

**JUNE 2002**

**INTERNATIONAL GCSE**

**MARK SCHEME**

**MAXIMUM MARK : 130**

**SYLLABUS/COMPONENT : 0580/4; 0581/4**

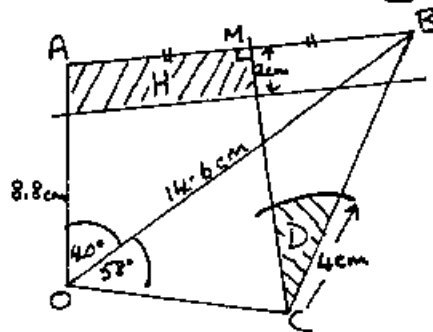
**MATHEMATICS**  
**(Structured Questions)**



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1(a)(i)	3(hours) o.e.	B1	eg 180 <sup>min</sup>
(ii)	45 (mins) c.a.o.	B1(2)	Not ¾ hour alone
(b)(i)	(Amit) \$342	B1	
(ii)	(Chris) \$513	B1(2)	
(c)	$\frac{2964}{52 \times 855}$ or $\frac{57}{855}$ 1/15	M1	$\frac{2964}{44460}$
		A1(2)	ww2
(d)	140% = \$3500 $\frac{3500 \times 100}{140}$ \$2500	s.o.i. M1 M1	
		A1(3)	ww3

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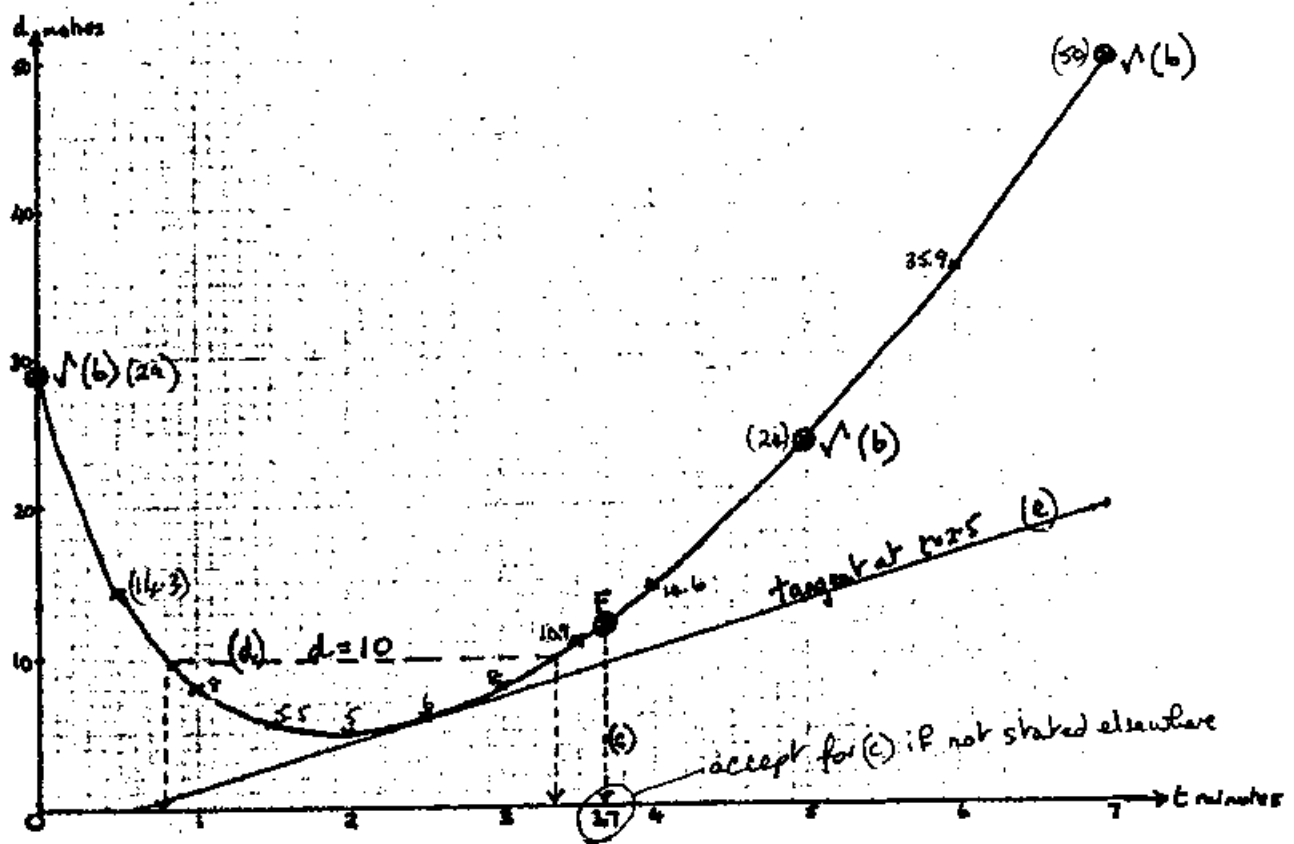
Throughout this question,  
all construction lengths to  
an accuracy of 2 mm and  
angle accuracy just over 1°

(a)(i)	OA = 8.8 cm OB = 14.6 cm $\angle AOB = 40^\circ$	B1 B1 B1	
(ii)	Intended perp. bisector of AB accurate <u>and</u> long enough	M1 A1✓	Just arcs <u>not</u> enough. Angle bisector $\widehat{ACB} \Rightarrow MO$ within 2mm of midpoint and 90°, ✓ <u>their</u> AB.
(iii)	$\angle AOC = 98^\circ$ OABC completed	B1 B1✓ (7)	✓C on their MC if long enough. If it is <u>not</u> , then C must be accurate.
(b)	74 (m) $\leq OC \leq 78$ (m) $103^\circ \leq \angle OAB \leq 106^\circ$	B1 B1(2)	Integer values only Integer values only
(c)	Ans. in range $254^\circ - 258^\circ$	B2 (2)	If not scored allow M1 for correct method, by calculation or ✓ attempt from diagram. (North line at B must be $\rightarrow$ parallel to OA.)
(d)	Arc, centre C, seen (their C) Compass drawn, 4 cm radius Correct shading (D) (Sector in field)	M1 A1 A1 <sup>dep</sup> (3)	Ignore outside field. Centre their C. Must use perp. bisector of AB.
(e)	Intention of line parallel to AB Accurate, ruled, 2 cm from AB Correct shading (H) in field	M1 A1 A1 <sup>dep</sup> (3)	Condone extra lines outside but must be <u>in field</u> . <u>no</u> extra shading <u>outside</u> .

Mark on  
diag. if  
not seen

3(a)		B1 B1 B1(3)	Accept fractions and percentages Bracketed probabilities are correct or absent.
(b)(i)	0.54 o.e. c.a.o	B1	
(ii)	(their) $0.54 + (their\ 0.4) \times 0.2$ 0.62	M1 A1(3)	$\checkmark$ his tree $\checkmark$ his tree correctly evaluated. ww2
** (c)(i)		B1 B1 B1	0.55 and 0.45 1 and 0 (s.o.i). (Can be absent or only the 1) 0.2 and 0.8 If no labels, tree must follow pattern in (a)
(ii)	$0.55 \times 1 + 0.45 \times 0.2$ 0.64 o.e. s.o.i.	M1 A1(5)	$\checkmark$ their tree ww2. i.s.w. wrong cancelling.
** (d)	Paula 62 Tarek 64	B1 B1(2)	$\checkmark$ 100 (their (b)(ii)) } Accept $\checkmark$ decimal or rounding / truncating. BO $\varphi > 100$ $\checkmark$ 100 (their (c)(ii))
<b>13</b>			
4(a)	$a = 90^\circ$ $b = 90^\circ$ $c = 138^\circ$ $d = 69^\circ$ $e = 45^\circ$	B1 B1 B1 B1 B1(5)	$\checkmark$ $\frac{1}{2}$ (their c)
** (b)	Congruent	B1(1)	Ignore extra words which are <u>not wrong</u> .
(c)(i)	$\frac{54}{GA} = \tan 21^\circ$ or $\frac{GA}{54} = \tan 69^\circ$ $\frac{54}{\tan 21^\circ}$ or $54 \tan 69^\circ$ Ans. rounds to 141 cm	M1 M1 A1	i.e. implicit method eg $\frac{54}{\sin 21} = \frac{GA}{\sin(\text{their } c/2)}$ i.e. explicit and implies first M. N.B. ww0
(iii)	$\frac{195}{GW} = \cos 42^\circ$ o.e. $GW = \frac{195}{\cos 42^\circ}$ s.o.i. Answer rounds to 262 cm	E 1(4) M1 M1 A1	Dep. previous 3 marks unless restated. (implicit) explicit and implies first M ww3
** (iv)	121 cm $\checkmark$ or 122 cm	B1(4)	(NOT 195) (their 262) - (their 141) $\checkmark$ evaluated [or WX-54] (GW) - (GA)
<b>14</b>			

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(a)	$p = 29$ $q = 24$ $r = 50$	B1 B1 B1(3)	Must be stated.
(b)	Scales correct 12 points plotted	S1 P4	$0 \leq t \leq 7$ and $\uparrow$ (to 50) Reverse axes $\rightarrow$ 50 P3 for 10 or 11, P2 for 8 or 9, P1 for 6 or 7 Accuracy < 2mm
	Reasonable curve through 11 or 12 points	C1	Covers 0 to 7 & correct shape.
(c)	mark at $d = 12$ on curve. $t = 3.7$ or $3.6$ correct their graph	B1 B1(2)	Indep. Extra answers $\rightarrow$ 80 [Indep. only in answer]
(d)	Uses $d = 10$ 2.4 to 2.6 mins AND	M1 A1(2)	( $\approx 3.4 - \approx 0.8$ ) Correct (to 0.1) for their graph
(e)	Tangent drawn at (2.5, 6)  Relates gradient to speed  Vertical/ horizontal using scales correctly  Answer in range 2.6 to 3.8 m/min. s.w.	M1 M1 M1 A1(4)	Not line joining (0,0) to (2.5, 6)    www. Needs M3. Different units must be stated. [eg 3 m/s = 180]

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6(a)(i)	$PQ = 12 - 2x$ or $12 - x - x$ $PQ^2 = (A'P)^2 + (A'Q)^2$ $(12 - 2x)^2 = x^2 + x^2$	B1 Seen. (Can be in words) B1 Accept "Pythagoras" mentioned B1 (3) 3 marks $\Rightarrow$ no errors seen.
(ii)	$144 - 48x + 4x^2 (= 2x^2)$ $2x^2 - 48x + 144 = 0$ $x^2 - 24x + 72 = 0$	B1 M1 $\checkmark$ his bracket expansion E1 (3) No errors seen and working there
(iii)	$q = (-24)^2 - 4 \cdot 1 \cdot 72$ or 288  $p = (-)24$ and $r = 2$  $x = 20.49$ c.a.o. $x = 3.51$ c.a.o.	B1 Must be in $p \pm \sqrt{q}/r$ form  B1 Must be in $(p \pm \sqrt{q})/r$ form  B1 Both wrong accuracy, allow Sc1 (20.485...) B1 (4) N.B. ww cannot score first two marks (3.5147...)
(b)(i)	Uses 16(their x) Answer <u>56</u> <del>56.4 km</del>	M1 Accept 16x A1 ww2 if (a)(iii) correct
(ii)	Triangle area $\frac{1}{2}x^2$ (o.e.) Area $12^2 + 4$ triangles Answer rounds to 169 cm <sup>2</sup>	M1 Accept $\frac{x^2}{2}$ . M1 Independent A1 (5) ww3 if (a)(iii) correct
<b>15</b>		
7(a)(i)	<b>Rotation</b> (only)  90° clockwise (about O)	B1 (only) $\Rightarrow$ lost if another transformation mentioned B1 (2) Accept $\frac{1}{2}$ or $-90^\circ$ , or $270^\circ$ (anticlockwise)
(ii)	<b>Reflection</b> (only) in line $y = x$	B1 B1 (2)
(iii)	<b>Enlargement</b> (only) Scale factor 2 Centre (0, 0) or O	B1 B1 2:1 B1 (3)
(b)	<b>Translation</b> (only) by vector $\begin{pmatrix} 0 \\ -4 \end{pmatrix}$ o.e.	B1 <u>Not Transformation or Translocation</u> B1 (2)
(c)(i)	<b>Reflection</b> (only) in $y + x = 0$	B1 B1
(ii)	(-4, 2) w.w.w.	B2 (4) B1 for each coordinate. Accept in any form. final ans.
(d)(i)	$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$	B2 Allow Sc1 for $\begin{pmatrix} \cos 90^\circ & -\sin 90^\circ \\ \sin 90^\circ & \cos 90^\circ \end{pmatrix}$
(ii)	A w.w.w.	B2 (4) Allow Sc1 if RM = $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$ or "reflection in x-axis" seen or for $\begin{pmatrix} -1 \\ 2 \end{pmatrix}$ or $(-1, 2)$
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8(a)(i)	$\pi \cdot 6^2$ used 6.28 (cm <sup>2</sup> )	M1 A1	ww2
(ii)	$2\pi \cdot 6$ used 2.09 (cm)	M1 A1 <sub>(4)</sub>	ww2. After 0/4 allow Sc1 for 20/360 seen
(b)(i)	5 × their sector area 31.4 (cm <sup>3</sup> ) or 31.5 cm <sup>3</sup>	M1 A1 <sup>✓</sup>	✓ 5 × (their(a)(i)),
(ii)	2 × their sector area (12.56) 5 × their arc length (10.47) 2 × 6 × 5 (60) 83 <sup>(1)</sup> <sub>(.0)</sub> (cm <sup>2</sup> )	M1 M1 M1 A1 <sub>(6)</sub>	www4
(c)(i)	D	B2	
(ii)	Height is $h/4$ o.e. Accept $h = 1.25$ cm	B2 A1 <sub>(4)</sub>	Allow Sc1 for "height less" o.e. (accept 1/2)
<b>14</b>			
9(a)	(3, 8, 4) 8 - - <b>Provided</b> (3, 8, 4) 7 - <b>Provided</b> Total of 6 = 42 s.o.i. 42 - (sum of their 5 numbers) s.o.i. 12	B1 B1 M1 M1 A1 <sub>(5)</sub>	that 8 is still the only mode that 7½ is still the median
(b)	Uses midintervals 5, 15 and 30 $5 \times 15 + 15m + 30n$ $\frac{75 + 15m + 30n}{15 + m + n} = 13$ o.e. $75 + 15m + 30n = 13(15 + m + n)$ Simplifies to $2m + 17n = 120$	M1 M1 M1 M1 E <sub>(5)</sub>	(Accept 5.005 etc) dep first M1 www implies M3. Allow M1 for $\frac{\text{their } \Sigma fx}{15m+n} = 13$ Indep. Correctly x by denominator containing m+n.
(iii)	Area represents frequency o.e.	B1	Some working and no errors seen
(iv)	$2(m + n = 15)$ and subtraction $m = 9$ $n = 6$	M1 A1 A1 <sub>(4)</sub>	Or $m = 15 - n$ and substitution o.e. ww, BOTH correct answer implies 3 marks
<b>14</b>			