

JUNE 2002

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK : 130

SYLLABUS/COMPONENT : 0580/4; 0581/4

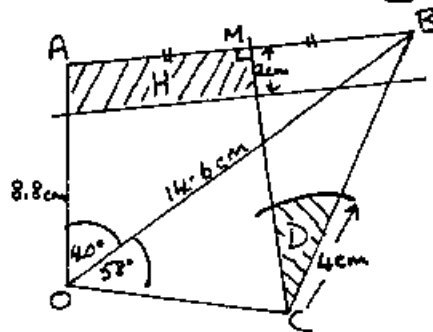
MATHEMATICS
(Structured Questions)



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1(a)(i)	3(hours) o.e.		B1	eg 180 ^{min}
(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 $\frac{57}{855}$		M1	$\frac{2964}{44460}$
	1/15		A1(2)	ww2
(d)	140% = \$3500	s.o.i.	M1	
	$\frac{3500 \times 100}{140}$		M1	
	\$2500		A1(3)	ww3

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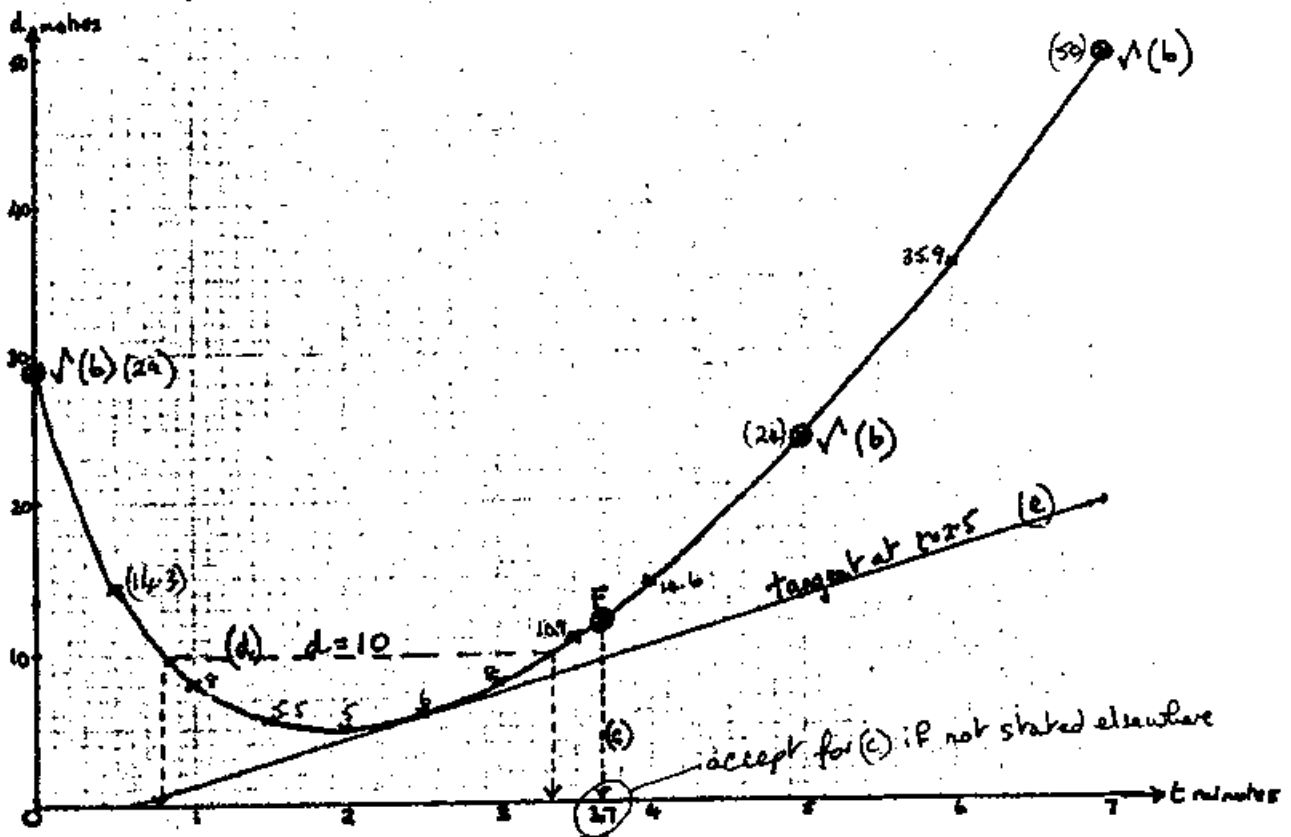
Throughout this question,
all construction lengths to
an accuracy of 2 mm and
angle accuracy just over 1°

(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 $\hat{ACB} \Rightarrow MO$ 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 ^{dep} (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 ^{dep} (3)	Condone extra lines outside but must be <u>in field</u> . <u>no extra shading 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. $BO \checkmark \varphi > 100$ \checkmark 100 (their (c)(ii)) }
13			
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)
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(a) $p = 29$

$q = 24$

$r = 50$

(b) Scales correct

12 points ✓ plotted

k#

Reasonable curve through 11 or 12 points

(c) mark at $d = 12$ on curve.

$t = 3.7$ or 3.6 correct their graph

(d) Uses $d = 10$

2.4 to 2.6 mins AND

(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.

B1 Must be stated.

B1

B1(3)

S1 $0 \leq t \leq 7$ and \uparrow (to 50) Reverse axes \rightarrow 50

P4 ✓ P3 for 10 or 11 ✓, P2 for 8 or 9 ✓, P1 for 6 or 7 ✓
Accuracy < 2mm

C1 (6) Covers 0 ≤ t ≤ 7 & correct shape.

B1

B1(2) Indep. Extra answers \rightarrow 80 [1 dp. only in answer]

M1 ($\approx 3.4 - \approx 0.8$)

A1(2) Correct (to 0.1) for their graph

M1 Not line joining (0,0) to (2.5, 6)

M1

M1

A1(4) www. Needs M3. Different units must be stated.
[eg 3 m/s = A0]

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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> 56.4 km	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 ²	M1 Accept $\frac{x^2}{2}$. M1 Independent A1 (5) ww3 if (a)(iii) correct
15		
7(a)(i)	Rotation (only) 90° clockwise (about O)	B1 (only) \Rightarrow lost if another transformation mentioned B1 (2) Accept $\frac{1}{2}$ or -90° , or 270° (anticlockwise)
(ii)	Reflection (only) in line $y = x$	B1 B1 (2)
(iii)	Enlargement (only) Scale factor 2 Centre (0, 0) or O	B1 B1 2:1 B1 (3)
(b)	Translation (only) by vector $\begin{pmatrix} 0 \\ -4 \end{pmatrix}$ o.e.	B1 Not Transformation or Translocation B1 (2)
(c)(i)	Reflection (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 ²)	M1 A1	ww2
(ii)	$2\pi \cdot 6$ used 2.09 (cm)	M1 A1 ₍₄₎	ww2. After 0/4 allow Sc1 for 20/360 seen
(b)(i)	5 × their sector area 31.4 (cm ³) or 31.5 cm ³	M1 A1 [✓]	✓ 5 × (their(a)(i)),
(ii)	2 × their sector area (12.56) 5 × their arc length (10.47) 2 × 6 × 5 (60) 83 ⁽¹⁾ _(.0) (cm ²)	M1 M1 M1 A1 ₍₆₎	www4
(c)(i)	D	B2	
(ii)	Height is $h/4$ o.e. Accept $h = 1.25$ cm	B2 A1 ₍₄₎	Allow Sc1 for "height less" o.e. (accept 1/2)
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9(a)	(3, 8, 4) 8 - - Provided (3, 8, 4) 7 - Provided Total of 6 = 42 s.o.i. 42 - (sum of their 5 numbers) s.o.i. 12	B1 B1 M1 M1 A1 ₍₅₎	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 ₍₅₎	(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 ₍₄₎	Or $m = 15 - n$ and substitution o.e. ww, BOTH correct answer implies 3 marks
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