

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