

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

**0580 MATHEMATICS**

**0580/31**

Paper 3 (Core), maximum raw mark 104

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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
<b>1</b>	<b>(a)</b> 342.63	<b>2</b>	<b>M1</b> for $500 \div 1.4593$
	<b>(b)</b> 280	<b>3</b>	<b>M1</b> for $2 \times 62 + 3 \times 52$ <b>B1</b> for 124 or 156 seen
	<b>(c)</b> 71.4 or 71.42 to 71.43	<b>1ft</b>	
	<b>(d)</b> 4.12	<b>2</b>	<b>B1</b> for $6 \times 0.98$ seen <b>B1</b> for 5.88 or $4 + 6 \times 0.02$
	<b>(e)</b> correct working	<b>1</b>	$50 \times 2.54 = 127$ oe or $130 \div 2.54 = 51.2$ or better
<b>2</b>	<b>(a)</b> (triangular) prism	<b>1</b>	
	<b>(b)</b> 49.6 to 50.4	<b>1</b>	
	<b>(c) (i)</b> 6	<b>2</b>	<b>M1</b> for $\frac{1}{2} \times 4 \times 3$ oe
	<b>(ii)</b> 42	<b>2ft</b>	<b>M1</b> for their <b>(c)(i)</b> $\times 7$
	<b>(d)</b> 3.5	<b>2ft</b>	<b>M1</b> for their <b>(c)(ii)</b> $\div (3 \times 4)$ oe
<b>3</b>	<b>(a) (i)</b> 10	<b>2</b>	<b>M1</b> $3 \times 2 - -4$ or better
	<b>(ii)</b> 8	<b>3</b>	<b>M1</b> for $19 = 3m - 5$ oe <b>M1</b> for $m = (19 + 5) \div 3$ oe
	<b>(b)</b> $7fg - g^3$	<b>2</b>	<b>B1</b> for $7fg$ or <b>B1</b> for $-g^3$
	<b>(c)</b> $6h(3h - 2j)$	<b>2</b>	<b>B1</b> for partial factorisation $2(9h^2 - 6hj)$ or $3(6h^2 - 4hj)$ or $h(18h - 12j)$ or $6(3h^2 - 2hj)$ or $3h(6h - 4j)$ or $2h(9h - 6j)$ or <b>B1</b> for $6h(ah - 2j)$ or $6h(3h - bj)$
	<b>(d)</b> $\frac{t-15}{8}$	<b>2</b>	<b>M1</b> for correct first step or <b>M1</b> for correct second step ft
	<b>(e)</b> 9	<b>3</b>	<b>M1</b> for $3p - 15$ <b>M1</b> for collecting their terms $2p = k$ or $kp = 18$

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<b>4</b>	<b>(a) (i)</b>	1	<b>1</b>	
	<b>(ii)</b>	15	<b>1</b>	
	<b>(iii)</b>	10	<b>1</b>	
	<b>(b) (i)</b>	3	<b>1</b>	
	<b>(ii)</b>	24	<b>2</b>	<b>M1</b> for $4 \div 10 \times 60$ or <b>M1</b> for $4 \div \frac{1}{6}, 4 \times 6,$ $(4 \times 60)/10$ oe
	<b>(iii)</b>	6.67 or 6.66(6...)	<b>3</b>	<b>M1</b> for dist = 5 and time = 45 seen <b>M1</b> for $5 \div 45 \times 60$ oe
<b>(c)</b>	horizontal line to (105, 5) line from (their 105, 5) to (10 + their 105, 0)	<b>1</b> <b>1ft</b>		
<b>5</b>	<b>(a) (i)</b>	2	<b>2</b>	<b>M1</b> for numbers representing change in $y$ / change in $x$ Implied by $2k/k$
	<b>(ii)</b>	$2x + 1$	<b>2ft</b>	<b>M1</b> for {their <b>(a)(i)</b> } $x + j$ or $kx + 1$ ( $j, k$ not equal to 0)
	<b>(b) (i)</b>	2   -2   2	<b>2</b>	<b>B1</b> for 2 correct
	<b>(ii)</b>	7 points correct  smooth curve	<b>3 ft</b>  <b>1</b>	<b>B2</b> for 5 or 6 points correct <b>B1</b> for 3 or 4 points correct Must be close to parabolic in shape
	<b>(iii)</b>	-1.5 to -1.3 cao 1.3 to 1.5 cao	<b>1</b> <b>1</b>	
	<b>(c)</b>	(-1, -1) and (3, 7) cao	<b>1, 1</b>	

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6	(a) (i)	144	1	
	(ii)	125	1	
	(iii)	103	1	
	(iv)	159	1	
	(b)	$2^3 \times 11$ or $2 \times 2 \times 2 \times 11$	2	SC1 for 2 and 11 seen, no extras or SC1 for $2 \times 4 \times 11$
	(c)	24	2	SC1 for at least one of 2, 3, 4, 6, 8 or 12 or SC1 for $72 = 3 \times 24$ and $96 = 4 \times 24$
(d)	60	2	SC1 for $60k$ or SC1 $2 \times 2 \times 3 \times 5$ oe	
7	(a) (i)	correct reflection	1	
	(ii)	correct rotation	2	SC1 for rotation $90^\circ$ anti-clockwise or $90^\circ$ clockwise about any other point
	(b) (i)	enlargement sf 2 about origin	1 1 1	independent marks
	(ii)	translation by $\begin{pmatrix} 3 \\ 5 \end{pmatrix}$	1 1	independent marks
8	(a)	frequencies 5, 3, 3, 0, 2	3	B2 for 4 correct, B1 for 3 correct If frequencies blank then SC2 for all tallies correct, SC1 for 3
	(b) (i)	9	1	
	(ii)	3	1ft	
	(iii)	5	2	M1 clear attempt to find middle
	(iv)	4.8	3	M1 for $\Sigma$ their $f \times x$ implied by 144 – clear attempt M1 dep for dividing by 30 isw
	(c) (i)	$\frac{3}{30}$ oe	1	
	(ii)	0	1	allow 0/30 only, accept zero, none, impossible
(iii)	$\frac{17}{30}$ oe	1	accept 0.566 to 0.567 isw	

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<b>9</b>	<b>(a)</b>	correct triangle with arcs	<b>2</b>	<b>B1</b> without arcs or <b>SC1</b> correct mirror image with arcs	
	<b>(b)</b>	68° to 71°	<b>1ft</b>		
	<b>(c)</b>	<b>(i)</b>	perpendicular bisector with 2 pairs of arcs	<b>2</b>	<b>SC1</b> if accurate without arcs or accurate arcs with no line or accurate with arcs of <i>AB</i> or <i>AC</i>
		<b>(ii)</b>	3 to 3.4 cm	<b>1ft</b>	for their <i>P</i> on their bisector
	<b>(d)</b>	arc centre their <i>A</i> radius 5 cm	<b>1ft</b>	minimum must cut their <i>AB</i> and <i>AC</i>	
<b>(e)</b>	shading inside arc <b>and</b> to left of perpendicular bisector	<b>2</b>	<b>SC1</b> for either condition met		
<b>10</b>	<b>(a)</b>	<b>(i)</b>	95.8 or 95.83 to 95.84	<b>2</b>	<b>M1</b> for $120 \times \sin 53$ or $\sin 53 = \frac{x}{120}$ oe
		<b>(ii)</b>	233°	<b>1cao</b>	
	<b>(b)</b>	<b>(i)</b>	20.6° or 20.55 to 20.56	<b>2</b>	<b>M1</b> for $\tan = \frac{9}{24}$ oe
		<b>(ii)</b>	17.9	<b>3</b>	<b>M2</b> for $\sqrt{20^2 - 9^2}$ or <b>M1</b> for $x^2 + 9^2 = 20^2$ oe