UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2012 question paper for the guidance of teachers

0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/42

Paper 4 (Extended), maximum raw mark 120

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

• Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2012 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

| Page 2 | Mark Scheme: Teachers' version | Syllabus | .0 | 1 |
|--------|--------------------------------|----------|-----|---|
| | IGCSE – May/June 2012 | 0607 | 800 | |

| | T | _ | 63 |
|-----------|--|---|---|
| (a) | 510 | 2 | M1 for 0.85 × 600 |
| (b) (i) | 12.5 | 2 | M1 for 0.85×600 M1 for $\frac{17500}{20000} \times 100$ soi or $\frac{20000 - 17500}{20000}$ |
| (ii) | 155 www 3 | 3 | M2 for $\frac{161.2}{1.04}$ oe or M1 for 1.04 or 104 seen |
| (c) | 3000 | 2 | M1 for $\div 14 \times 5$ [9] |
| 2 (a) (i) | 125 | 1 | |
| (ii) | 35 | 1 | |
| (b) (i) | 35 | 1 | |
| (ii) | 80 www 2 | 2 | M1 line extended from R parallel to ST or for line extended from TS parallel to QP with one extra angle found or extending PQ and one angle found |
| (c) (i) | 40 | 2 | M1 for recognising OAT or $OBT = 90^{\circ}$ |
| (ii) | 110 | 2 | M1 for 220° seen at centre or 70° seen as angle on circumference in alternate segment |
| (iii) | 9.40 (9.396 – 9.397) | 3 | M2 for $2 \times 5 \times \sin 70^{\circ}$ or $5^2 + 5^2 - 2.5.5 \cos 140$ oe or M1 for identifying correct trig ratio or implicit cosine formula oe [12] |
| 6 (a) | 9.95×10^{-5} | 1 | |
| (b) | 1.1×10^{-5} | 1 | |
| (c) | 9.9×10^{-5} | 2 | M1 for figs 595 seen (can be implied by 9.92 or 9.916 to 9.917) |
| (d) | 1.05×10^{-4} or 1.06×10^{-4} | 3 | M2 for $(1.0 \times 10^{-4}) \times 7$ – their Σx or M1 for $(1.0 \times 10^{-4}) \times 7$ soi or (sum of 6 values + x) ÷ 7 = 1.0 × 10 ⁻⁴ |

| Page 3 | Mark Scheme: Teachers' version | Syllabus | 1 |
|--------|--------------------------------|----------|---|
| | IGCSE – May/June 2012 | 0607 | |

| | | | | 6 |
|---|---------|---|-----------|---|
| 4 | (a) | -1 | 1 | R1 for 3 R1 for -3 |
| | (b) | 3, -3 | 2 | B1 for 3, B1 for -3 |
| | (c) | $(x-2)^2 - 5$ or $(x-2)(x-2) - 5$ | M1 | |
| | | $(x-2)^2 - 5$ or $(x-2)(x-2) - 5$ $x^2 - 2x - 2x + 4 - 5$ | A1 | -4x can be allowed for $-2x-2x$ |
| | (d) | 1 | 2 | B1 for $-4x - 1 = -5$ or better |
| | | | | or M1 for using intersection on reasonable sketch [7] |
| 5 | (a) (i) | 13.4 (13.41 to 13.42) | 2 | M1 for $18^2 - 12^2$ soi |
| | (ii) | 48.1 or 48.2 (48.11 – 48.19) | 2 | M1 for $\cos[A] = \frac{12}{18}$ oe |
| | (b) | Angle $FBE = \frac{1}{2}$ their (a)(ii) | M1 | |
| | | tan (their FBE or $\frac{1}{2}$ their (a)(ii)) = $\frac{\text{their (a)(i)}}{BE} \text{ oe}$ | M1 | |
| | | BE = 29.95 to 30.05 at least 4 figs | A1 | |
| | (c) | art 32.8 or 32.9 | 2 | M1 for $[FB^2]$ their 13.4(16) ² + 30.0 ² oe |
| | (d) | 14.3 (14.28 to 14.30) | 3 | M1 for $20^2 + 30^2 - 2 \times 20 \times 30 \cos(\frac{1}{2} \text{ their}(\mathbf{a})(\mathbf{ii}))$ |
| | | | | A1 for 204.1 to 204.6 [12] |

| Page 4 | Mark Scheme: Teachers' version | Syllabus | .0 |
|--------|--------------------------------|----------|-----|
| | IGCSE – May/June 2012 | 0607 | 123 |

| | T | | 6 |
|---------------|--|----------|--|
| 6 (a) | Correct sketch | 3 | B1 for two branches with correct sh B1 for lower crossing y-axis at approximately (0, -6) B1 for upper crossing or touching x-axis to right of (1, 0) and left of (4, 0) |
| (b) | x = 1 | 1 | |
| | | | |
| (c) | $y \le -5.83 (-5.828)$ $y \ge -0.172 (-0.1716 \text{ to } -0.1715)$ | B1 B1 | If B0 , SC1 for $y \le -5.8$ and $y \ge -0.17$ |
| | | | 11 20, 501 101 y = 5.0 and y = 0.17 |
| (d) | 2, 3 | 1 | |
| (e) | Correct sketch | 2 | B1 for straight line with positive gradient, B1 for line crossing <i>y</i> -axis at approximately -2 |
| (f) | (-1.414, -6.243) (1.414, 2.243) | 2 | B1, B1 for each correct pair of co-ordinates If B0 award SC1 for answers given to other accuracy at least 2 or 4 or more decimal places [11] |
| 7 (a) | 4 www | 3 | B1 for interest = 63 soi M1 for correctly substituted simple interest formula oe or M1 for $\frac{588}{525}$ A1 for 112% soi |
| (b) | 14800 | 3 | M1 for 10000×1.05^n where <i>n</i> is an |
| | | | integer >1 oe |
| | | | A1 for 14770 to 14780 [6] |
| 8 (a) (i) | 12 | 1 | |
| (ii) (iii) | 5 10 | 1 1 | |
| | | | |
| (b) (i) | Correct Venn diagram | 3 | B1 for 0 in centre B1 for 7, 2, 12 in correct positions |
| | | | B1 for 5, 10, 4 in correct positions |
| (ii) | 40 | 1ft | ft from their Venn diagram [7] |
| | | L | |

| Page 5 | Mark Scheme: Teachers' version | Syllabus | .0 | τ . |
|--------|--------------------------------|----------|-----|-----|
| | IGCSE – May/June 2012 | 0607 | 100 | |

| 9 (a) | 2410 (2411 to 2414) | 2 | M1 for $\pi \times 8^2 \times 12$ M1 for $\pi \times 8^2$ (200.9 to 201.1) M1 for $\pi \times 16 \times 12$ oe (602.8 to 603.3) |
|------------|---|-----|---|
| (b) | 804 (803.8 to 804.4) | 3 | M1 for $\pi \times 8^2$ (200.9 to 201.1) |
| | | | M1 for $\pi \times 16 \times 12$ oe (602.8 to 603.3) |
| (c) | 2.5 www 3 | 3 | M1 for $500 = \pi \times 8^2 \times h$ or better or |
| | | | $\frac{x}{500} = \frac{12}{\text{their (a)}} \text{ oe}$ |
| | | | A1 for 2.486 to 2.488 or 2.49 |
| | | | AT 101 2.400 to 2.400 01 2.49 |
| (d) | 4 | 2 | M1 for scale factor $\sqrt[3]{\frac{1}{8}}$ oe [10] |
| 10 (a) | 29 www 2 | 2 | M1 for 18 or 47 seen |
| (b) | Frequency 4, 5, 10, 5, 6 | 2 | B1 for at least 3 correct |
| | Frequency density 1, 0.5, 0.5, 0.3 | 2ft | ft from their frequency values |
| | | | B1 for at least 2 correct ft |
| (c) | Correct histogram | 3ft | B1 for correct widths with vertical lines |
| | | | consistently placed from 9 to 10, 14 to 15 etc. B2 for their heights ft dep on 5 columns |
| | | | B1 for 3 or 4 heights ft dep on 5 cols [9] |
| 11 (a) | $\frac{1}{4}$ (0.25, 25%) | 1 | |
| | 1 | | 2 1 |
| (b) | $\frac{1}{6}$ oe (0.167, 16.7%) www 2 | 2 | M1 for $\frac{2}{4} \times \frac{1}{3}$ oe |
| (0) | 1 00 (0.25, 25%) | 3 | M2 for $\frac{3}{4} \times \frac{1}{3}$ oe |
| (c) | $\frac{1}{4}$ oe (0.25, 25%) www 3 | | |
| | | | or M1 for $\frac{a}{b} \times \frac{1}{3}$ |
| | $\frac{1}{12}$ oe (0.0833, 8.33%) www 2 | 2 | M1 for $\frac{1}{4} \times \frac{1}{3}$ oe [8] |

| Page 6 | Mark Scheme: Teachers' version | Syllabus | .0 | 1 |
|--------|--------------------------------|----------|-----|---|
| | IGCSE – May/June 2012 | 0607 | 800 | |

| | | 1 | 8 |
|------------|---|----------|---|
| 12 (a) | Correct quadrilateral drawn | 1 | ft their (a) SC1 for any other translation $\binom{2}{\mathbf{or}} \binom{k}{k}$ |
| (b) (i) | Correct reflection | 1ft | ft their (a) |
| (ii) | Correct translation | 2ft | SC1 for any other translation $\binom{2}{k}$ or $\binom{k}{-3}$ |
| (iii) | Correct enlargement | 3ft | SC2 for other enlargement scale factor $\frac{1}{2}$ with correct orientation or SC1 for any other enlargement centre $(0,0)$ [7] |
| 3 (a) | $\frac{x}{360} \times \pi \times 10^2$ or better | 2 | M1 for $\frac{x}{360}$ used SC1 for $\frac{360 - x}{360} \times \pi \times 10^2$ or better |
| (b) | $0.5 \times 10 \times 10 \times \sin x$ or better | 2 | M1 for expression from more complicated method |
| (c) | $\frac{x}{360} \times \pi \times 10^2 - 0.5 \times 10 \times 10 \times \sin x$ | 1ft | Both expressions must have 10 (not just r) for the radius |
| (d) (e) | their (b) = 25 $\sin x = \frac{1}{2}$ oe x = 180 - 30 oe 106 (105.8 - 105.9) | M1 A1 E1 | ft M1 for equating their area of triangle to 25 SC2 for $0.5 \times 10 \times 10 \sin 150$ (or $50\sin 150$) = $50 \times 0.5 = 25$ ft from their (c) (or their (a) – (b)) if working seen. Could re-start. ft only if answer positive |
| | | | M1 ft for 150 substituted in their (c) (or their (a) – (b) or re-start) [17] |
| 14 (a) | Sketch drawn | 1 | Allow freehand |
| (b) | 3.4(0) (3.402 – 3.403) www 4 | 4 | M3 for $r = \frac{2}{\sin 36}$ or $\frac{4 \sin 54}{\sin 72}$ or $\sqrt{\frac{8}{1 - \cos 72}}$ oe i.e explicit expression or M2 for correct implicit expression If M0, B1 for 72, 36, 54 or 108 seen in correct position [5] |