

MATHEMATICS

0580/21 October/November 2017

Paper 2 (Extended) MARK SCHEME Maximum Mark: 70

Published

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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 | Partial marks |
|----------|---|------|--|
| 1 | 101 | 1 | |
| 2 | 2 | 1 | |
| 3(a) | 1.49220 | 1 | |
| 3(b) | 1.5 | 1FT | FT <i>their</i> answer to (a) rounded correctly to 2 significant figures |
| 4 | 88 | 2 | M1 for $\frac{68+81+74+89+x}{5} = 80$ oe |
| | | | or B1 for 400 |
| 5 | 3x(4x + 5y - 3) final answer | 2 | B1 for $3(4x^2 + 5xy - 3x)$ or $x(12x + 15y - 9)$ allow in working or correct answer spoiled |
| | | | If zero scored, SC1 for $3x(4x + 5y - 3)$ with only 2 correct elements in the brackets, allow in working |
| 6(a) | (-2, 3) | 1 | |
| 6(b) | Correct rhombus with 4th point at (2,2) | 1 | |
| 7 | Diagonal line from (0, 0) to (30, 12) | 1 | |
| | and | 1FT | FT for horizontal line from $(30, k)$ to $(70, k)$ where k is <i>their</i> 12 |
| | Horizontal line from (30, 12) to (70, 12) | | where k is <i>their</i> 12 |
| 8 | 19.65 cao | 2 | B1 for 6.55 seen (must be evaluated, not 6.5 + 0.05) or M1 for 3 × (6.5 + 0.05) |
| 9 | 7615.15 | 2 | M1 for $12400 \times \left(1 - \frac{15}{100}\right)^3$ oe |

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| Question | Ans | wer | Mark | Partial marks |
|----------|--|---------------------------------------|------|---|
| 10 | $\frac{5}{3}$ | $\frac{2}{3} + \frac{4}{15}$ | B1 | Allow $\frac{5k}{3k}$ |
| | $\frac{25}{15}$ [and $\frac{11}{15}$] | $\frac{10}{15}$ [and $\frac{4}{15}$] | M1 | Correct method to find common denominator e.g. $\frac{75}{45}$ and $\frac{33}{45}$ |
| | | | | Follow through <i>their</i> $\frac{5}{3}$ for the M1 mark |
| | $\frac{14}{15}$ cao | $\frac{14}{15}$ cao | A1 | |
| 11 | 54 | | 3 | M2 for $\frac{180 \times (5-2)}{5}$ or $180 - \frac{360}{5}$ |
| | | | | or M1 for $180 \times (5-2)$ or $\frac{360}{5}$ |
| 12(a) | 343 | | 1 | |
| 12(b) | -11 | | 1 | |
| 12(c) | 343 | | 1 | |
| 13(a) | m^{10} final answer | | 1 | |
| 13(b) | $20x^5y^2$ final answer | | 2 | B1 for 2 out of 3 elements correct in final answer or correct answer spoiled |
| 14(a) | (9, -4) | | 1 | |
| 14(b) | -5 | | 2 | M1 for $t^2 + 12^2 = 13^2$ oe or SC1 for answer 5 or ± 5 |
| 15(a) | Fewer than 6 elements from $\{1, 2, 3, 4, 5, 6\}$ or \emptyset | | 1 | |
| 15(b) | | | 1 | |
| | | В | 1 | |

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| Question | Answer | Mark | Partial marks |
|----------|---|------|---|
| 16 | Enlargement | 1 | |
| | $\frac{1}{3}$ | 1 | |
| | (2, 1) | 1 | |
| 17(a) | $(y=) \frac{72}{(x+1)^2} \text{ oe}$ | 2 | M1 for $y = \frac{k}{(x+1)^2}$ |
| 17(b) | 32 | 1FT | FT correct evaluation from <i>their</i> equation in (a) using 0.5 |
| 18 | Correct position of <i>S</i> with 2 pairs of correct construction arcs for line | 4 | B3 for correct position of <i>S</i> with missing/incorrect construction arcs but correct line |
| | | | or |
| | | | B2 for correct ruled line equidistant from the two trees with correct arcs or B1 for correct line with no/wrong arcs or correct arcs with no line and B1 for arc centre bird bath, radius 5 cm or <i>S</i> in correct position with no/incorrect working |
| 19 | $\frac{x^2 + 20x + 31}{2(x-3)(x+7)}$ final answer | 4 | B1 for a common denominator of $[2](x-3)(x+7)$ seen isw |
| | | | M1 for $2 \times 5 \times (x + 7) + 2 \times 3 \times (x - 3) + (x - 3)(x + 7)$ oe and must have attempted to expand all the brackets in the numerator |
| | | | M1 for $10x + 70 + 6x - 18$ or $x^2 - 3x + 7x - 21$ or [2](5x + 35 + 3x - 9) or better |
| 20(a) | 1480 | 1 | |
| 20(b) | 30 | 3 | M2 for $10 \times \sqrt{\frac{3960}{440}}$ or $10 \div \sqrt{\frac{440}{3960}}$ or M1 for $\sqrt{\frac{3960}{440}}$ or $\sqrt{\frac{440}{3960}}$ or $\left(\frac{h}{10}\right)^2 = \frac{3960}{440}$ oe |

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| Question | Answer | Mark | Partial marks |
|----------|--|------|---|
| 21 | 46.7 or 46.68 to 46.69 | 4 | M3 for tan [=] $\frac{9}{\frac{1}{2}\sqrt{12^2 + 12^2}}$ oe or M1 for $\left[\frac{1}{2}\times\right]\sqrt{12^2 + 12^2}$ oe e.g. $\sqrt{\frac{12^2}{2}}$ and M1 for identifying angle <i>MCE</i> |
| 22(a) | 80 to 84 | 2 | M1 for 116 to 120 |
| 22(b) | Correct curve or ruled lines | 3 | B2 for 7 or 8 correct points B1 for 5 or 6 correct points |
| 22(c) | 26 | 2 | B1 for 156 or 130 or for <i>their</i> 130 from <i>their</i> increasing curve (or lines) |
| 23(a) | $\begin{array}{l} x + y \leqslant 16 \text{ oe} \\ x \geqslant 4 \text{ oe} \end{array}$ | 2 | B1 for each mark final answers If zero scored, SC1 for $x + y < 16$ and $x > 4$ |
| 23(b) | Correct shading | 3 | M2 for lines at $x = 4$ and $x + y = 16$ or for correct shading of $x < 4$ or $x + y > 16$ or M1 for line at $x = 4$ or <i>their</i> $x = 4$ or for line at $x + y = 16$ or <i>their</i> $x + y = 16$ |
| 23(c) | 144 | 2 | M1 for (8, 8) selected or for $10 \times x + 8 \times y$ for any numerical point which is inside or on the boundary of <i>their</i> unshaded region |