**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

International General Certificate of Secondary Education

# MARK SCHEME for the October/November 2013 series

## 0444 MATHEMATICS (US)

0444/31          Paper 3 (Core), maximum raw mark 104

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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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**Abbreviations**

cao    correct answer only
cso    correct solution only
dep    dependent
ft    follow through after error
isw    ignore subsequent working
oe    or equivalent
SC    Special Case
www    without wrong working

| Qu. | Answers | Mark | Part Marks |
|---|---|---|---|
| 1 (a) (i) | 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60. | 1 | Award mark for any one from list. |
| (ii) | 60 | 2 | **B1** for any common factor on answer line, 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 |
| (b) (i) | 60 | 1 | |
| (ii) | 49 | 1 | |
| (iii) | 2 | 1 | |
| (c) (i) | Any correct example | 1 | Calculation and correct answer must be seen. |
| (ii) | Any correct example | 1 | Calculation and correct answer must be seen. |
| (d) (i) | > | 1 | |
| (ii) | > | 1 | |
| (iii) | < | 1 | |
| 2 (a) | 7 (hours) 25 (minutes) cao | 1 | |
| (b) (i) | 128.42 | 2 | **M1** for $167 \times 0.769$ soi by 128.423 or 128.4 or 128 |
| (ii) | 80 | 2 | **M1** for $61.52 \div 0.769$ |
| (c) | 20 | 3 | **M2** for $\dfrac{10}{\sin 30}$ or **M1** for $\sin 30 \dfrac{10}{BC}$ |
| (d) | 52.[0] or 51.99 | 4 | **B1** for 73900 seen<br>**M2** for $r^3 = \dfrac{3 \times \text{their } 73600}{4\pi}$ oe imp by 17563 to 17580.<br>Or **M1** for $\dfrac{4}{3}\pi r^3 = their\, 76300$ oe |

| 3 | (a) | (i) | 44–46 | 1 | |
|---|-----|-----|-------|---|---|
| | | (ii) | 213–235 | 1 | |
| | (b) | (i) | Fully correct drawing with arcs | 3 | **B2** for correct triangle without arcs<br>Or<br>**B1** for 1 correct length side<br>Or arc of 6cm or 8cm |
| | | (ii) | 52250 to 60500 **nfww** | 3FT | **M2** for<br>$\frac{1}{2} \times 550 \times$ (*their* correct height $\times$ 50)<br><br>Or $\frac{1}{2} \times 11 \times$ *their* correct height in cm<br><br>Or **B1** for *their* correct height in cm<br>or *their* correct height $\times$ 50 seen<br><br>If 0 scored then **SC1** for<br>$\frac{1}{2} \times 550 \times (50 \times k)$ |
| 4 | (a) | (i) | Translation<br>$\begin{bmatrix} -7 \\ -8 \end{bmatrix}$ | 1<br><br>1 | <br><br>Accept 7 left and 8 down |
| | | (ii) | Enlargement<br>[Scale factor] 0.5<br>[Centre] (0, 0) | 1<br>1<br>1 | |
| | (b) | (i) | D at (–2, 4) (–4, 4) (–3, 6) | 1 | |
| | | (ii) | E at (–4, 2) (–4, 4) (–6, 3) | 2 | **B1** for correct orientation, incorrect centre<br>or 90° rotation clockwise about (0, 0). |
| 5 | (a) | | 252.56 | 2 | **M1** for $(30 + 30 + 17) \times 3.28$ or better oe |
| | (b) | (i) | 510 | 2 | **M1** for $30 \times 17$ |
| | | (ii) | 170<br>102<br>136 | 3 | **M2** for 2 correct areas clearly identified or<br>**M1** for $408 \div (5 + 3 + 4)$ soi by 34 or one<br>correct area clearly identified<br>**SC2** for three correct answers in incorrect<br>places |
| | (c) | | 34.5 | 3 | **M2** for $\sqrt{30^2 + 17^2}$ soi by $\sqrt{1189}$<br>or **M1** for $30^2 + 17^2$ soi by 1189 |
| | (d) | (i) | 63.6 or 63.61–63.63 | 2 | **M1** for $4.5^2 \times \pi$ or $20.25\pi$ |
| | | (ii) | 127 or 127.2… | 1FT | **FT** for *their* **(d)(i)** $\times$ 2 |

| 6 | (a) | 14, 4, 2, 8, 14 | **3** | **B2** for 4 correct<br>**B1** for 2 or 3 correct |
|---|---|---|---|---|
| | (b) | 8 points correctly plotted | **P3FT** | **P2FT** for 6 or 7 points correctly plotted<br>**P1FT** for 4 or 5 points correctly plotted |
| | | Smooth and correct curve through all correct points | **C1** | |
| | (c) | $x = 0.5$ or $x = \dfrac{1}{2}$ | **1** | |
| | (d) (i) | $y = 9$ ruled | **1** | |
| | (ii) | –2.15 to –2.25<br>3.15 to 3.25 | **1FT**<br>**1FT** | |
| 7 | (a) (i) | July or Jul | **1** | |
| | (ii) | 10.9 | **1** | |
| | (iii) | –9.6 | **1** | |
| | (b) (i) | $150 \div \dfrac{90}{360}$ oe | **1** | Accept $150 \times \dfrac{360}{90}$ , $150 \times 4$ |
| | (ii) | 250 | **3** | **M1** for *their* $\dfrac{150}{360} \times 600$ or *their* $150 \times \dfrac{150}{90}$<br>and<br>**B1** for 150 seen as angle |
| | (c) | 11682 | **3** | **M2** for $885 \times 15 \times 0.88$ oe<br>**M1** for $885 \times 0.88$ oe or $885 \times 15 \times 0.12$ oe |
| | (d) (i) | $4.48 \times 10^6$ cao | **1** | |
| | (ii) | 9.82 | **3** | **M2** for $\dfrac{4920000 - 4480000}{4480000} \times 100$ oe<br>or $\left( \dfrac{4920000}{4480000} - 1 \right) \times 100$ oe<br>or<br>**B1** for 440000 or 0.44 or 1.098(…)<br>or 109.8(…) |

| 8 | (a) | (i) | Chord<br>Radius | 1<br>1 | |
|---|-----|-----|------|---|---|
| | | (ii) | 12<br>Tangent [meets] radius [at] 90[°] | 1<br>1 | |
| | | (iii) | 66 | 2 | **M1** for BCD identified as 90<br>or 180–24–90 |
| | | | Angles [in] triangle 180 or<br>Angle [in a] semi-circle [=90] | 1 | |
| | (b) | (i) | Octagon | 1 | |
| | | (ii) | 360 ÷ 8 [= 45] | **M1** | alternative method<br>**M1** for (8–2) × 180 [=1080] or<br>6 × 180 [= 1080] |
| | | | (180 – their 45) ÷ 2<br>67.5 | **M1FT**<br><br>**A1** | **M1FT** for (their 1080 ÷ 8) ÷ 2<br>or *their* 1080 ÷ 16<br>**A1** for 67.5 |
| | (c) | | 15 | 2 | **M1** for 360/24 |
| 9 | (a) | (i) | 230 | 2 | **M1** for 130 + 4 × 25 or better |
| | | (ii) | 252 | 2 | **M1** for $4n = 1138 - 130$ or better<br>Or $\dfrac{(1138 - 130)}{4}$ or better |
| | (b) | (i) | 9 | 1 | |
| | | (ii) | 3.5 | 2 | **M1** for $8y = 24 + 4$ or better<br>Or $y - \dfrac{4}{8} = \dfrac{24}{8}$ or better |
| | | (iii) | 4 | 3 | **M1** for first correct step<br>**M1FT** for second correct step |
| | (c) | | $x = 1.5$ or 3/2<br>$y = -5$ | 4 | **M1** for correctly equating one set of coefficients.<br>**M1** for correct method to eliminate one variable.<br>**A1** for $x = 1.5$<br>**A1** for $y = -5$ |