

**MARK SCHEME for the October/November 2014 series**

**0444 MATHEMATICS (US)**

**0444/31**

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.

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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
nfw	not from wrong working
soi	seen or implied

Qu.	Answers	Mark	Part Marks
<b>1 (a)</b>	6 003 076	<b>1</b>	
<b>(b) (i)</b>	-0.375 or $-\frac{3}{8}$	<b>1</b>	
<b>(ii)</b>	-2.2 or $-2\frac{1}{5}$ or $-\frac{11}{5}$	<b>1</b>	<b>FT</b> <i>their</i> answers to <b>(i)</b> and <b>(ii)</b>
<b>(iii)</b>	>	<b>1FT</b>	
<b>(c)</b>	1.667 cao	<b>2</b>	<b>B1</b> for $1\frac{2}{3}$ or $\frac{5}{3}$ or better
<b>(d) (i)</b>	1	<b>1</b>	
<b>(ii)</b>	$\frac{1}{125}$	<b>1</b>	
<b>(iii)</b>	$24x^9$	<b>2</b>	<b>B1</b> for $24x^k$ or $kx^9$
<b>2 (a) (i)</b>	$540 \div 9$ <i>their</i> $60 \times (9 + 7 + 4 + 5)$ $1500 \div 1000$	<b>M1</b> <b>M1FT</b> <b>A1</b>	Alternative method <b>M1</b> $540 \div 1000$ <b>M1FT</b> <i>their</i> $0.54 \div 9$ <b>A1</b> $0.06 \times (9 + 7 + 4 + 5)$
<b>(ii)</b>	300	<b>2</b>	If 0 scored <b>SC1</b> for $0.54 + 0.42 + 0.24 + 0.3$ <b>M1</b> for $5 \div (9 + 7 + 4 + 5) \times 1500$ or $\left(\frac{540}{9}\right) \times 5$ or $60 \times 5$
<b>(iii)</b>	210	<b>2FT</b>	<b>M1</b> for $70 \div 100 \times$ <i>their</i> <b>(a)(ii)</b> oe
<b>(b) (i)</b>	2.25	<b>1</b>	
<b>(ii)</b>	52.6[0]	<b>2</b>	<b>B1</b> for 14 or $\left(\frac{7}{8}\right) \times 16 \times 3.4[0]$

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	(iii)	46.1	3FT	M2 for $(\text{their } (b)(ii) - 36) \div 36 \times 100$ or M1 for $\text{their } (b)(ii) - 36$  M2 for $\text{their } (b)(ii) \div 36 \times 100 - 100$ M1 for $\text{their } (b)(ii) \div 36 [\times 100]$
3	(a) (i)	Trapezium	1	M1 for $\frac{1}{2}(2 + 6) \times 4$ oe  Independent marks  SC1 for correct reflection in $x = 0$ SC1 for one of 5 left or 7 up SC1 for enlargement, SF $\frac{1}{2}$ , but incorrectly placed.
	(ii)	16 cm <sup>2</sup>	2 1	
	(b)	Rotation	B1	
		90° [anti-clockwise] oe	B1	
		[centre] (-2, -8)	B1	
	(c) (i)	Correct reflection in $y = 0$	2	
	(ii)	Translation 5 left and 7 up	2	
(iii)	Correct Enlargement	2		
(d)	Obtuse angle marked	1		
4	(a) (i)	4 points correctly plotted.	2	B1 for 1 correct
	(ii)	Correct continuous ruled line of best fit.	1	Dependent on at least 8 points on graph
	(iii)	Distance on their line of best fit.	1FT	FT their single straight line in part (ii).
	(iv)	Negative	1	
	(v)	Less time, longer the distance oe or Faster speed, longer distance oe	1	
	(b) (i)	11.7 or 11.69... NFWW	2	M1 for Attempt at $\sum f \div 12$
	(ii)	41.7 or 41.66 to 41.67	2	B1 for $\frac{5}{12}$ seen
	(iii)	2.45 cao	1	

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5	(a)	$x + x + 180 = 480$ or $x + x = 480 - 180$ $2x = 300$	M1 M1	B1 for $(480 - 180) \div 2$	
	(b)	1060	2	M1 for $2 \times 480 + 2 \times (20 + 30)$ oe	
	(c)	(i)	16 500	2	M1 for $(30 \times 150) + (50 \times 180) + (20 \times 15)$ oe or better
		(ii)	2 805 000	1FT	FT <i>their</i> (c)(i) $\times 170$ .
	(d)	(i)	78.7 or 78.69....	2	M1 for $\tan [\dots =] \frac{150}{30}$ or better If zero scored, SC1 for answer of 11.3 to 11.4
		(ii)	151 or 151.3...	2	M1 for $\sqrt{150^2 + 20^2}$
6	(a)	(i)	4, 7, 4	2	B1 for 2 correct
		(ii)	7 points correctly plotted  The correct curve through the points	3FT  1	B2FT for 5 or 6 correct B1FT for 3 or 4 correct
	(iii)	$x = 0$	1		
	(iv)	2.7 to 2.9, $-2.7$ to $-2.9$	1FT, 1FT		
	(b)	(i)	Points correctly plotted and a continuous ruled line through points and beyond them.	2	B1 for 1 correct plot. (even if line is not drawn)
		(ii)	$[y =] -2x + 4$	3	B2 for $-2x + j$ or B1 for $kx + 4$ $k \neq 0$ or $[\text{gradient} =] \frac{\text{rise}}{\text{run}}$ with correct values
		(iii)	$(-1.1$ to $-1.4, 6.3$ to $6.6)$	1FT	FT <i>their</i> straight line and <i>their</i> curve
7	(a)	106 to 110	1		
	(b)	(i)	Correct continuous bisector of $AB$ constructed with 2 pairs of arcs.	2	B1 for correct continuous bisector without arcs or with incorrect arcs.
		(ii)	Correct bisector of angle $ABC$ with 2 sets of arcs.	2	B1 for correct bisector without arcs or with incorrect arcs.
	(iii)	T labelled at intersection of their bisectors.	1FT		

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(c)	24.0[km] to 25.6[km]	2FT	FT their AT $\times 4$ ( $\pm 0.8$ )  B1FT for their AT correctly measured $\pm 0.2$
(d)	[No] It is 32.4 to 34.0km or [No] CT is more than 30m	1FT	Strict FT their CT
(e)	1.8849 to 1.8852 or 1.88 or 1.89	2	M1 for $\pi \times 0.2^2 \times 15$
8	(a) (i) Correct diagram with linear scale	3	B1 for linear scale correct. B1 for all widths (and gaps between bars) the same B1 for all 6 heights correct with linear scale so i
	(ii) $\frac{19}{120}$ or 0.158[3....] or 15.8[3.....]%	1	
	(b) [Probability/it] must be between 0 and 1 oe or [Probability/it] must be less than 1 oe or [7/5] is greater than 1 oe	1	
	(c) (i) $\frac{9}{22}$ or 0.409[4....] or 40.9[4....]%	1	
	(ii) $\frac{20}{22}$ oe	1	M1 for $1 - \frac{2}{22}$ oe or $\frac{9+11}{22}$ oe
9	(a) (i) 18 23 28	1, 1, 1	Allow one mark for each addition of 5 to the previous answer
	(ii) Add 5 oe	1	
	(iii) $5n - 2$ oe	2	B1 for $5n + j$ or $kn - 2$ $k \neq 0$
	(iv) 73	1FT	FT their (a)(iii) if linear.
	(b) (i) 10 14	1, 1	Allow 1 mark for addition of 4 on their value for 3rd diagram.
	(ii) $4n - 2$ oe	2	B1 for $4n + j$ or $kn - 2$ $k \neq 0$