**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**International General Certificate of Secondary Education**

# MARK SCHEME for the October/November 2013 series

## 0580 MATHEMATICS

**0580/42** Paper 4 (Extended), maximum raw mark 130

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
art anything rounding to
soi seen or implied

| | Correct answer | Mark | Part marks |
|---|---|---|---|
| **1** | **(a) (i)** 3216 Final answer | **2** | **M1** for (18900 – 5500) × 0.24 oe |
| | **(ii)** 1307 Final answer | **2FT** | **FT** (18900 – *their* **(a)(i)**) ÷ 12 correctly evaluated<br>**M1** for (18900 – *their* **(a)(i)**) ÷ 12 |
| | **(b)** 4.5[%] nfww | **2** | **M1** for $\frac{19750.50\,[-18900]}{18900}\times 100$ or $\frac{19750.50-18900}{18900}$ |
| | **(c)** A by 31.05…<br>or 31.04 to 31.05<br>or 31.[0]<br>31.1[0] | **5** | **M1** for 1500 × 4.1/100 × 3 [+ 1500] oe<br>**M1** for 1500 × $1.033^3$ [– 1500] oe<br>**A1** for 1684.5 or 184.5 **or** 1653[.45..] or 153[.45..]<br>**and M1dep** for subtraction of *their* amounts or *their* interests |
| **2** | **(a)** 36.9° or 36.86 to 36.87 | **2** | **M1** for tan[*DBC*] = 1.8/2.4 oe |
| | **(b) (i)** $1.8^2 + 2.4^2$ leading to $\sqrt{9}$ | **2** | **M1** for $1.8^2 + 2.4^2$ or better |
| | **(ii)** [cos*ABD*) =] $\frac{6.46^2+3^2-8.6^2}{2\times 6.46\times 3}$<br>127 or 126.8… | **M2**<br>**A2** | **M1** for correct cos rule but implicit version<br>**A1** for –0.599…<br>After **0** scored, **SC2** nfww for answer 127 or 126.8 to 126.96 from other methods or no working shown |
| | **(c)** 39.6 or 39.7 or 39.59 to 39.68 | **3** | **M2** for ½ (2.4 + 8.6) × 1.8 × 4 oe<br>**Or M1** for $\frac{1.8}{2}(2.4+8.6)$ oe soi by 9.9 to 9.92 |

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|---|---|---|---|
| **3** | **(a)** $\frac{4x-7}{10}$ final answer nfww | **3** | **M2** for $\frac{5(2x-1)-2(3x+1)}{2\times5}$ or $\frac{5(2x-1)}{5\times2}-\frac{2(3x+1)}{5\times2}$ **or M1** for attempt to convert to common denominator of 10 or multiple of 10 with one error in numerator |
| | **(b)** $x^2 + 9$ final answer nfww | **4** | **B3** for $4x^2 – 6x – 6x + 9 – 3x^2 +12x$ or correct answer given and then spoilt **or B1** for $4x^2 – 6x – 6x + 9$ seen **and B1** for $– 3x^2 +12x$ or $– (3x^2 – 12x)$ seen |
| | **(c)** **(i)** $(2x – 1)(x + 3)$ isw solving | **2** | **M1** for $(2x + a)(x + b)$ where $ab = –3$ or $2b + a = 5$ with integers $a$ and $b$ |
| | **(ii)** $\frac{2x-1}{2(x-3)}$ or $\frac{2x-1}{2x-6}$ final answer nfww | **3** | **M2** for $2(x + 3)(x – 3)$ or $(2x – 6)(x + 3)$ or $(2x + 6)(x – 3)$ seen **or M1** for $2(x^2 – 9)$ seen |
| **4** | **(a)** **(i)** $90 \div (42/360 \times \pi \times 8^2)$ o.e. | **M3** | **M2** for $42/360 \times \pi \times 8^2 \times h = 90$ **or M1** for $42/360 \times \pi \times 8^2$ |
| | 3.836 to 3.837 | **A1** | |
| | **(ii)** 131 or 130.75 to 130.9 nfww | **5** | **M2** for $42/360 \times \pi \times 2 \times 8 \times 3.84$ oe [22.48 to 22.53] **or M1** for $42/360 \times \pi \times 2 \times 8$ oe soi [5.86 to 5.87] **and M1** for $2 \times (8 \times 3.84)$ [61.37 to 61.44] **and M1** for $2 \times (42/360 \times \pi \times 8^2)$ [46.88 to 47] |
| | **(b)** 2.42 or 2.416 to 2.419 | **3** | **M2** for $3.84 \times \sqrt[3]{\frac{22.5}{90}}$ oe or $h = \sqrt[3]{\frac{3.84^3 \times 22.5}{90}}$ **or M1** for $\sqrt[3]{\frac{22.5}{90}}$ oe or $\sqrt[3]{\frac{90}{22.5}}$ oe seen or $\frac{3.84^3}{h^3} = \frac{90}{22.5}$ oe |

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| **5** | **(a)** 7, 11.5, 4.5 | **1,1,1** | |
| | **(b)** Correct curve cao | **5** | **B3FT** for 10 correct plots, on correct vertical grid line and within correct 2 mm square vertically<br>**Or B2FT** for 8 or 9 correct plots<br>**Or B1FT** for 6 or 7 correct plots<br>**and B1 indep** for two separate branches on either side of $y$-axis |
| | **(c) (i)** $0.69 < x < 0.81$ | **1** | |
| | **(ii)** $-2.3 < x < -2.2$<br>$-0.8 < x < -0.6$<br>$0.35 < x < 0.5$ | **3** | **B1** for each correct<br>After 0 scored, allow **SC1** for drawing line $y = 7.5$ long enough to cross curve at least once |
| | **(d) (i)** $y = 10 - 3x$ ruled correctly | **B2** | long enough to cross curve twice.<br>**B1** for ruled line gradient –3 or $y$ intercept at 10 but not $y = 10$<br>**Or B1** for 'correct' but freehand |
| | $-0.55 < x < -0.45$ | **B1dep** | Dependent on at least **B1** scored for line |
| | $0.35 < x < 0.45$ | **B1dep** | After 0 scored, **SC2** for –0.5 **and** 0.4 [from solving equation] |
| | **(ii)** 10 1 –2<br>**or** –10 –1 2 | **3** | **B2** for $2 - x - 10x^2$ [= 0] oe<br>Or **B1** for $\frac{2}{x^2} - \frac{1}{x} - 10 = 0$ oe Correctly eliminating $-3x$<br>Or **B1** for $2 - x - 3x^3 = 10x^2 - 3x^3$ oe Correctly clearing fractions |

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| **6** | **(a) (i)** $\frac{1}{110}$ oe | **2** | **M1** for $\frac{1}{11}\times\frac{1}{10}$ |
| | **(ii)** $\frac{6}{110}$ oe $\left[\frac{3}{55}\right]$ | **2** | **M1** for $\frac{3}{11}\times\frac{2}{10}$ |
| | **(iii)** $\frac{8}{110}$ oe $\left[\frac{4}{55}\right]$ | **2FT** | **FT** *their* **(a)(ii)** + $\frac{2}{11}\times\frac{1}{10}$ correctly evaluated **or M1** *their* **(a)(ii)** + $\frac{2}{11}\times\frac{1}{10}$ |
| | **(b) (i)** $\frac{6}{990}$ oe $\left[\frac{1}{165}\right]$ | **2** | **M1** for $\frac{3}{11}\times\frac{2}{10}\times\frac{1}{9}$ |
| | **(ii)** $\frac{336}{990}$ oe $\left[\frac{56}{165}\right]$ | **2** | **M1** for $\frac{8}{11}\times\frac{7}{10}\times\frac{6}{9}$ |
| | **(iii)** $\frac{198}{990}$ oe $\left[\frac{1}{5}\right]$ | **5** | **M4** for $3\left(\frac{3}{11}\times\frac{2}{10}\times\frac{8}{9}\right)+3\left(\frac{2}{11}\times\frac{1}{10}\left[\times\frac{9}{9}\right]\right)$ oe **or M3** for $3\left(\frac{3}{11}\times\frac{2}{10}\times\frac{8}{9}\right)$ *or* $3\left(\frac{2}{11}\times\frac{1}{10}\left[\times\frac{9}{9}\right]\right)$ oe **Or** **M1** for $\frac{3}{11}\times\frac{2}{10}\times\frac{8}{9}$ oe seen **and M1** for $\frac{2}{11}\times\frac{1}{10}\left[\times\frac{9}{9}\right]$ oe seen |

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|---|---|---|---|
| **7** | **(a)** 14 10 or 2 10 pm final answer | **2** | **M1** for (0)8 10 oe or answer 14 hours and 10 minutes or answer 2 10 [am] |
| | **(b)** 5 hours 45 minutes cao | **2** | **M1** for 345 [mins] seen or for 805 /7 × 3 oe or 5.75 seen |
| | **(c) (i)** 798 or 798.2 to 798.4…. | **2** | **M1** for 10712 / $13\frac{25}{60}$ or 10712 ÷ 13.4… |
| | **(ii)** $1.82 \times 10^5$ or $1.815 \times 10^5$ to $1.816 \times 10^5$ | **4** | **B3** for 182000 or 181500 to 181600 seen **or M2** for 10712000/59 oe **or M1** for figs 10712/figs 59 soi by figs 182 or figs 1815 to 1816 **and B1 FT** for their number of litres correctly converted to standard form rounded to 3sf or better |
| | **(d)** 8600 | **3** | **M2** for 10148 ÷ 1.18 oe **or M1** for 10148 associated with 118[%] |
| **8** | **(a) (i)** –6 | **1** | |
| | **(ii)** 2.75 oe | **2** | **M1** for [g($x$) =] 0.5 or 7/14 Or $\left(\frac{7}{x+1}\right)^2 + 5\left(\frac{7}{x+1}\right)$ oe |
| | **(b)** $\frac{x-3}{4}$ or $\frac{x}{4} - \frac{3}{4}$ Final answer | **2** | **M1** for $y - 3 = 4x$ or better or $x = 4y + 3$ or better or $\frac{y}{4} = \frac{3}{4} + x$ or flowchart with – 3 then ÷ 4 |
| | **(c) (i)** 5 | **2** | **M1** for $4x = 23 - 3$ or $x + \frac{3}{4} = \frac{23}{4}$ or better |
| | **(ii)** $x^2 + 5x - 7 = 0$ | **B1** | May be implied by correct values in formula |
| | $\frac{-5 \pm \sqrt{5^2 - 4(1)(-7)}}{2(1)}$ oe | **B1**<br>**B1** | **B1** for $\sqrt{5^2 - 4(1)(-7)}$ or better [53] If in form $\frac{p + \sqrt{q}}{r}$ or $\frac{p - \sqrt{q}}{r}$, **B1** for –5 and 2(1) or better **No** recovery of full line unless **seen** |
| | 1.14 and –6.14 final answers | **B1**<br>**B1** | **Or SC1** for 1.1 or 1.140…. and –6.1 or – 6.140 … Or answers –1.14 and 6.14 |

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| **9** | **(a) (i)** Reflection<br>$x = -2$ oe | **2** | | **B1** for either |
| | **(ii)** Translation<br>$\begin{pmatrix} -7 \\ 2 \end{pmatrix}$ oe | **2** | | **B1** for either |
| | **(iii)** Stretch<br>$x$-axis oe invariant<br>[factor] 3 | **3** | | **B1** for each |
| | **(b) (i)** Triangle with coords at (8, 2) (7, 3) and (7, 5) | **2** | | **B1** for rotation about (6, 0) but 90° anticlockwise<br>Or for rotation 90° clockwise around any point |
| | **(ii)** Triangle with coords at (–2, –5) (–6, –5) and (–8, –7) | | **2** | **B1** for 2 correct points or for enlargement of SF –2 any centre |
| | **(iii)** Triangle with coords at (1, –1) (4, –6) and (3, –5) | | **2** | **B1** for 2 correct points or coordinates of 2 points shown |
| | **(c)** $\begin{pmatrix} 1 & 0 \\ -2 & 1 \end{pmatrix}$ | | **2** | **B1** for one row or one column correct but not identity matrix.<br>**Or SC1** for $\begin{pmatrix} 1 & -2 \\ 0 & 1 \end{pmatrix}$ |
| **10** | **(a)** 48 and 57, $9n + 3$ oe | **1** | **2** | **B1** for $9n + k$ oe |
| | **(b)** 56 and 50, $86 - 6n$ oe | **1** | **2** | **B1** for $k - 6n$ oe |
| | **(c)** 125 and 216, $n^3$ oe | **1** | **1** | |
| | **(d)** 130 and 222 $n^3 + n$ oe | **1** | **1FT** | FT *their* **(c)** + $n$ dep on expression in $n$ in **(c)** |

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