

**CAMBRIDGE**  
INTERNATIONAL EXAMINATIONS

**NOVEMBER 2002**

**INTERNATIONAL GCSE**

<b>MARK SCHEME</b>
<b>MAXIMUM MARK : 130</b>
<b>SYLLABUS/COMPONENT : 0580/4; 0581/4</b> <b>MATHEMATICS</b> <b>(EXTENDED)</b>



UNIVERSITY of CAMBRIDGE  
Local Examinations Syndicate

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1(a)(i)	14 44	B1	
(ii)	$\frac{6(00\text{...})}{33}$ or $\frac{1(0\text{...})}{0.55}$ 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, UNITS ESSENTIAL
(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>
<b>8</b>			
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 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. $62^\circ$ or $63^\circ \Rightarrow$ M0
	$\cos B = \frac{100 + 61 - 89}{2 \cdot 10 \cdot \sqrt{61}}$	M1	Implies first M1
	$= 0.46 \dots$	A1	Implied by answer in range $62^\circ$ to $63^\circ$ inclusive. or by answer $69.5$ in grads.
	$\angle B = 62.5^\circ$ to $62.6^\circ$	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 $24 \text{ cm}^2$ , $15 \text{ cm}^2$ , $20 \text{ cm}^2$	M1	
	Adds 4 $\Delta$ areas together (theirs)	M1 independent	
f*	93.6 - 93.7	A1 (3)	$\sqrt{\text{(59 + their (c))}}$ www3
(e)	$(\frac{1}{2}) 5 \times 6 \times 8$ s.o.i.	M1	
	$\frac{1}{3}$ (above)	M1 dependent on first M1	
	40	A1 (3)	
<b>17</b>			

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3(a)	Scales correct EXAM correct		S1 B1 (2) B2✓	Minimum - $4 \leq x \leq 10$ and $-6 \leq y \leq 8$ Generous accuracy. Allow 2mm throughout. Allow Sc1 for correct reflection in x-axis
** (b)(i)	(Their) E reflected in y-axis (-4, 2), (-2, 2), (-2, 4), (-4, 4)		B2✓	Allow Sc1 for correct sized X, wrong place or correct idea >2mm out (<5mm)
k* (ii)	(Their) X correctly enlarged (0, 0), (6, 0), (0, -6), (6, -6)		B2✓	Allow Sc1 for rotation 90° clockwise or correct rotation >2mm out (<5mm)
e* (iii)	(Their) A correctly rotated 90° anticlockwise (-2, 6), (-4, 7), (-2, 8)		B2✓	Allow Sc1 for correct sized M, wrong position but correct orientation
c* (iv)	(Their) M correctly stretched with S.F.2 (8, 4), (8, 8), (9, 6), (10, 8), (10, 4)		B1 B1 (5)	Points, if labelled, must have correct label.
(c)(i)	(Q) at (3, 8)		B1	
(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)] <sup>2</sup> ) 0.16 (4/25)	o.e.	M1 A1✓ (2)	www2
** (ii)	0.4 × 0.6 s.o.i. (4/25) 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
(v)	Correct idea of product being square shown Answer in range 10/100 to 18/100 inclusive		M1 MB1	eg (3,3)(4,4)(5,5)... or (1,4)(2,8)... or prob. diag. with 25, 36... etc shown Not possible after wrong method seen.
	0.03	o.e.	A1 (2)	www2
	0.18	o.e.	A1 (3)	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 <sup>shaped</sup> curve thro' 11 points	S1 P4 ✓ C1 (6)	$0 \leq x \leq 6$ and $0 \leq y \leq 40$ 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 $1 \leq x \leq 6$
(c)	Tangent ruled at $x = 1.5$ Uses vert / horiz <u>and correct scales</u> ( $\frac{y}{x}$ ) 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)	B1	(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 (ignore $x = 5.5$ 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 $y = 15$ & $y = 20$ ]
** (v)	Gradient $\approx 2$ $y = mx +$ their correct $c$	A1 ✓ A1 ✓ (3) (2)	✓ their d(i) line wrong or <u>same grad</u> as d(i) ✓ 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 <u>their expressions provided</u> at 3 in <u>ax+b</u> form, $a \neq 0, b \neq 0$ ) Established correctly, including = 0.
(iv)	$(x - 7)(x + 3)$ seen Both $x = 7$ and $x = -3$	M1 A1	or $x = (4 \pm \sqrt{100})/2$ www2
(v)	16 years old c.a.o.	B1 (3)	
(b)(i)	$h = \frac{-8 \pm \sqrt{k}}{2}$ $8^2 - 4 \cdot 1 \cdot (-17)$ or 132 $h = 1.74$ w.w.w. $h = -9.74$ w.w.w.	B1 B1 B1 B1	Any $k$ but all $\div 2$ . $\pm$ may just be + indep. Allow Sc1 for both correct, wrong accuracy, truncated or rounded. (1.7445626, -9.7445626) or <u>1.75 and -9.75</u>
** (ii)	Final Ans 1.74(m) or <u>174 cm</u>	B1 ✓ (5) (15)	Must be 2 d.p. ✓ his positive reasonable $h$ in metres or to nearest cm. (1.005 $h \leq 2.50$ )

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 (3) B1 ✓ B1 (3)	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 = $84^\circ$ Angle C = $105^\circ$ Angle D = $63^\circ$		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 (14) (4)	If not scored, allow either B3 for 2 correct or B2 for 1 correct or Sc1 when $r > q$ or $100 \equiv 5 \text{ peps}$
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)	
(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 $k^2 S$ 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 $2590 \text{ cm}^2$		M1 A1 (2)	www2
(ii)	$0.259 \text{ m}^2$ 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