	
(b)	21.4, 29.5, 43.8, 42.9	B3 (-1 eeo)	3	
(c)	curve	Accuracy is ± 1 small square -1 mark for incorrect/non-uniform scale straight line segments each point missed each missed segment each point not plotted each point incorrectly plotted tramlines very poor curve	B3 B1 ft, B1 ft	3 2
(d)	$r > 2.5, r < 4.5$			
(e)	$\frac{1}{2} \left(25 - \frac{36r}{7} \right) = 2r$	M1		
	$r = 2.7$	A1	2	
(f)	41, 42 cm ²	B1	1	15

11. (a)	$\sin 60 = \frac{BD}{10}$ 8.66	M1 A1	2	
(b)	$\cos 35 = \frac{CD}{8.66}$ 7.09	M1 A1	2	
(c)	$\sin 35 = \frac{BC}{8.66}$ 4.97	M1 A1	2	
(d)	$\angle PBD = 25^\circ$ $\tan 25 = \frac{PD}{8.66}$ 4.04	B1 M1 A1	3	
(e)	$\tan \angle QBC = \frac{6}{4.97}$ 50.4°	M1 A1	2	
(f)	$\angle PCB = 90^\circ$ (could be implied) (PC =) $\sqrt{4.04^2 + 7.09^2}$ 8.16 or better $\tan \angle PBC = \frac{8.16}{4.97}$ 58.7°	B1 M1 A1 M1 (DEP) A1	5	16
OR				
	(PC =) $\sqrt{4.04^2 + 7.09^2}$ (PB =) $\sqrt{8.66^2 + 4.04^2}$ One of 8.16 or better, 9.56 or better	B1 (one of) M1 (both) A1		
	$\sin \angle PBC = \frac{8.16}{9.56}$ 58.7°	M1 A1	5	16
OR	Cosine Rule on $\triangle PBC$ (PC =) $\sqrt{4.04^2 + 7.09^2}$ (PB =) $\sqrt{8.66^2 + 4.04^2}$ One of 8.16 or better, 9.56 or better	B1 (one of) M1 (both) A1		
	$\cos \angle PBC = \frac{4.96^2 + 9.56^2 - 8.16^2}{2 \times 4.96 \times 9.56}$ 58.7°	M1 A1	5	16
