**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**Cambridge International General Certificate of Secondary Education**

# MARK SCHEME for the October/November 2015 series

## 0580 MATHEMATICS

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

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**Abbreviations**

cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

| Question | Answer | Mark | Part marks |
|---|---|---|---|
| 1 (a) (i) | $\frac{512}{7+11+14} \times 14$ | M2 | or **M1** for $\frac{512}{7+11+14}$ |
| (ii) | 112 | 1 | |
| (b) | 10 100 | 2 | **M1** for $224 \times 45$ soi by 10080 |
| (c) | 19 | 2 | **M1** for $224 \div 12$ soi by 18.66 to 18.67 or 18.7 or $18\frac{2}{3}$ |
| (d) (i) | 4093000 | 1 | |
| (ii) | $4.093 \times 10^6$ | 1FT | **FT** *their* **(d)(i)** |
| (e) | 198 or 198.1 to 198.2 | 3 | **M2** for $\frac{8.2-2.75}{2.75} \times 100$ oe<br>or **M1** for $\frac{8.2}{2.75} \times 100$ or $\frac{8.2-2.75}{2.75}$ |
| 2 (a) | 0 4 0.625 0.875 | 1,1,1,1 | |
| (b) | Fully correct smooth curve | 4 | **B3 FT** for 8 or 9 points<br>or **B2 FT** for 6 or 7 points<br>or **B1 FT** for 4 or 5 points |
| (c) | line $y = x + 1$ ruled<br>and<br>0.2 to 0.3<br>and<br>1.8 to 1.95 | 3 | Line must be fit for purpose ie at least from $x = 0$ to $x = 2$<br>**B2** for correct line and 1 correct value<br>or **B1** for correct line<br>or **SC1** for no/wrong line and 2 correct values |

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| | **(d)** | Tangent ruled at $x = -1.5$ | **B1** | No daylight between tangent and curve at point of contact. Consider point of contact as midpoint between two vertices of daylight, the midpoint must be between $x = -1.6$ and $x = -1.4$ |
| | | 2.2 to 5 | **2** | **dep** on **B1**<br>**M1** for $\frac{rise}{run}$ **also dep on** any tangent drawn or close attempt at tangent at any point<br>Must see correct or implied calculation from a drawn tangent |
| **3** | **(a)** | Correct diagram | **3** | **B1** for correct vertical plots<br>and<br>**B1** for correct horizontal plots<br>and<br>**B1 dep on at least B1** for reasonable increasing curve or polygon through *their* 6 points<br><br>If zero scored, **SC1** for 5 out of 6 correct plots |
| | **(b) (i)** | 32 to 34 | **1** | |
| | **(ii)** | 120 – reading at $r = 50$ | **2FT** | **B1FT** for reading at $r = 50$ seen |
| | **(c)** | 8 18 27 | **2** | **B1** for 2 correct |
| | **(d)** | 35.2 or $35\frac{1}{6}$ or 35.16 to 35.17 nfww | **4** | **M1** for mid-values soi<br>**M1 FT** for $\sum fx$ with $x$ in the correct interval including boundaries<br>**M1dep** for $\sum fx \div 120$<br>dependent on second **M1** earned |
| | **(e)** | 1.6<br>1.35<br>0.3 | **4FT** | **FT** from **(c)** *their* $8 \div 5$ and *their* $27 \div 20$<br><br>**B3FT** for any 2 correct<br>or **B2FT** for first **or** second answer correct<br>or **B1** for 0.3 only |
| **4** | **(a)** | 1.6[0] or 1.601 to 1.602 | **3** | **M2** for $\frac{0.6}{\cos 68}$ oe<br>or **M1** for $\cos 68 = \frac{0.6}{AC}$ |
| | **(b)** | 43.5 or 43.6 or 43.49 to 43.56 | **4** | **M2** for $\frac{1.9^2 + 2.3^2 - their 1.6^2}{2 \times 1.9 \times 2.3}$<br>or **M1** for implicit statement<br>**A1** for [cos = ] 0.724 to 0.726 |

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|---|---|---|---|
| **(c)** | 1.33 or 1.332...nfww | **4** | **M2** for $\sqrt{2.3^2-\left(\frac{1}{2}\times1.2\right)^2}$<br>or **M1** for $2.3^2=h^2+\left(0.5\times1.2\right)^2$<br><br>**and M1** for $\frac{1}{2}\times1.2\times$ *their* 2.22 (*their* 2.22 must come from attempt at Pythag or from trig in triangle *BCD*) |
| **(d)** | 41.1 or 41.13 to 41.14 | **3** | **M2** for $\sin=\frac{1.25}{1.9}$ oe<br>or **M1** for correct angle identified |
| **5 (a) (i)** | $4x(3x+13)-2x(4x-\{3x-9\})=24$ oe | **M1** | |
| | $12x^2+52x-2x^2-18x$ | **M1** | Correct removal of all *their* brackets<br>Dep on two **areas** added or subtracted |
| | $5x^2+17x-12=0$ | **A1** | with no errors or omissions seen and at least one more line of working showing collection of like terms or division by 2 |
| **(ii)** | $(5x-3)(x+4)$ [= 0] | **M2** | **M1** for $(5x+a)(x+b)$ where $ab = -12$ or $5b + a = 17$ [$a$, $b$ integers] |
| | $\frac{3}{5}$ oe , $-4$ | **A1** | If zero scored **SC1** for correct answers with no working or from other methods. |
| **(b)** | For correctly eliminating one variable | **M1** | |
| | $x = 3$<br>$y = -7$ | **A1**<br>**A1** | **SC1** if no working shown, but 2 correct answers given<br>If zero scored **SC1** for 2 values satisfying one of the original equations |
| **(c)** | $t = -2$ nfww | **5** | **M1** for $2(t+3)(t+3)-t^2$ or better seen<br>**M1** for denominator[s] $t(t+3)$ isw or for $t(t+3)$ isw on RHS<br>**M1dep** for $2t^2+12t+18-t^2=t^2+3t$ oe dependent on both numerators and denominator expanding to give quadratics<br><br>**A1** for $9t+18=0$ oe |

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| **6** | **(a) (i)** | 43 | **1** | |
| | **(ii)** | 62 | **1** | |
| | | Isosceles triangle or *OYZ* is isosceles | **1** | |
| | | Angle at centre is twice angle at circumference | **1** | |
| | **(iii)** | 30 | **2** | **M1** for $p + 5p = 180$ oe |
| | | [Opposite angles of a]cyclic quadrilateral [add up to 180°] | **1** | |
| | **(b) (i)** | 1 : 2 oe | **1** | |
| | **(ii)** | $OQ$ | **1** | |
| | | $MQ = NQ$ | **1** | |
| | | $OM = ON$ | **1** | |
| | | Centre or $O$ | **1** | Not origin |
| **7** | **(a) (i)** | Rotation | **1** | |
| | | [+]90 or 90 anticlockwise oe | **1** | |
| | | ( 0 , 2 ) | **1** | Not as column vector |
| | **(ii)** | Reflection | **1** | |
| | | $y = 1$ oe | **1** | |
| | **(iii)** | Enlargement | **1** | |
| | | [s f ] $-\frac{1}{2}$ oe | **1** | |
| | | Origin oe | **1** | |
| | **(b)** | $\begin{pmatrix} -\frac{1}{2} & 0 \\ 0 & -\frac{1}{2} \end{pmatrix}$ oe | **2FT** | **FT** *their* s f from **(a)(iii)**<br>**SC1** for $\begin{pmatrix} k & 0 \\ 0 & k \end{pmatrix}$, $k \neq 1$ or 0 |
| | **(c)** | Image at (4 , 1) (6, 1) (6 , 5) (4 , 3) | **2** | ruled or good freehand<br>**SC1** for translation $\begin{pmatrix} 2 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -3 \end{pmatrix}$ or for 4 correct vertices not joined |
| | **(d)** | Reflection | **1** | |
| | | $y = x$ oe | **1** | |

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| **8** | **(a)** | ( 4 , 6 ) | **1, 1** | |
| | **(b)** | 4.47 or 4.472 | **3** | **M2** for $\sqrt{(8-4)^2+(5-3)^2}$ or better<br>or **M1** for $(8-4)^2+(5-3)^2$ or better |
| | **(c)** | $y = 2x - 2$ oe | **3** | **B2** for $2x-2$ or $y = 2x + c$ oe<br>or **M1** for [$m$ =] $\frac{8-4}{5-3}$ oe soi by $2x$<br>**and M1** for (3, 4) or (5, 8) or *their* midpoint substituted into *their* $y = mx + c$ with $m$ numerical |
| | **(d)** | – 3 | **3** | **M1** for use of gradient × *their* $m$ = – 1 soi by $-\frac{1}{2}$<br>**M1** for $r$ = *their* gradient × 6 [+0] |
| **9** | **(a) (i)** | 11 | **1** | |
| | **(ii)** | 256 | **2** | **M1** for [g(3) =] 8 or $2^3$ or $2^{2^x}$ |
| | **(b)** | $\frac{x-5}{2}$ oe final answer | **2** | **M1** for $x = 2y + 5$ or $2x = y - 5$ or better<br>or $\frac{y}{2} = x + \frac{5}{2}$ |
| | **(c)** | $19 - 6x$ final answer | **2** | **M1** for $2(7 - 3x) + 5$ |
| | **(d)** | – 1, 0, 1, 2 | **3** | Additional values count as errors<br>**B2** for one error /omission<br>or **B1** for two errors/omissions<br><br>or **M2** for $-2 < x \leqslant 2$oe seen<br>or **M1** for $-2 < x$ **or** $x \leqslant 2$<br>**or** $x = -2$ **and** $x = 2$ **or** $-4 < 2x \leqslant 4$ |
| **10** | **(a)** | 8<br>25<br>17 | **2** | **B1** for 2 correct |
| | **(b)** | $n + 2$ oe | **1** | |
| | **(c) (i)** | $(n - 1)^2$ oe | **2** | **M1** for $(n + k)^2$ for integer $k$ |
| | **(ii)** | 92 | **2** | **M1** for $\sqrt{8281}$ or 91 seen |
| | **(d) (i)** | $n^2 - 3n - 1$ final answer | **2** | **M1** for *their* $(n - 1)^2$ – *their* $(n + 2)$ soi |
| | **(ii)** | 39 | **1** | |

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|---|---|---|---|
| **(e)** | 1 and $-\frac{1}{2}$ oe | **1** | |
| | $\frac{1}{4}$ oe | **1** | |
| | $-\frac{1}{8}$ oe | **1** | |

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