

MARK SCHEME for the May/June 2011 question paper
for the guidance of teachers

0580 MATHEMATICS

0580/21

Paper 2 (Extended), maximum raw mark 70

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 Mark |
|-----|----------------------------|------|--|
| 1 | 847 | 1 | |
| 2 | correct regions shaded | 1, 1 | |
| 3 | 48 | 2 | B1 for 3 and 16 seen |
| 4 | (a) 10 | 1 | |
| | (b) 5.5 oe | 1 | |
| 5 | (a) 86400 | 1 | |
| | (b) 8.64×10^4 | 1ft | |
| 6 | 108 | 2 | M1 for 3^3 or 27 or $\left(\frac{1}{3}\right)^3$ or $\frac{1}{27}$ seen |
| 7 | 13 | 3 | B1 for 12, 5 seen M1 for $(\text{their } 12)^2 + (\text{their } 5)^2$ or M2 $\sqrt{[(-8 - 4)^2 + (1 - 6)^2]}$ oe or M1 if $\sqrt{\quad}$ missing |
| 8 | 6.70 | 3 | M1 for $(r^3 =) 1260 \times \frac{3}{4\pi}$ oe seen M1 for $\sqrt[3]{\quad}$ of their r^3 seen or implied |
| 9 | 22.5 oe | 3 | B2 $180 = 5x + 2x + x$ oe or better B1 for 2x or 6x marked in the correct place on the diagram. |
| 10 | $x = 13$ $y = -9$ | 3 | M1 for consistent multiplication and addition/subtraction A1 for $x = 13$ or A1 for $y = -9$ |
| 11 | (a) 85.8 | 2 | M1 for 23.25 and 19.65 seen |
| | (b) 456.8625 cao | 1 | |
| 12 | (a) (0)8(.)01 (am) | 1 | Not 8.01pm |
| | (b) 78.4 or 78.38 to 78.39 | 3 | M2 for $827 \div 10.55$ or M1 for figs $827 \div$ their time |
| 13 | (a) 0.54 | 2 | M1 for $\frac{2.7 \times 20000}{100000}$ oe or SC1 for figs 54 in answer |
| | (b) 1.61 | 2 | SC1 for figs 161 or M1 200^2 or $20\ 000^2$ seen |

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|----|--|------------------|--|
| 14 | -2.64, 1.14 cao with working | 4 | B1 for $\sqrt{3^2 - 4(2)(-6)}$ or better seen anywhere B1 for $p = -3$ and $r = 2 \times 2$ or better as long as in the form $\frac{p + \sqrt{q}}{r}$ or $\frac{p - \sqrt{q}}{r}$ After B0B0, SC1 for -2.6 or -2.637(45...) and 1.1 or 1.137(45...) |
| 15 | (a) 4 (b) (i) $\frac{12}{36}$ oe 0.333 (ii) $\frac{11}{36}$, 0.306 or 0.3055 to 0.3056 (c) $\frac{8}{15}$ oe 0.533(3...) | 1 1 1 1 | |
| 16 | (a) Answer given (b) $k = (\pm)\sqrt{\frac{4A}{4-\pi}}$ or $2\sqrt{\frac{A}{4-\pi}}$ | 2 3 | M1 $(A =)k^2 - \pi\left(\frac{k}{2}\right)^2$ E1 $A = k^2 - \frac{\pi k^2}{4}$ correctly completed to $4A = 4k^2 - \pi k^2$ M1 factorising (must contain a π) M1 division (by coefficient of k^2) M1 square root |
| 17 | (a) 66° (b) 33° (c) 123° | 2 1 2 | M1 for 90° clearly identified as A B1 for OBA or $OAB = 57^\circ$ |
| 18 | (a) (i) $-r + q$ or $q - r$ (ii) $\frac{1}{2}(3q - r)$ oe (b) correct working | 1 1 3 | Must be simplified M1 for $MX = \frac{1}{2}r + \frac{3}{4}$ their $(-r + q)$ M1 using a different route for XS or $\frac{1}{2}MS$ E1 dep correct simplification and conclusion |
| 19 | (a) 480 (b) 9900 (c) 0.125 or $\frac{1}{8}$ | 1 3 2 | M1 for attempt at area under graph M1 for $0.5 \times 15 \times (\text{their (a)} + 14 \times 60)$ oe or $0.5 \times 15 \times (8 + 14)$ oe M1 for numerical vertical/horizontal or numerical use of $v = u + at$ but $t \leq 120$ or $t \leq 2$ |
| 20 | (a) (i) 9 (ii) $8x^3$ cao (b) 4 www (c) $\frac{x+3}{2}$ | 1 1 3 2 | M1 for $(2x - 3)^3 = 125$ M1 $2x - 3 = 5$ M1 for $x \pm 3 = 2y$ or $x = \frac{y \pm 3}{2}$ |