

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

0580 MATHEMATICS

0580/43

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 |
| nfw | not from wrong working |
| soi | seen or implied |

| Qu | | Answers | Mark | Part Marks |
|----|------------|---|------------------------|---|
| 1 | (a) | (i) Triangle at $(-3, 1), (-3, 3), (-4, 3)$ | 2 | SC1 for reflection in line $y = -1$ at $(1, -3), (1, -5), (2, -5)$ or reflection in any vertical line or three correct points not joined SC1 for rotation 180° but other centre or three correct points not joined |
| | | (ii) Triangle at $(-1, -1), (-2, -3), (-1, -3)$ | 2 | |
| | (b) | (i) Translation | 1 | |
| | | $\begin{pmatrix} -2 \\ 2 \end{pmatrix}$ oe | 1 | |
| | | (ii) Enlargement | 1 | |
| | | $(0, 3)$ | 1 | |
| | [factor] 3 | 1 | | |
| 2 | (a) | (i) 640×1.02^6 oe $= 720.7\dots$ | M1 B1 | Must be seen M3 for $[x =] \sqrt[4]{721 \div 640}$ or better (implied by answer of $1.03[02\dots]$ or $r = 0.0302[4\dots]$ or M2 for $(their\ x)^4 = 721 \div 640$ or M1 for $640 \times (their\ x)^4 = 721$ oe |
| | | (ii) 3.02 or 3.020 to 3.024... nfw | 4 | |
| | (b) | 874.8[0] final answer | 2 | |

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| Qu | | Answers | Mark | Part Marks | |
|-----|--|---------------------|--|--|---|
| 3 | (a) | 1 | 1 | | |
| | | 3 | 1 | | |
| | | 2.5 | 1 | | |
| | (b) | Fully correct graph | 5 | | <p>B3FT for 11, 12 points correct or B2FT for 9, 10 correct points or B1FT for 7, 8 correct points</p> <p>B1 for branch each side of y-axis and not touching y-axis</p> <p>SC4 for correct graph but branches joined</p> |
| | (c) | -2.6 to -2.4 | 1 | | |
| (d) | Correct ruled line fit for purpose -1.6 to -1.5 | 2 1 | <p>SC1 for ruled line through $(0, 1)$ but not $y = 1$ or ruled line with gradient -1 or for correct line but freehand</p> | | |
| (e) | Correct tangent and $0.9 \leq \text{grad} \leq 1.5$ | 3 | <p>Consider point of contact as midpoint between two vertices of daylight, the midpoint must be between $x = -3.4$ and -2.6</p> <p>B2 if close attempt at correct tangent and answer in range (may be small amount of daylight)</p> <p>or B1 for ruled tangent at $x = -3$ within tolerance, no daylight at the point of contact</p> <p>and M1 (dep on B1 or close attempt at tangent) for a tangent at any point and $\frac{\text{rise}}{\text{run}}$ used</p> | | |
| 4 | (a) | 72.5 | 3 | <p>M1 for Σfm with correct frequencies and correct mid-interval values</p> <p>M1 for $\div 200$ dep on first M1</p> | |
| | (b) | Correct histogram | 4 | <p>B1 four correct widths – no gaps</p> <p>B3 for blocks of correct heights 0.5, 5, 16, 4 or B2 for 3 blocks of correct heights or B1 for 2 blocks of correct heights If 0 scored for the heights then SC1 for all four frequency densities soi</p> | |

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| Qu | | Answers | Mark | Part Marks |
|-----|--------------------------|-----------------------------|---|---|
| 5 | (a) | (i) $\frac{4}{7}$ oe | 1 | |
| | | (ii) $\frac{6}{7}$ oe | 1 | |
| | | (iii) $\frac{5}{7}$ oe | 1 | |
| | (b) | (i) $\frac{12}{42}$ oe nfw | 2 | M1 for $\frac{4}{7} \times \frac{3}{6}$ |
| | | (ii) $\frac{28}{42}$ oe nfw | 3 | M2 for $\frac{4}{7} \times \frac{3}{6} + \frac{2}{7} \times \frac{5}{6} + \frac{1}{7}$ or $1 - \frac{4}{7} \times \frac{3}{6} - \frac{2}{7} \times \frac{1}{6}$ oe or M1 for the sum of two terms of $\frac{4}{7} \times \frac{3}{6}, \frac{2}{7} \times \frac{5}{6}, \frac{1}{7}$ |
| (c) | $\frac{120}{210}$ oe nfw | 2 | M1 for $\frac{6}{7} \times \frac{5}{6} \times \frac{4}{5}$ or $\left(\frac{4}{7} \times \frac{3}{6} \times \frac{2}{5}\right) + 3\left(\frac{4}{7} \times \frac{3}{6} \times \frac{2}{5}\right) + 3\left(\frac{4}{7} \times \frac{2}{6} \times \frac{1}{5}\right)$ oe | |

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| Qu | | Answers | Mark | Part Marks |
|----|---------|---------------|------|--|
| 6 | (a) | 100 nfw | 4 | M3 for a correct calculation that would lead to the answer or B2 two correct relevant different size angles in <i>their</i> diagram or one relevant angle and total in <i>their</i> polygon or angle $EDA + \text{angle } FAD = 140$ or B1 for one relevant angle or total in <i>their</i> polygon |
| | (b) (i) | 50 | 2 | B1 for angle $ADC = 80$ or angle $BAC = 30$ or angle $ADB = 50$ soi |
| | (ii) | 41 | 2FT | FT 91 – <i>their</i> (b)(i) B1 for angle $XBC = 41$ |
| | (iii) | Similar | 1 | |
| | (c) | 27.8 or 27.83 | 2 | M1 for evidence of $\left(\frac{11}{10}\right)^2$ or 1.21 or $\left(\frac{10}{11}\right)^2$ or 0.826(4...) |
| | (d) (i) | 60 | 3 | M2 for $\frac{n}{10} = \frac{360}{n}$ oe e.g. $\frac{180(n-2)}{n} = 180 - \frac{n}{10}$ or B1 for exterior sum = 360 or $180(n-2)$ seen |
| | (ii) | 174 | 2 | M1 for $\frac{\text{their } n}{10}$ or $\frac{360}{\text{their } n}$ for <i>their</i> $n < 1800$ |

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| Qu | | Answers | Mark | Part Marks | |
|----|-----|---|---------------------|--|---|
| 7 | (a) | (i) 331 or 331.1 to 331.2 | 2 | M1 for $\pi \times 6.2 \times 10.8 + \pi \times 6.2^2$ | |
| | | (ii) $\frac{A - \pi r^2}{\pi r}$ oe final answer | 2 | M1 for correct re-arrangement isolating term in l M1 for correct division by πr | |
| | (b) | (i) 4.39 or 4.390... | | 3 | M2 for $18 \div \left(\frac{10}{4} + \frac{8}{5}\right)$ or M1 for $\frac{10}{4}$ or $\frac{8}{5}$ |
| | | | (ii) $x + x + 4$ oe | B1 | Must be seen |
| | | $\frac{x}{5}$ or $\frac{x+4}{10}$ | B1 | Must be seen | |
| | | $\frac{x+x+4}{\frac{x}{5} + \frac{x+4}{10}} = 7$ oe | M2 | or M1 for evidence of total distance \div <i>their</i> total time | |
| | (c) | (i) 16.5[0] final answer | 3 | M2 for $19.8 \div \left(1 + \frac{20}{100}\right)$ oe or M1 for evidence of $(100 + 20)\%$ associated with 19.8 | |
| | | (ii) $\frac{100x}{100+y}$ final answer | 3 | B2 for $\frac{x}{1 + \frac{y}{100}}$ or $\frac{x}{1 + 0.01y}$ oe or B1 for $1 + \frac{y}{100}$ or $100 + y$ or $1 + 0.01y$ seen | |

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| Qu | | Answers | Mark | Part Marks |
|----|---------|---|-----------------------------|--|
| 8 | (a) | 28.3 or 28.29... | 2 | M1 for $180\,000 \div (\pi \times 45^2)$ |
| | (b) (i) | 360 000 | 3 | M2 for $\frac{1}{2}(70+50) \times 40 \times 150$ oe or M1 for $\frac{1}{2}(70+50) \times 40$ oe or <i>their</i> area of $ABCD \times 150$ dependent on <i>their</i> area being two dimensional |
| | | (ii) | 360 | 1FT |
| | (c) | 3 h 20 min | 3 | M2 for $180\,000 \div 15 \div 60$ (implied by 200) or M1 for $180\,000 \div 15$ (implied by 12000) or correct conversion of <i>their</i> seconds into h and min |
| | (d) (i) | $\frac{h}{40} = \frac{\frac{1}{2}(x-50)}{10}$ oe $h = 2(x-50)$ | M1 | i.e. a correct statement from similar figures which must contain h , x and numbers |
| | | (ii) | $\frac{1}{2}(x+50) 2(x-50)$ | M1 |
| | (iii) | 60.8 or 60.82 to 60.83 | 2 | M1 for $(x^2 - 2500) \times 150 = 180\,000$ or better |
| | (iv) | 21.7 or 21.65 to 21.66 | 1FT | FT for $2(\textit{their} \text{ (d)(iii)} - 50)$ evaluated only if $x > 50$ |

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| Qu | | Answers | Mark | Part Marks |
|----|-----|--|------|--|
| 9 | (a) | $\begin{pmatrix} 2 & 13 \\ 1 & 14 \end{pmatrix}$ | 2 | SC1 for one correct column or row |
| | (b) | $\frac{1}{3}\begin{pmatrix} 3 & -2 \\ 0 & 1 \end{pmatrix}$ oe isw | 2 | B1 for $k\begin{pmatrix} 3 & -2 \\ 0 & 1 \end{pmatrix}$ oe for $k \neq 0$ or $\frac{1}{3}\begin{pmatrix} a & c \\ b & d \end{pmatrix}$ |
| | (c) | $[u =] 3$ $[v =] 2$ | 3 | B2 for two of $3 = u, 2u + 3v = 4u, 4 = 2 + v, u + 4v = 3 + 4v$ or B1 for one or M1 for $\begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}\begin{pmatrix} 0 & u \\ 1 & v \end{pmatrix} = \begin{pmatrix} 0 & u \\ 1 & v \end{pmatrix}\begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}$ B1 for $\begin{pmatrix} 3 & 2u + 3v \\ 4 & u + 4v \end{pmatrix}$ or $\begin{pmatrix} u & 4u \\ 2 + v & 3 + 4v \end{pmatrix}$ |
| | (d) | 12 nfw | 2 | M1 for $w \times 2 - 8 \times 3 [= 0]$ oe |
| 10 | (a) | 9 | 2 | B1 for $[f(3) =] 5$ or $2(2x - 1) - 1$ |
| | (b) | $4x^2 - 2x$ or $2x(2x - 1)$ final answer | 3 | M1 for $(2x - 1)^2 + (2x - 1)$ B1 for $[(2x - 1)^2 =] 4x^2 - 2x - 2x + 1$ or $(2x - 1)(2x - 1 + 1)$ |
| | (c) | $\frac{x+1}{2}$ oe final answer | 2 | M1 for $x = 2y - 1$ or $y + 1 = 2x$ or $\frac{y}{2} = x - \frac{1}{2}$ |
| | (d) | $\frac{4x+4}{x(x+2)}$ or $\frac{4x+4}{x^2+2x}$ or $\frac{4(x+1)}{x(x+2)}$ or $\frac{4(x+1)}{x^2+2x}$ final answer | 4 | B1 for $x(x+2)$ oe isw as common denominator B2 for $4x + 4$ as numerator or B1 for $2(x+2) + 2x$ or better as numerator |

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| Qu | | Answers | Mark | Part Marks |
|----|-----|---|------|---|
| 11 | (a) | $\frac{5}{7}$ $\frac{n}{n+2}$ oe 7 $n+2$ oe 3 $n-2$ oe 21 n^2-4 oe | 8 | B1 each |
| | (b) | 72 | 2 | M1 for $\frac{72}{74}$ or their $\frac{n}{n+2} = \frac{36}{37}$ |
| | (c) | 27 | 2 | M1 for their $(n^2 - 4) = 725$ or $25 \times 29 [= 725]$ |