

**MARK SCHEME for the October/November 2011 question paper
for the guidance of teachers**

0580 MATHEMATICS

0580/31

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.

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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) 25 000 000 cao | 1 | |
| | (b) $0.6 < 65\% < \frac{2}{3}$ | 1 | |
| | (c) 20% | 3 | B1 for 50 seen M1 for $\frac{\text{their } 50}{250} \times 100$ or B1 for 0.8 or 80 seen M1 for 1 – their 0.8 or 100 – their 80 |
| | (d) (i) 30 (ii) 40 | 1 2 | M1 for $360 - (90 + 150)$ implied by 120 seen |
| 2 | (a) $1.5(0) \times 10^2$ cao | 1 | |
| | (b) 100 cao | 1 | |
| | (c) 2 hours 15 minutes cao | 1 | |
| | (d) 16(:) 25 (pm) or (0)425 pm | 2 | M1 for 2.5 (oe), 2hrs 30 min |
| | (e) $145 \leq d < 155$ | 2 | B1 for each value in correct place |
| 3 | (a) (i) 36, 10 | 1 | |
| | (ii) 29, 41, 13 any two | 2 | B1 for each |
| | (iii) 36 | 1 | |
| | (iv) 45, 15, 10 any two | 2 | B1 for each |
| | (b) (i) 27 | 2 | B1 for $36 + 29 + \dots + 13$ seen implied by 189 |
| | (ii) 29 | 2 | M1 for attempting to order the numbers |
| | (iii) 35 cao | 1 | |
| | (c) (i) $\frac{2}{7}$ oe | 1 | |
| (ii) $\frac{3}{7}$ oe | 1ft | Their denominator from (c)(i) | |

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| | | | |
|------------|--|---|---|
| 4 | (a) (i) 70 cao | 1 | |
| | (ii) 1.11(11...) | 2 | B1 for $100 \div 90$, $10 \div 9$, $1\frac{1}{9}$ |
| | (b) (i) 15 cao | 1 | |
| | (ii) $(1500 - 15) \times 1.04$ | 2 | B1 for $\times 1.04$, 1560, 15.60 |
| (c) 561.92 | 3 | M1 for $1544.40 - 950 - 10$ (584.40) oe M1 indep for $\div 1.04$ | |
| 5 | (a) $-\frac{4}{3}$ oe, -1.2 to -1.4 | 2 | B1 for attempt at $\frac{\text{rise}}{\text{run}}$ |
| | (b) (i) 3, 2, 6 | 3 | B1 for each value |
| | (ii) Correct continuous line | 2ft | Minimum length (0,3) to (6,0) B1 for plotting their 3 points |
| | (c) $x = -2, y = 4$ | 2ft | B1 for their x , B1 for their y from their intersections |
| 6 | (a) (i) Correct construction | 2 | B1 for two lines or B1 for accurate arcs seen or B1 for one correct line with two arcs SC1 for $AC = 6$ and $BC = 7$ with arcs |
| | (ii) 47° (45 – 49) | 1ft | Strict ft their (a)(i) |
| | (iii) Correct construction | 2ft | Their (a)(i) B1 for accurate arcs no line or B1 for accurate line drawn no arcs or B1 for accurate line with arcs bisecting another angle |
| | (iv) 4 (3.8 – 4.2) | 1ft | Strict ft their (iii) with intersection on opposite side of triangle |
| | (v) Correct construction | 2ft | B1 for accurate arcs no line or B1 for accurate line drawn no arcs or B1 for accurate line with arcs, bisecting AB or AC |
| | (vi) Correct region shaded | 1ft | ft is for boundaries of correct perpendicular bisector of their BC and correct angle bisector of their ABC , with or without arcs |
| | (b) (i) Correct scale drawing of PQ | 2 | B1 for accurate angle 40° , B1 for PQ 8cm |
| | (ii) Correct scale drawing of their QR | 2 | B1 for accurate angle 160° , B1 for QR 6cm |
| | (iii) 35 to 37 | 1ft | Measure $\times 5 \pm 1$ km |
| | (iv) 264 to 268 | 1ft | |

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| | | | |
|----|--|---|---|
| 7 | <p>(a) -6 www</p> <p>(b) $\frac{3-b}{a}$ or $\frac{3}{a} - \frac{b}{a}$</p> <p>(c) 3</p> <p>(d) (i) $x + x + 2x - 5 + 2x - 5 = 6x - 10$</p> <p>(ii) 10</p> | <p>3</p> <p>2</p> <p>2</p> <p>2</p> <p>2</p> | <p>M2 for $8 = x + 6 + 8$ or better or $-x + 8 = 6 + 8$ or better M1 for $2x + 8$ or $3x + 6$ or $3x + 14$</p> <p>B1 for $3 - b$ seen or $z + \frac{b}{a} = \frac{3}{a}$</p> <p>B1 for $\frac{54}{2}$ or better SC1 for embedded answer ie $2 \times 3^3 = 54$ or $2 \times 3 \times 3 \times 3 = 54$</p> <p>M1 accept $2x + 2(2x - 5)$ or $2(x + 2x - 5)$ E1 dep</p> <p>M1 for $6x - 10 = 50$</p> |
| 8 | <p>(a) Translation $\begin{pmatrix} 0 \\ -6 \end{pmatrix}$</p> <p>(b) Correct line drawn</p> <p>(c) (i) Correct reflection (ii) Correct enlargement</p> | <p>2</p> <p>1</p> <p>1ft</p> <p>2</p> | <p>B1 for translation B1 for column vector</p> <p>Continuous full line. Accept freehand. Their (b)</p> <p>B1 for any other enlargement scale factor 2</p> |
| 9 | <p>(a) $3x(x + 4)$</p> <p>(b) 20</p> <p>(c) $6x^7$</p> | <p>2</p> <p>2</p> <p>2</p> | <p>B1 for $3(x^2 + 4x)$ or B1 for $x(3x + 12)$ or B1 for $3x(x + 4)$ seen (if not final answer)</p> <p>B1 for 8 or 12 seen</p> <p>B1 for kx^7 or for $6x^k, k \neq 0$</p> |
| 10 | <p>(a) 5.4 cao</p> <p>(b) 5</p> <p>(c) 50</p> <p>(d) 134</p> <p>(e) 301.5(0)</p> | <p>3</p> <p>2</p> <p>1ft</p> <p>3ft</p> <p>1ft</p> | <p>M1 for $2^2 + 5^2 (= x^2)$ implied by 29 A1 5.38(51..) or $\sqrt{29}$ or 5.39 B1 indep for rounding their answer to 1 decimal place</p> <p>M1 for $0.5 \times 5 \times 2$ oe</p> <p>$10 \times$ their (b)</p> <p>M2 for $2 \times$ their (b) + $10 \times$ their (a) + $2 \times 10 + 5 \times 10$ or better M1 for any 3 faces correct</p> <p>Their (d) $\times 2.25$</p> |
| 11 | <p>(a) Correct shape drawn</p> <p>(b) 16, 21, 26</p> <p>(c) 41</p> <p>(d) $5n + 1$</p> <p>(e) 501</p> <p>(f) 13</p> | <p>1</p> <p>3</p> <p>1</p> <p>2</p> <p>1ft</p> <p>2ft</p> | <p>B1 for each SC1 "their 16" + 5 SC1 "their 21" + 5</p> <p>B1 for $5n$, B1 for +1</p> <p>Their (d) if linear</p> <p>Their (d) if linear B1 for their (d) = 66</p> |