CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

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.

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
nfww	not from wrong working
soi	seen or implied

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

	(iii)	46.1	**3FT**	**M2** for (*their* **(b)(ii)** – 36) ÷ 36 × 100 or **M1** for *their* **(b)(ii)** – 36 **M2** for *their* **(b)(ii)** ÷ 36 × 100 – 100 **M1** for *their* **(b)(ii)** ÷ 36 [× 100]
3	**(a) (i)**	Trapezium	**1**	
	(ii)	16 cm^2	**2** **1**	**M1** for ½(2 + 6) × 4 oe
	(b)	Rotation	**B1**	Independent marks
		90° [anti-clockwise] oe	**B1**	
		[centre] (–2, –8)	**B1**	
	(c) (i)	Correct reflection in $y = 0$	**2**	**SC1** for correct reflection in $x = 0$
	(ii)	Translation 5 left and 7 up	**2**	**SC1** for one of 5 left or 7 up
	(iii)	Correct Enlargement	**2**	**SC1** for enlargement, SF ½, but incorrectly placed.
	(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**	

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** *their* **(c)(i)** $\times$ 170.
	(d) (i)	78.7 or 78.69….	**2**	**M1** for tan [... =] $\frac{150}{30}$ 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 [gradient =] $\frac{rise}{run}$ with correct values
	(iii)	(–1.1 to –1.4, 6.3 to 6.6)	**1FT**	**FT** *their* straight line and *their* 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**	

	(c)	24.0[km] to 25.6[km]	**2FT**	**FT** their AT × 4 (±0.8) **B1FT** for their AT correctly measured ±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 soi
	(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 $kn - 2$ $k \neq 0$