



MATHEMATICS

0580/23

Paper 2 (Extended)

October/November 2016

MARK SCHEME

Maximum Mark: 70

Published

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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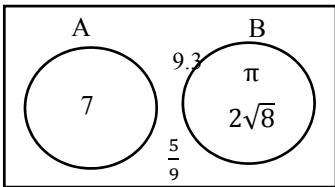
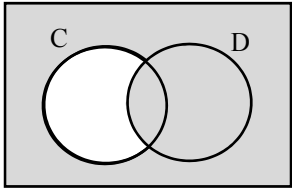
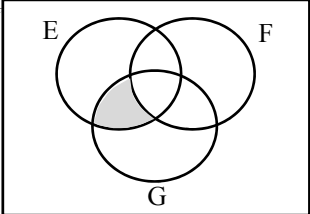
Abbreviations

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

| Question | Answer | Mark | Part marks |
|----------|--|--------------|---|
| 1 | 36 | 1 | |
| 2 | n^7 final answer | 1 | |
| 3 | B | 1 | |
| 4 (a) | 2.47×10^6 | 1 | |
| (b) | 7.9×10^{-3} | 1 | |
| 5 | $\frac{18}{30}$ and $\frac{5}{30}$ oe must be shown $\frac{23}{30}$ cao | M1 A1 | $\frac{18k}{30k}$ and $\frac{5k}{30k}$ |
| 6 | Thursday | 2 | M1 for 5.4 found or at least two of: 3.8, 3.6 and 4 found |
| 7 | 0.4^2 0.6^3 0.22 $\sqrt{0.09}$ | 2 | M1 for decimal conversion 0.216 and 0.3 and 0.16 |
| 8 | 4.25 4.15 | 2 | B1 for each or both answers reversed |
| 9 (a) | A | 1 | |
| (b) | A ruled line joining (65, 23) to (80, 28) | 1 | |
| 10 (a) | 2.9[0] or 2.900 to 2.901 | 1 | |
| (b) | 3.17 or 3.172 to 3.173 | 1 | |
| 11 | 18 360 | 2 | M1 for $34\,000 \times \left(1 - \frac{40}{100}\right) \times \left(1 - \frac{10}{100}\right)$ oe |
| 12 | 32.7 or 32.72 to 32.73 | 2 | M1 for $\left[\frac{1}{2} \times \frac{4}{3}\right] \times \pi \times \left(\frac{5}{2}\right)^3$ |

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| Question | Answer | Mark | Part marks |
|---------------|--------------------------------------|----------|---|
| 13 | $\frac{2}{9}$ oe, must be a fraction | 2 | M1 for $2.\dot{2} - 0.\dot{2}$ oe or B1 for $\frac{k}{9}$ |
| 14 (a) | 30 | 1 | |
| (b) | 47.5 | 2 | M1 for 4.5×5 oe |
| 15 (a) | 68 | 1 | |
| (b) | 9 | 2 | M1 for $360 \div 40$ oe or $\frac{180(n-2)}{n} = 140$ oe |
| 16 | 1.25 | 3 | M1 for $d = \frac{k}{(w+1)^2}$ or better M1 for [$d=$] $\frac{\text{their } k}{(7+1)^2}$ or M2 for $3.2(4+1)^2 = d(7+1)^2$ oe |
| 17 | $y = 2x$ oe | 3 | M1 for $\frac{1-3}{12-8}$ oe M1 for perpendicular gradient \times <i>their</i> $\frac{1-3}{12-8} = -1$ oe If zero scored, SC1 for answer $y = kx$ $k \neq 2$ or 0 |
| 18 (a) | 25 | 1 | |
| (b) | $\frac{x^2-3}{2}$ oe final answer | 1 | |
| (c) | $2x + 3$ final answer | 2 | M1 for correct first step, e.g. $x = \frac{y-3}{2}$ or $2y = x - 3$ |

| Question | Answer | Mark | Part marks |
|----------|---|--------------------|--|
| 19 (a) | Correct tangent $2.1 \leq \text{grad} \leq 3.9$ | B1 2 | 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 $x = 0.8$ and $x = 1.2$ dep on B1 M1 for $\frac{\text{rise}}{\text{run}}$ also dep on any tangent drawn or close attempt at tangent at any point Must see correct or implied calculation from a drawn tangent |
| (b) | $(-2, 8)$ | 1 | |
| 20 (a) |  | 2 | B1 for 3 elements in the correct place |
| (b) |  | 1 | |
| |  | 1 | |
| 21 (a) | 14.4 or 14.42 to 14.43 | 2 | M1 for $\frac{1}{2} \times 6.2 \times 4.7 \times \sin 82$ oe |
| (b) | 30.7 or 30.72... | 2 | M1 for $\sin = \frac{2050}{\frac{1}{2} \times 107 \times 75}$ |
| 22 | 1 3.5 1 | 4 | B3 for 2 correct B2 for 1 correct or M1 for 2, 7, [...] and 2 seen [FDs] |
| 23 | $\frac{7n}{2t+3m}$ final answer | 4 | M1 for $7n(6p-1)$ seen and M2 for $(2t+3m)(6p-1)$ seen or M1 for $2t(6p-1) + 3m(6p-1)$ or $6p(2t+3m) - 1(2t+3m)$ |

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| Page 5 | Mark Scheme | Syllabus | Paper |
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| Question | Answer | Mark | Part marks |
|-----------------|---|-------------|---|
| 24 | $y \leq -\frac{3}{5}x + 6$ oe $x \geq 2$ oe $y > x$ oe final answers | 5 | SC4 for $y < -\frac{3}{5}x + 6, x > 2, y \geq x$ oe or B3 for $y \leq -\frac{3}{5}x + 6$ oe or B2 for $y = -\frac{3}{5}x + 6$ oe or B1 for gradient = $-\frac{3}{5}$ oe soi and B2 for $x \geq 2$ and $y > x$ oe or B1 for either $x \geq 2$ or $y > x$ oe or for $x = 2$ and $y = x$ with incorrect inequalities |
| 25 (a) | CB | 1 | |
| (b) | $\begin{pmatrix} 36 & -2 \\ 18 & -1 \end{pmatrix}$ | 2 | B1 for two correct entries |
| (c) | $\frac{1}{47} \begin{pmatrix} 5 & 3 \\ -4 & 7 \end{pmatrix}$ oe isw | 2 | B1 for $k \begin{pmatrix} 5 & 3 \\ -4 & 7 \end{pmatrix}$ seen or det = 47 soi |
| (d) | The determinant is 0 oe | 1 | |