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

		(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 $[... =] \dfrac{150}{30}$ 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	3FT	B2FT for 5 or 6 correct B1FT for 3 or 4 correct
			The correct curve through the points	1	
		(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)	$\dfrac{19}{120}$ 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)**	$\dfrac{9}{22}$ or 0.409[4....] or 40.9[4....]%	**1**	
		(ii)	$\dfrac{20}{22}$ oe	**1**	**M1** for $1 - \dfrac{2}{22}$ oe or $\dfrac{9+11}{22}$ 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 $kn - 2\ k \neq 0$