CAMBRIDGE
INTERNATIONAL EXAMINATIONS

NOVEMBER 2002

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK : 130

SYLLABUS/COMPONENT : 0580/4; 0581/4

MATHEMATICS

(EXTENDED)

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

1(a)(i)	14 44	B1	
(ii)	$\frac{6(00..)}{33}$ or $\frac{(0...)}{0.55}$ or figs 18...	M1	
	18.2(km/h) w.w.w.	A1	Accept 18.18.., $18\frac{2}{11}$. Units wrong, AO www2
(iii)	(Mark Final Answer) 32 min 8.8 sec	B1 (4)	Accept 32.1 min, or 1928.8 sec 32.15 min, 1929 sec 32.1467 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 560cm
		(8)	
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	B1	
	DA = AF o.e.	B1 (4)	Indep
(b)	$89 = 100 + 61 - 2.10.\sqrt{61}\cos B$ o.e	M1	(√their $\sqrt{61}$) SCALE DRAWING ⇒ MO So w.w. 62° or 63° ⇒ MO
	$\cos B = \frac{100 + 61 - 89}{2.10.\sqrt{61}}$	M1	Implies first M1
	$= 0.46.....$	A1	Implied by answer in range 62° to 63° inclusive. or by answer 69.5 in grads.
	$\angle B$ = 62.5° to 62.6°	A1 (4)	Implies previous A1 www4
(c)	½. 10. √ 61. sin 62.6°	M2	Or alternative complete method √ their $\angle B$ and $\sqrt{61}$
	34.6 - 34.7	A1 (3)	www3
(d)	Two of 24 cm², 15 cm², 20 cm²	M1	
	Adds 4 Δ areas together (theirs)	M1	independent
	93.6 - 93.7	A1 √ (3)	√ (59 + their (c)) www3
(e)	$(\frac{1}{2})5\times6\times8$ s.o.i.	M1	
	$\frac{1}{3}$ × (above)	M1	dependent on first M1
	40	A1 (3)	
		(17)	

3(a)	Scales correct **EXAM** correct		S1 B1 (2)	Minimum $-4 \leqslant x \leqslant 10$ and $-6 \leqslant y \leqslant 8$ 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 ½	o.e.	B1	Probabilities should be fractions, decimals or
(ii)	**0.4** or 4/10 or 2/5	o.e.	B1	percentages. Mark i.s.w. all parts for wrong cancelling.
(iii)	**0.7**	o.e.	B1	Disallow **first** answer of 5 **in** 10 or 5 **out of** 10
(iv)	1/5 or **0.2**	o.e.	B1 (4)	type. **No credit** for 5 : 10 type.
(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 $k \neq 0$ or None or no probability
(iv)	At least two of (1 , 1) and (1 , 2) and (2 , 1) **only**		M1	If not seen, allow (Sc1) for 2/100
	0.03	o.e.	A1 (2)	www2
(v)	Correct idea of product being square shown		M1	eg (3,3)(4,4)(5,5)... or (1,4) (2,8)... or prob. diag. with 25, 36... etc shown
	Answer in range 10/100 to 18/100 inclusive		MB1	Not possible after wrong method seen.
	0.18	o.e.	A1 (3)	www3
			(15)	

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 must be stated, but maximum of 1 mark lost for wrong accuracy.
(b)	Correct scale	S1	$0 \leqslant x \leqslant 6$ and $0 \leqslant y \leqslant 40$ minimum. Condone reversed axes.
**	12 points correctly plotted ($\surd$their l, m, n)	P4$\surd$	Allow **P3** for 10 or 11 correct $\surd$ **P2** for 8 or 9 correct $\surd$ **P1** for 6 or 7 correct $\surd$
	Reasonable correct shaped curve thro' 11 points	C1 (6)	Daylight rule. Must go from $1 \leqslant x \leqslant 6$
(c)	**Tangent** ruled at $x = 1.5$	M1	Not for chord (daylight)
	Uses vert / horiz and correct scales ($\frac{y}{x}$)	M1	M0M1 possible on hard case M0
	Correct numerical value $7 - 15$	A1	Dependent on M2 (implies 2nd M1 if not seen)
	Negative answer	B1 (4)	Dep. Their line having -ve gradient
(d)(i)	Line ruled from (0 , 20) to (6 , 32)	SL1	
(ii)	$y = 2x + 20$	B2	(grad) (intercept) 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 $y=15$ & $y=20$]
**	(v) Gradient ≈ 2	A1$\surd$	$\surd$ their **d(i)** line wrong or same grad as d(ii)
**	$y = mx +$ **their correct** c	A1$\surd$ (3)	$\surd$ their y- intercept for this line
		(21)	
6(a)(i)	$x + 5$ $2x$	B1 B1	Allow unsimplified final answers
**	(ii) $x + 2$, $x + 7$, $2x + 2$	B1$\surd$ (3)	$\surd$ (their **a(i)** + 2)
	(iii) $(x + 2)(2x + 2) = (x + 5)^2$	M2$\surd$	If not scored, allow M1 for **either** expression seen ($\surd$M2 their expressions provided all 3 in axb form, $a \neq 0$, $b \neq 0$)
	$2x^2 + 6x + 4$ **or** $x^2 + 10x + 25$ s.o.i	B1	
	No errors to $x^2 - 4x - 21 = 0$	E1 (4)	Established correctly, including $= 0$.
	(iv) $(x - 7)(x + 3)$ seen	M1	or $x = (4 \pm \sqrt{100})/2$
	Both $x = 7$ and $x = -3$	A1	www2
	(v) 16 years old c.a.o.	B1 (3)	
(b)(i)	$h = \frac{-8 \pm \sqrt{k}}{2}$	B1	Any k but **all** $\div 2$. $\pm$ may just be +
	$8^2 - 4.1.(-17)$ or 132	B1	indep.
	$h = 1.74$ w.w.w. $h = -9.74$ w.w.w.	B1 B1	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 174cm	B1$\surd$ (5)	Must be 2 d.p. $\surd$ his positive **reasonable** h ($1.00 \leqslant h \leqslant 2.50$) in metres or to nearest cm.
		(15)	

7(a)(i)	108 : 360 = 36 : n o.e. 120 students		M1 A1	 www2
** (ii)	84		B1√ (3)	√ (their n) – 36 correct
** (iii)	Grade B = 28 students √ their 84 Grade C = 35 students √ Grade D = 21 students √		B1√ 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° Angle C = 105° Angle D = 63°		B1 B1 B1 (3)	If 0 scored, allow Sc1 for (360 – 108) ÷ (their 4 + 5 +3) s.o.i. OR Uses method 1 person ≡ 3° then Sc2 for 3√ correct Sc1 for 1√ or 2√ correct
** (v)	9:7 or 1:7/9 or 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 $1cm^2 \equiv 5$ people
			14	
8(a)(i)	$A = 9\pi r^2 h$ o.e. $B = 3\pi r^2 h$ o.e. $C = 27\pi r^2 h$ 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. www2
(iii)	Pot C Because 3r : r = 3h : h o.e.		M1 A1 (2)	
(iv)	9S (cm^2) w.w.w.		B2 (2)	Allow Sc1 for k^2S where k is their S.F. $9S^2 \Rightarrow$ 0 marks
(b)(i)	$\pi.15^2 + 2.\pi.15.20$ Answer rounds to 2590 cm^2		M1 A1 (2)	 www2
(ii)	0.259m^2 or 300 000 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
			15	
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)	$n[\ 2n + 6 - (n + 6\ ]$		B1√	√ their (a)(i)[(iii) – (ii)] provided they involve n
	n^2		B1 (5)	INDEPENDENT. Not $n(n)$ or $n \times n$
			10	

Total 130