

MARK SCHEME for the May/June 2014 series

0580 MATHEMATICS

0580/32

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 |
| 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 Answers | |
|-----------------------------------|-----|------------------------------------|---------------------------------------|--------------|--|
| 1 | (a) | (i) 5 and 9 cao | 1 | | |
| | | (ii) 4 and 9 cao | 1 | | |
| | | (iii) 8 cao | 1 | | |
| | | (iv) 2 and 5 cao | 1 | | |
| | (b) | < | 2 | | B1 for 3 correct |
| | | = | | | |
| | | > | | | |
| | | > | | | |
| | (c) | (i) $(16 + 8) \div 4 - 2 = 4$ | 1 | | |
| | | (ii) $16 + 8 \div (4 - 2) = 20$ | 1 | | |
| | (d) | (i) $2 \times 2 \times 3 \times 7$ | 2 | | B1 for 2, 3, 7 or 2, 2, 3, 7, or $1 \times 2 \times 2 \times 3 \times 7$ |
| | | (ii) 12 | 2 | | B1 for 2, 3, 4 or 6 or $2 \times 2 \times 3$ or $2^2 \times 3$ or 4×3 or 2×6 seen as ans |
| | | (iii) 168 | 2 | | B1 for any other multiple of 168 or $2 \times 2 \times 2 \times 3 \times 7$ oe |
| | (e) | (i) 19 | 1 | | any other terms must be correct |
| (ii) +4 oe | | 1 | e.g. add 4 | | |
| (iii) $4n - 1$ oe final answer | | 2 | B1 for $4n + k$, $qn - 1$ $q \neq 0$ | | |
| (iv) accept any correct statement | | 1 | | | |

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| | | | | |
|---|---------|---|---------------------|---|
| 2 | (a) (i) | Trapezium | 1 | |
| | (ii) | 25 200 | 2 | SCB3 for 2.52 m ² M1 for $\left(\frac{180+240}{2}\right) \times 120$ or $180 \times 120 + \frac{1}{2} \times 120 \times 60$ or $\left(\frac{1.8+2.4}{2}\right) \times 1.2$ or $1.8 \times 1.2 + \frac{1}{2} \times 1.2 \times 0.6$ oe |
| | | cm ² | 1 | |
| | (iii) | 6.3 | 2 | M1 for <i>their</i> (a)(ii) $\times 2.5$ oe or figs 63 |
| | (iv) | 134 or 134.1 to 134.2 | 3 | B1 for 60 seen on diagram or used M1 for $120^2 + (\text{their '240 - 180'})^2$ or better |
| | (b) | correct angle bisector of angle <i>J</i> with two pairs of supporting arcs arc centre <i>H</i> radius 4 cm correct region shaded | 2 2 1 | M1 for the correct angle bisector of angle <i>J</i> without arcs M1 for any arc centre <i>H</i> dep on at least both M marks |
| 3 | (a) | correct mirror line | 1 | |
| | (b) | 2 | 1 | |
| | (c) (i) | 131 | 1 | |
| | (ii) | 103 | 2 | M1 for 180 – 49 – 54 or 49 + 54 or 77 seen or fully correct method |
| | (d) | 56 | 2 | M1 for 180 – 90 – 34 or better or indication of angle <i>B</i> = 90 |
| | (e) | 9 with supporting working | 5 | M2 for internal angle of P = 120 or M1 for 180 – (360 ÷ 6) or (6 – 2) × 180 ÷ 6 M1FT for 360 – their '120' – 100 [= 140] M1FT for 360 ÷ (180 – their '140') if M0 then answer of 9 scores SC2 |

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| | | | | |
|---|---------|---|--------------|---|
| 4 | (a) (i) | 2 | 1 | |
| | (ii) | 4 and a half circles | 1FT | FT is 9 / <i>their a(i)</i> if <i>their a(i)</i> is an integer |
| | (b) (i) | 1 | 1FT | |
| | (ii) | 2 cao | 1 | |
| | (iii) | 6 cao | 1 | |
| | (iv) | $\frac{13}{46}$ oe isw | 2 | M1 for 13 seen or $(6 + 5 + 2)/46$ or $6\frac{1}{2} / 23$ |
| | (c) (i) | four points correctly plotted | 2 | M1 for 3 points correctly plotted |
| | (ii) | continuous ruled line of best fit | 1 | dependent on at least 9 points on graph |
| | (iii) | positive | 1 | |
| | (iv) | 65 to 70 | 1FT | |
| | (v) | E | 1 | FT their continuous ruled line of best fit if positive |
| 5 | (a) (i) | 461.7(0) cao | 1 | |
| | (ii) | 397.06 or 397.1 or 397 or 397.062 | 2FT | M1FT for <i>their (a)(i)</i> $\times 0.86$ oe soi |
| | (iii) | 6880 or 6882 or 6882.(...) | 2FT | M1FT for <i>their (a)(ii)</i> $\div 3$ soi or <i>their (a)(ii)</i> $\times 52$ soi |
| | (iv) | 84 | 2 | M1 for $140 \times 3 \div (3 + 2)$ |
| | (b) | 124 cao | 3 | B2 for 124.3(.....) or 124.4 if B0 then M1 for $10\ 000 \div 80.4$ B1 for rounding their answer, if decimal, to the nearest integer |
| 6 | (a) | 5 12 | 2 | B1, B1 |
| | (b) | 9 points plotted correctly correct smooth curve through all 9 correct points | 3FT 1 | B2FT for 7 or 8 points correctly plotted B1FT for 5 or 6 points correctly plotted |
| | (c) | correct ruled line | 1 | minimum length must touch y axis and curve |
| | (d) | 2.7 to 2.8 | 1FT | FT their curve and ruled line |

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| | | | | | |
|-----|-------|---|---|---|--|
| 7 | (a) | $13p - r$ Final Answer | 2 | B1 for either $13p$ or $-r$ in the answer or $13p - r$ spoilt | |
| | (b) | 198 | 2 | M1 for $12 \times 16 - 2 \times -3$ or B1 for 192 or + 6 or $-(-6)$ seen | |
| | (c) | (i) | 6.4 or $6\frac{2}{5}$ | 1 | |
| | | (ii) | -3 | 2 | M1 for first correct step, i.e. $5b = 8 - 23$ or better, or $b + \frac{23}{5} = \frac{8}{5}$ or better |
| | (iii) | -9 | 3 | B1 for $2c - 20$ M1FT for correctly collecting cs on one side and numbers on the other, e.g. $5c - 2c = -7 - 20$ or better | |
| | (d) | (i) | $16x + 24$ | 1 | |
| | | (ii) | $6x(x - 2)$ | 2 | B1 for $x(6x - 12)$, $6(x^2 - 2x)$, $2(3x^2 - 6x)$, $3(2x^2 - 4x)$, $2x(3x - 6)$ or $3x(2x - 4)$ |
| (e) | (i) | $15q^6$ | 2 | B1 for $15q^n$ (n not 0) or kq^6 (k not 0) | |
| | (ii) | t^6 | 1 | | |
| 8 | (a) | (i) | $\begin{pmatrix} 10 \\ -15 \end{pmatrix}$ | 1 | |
| | | (ii) | $\begin{pmatrix} 7 \\ -6 \end{pmatrix}$ | 1 | |
| | (b) | $\begin{pmatrix} -4 \\ 5 \end{pmatrix}$ | 1 | | |
| | (c) | (3,1) | 1 | | |
| 9 | (a) | (i) | correct reflection at (1,-1), (3,-1) and (3,-5) | 1 | |
| | | (ii) | correct rotation at (-1,-1), (-3,-1) and (-3,-5) | 2 | SC1 for correct rotation any centre |
| | | (iii) | correct translation at (-4,4), (-2,4) and (-2,8) | 2 | B1 for one direction correct, i.e. 5 left or 3 up |
| | (b) | enlargement [centre] (0,1) [scale factor] 2 | 1 1 1 | | |