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CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/43**

Paper 4 (Extended) **May/June 2016**

MARK SCHEME

Maximum Mark: 120

Published

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Abbreviations

awrt answers which round to
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)	13205.2	**1**	
(ii)	13200	**1**	
(iii)	13210	**1**	
(iv)	13205.173	**1**	
(b)	120	**1**	
2 (a)	$(3x+2)(x-4)$	**2**	**SC1** for $(3x+a)(x+b)$ where $ab = -8$ or $a+3b = -10$
(b)	$-\frac{2}{3} < x < 4$	**2FT**	**B1** for either correct
(c)	221.8 or 221.8… 318.2 or 318.18 to 318.19	**3**	**B2** for either correct or **M1** for $\sin x = their\left(-\frac{2}{3}\right)$ where $-1 < their\left(-\frac{2}{3}\right) < 1$ or **M1** for sketch or **M1** for 41.8 or –41.8 seen
3 (a)	62.5	**3**	**B1** for $y = k(x+1)^3$ **B1** for $k = 0.5$ OR **M2** for $\frac{y}{32} = \frac{(4+1)^3}{(3+1)^3}$
(b)	2	**2**	**B1FT** for $x+1 = \sqrt[3]{their\ 27}$
(c)	$x = \sqrt[3]{2y} - 1$ oe final answer	**3**	**M1** for division by *their k* **M1** for cube root **M1** for subtracting 1, must be final step

Question	Answer	Mark	Part Marks
4 (a) (i)	$A = 4r^2 - \pi r^2$ oe final answer	2	**M1** for $ar^2 - b\pi r^2$
(ii)	30.9 or 30.88 to 30.90[…]	1	
(b)	$8r + 2\pi r$ oe final answer	3	**B1** for $8r$ oe **B1** for $2\pi r$ oe If **B0** scored then **M1** for $r + r + \frac{1}{4} \times 2\pi r$ oe
5 (a)	$0.5 \times 12.4 \times x \times \sin 30$ [= 34.1] oe	1	
(b)	6.21 or 6.205 to 6.206	3	**B2** for 38.50 to 38.51 or **M1** for $11^2 + 12.4^2 - 2 \times 11 \times 12.4 \times \cos 30$
(c)	62.3 or 62.4 or 62.33 to 62.41…	3	**M2** for $\sin A = \frac{11 \times \sin 30}{their 6.21}$ or $\cos A = \frac{12.4^2 + (their(b))^2 - 11^2}{2 \times 12.4 \times their(b)}$ or **M1** for $\frac{11}{\sin A} = \frac{their 6.21}{\sin 30}$ oe
(d)	6.2	2	**M1 for** $12.4 \times \sin 30$ oe
6 (a)	166 or 165.6 to 165.7	2	**M1** for correct use of mid-pts at least 4 of (150, 157.5, 162.5, 167.5, 172.5,182.5)
(b) (i)	2.6, 13.2, 16.4, 23.6, 16.4, 1.73	2	**B1** for 4 or 5 correct
(ii)	Suitable vertical scale Correct column widths Correct heights	1 1 2FT dep	 **B1** for 4 or 5 correct **dep** on at least B1 in **(b)(i)**
7 (a)	90 000	4	**M3** for $1.05 \times 1.1 \times a = 103950$ or better **M2** for $\frac{103950}{1.05 \text{ or } 1.1}$ oe or **M2** for 1.05×1.1 **M1** for 103 950 = 105%
(b)	2028	3	**M2** for $1.05^n = \frac{200000}{103950}$ where $n > 1$ or **M1** for 103950×1.05^n where $n > 1$ If 0 scored **SC2** for 13.4 or 13.41… seen

Question	Answer	Mark	Part Marks
8 (a)	$6\mathbf{p} - \mathbf{q}$	**2**	**B1** for $\overrightarrow{XD} = -\mathbf{q}$ or **M1** for $\overrightarrow{AD} = \overrightarrow{AX} + \overrightarrow{XD}$ oe
(b)	$3\mathbf{p} + \mathbf{q}$ oe	**2**	**M1** for $\overrightarrow{AC} = 9\mathbf{p}$ or $\overrightarrow{XC} = 3\mathbf{p}$ or correct route
(c)	$3\mathbf{p} - 2\mathbf{q}$ oe	**3**	**M1** for $\overrightarrow{BD}$ = *their* (a) **M1** for $\overrightarrow{CB} = \overrightarrow{CD} + \overrightarrow{DB}$ oe
9 (a)	[*QR* =] *P* [*PQR* =] *Q* [*ST* =] *Q* [*SQ* =] *T* [*PTP* =] *T* [*TPP* =] *S*	 **6**	**B1** for each
(b) (i)	Points (2, 2) (2, 1) (5, 1)	**2**	**B1** for (2, 1) or (5, 1) correct
(ii)	Points (2, –2) (2, –1) (5, –1)	**1FT**	**FT** their *B* reflected in *x*-axis
(iii)	Rotation 90 [anticlockwise] oe [Centre] (0, 0) oe	**1** **1** **1**	
10 (a) (i)	Points correctly plotted	**3**	**B2** for 4 or 5 correct points **B1** for 2 or 3 correct points
(ii)	Positive	**1**	
(b) (i)	32.7	**1**	
(ii)	23.6	**1**	
(c) (i)	$[y =] -5.57 + 0.892x$	**2**	**B1** for $-5.57 + kx$, or **B1** for $a + 0.892x$, If 0 scored **SC1** for $-5.6 + 0.89x$
(ii)	21.2 or 21.19…	**1FT**	**FT** *their* (c)(i) using $x = 30$
(iii)	Outside range oe	**1**	

Question	Answer	Mark	Part Marks
11 (a)	Correct sketch	**4**	**B1** Correct graph for $x > 3$ **B1** Correct graph for $x < 1$ **B1** Correct graph for $1 < x < 3$ **B1** Approximately correct intercepts
(b)	$x = 1$ $x = 3$ $y = 3$	**1** **1** **1**	
(c)	(2, 2)	**1**	
(d)	1.38, 2, 3.62	**3**	**B1** for each
12 (a)	18	**2**	**M1** for $4x + 6x = 180$
(b)	18	**2**	**M1** for $180 - 6x - 3x$
(c)	90	**3**	**M2** for $180 - 3x - x - x$ or **B1** for $CED = x$ or $DCE = 4x$
13 (a) (i)	4.71 or 1.5π or 4.712 to 4.713	**2**	**M1** for $\frac{60}{360} \times \pi \times 3^2$
(ii)	12.5 or $1.5\pi + 4.5\sqrt{3}$ oe or 12.50 to 12.51	**3**	**M2** for $0.5 \times 3 \times \frac{3}{\cos 60} \times \sin 60 + \textit{their}(\text{a})$ oe or **M1** for $\frac{3}{\cos 60}$
(iii)	31.4 or $7.5\pi + 4.5\sqrt{3}$ oe or 31.35 to 31.36	**3**	**B1** for hyp = 6 **M1** for $\frac{60}{360} \times \pi \times (\textit{their}6)^2$
(b)	263 or $31.5\pi + 94.5\sqrt{3}$ oe or 262.6 to 262.7	**4**	**M3** for $1.5\pi + 6\pi + 24\pi + 4.5 \times \sqrt{3} + 18 \times \sqrt{3} + 72 \times \sqrt{3}$ or **M1** for $1.5\pi + 6\pi + 24\pi$ **and M1** for $4.5 \times \sqrt{3} + 18 \times \sqrt{3} + 72 \times \sqrt{3}$ or **M1** for correct new triangle in diagram 4 or **M1** for correct new sector in diagram 5 or **M1** for correct new triangle in diagram 6

Question	Answer	Mark	Part Marks
14 (a) (i)	$\left(\frac{x}{x+y}\right)^2$ oe final answer	2	**B1** for $\frac{x}{x+y}$
(ii)	$2\times\frac{xy}{(x+y)^2}$ oe final answer	3	**M2** for $\frac{x}{(x+y)}\times\frac{y}{(x+y)}$ oe or **B1** for $\frac{y}{x+y}$ seen
(b) (i)	$\frac{x(x-1)}{(x+y)(x+y-1)}$ oe final answer	3	**B2** for $\frac{x-1}{x+y-1}$ or **B1** for $x+y-1$ seen
(ii)	$2\times\frac{xy}{(x+y)(x+y-1)}$ oe final answer	3	**M2** for $\frac{x}{(x+y)}\times\frac{y}{(x+y-1)}$ oe or **B1** for $\frac{y}{x+y-1}$ seen