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) $\dfrac{6(00..) \text{ or } \cancel{10..})}{33} \text{ or Figs } 18..$ M1

$\quad$ 18.2 (km/h)   w.w.w.   A1   Accept 18.18.., 18³/₁₁. Units wrong, A0 www2

(iii) (Mark Final Answer) 32 <u>min</u> 8.8 <u>sec</u>   B1 (4)   Accept 32.1 min, or 1928.8sec <u>UNITS ESSENTIAL</u>
$\qquad\qquad$ 32.15 min, 1929 sec
$\qquad\qquad$ 32.147min, 1930 sec
$\qquad\qquad$ 32.1466 min,

(b) 80 × 0.95   M1

$\quad$ 76   A1 (2)   www2

(c) Division by 110 or 1.1.   M1

$\quad$ 5.60 or 5.6   A1 (2)   www2 Accept <u>560cm</u>

$\qquad\qquad\qquad\qquad\qquad\quad$ 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
$\quad$ **DA = AF** o.e.   B1 (4)   Indep

(b) $89 = 100 + 61 - 2.10.\sqrt{61}\cos B$ o.e   M1   ($\sqrt{}$ their $\sqrt{61}$)   SCALE DRAWING ⇒ M0
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ So w.w. 62° or 63° ⇒ M0

$\qquad \cos B = \dfrac{100 + 61 - 89}{2.10.\sqrt{61}}$ M1   Implies first M1

$\qquad\qquad = 0.46....$ A1   Implied by answer in range 62° to 63° inclusive. or by answer 69.5 in grads.

$\qquad \angle B = 62.5° \text{ to } 62.6°$ A1 (4)   Implies previous A1   www4

(c) ½. 10. $\sqrt{61}$. sin 62.6°   M2   Or alternative complete method $\sqrt{}$ their $\angle B$ and $\sqrt{61}$

$\qquad$ **34.6 - 34.7**   A1 (3)   www3

(d) Two of 24 cm², 15 cm², 20 cm²   M1

$\qquad$ Adds 4 Δ areas together (theirs)   M1 independent

$\qquad$ **93.6 - 93.7**   A1 (3) $\sqrt{}$ (59 + their (c))   www3

(e) $\left(\tfrac{1}{2}\right) 5 \times 6 \times 8$ s.o.i.   M1

$\qquad \tfrac{1}{3} \times$ (above)   M1 dependent on first M1

$\qquad$ **40**   A1 (3)

$\qquad\qquad\qquad\qquad\qquad$ ⑰

3(a)	Scales correct	S1	Minimum $-4 \leqslant x \leqslant 10$ and $-6 \leqslant y \leqslant 8$
	EXAM correct	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
k✱ (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)
e ✱ (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)
c ✱ (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≠ 0 or None or no probability
(iv) At least two of	(1 , 1) and (1 , 2) and (2 , 1) only 0.03 o.e.	M1 A1 (2)	If not seen, allow (Sc1) for 2/100 www2
(v)	Correct idea of product being square shown Answer in range 10/100 to 18/100 inclusive 0.18 o.e.	M1 MB1 A1 (3) (15)	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. www3

	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 — B1 — Accuracy for graph is < 2mm

($m =$)17.5 — B1 — Values must be stated, but maximum of 1 mark lost for wrong accuracy.

($n =$)21.4 — B1 (3)

(b) Correct scale — S1 — $0 \le x \le 6$ and $0 \le y \le 40$ minimum. Condone reversed axes.

✷✷ 12 points correctly plotted — P4√ — Allow P3 for 10 or 11 correct √
($√$ their l, m, n) — P2 for 8 or 9 correct √
P1 for 6 or 7 correct √

Reasonable correct shaped curve thro' 11 points — C1 (6) — Daylight rule. Must go from $1 \le x \le 6$

(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) — $L1$

(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 — B1 — Allow Sc1 if both correct but given as
($x = 5.5$ ignore extra tangent intersection) — B1 (5) — (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√ — √ their d(i) line wrong or same grad as d(ii)
✷✷ $y = mx +$ their correct c — A1√ (3) — √ their y- intercept for this line

(21)

6(a)(i) $x + 5$ — B1 — Allow unsimplified final answers
$2x$ — B1

✷✷ (ii) $x + 2$, $x + 7$, $2x + 2$ — B1√ (3) — √ (their a(i) + 2)

(iii) $(x + 2)(2x +2) = (x + 5)^2$ — M2√ — If not scored, allow M1 for either expression seen
(√M2 their expressions provided all 3 in axb form, a ≠ 0, b ≠ 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) $h = \dfrac{-8 \pm \sqrt{k}}{2}$ — B1 — Any k but all ÷ 2. ± may just be +

$8^2 - 4.1.(-17)$ or 132 — B1 — indep.

$h = 1.74$ w.w.w. — B1 — Allow Sc1 for both correct, wrong accuracy, truncated or rounded.
$h = -9.74$ w.w.w. — B1 — (1.7445626, -9.7445626) or 1.75 and -9.75.

✷✷ (ii) Final Ans 1.74(m) or 174 cm — B1√ (5) — Must be 2 d.p. √ his positive reasonable h in metres or to nearest cm. ($1.00 \le h \le 2.50$)

(15)

7(a)(i) $108 : 360 = 36 : n$ o.e.   M1
         120 students   A1   www2

** **(ii)**   84   B1√ (3)   √ (their n) – 36 correct

** **(iii)** Grade B = 28 students   √ their 84   B1√   If 0 scored, allow Sc1 for (their 84) ÷ (their 4 +5 +3)
**   Grade C = 35 students √   B1√   s.o.i.   or Sc1 for 120 into 40, 50, 30.
**   Grade D = 21 students√   B1√ (3)

     (iv) Angle B = 84°   B1   If 0 scored, allow Sc1 for $(360(-108))÷$(their 4 + 5 +3)
        Angle C = 105°   B1   s.o.i. or Uses method 1 person ≡ 3°
           Angle D = 63°   B1 (3)   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
                              (14)   or B2 for 1 correct or Sc1 when $r > q$ or $q^2 ≡ 5p$ roof

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8(a)(i) $A = 9\pi r^2 h$ o.e.   B1
         $B = 3\pi r^2 h$ o.e.   B1   Marking FINAL answers
            $C = 27\pi r^2 h$ o.e.   B1 (3)

** **(ii)** $9 : 3 : 27$ M1   √ their (a)(i) provided all $k\pi r^2 h$ type. reduced to numerical form.
           $3 : 1 : 9$ c.a.o.   A1 (2)   www2

     (iii)   Pot C   M1
          Because 3r : r = 3h : h   o.e.   A1 (2)

     (iv) $9S$ (cm²)   w. w. w.   B2 (2)   Allow Sc1 for $k^2 S$ where k is their S.F.
                            $9S^2 ⟹$ 0 marks

     (b)(i) $\pi.15^2 + 2.\pi.15.20$ M1
         Answer rounds to **2590 cm²**   A1 (2)   www2

     (ii)   0.259m² or 300 000 cm²   M1
         Figs 3 ÷ their 259   M1√   Can get M0M1
            115 pots   A2 (4)   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   B1
        Answer contains $2n$ M1
           $2n + 6$ A1 (5)

     (b)(i) $5(16 - 11)$ B1
           $10(26 - 16)$ 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 $n×n$

               (10)

Total 130