

NOVEMBER 2002

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK : 130

SYLLABUS/COMPONENT : 0580/4; 0581/4

MATHEMATICS

(EXTENDED)



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1(a)(i)	14 44	B1	
(ii)	$\frac{6(00...)}{33}$ or $\frac{10...}{0.55}$ or Figs 18...	M1	
	18.2(km/h) w.w.w.	A1	Accept 18.18., 18 $\frac{2}{11}$. <u>Units wrong, AD</u> www2
(iii) (Mark Final Answer)	32 <u>min</u> 8.8 <u>sec</u>	B1 (4)	Accept 32.1 min, or 1928.8 sec 32.15 min, 1929 sec 32.147 min, 1930 sec 32.1466 min,
(b)	80 × 0.95	M1	
	76	A1 (2)	www2
(c)	Division by 110 or 1.1.	M1	
	5.60 or 5.6	A1 (2)	www2 Accept 560 <u>cm</u>
2(a)(i)	$6^2 + 5^2$ seen	B1	
(ii)	$\sqrt{61}$ o.e.	B1	Accept 7.81 or 7.8
(iii)	$8^2 + 5^2$ seen DA = AF o.e.	B1 (4)	Indep
(b)	$89 = 100 + 61 - 2 \cdot 10 \cdot \sqrt{61} \cos B$ o.e.	M1	($\sqrt{\text{their } \sqrt{61}}$) SCALE DRAWING $\Rightarrow$ M0 So w.w. 62° or $63^\circ \Rightarrow$ M0
	$\cos B = \frac{100 + 61 - 89}{2 \cdot 10 \cdot \sqrt{61}}$	M1	Implies first M1
	= 0.46.....	A1	Implied by answer in range 62° to 63° inclusive. or by answer 69.5 in <u>grads</u> .
	$\angle B = 62.5^\circ$ to 62.6°	A1 (4)	Implies previous A1 www4
(c)	$\frac{1}{2} \cdot 10 \cdot \sqrt{61} \cdot \sin 62.6^\circ$	M2	Or alternative complete method $\sqrt{\text{their } \angle B \text{ and } \sqrt{61}}$
	34.6 - 34.7	A1 (3)	www3
(d)	Two of 24 cm^2 , 15 cm^2 , 20 cm^2	M1	
	Adds 4 Δ areas together (theirs)	M1 independent	
	93.6 - 93.7	A1 (3)	$\sqrt{\text{their (c)}}$ www3
(e)	$(\frac{1}{2}) 5 \times 6 \times 8$ s.o.i.	M1	
	$\frac{1}{3} \times (\text{above})$	M1 dependent on first M1	
	40	A1 (3)	

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3(a)	Scales correct EXAM correct	S1	Minimum – $-4 \leq x \leq 10$ and $-6 \leq y \leq 8$	
		B1 (2)	Generous accuracy. Allow 2mm throughout.	
* (b)(i) (Their) E reflected in y-axis (-4, 2), (-2, 2), (-2, 4), (-4, 4)		B2✓	Allow Sc1 for correct reflection in x-axis	
* (ii) (Their) X correctly enlarged (0, 0), (6, 0), (0, -6), (6, -6)		B2✓	Allow Sc1 for correct sized X, wrong place or correct idea >2mm out (<5mm)	
* (iii) (Their) A correctly rotated 90° anticlockwise (-2, 6), (-4, 7), (-2, 8)		B2✓	Allow Sc1 for rotation 90° clockwise or correct rotation >2mm out (<5mm)	
* (iv) (Their) M correctly stretched with S.F.2 (8, 4), (8, 8), (9, 6), (10, 8), (10, 4)		B2✓ (8)	Allow Sc1 for correct sized M, wrong position but correct orientation	
(c)(i) (Q) at (3, 8)		B1	Points, if labelled, must have correct label.	
(ii) $\sqrt{9+4}$ 3.61	c.a.o.	M1 A1	ww2 Wrong accuracy A0	
(iii) (S) at (2, 5)		B1		
(iv) (R) at (-1, 7)		B1 (5)		
(15)				
4(a)(i)	0.5 or 5/10 or 1/2	o.e.	B1	Probabilities should be fractions, decimals or percentages. Mark i.s.w. all parts for wrong cancelling.
(ii)	0.4 or 4/10 or 2/5	o.e.	B1	Disallow first answer of 5 in 10 or 5 out of 10 type. No credit for 5 : 10 type.
(iii)	0.7	o.e.	B1	
(iv)	1/5 or 0.2	o.e.	B1 (4)	
(b)(i)	0.4 × 0.4 (or [a(ii)] ²) 0.16 (4/25)	o.e.	M1 A1✓ (2)	www2
* (ii)	0.4 × 0.6 s.o.i. (6/25) 0.48 (12/25) (c.a.o.)	o.e.	M1 A1 (2)	Accept (their 0.4) × (1 – their 0.4) www2
(iii)	Naught or Nothing or 0 or zero or nil.		B2 (2)	Allow Sc1 for “impossible” or 0/k for k ≠ 0 or None or no probability
(iv) At least (1, 1) and (1, 2) and (2, 1) only two of			M1	If not seen, allow (Sc1) for 2/100
	0.03	o.e.	A1 (2)	www2
(v) Correct idea of product being square shown Answer in range 10/100 to 18/100 inclusive			M1	eg (3,3)(4,4)(5,5)... or (1,4)(2,8)... or prob. diag. with 25, 36... etc shown
	0.18	o.e.	MB1 A1 (3)	Not possible after wrong method seen. www3
(15)				

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0.8	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
38.1	25	12.9	10	10.1	11.7	14.2	17.5	21.4	26	31	36.7

5(a)	(l=)14.2 (m=)17.5 (n=)21.4	B1 B1 B1 (3)	Accuracy for graph is < 2mm Values <u>must</u> be stated, but maximum of 1 mark lost for wrong accuracy.
*(b)	Correct scale 12 points correctly plotted (✓ their l, m, n) Reasonable correct ^{shaped} curve thro' 11 points	S1 P4 ✓ C1 (6)	0 ≤ x ≤ 6 and 0 ≤ y ≤ 40 minimum. Condone reversed axes. Allow P3 for 10 or 11 correct ✓ P2 for 8 or 9 correct ✓ P1 for 6 or 7 correct ✓ Daylight rule. Must go from 1 ≤ x ≤ 6
(c)	Tangent ruled at x = 1.5 Uses vert / horiz <u>and correct scales</u> (✓) Correct numerical value 7-15 Negative answer	M1 M1 A1 B1 (4)	Not for chord (daylight) MOM1 possible on hard case M0 Dependent on M2 (implies 2nd M1: if not seen) Dep. their line having -ve gradient
(d)(i)	Line ruled from (0, 20) to (6, 32)	L1	(grad) (intercept)
(ii)	y = 2x + 20	B2	Allow B1 for either m = 2 or c = 20 or 2x + 20 (no y =) or gradient. not cancelled to 2.
(iii)	x = 1.05 to 1.1 inclusive x = 5.5 (ignore extra tangent intersection)	B1 B1 (5)	Allow Sc1 if both correct but given as (5.5, y ₁) and (1.1, y ₂)
*(iv)	Tangent parallel to d(i) drawn (their d(i))	M1	Parallel by eye [if d(i) correct then at x = 2.5 and cuts x = 6 between y = 15 and y = 20]
*(v)	Gradient ≈ 2 y = mx + their correct c	A1 ✓ A1 (3) (21)	✓ their d(i) line wrong or same grad as d(ii) ✓ their y-intercept for this line
6(a)(i)	x + 5 2x	B1 B1	Allow unsimplified final answers
*(ii)	x + 2, x + 7, 2x + 2	B1 ✓ (3)	✓ (their a(i) + 2)
(iii)	(x + 2)(2x + 2) = (x + 5) ² 2x ² + 6x + 4 or x ² + 10x + 25 s.o.i No errors to x ² - 4x - 21 = 0	M2 ✓ B1 E1 (4)	If not scored, allow M1 for either expression seen (✓ M2 their expressions provided at 3 in ax + b form, a ≠ 0, b ≠ 0) Established correctly, including = 0.
(iv)	(x - 7)(x + 3) seen Both x = 7 and x = -3	M1 A1	or x = (4 ± √100)/2 www2
(v)	16 years old c.a.o.	B1 (3)	
(b)(i)	h = $\frac{-8 \pm \sqrt{k}}{2}$ 8 ² - 4.1. (-17) or 132 h = 1.74 w.w.w. h = -9.74 w.w.w.	B1 B1 B1 B1	Any k but all ÷ 2. ± may just be + indep. Allow Sc1 for both correct, wrong accuracy, truncated or rounded. (1.7445626, -9.7445626) or 1.75 and -9.75
*(ii)	Final Ans 1.74(m) or 174 cm	B1 (5) (15)	Must be 2 d.p. ✓ his positive reasonable h in metres or to nearest cm. (1.005 h ≤ 2.50)

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7(a)(i)	$108 : 360 = 36 : n$ 120 students	o.e.	M1 A1	www2
** (ii)	84		B1 ✓	✓ (their n) – 36 correct
** (iii)	Grade B = 28 students ✓ their 84 Grade C = 35 students ✓ Grade D = 21 students ✓		B1 ✓ B1 ✓ B1 ✓	If 0 scored, allow Sc1 for (their 84) ÷ (their 4 + 5 + 3) s.o.i. or Sc1 for 120 into 40, 50, 30.
(iv)	Angle B = 84° Angle C = 105° Angle D = 63°		B1 B1 B1 (3)	If 0 scored, allow Sc1 for $(360 - 108) \div (\text{their } 4 + 5 + 3)$ s.o.i. OR Uses method 1 person $\equiv 3^\circ$ then (Sc2) for 3 ✓ correct (Sc1) for 1 ✓ or 2 ✓ correct
** (v)	$9:7$ or $1:\frac{7}{9}$ or $\frac{9}{7}:1$		B1 ✓ (1)	✓ 36 : their B in lowest terms
(b)	$p = 20, q = 10, r = 15$		B4 (4)	If not scored, allow either B3 for 2 correct or B2 for 1 correct or Sc1 when $r > q$ or $1\text{cm}^2 \equiv 5\text{pays}$
8(a)(i)	$A = 9\pi r^2 h$ $B = 3\pi r^2 h$ $C = 27\pi r^2 h$	o.e. o.e. o.e.	B1 B1 B1 (3)	Marking FINAL answers
** (ii)	$9:3:27$ $3:1:9$	c.a.o.	M1 A1 (2)	✓ their (a)(i) provided all $k\pi r^2 h$ type, reduced to numerical form.
(iii)	Pot C Because $3r : r = 3h : h$	o.e.	M1 A1 (2)	
(iv)	$9S \text{ (cm}^2\text{)}$	w.w.w.	B2 (2)	Allow Sc1 for k^2S where k is their S.F. $9S^2 \Rightarrow 0 \text{ marks}$
(b)(i)	$\pi \cdot 15^2 + 2 \cdot \pi \cdot 15 \cdot 20$ Answer rounds to 2590 cm^2		M1 A1 (2)	www2
(ii)	0.259m^2 or $300\,000 \text{ cm}^2$ Figs 3 ÷ their 259 115 pots		M1 M1 ✓ A2 (4)	Can get MOM1 Allow A1 for 115.7.. or 115.8.. or 116 www4 or 3
9(a)(i)	10 and n		B1	Accept unsimplified algebraic expressions and mark final answers. Condone consistent alternative letter.
(ii)	16 and $n + 6$		B1	
(iii)	26 Answer contains $2n$ $2n + 6$		B1 M1 A1 (5)	
(b)(i)	$5(16 - 11)$ $10(26 - 16)$		B1 B2 ✓	✓ their (a) 10, 16, 26
** (ii)	$n[2n + 6 - (n + 6)]$ n^2		B1 ✓ B1 (5)	✓ their (a)(i)[(iii) - (ii)] provided they involve n INDEPENDENT. Not $n(n)$ or $n \times n$

Total 130