MARK SCHEME for the October/November 2015 series

0444 MATHEMATICS (US)

| 0444/33 | 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.

Cambridge will not enter into discussions about these mark schemes.

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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
nfww	not from wrong working
soi	seen or implied

Question			Answer	Mark	Part marks
1	**(a)**	**(i)**	6800	**1**	
		(ii)	$\dfrac{1}{4}$	**1**	Accept equivalent fraction
		(iii)	6	**1**	
		(iv)	6.87×10^8	**1**	
	(b)	**(i)**	9	**1**	Accept ± 9
		(ii)	343	**1**	
		(iii)	1	**1**	
	(c)	**(i)**	11	**1**	
		(ii)	17	**3**	**M1** for $8y + 28 = 164$ or $2y + 7 = 41$
					M1 FT for a correct further step
	(d)		$48x^5$	**2**	**M1** for $48x^k$ or jx^5

2	(a)		9 hours 5 minutes	2	**B1** for 17 hrs 5 mins or using 10 30 or 11 35
	(b)	(i)	12034	3	**M2** for 290 × 37 + 163 × 8 or **M1** for either 290 × 37 or 163 × 8
		(ii)	84.9	2	**M1** for (37 + 8) ÷ 53 or better
		(iii)	9628	1	
	(c)	(i)	Copenhagen 3 Helsinki 5 St Petersburg 10 Stockholm 4 Tallinn 8	2	**B1** for 3 or 4 correct or fully correct tallies if frequency column blank or correct frequencies in tally column
		(ii)	Correct bar chart	3FT	**B3** for all bars correct height same width and same gaps between bars and linear scale **B2** for all bars correct height same width and same gaps between bars **B1** for linear scale on *y*-axis **B1 FT** 3 or 4 correct heights

3	(a)		4800		M2 for 1 correct value in correct place
			7200	3	M1 for $21600 \div (2 + 3 + 4)$ or better
			9600		If zero scored SC1 for all correct values in incorrect order
	(b)	(i)	4200	2	M1 for 0.3×14000 oe
		(ii)	$\dfrac{4}{7}$ cao	2	B1 for correct fraction other than $\dfrac{8000}{14000}$
		(iii)	1200	2FT	M1FT for $(14000 - their$ (b)(i) $- 8000 - 600)$
	(c)		20	3	M2 for $(1 - 17280 \div 21600) \times 100$ oe or M1 for $(17280 \div 21600) \times 100$ oe Alternative method M2 for $\dfrac{21600 - 17280}{21600} \times 100$ or B1 for $21600 - 17280$ soi 4320
	(d)		422.9[0] or 422.89	3	M2 for $5500 \times 1.025^3 [- 5500]$ oe M1 for 5500×1.025^2 oe

4	(a)		Correct explanation	1	eg 2200 is one of the larger engine sizes so the distance is probably less
	(b)	(i)	4 points correctly plotted	2	**B1** for 3 points correctly plotted
		(ii)	$\dfrac{737}{11}$	1	
		(iii)	Mean point plotted and line drawn through	1	
			Correct ruled line of best fit	**1dep**	
		(iv)	Negative	1	
	(c)		50 to 56	**1FT**	FT *their* straight line of best fit if negative
5	(a)	(i)	90	1	
			Angle [in a] semi-circle	1	
		(ii)	25	1	
			Angles [in a] triangle [add to] 180°	1	
		(iii)	65	**1FT**	
			Angle [between] radius and tangent is 90° oe	1	
		(iv)	65	**1FT**	
			Alternate angles	1	
	(b)	(i)	Radius	1	
		(ii)	Chord	1	

6	(a)	(i)		Blue	1	
		(ii)		$\dfrac{2}{16}$ oe	1	
	(b)	(i)		4.52 or 4.523 to 4.524…	3	**M2** for $1.5^2\pi - 0.9^2\pi$ or better or **M1** for either $1.5^2\pi$ or $0.9^2\pi$ or better
		(ii)		9.42 or 9.43 or 9.424 to 9.426	2	**M1** for $2 \times 1.5\pi$ or better
		(iii)		2.6[0]	2	**M1** for $20 - (12 \times 1.45)$
7	(a)	(i)		8	1	
		(ii)		6	2FT	**M1** for $\dfrac{their\,8 \times 15}{20}$ or $\dfrac{2}{5} \times 15$ oe
	(b)	(i)		[trapezoidal] prism	1	
		(ii)	(a)	49.6 or 49.63 to 49.64	2	**M1** for $\tan(...) = \dfrac{40}{34}$ oe
			(b)	52.49 to 52.5[0]	2	**M1** for $\sqrt{40^2 + 34^2}$ oe
8	(a)	(i)		Correct rotation	2	**B1** for correct rotation with incorrect centre used
		(ii)		Correct reflection	2	**B1** for reflection in $x = k$ or $y = -1$
		(iii)		Enlargement [Scale factor] 0.5 oe [Centre] (7, 4)	1 1 1	
	(b)	(i)		(5, −2)	1	
		(ii)		$\begin{pmatrix} -3 \\ -5 \end{pmatrix}$	1	
		(iii)		Z plotted at (3, 4)	1	

9	(a)	(i)	10, 3, −5	3	**B1** for each correct
		(ii)	Correct curve	4	**B3FT** for 7 or 8 points correctly plotted **B2FT** for 5 or 6 points correctly plotted **B1FT** for 3 or 4 points correctly plotted
		(iii)	−0.5 to −0.4 and 4.4. to 4.5	2FT	**B1FT** for each correct
	(b)		$5x + 3$	3	**B2** for $5x + c$ or $kx + 3$, k not equal 0 or **M1** for attempt at $\dfrac{Rise}{Run}$
10	(a)		15 20 16 21	2	**B1** for 1 correct row or column
	(b)	(i)	$5n$ oe final answer	1	
		(ii)	$5n + 1$ oe final answer	1FT	**FT** algebraic expression
	(c)		100	1	
			101	1	