

## **MARK SCHEME for the May/June 2014 series**

<b>0580 MATHEMATICS</b>	
<b>0580/31</b>	Paper 3 (Core), maximum raw mark 104

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.

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  
 nfwf not from wrong working  
 soi seen or implied

Question		Answers	Mark	Part Marks	
<b>1</b>	<b>(a) (i)</b>	$\frac{3}{3+4+8}$ or $\frac{180}{3+4+8}$	<b>M1</b>	One mark for each. If zero, <b>SC1</b> for sum of both angles = 144.	
		$3 \div (15) \times 180$ or $\frac{180 \times 3}{15}$ (= 36)	<b>M1</b>		
	<b>(ii)</b>	48 [and] 96	<b>1,1</b>		
	<b>(b) (i)</b>	Angle $BAC = 35$ ( $\pm 2^\circ$ )	<b>B1</b>		If zero <b>SC1</b> for $AC$ and $BC$ reversed and triangle completed
		Angle $ABC = 65$ ( $\pm 2^\circ$ ) and triangle completed	<b>B1</b>		
	<b>(ii)</b>	4.45cm to 4.85cm	<b>1 FT</b>		FT for their shortest side
<b>(c)</b>	19.6 cao	<b>2</b>	<b>M1</b> for $0.5 \times 7 \times 5.6$		
	cm <sup>2</sup> oe	<b>1</b>			
<b>2</b>	<b>(a)</b>	<b>(i)</b> 86	<b>1</b>	<b>B1</b> for any other multiple of 120	
		<b>(ii)</b> 55	<b>1</b>		
		<b>(iii)</b> 81	<b>1</b>		
		<b>(iv)</b> 64	<b>1</b>		
	<b>(b)</b>	<b>(i)</b> 77	<b>1</b>		
		<b>(ii)</b> 120	<b>2</b>		
	<b>(c)</b>	12 [days] 15 [hours]	<b>1,1</b>		

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3	(a) (i)	Parallelogram	1	
	(ii)	0	1	
	(b)	Translation	1	
		$\begin{pmatrix} 9 \\ -6 \end{pmatrix}$	1	Independent Accept 9 right, 6 down
	(c) (i)	(1, 4), (4, 4), (5, 2), (2, 2).	2	SC1 for reflection in $x$ -axis
	(ii)	(-4, -1), (-4, -4), (-2, -5), (-2, -2)	2	SC1 for rotation 90° clockwise or correct rotation any centre
	(d)	(-6,8), (0,8), (-8,4), (-2,4)	2	SC1 for enlargement of S, scale factor 2, wrong position
	(e) (i)	6	2	M1 for $3 \times 2$
	(ii)	4	1	
	(iii)	24	1FT	FT $their(e)(i) \times their(e)(ii)$ Or FT area of $their(d)$ if a parallelogram and not congruent to S.
4	(a) (i)	2, 4, 2, 5, 6, 3, 3	2	B1 for 5 or 6 correct  Or 7 correct tallies if frequency column blank Or 7 correct frequencies in tally column
	(ii)	70	1FT	
	(iii)	30	1	
	(iv)	$\Sigma(\text{Frequency, } f \times \text{mass, } w)$  $1650 \div 25$	M1  B1	7 items attempted and added or sum of 25 masses
	(b)	768	2	M1 for $0.96 \times 800$ oe

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	(c) (i)	49.5 cao	3	M1 for figs $66 \times 750$ soi M1 for $\div 1000$
	(ii)	69.3[0]	1 FT	Their (c)(i) $\times 1.40$
	(iii)	110	3	M2 for $\frac{\text{their}(c)(ii) - 33}{33} \times 100$ or M1 for $\text{their}(c)(ii) - 33$  Alternative method M2 for $\frac{\text{their}(c)(ii)}{33} \times 100 - 100$ Or M1 for $\frac{\text{their}(c)(ii)}{33}$
5	(a)	Hexagon correct with arcs. $AF = 7 \text{ cm } (\pm 2\text{mm})$ $EF = 8 \text{ cm } (\pm 2\text{mm})$	2	B1 for correct hexagon without arcs or one length correct with arcs. Or B1 for two correct arcs
	(b)	Hexagon	1	
	(c) (i)	Bisector of $CD$ with 2 pairs of arcs	2	B1 for correct bisector with one pair or no arcs
	(ii)	Bisector of angle $ABC$ with 2 pairs of correct arcs.	2	B1 for bisector without 2 pairs of arcs
	(iii)	Correct enclosed region shaded	1 FT	Their enclosed region provided at least 1 mark in each of parts (i) and (ii)
	(d) (i)	Semi-circle radius 2.5cm ( $\pm 2\text{mm}$ ) from P and inside polygon	2	SC1 for arc centre P radius 2.5cm Or for arc inside polygon centre P touching boundaries twice or any circle centre P.
	(ii)	3930 or 3926 to 3928	2	M1 for $(\pi \times 50^2) \div 2$ oe
6	(a) (i)	-1, -4, -8, 8, 4, 1.	3	1 for each symmetrical pair
	(ii)	8 points correctly plotted, within $\frac{1}{2}$ square.  2 smooth correct curves, not joined	3 FT  1	B2 FT for 6 or 7 correct Or B1 FT for 4 or 5 correct
	(iii)	2	1	

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	(b) (i)	-3 0 6	2	B1 for two correct
	(ii)	Correct ruled line	1	
	(c)	1.4 to 1.6 and -3.6 to -3.4	1FT,1FT	FT from their graph $\pm 0.1$
	(d)	1.5	1	
7	(a) (i)	[Car angle =] $135 (\pm 2^\circ)$ $135 \div 360 \times 120$ (= 45)	B1 M1	
	(ii)	$\frac{2}{3}$ or value from 0.658 to 0.675	2	B1 for angles of $238^\circ$ to $242^\circ$ or 79 to 81 people
	(b) (i)	$x + 31 + x + 17 + 2x$ [= 120] or better	3	B1 for $x + 17$ – seen together B1 for $2x$
	(ii)	18 cao	3	M1 FT for <i>their</i> $(4x + 48)$ [=120] or their $2x + x + x = 120 - 31 - 17$ or better. M1FT for their $(4x = 72)$ If zero SC2 for a correct numerical solution of their equation of equivalent difficulty.
8	(a)	$160c + 400f$ final answer	2	B1 for $160c$ or $400f$ seen
	(b)	$2x - 7y$ final answer www	2	B1 for $2x$ or $-7y$ or $6x - 15y$ or $-4x + 8y$ www
	(c)	$5x(xy - 4)$ final answer	2	B1 for $5(x^2y - 4x)$ or $x(5xy - 20)$

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	(d)	[x=] 5 [y=] -2	4	<p><b>M1</b> for correctly equating one set of coefficients  <b>M1</b> for correct method to eliminate one variable  <b>A1</b> for correct <math>x</math> or <math>y</math></p> <p>If zero scored <b>SC1</b> for 2 values satisfying one of the original equations</p> <p>Alternative method</p> <p><b>M1</b> for correct rearrangement of one equation  <math>x = (7 - 4y) \div 3</math> or <math>y = (7 - 3x) \div 4</math>  or  <math>x = (26 + 3y) \div 4</math> or <math>y = (4x - 26) \div 3</math>  <b>M1</b> for correct substitution in other equation  <math>4(7 - 4y) \div 3 - 3y = 26</math>  <math>4x - 3(7 - 3x) \div 4 = 26</math>  <math>3(26 + 3y) \div 4 + 4y = 7</math>  <math>3x + 4(4x - 26) \div 3 = 7</math>  <math>(7 - 4y) \div 3 = (26 + 3y) \div 4</math>  <math>(7 - 3x) \div 4 = (4x - 26) \div 3</math>  <b>A1</b> for correct <math>x</math> or <math>y</math></p> <p>If zero scored <b>SC1</b> for 2 values satisfying one of the original equations</p>
9	(a) (i)	48, 39 Subtract 9 oe	1, 1FT 1	FT 6th term = 5th term - 9
	(ii)	162, 486 Multiply by 3 oe	1, 1FT 1	FT 6th term = 5th term $\times$ 3
	(b) (i)	$93 - 9n$ oe final answer	2	<b>B1</b> for $-9n + c$ or $kn + 93$ , $k \neq 0$
	(ii)	-96 cao	2	<b>M1</b> for substitution of $n = 21$ into their <b>linear</b> expression