CAMBRIDGE INTERNATIONAL MATHEMATICS	**0607/43**
Paper 4 (Extended)	**May/June 2016**

MARK SCHEME

Maximum Mark: 120

Published

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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)	$-\dfrac{2}{3} < x < 4$	**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 $\sin x = their\left(-\dfrac{2}{3}\right)$ where $-1 < their\left(-\dfrac{2}{3}\right) < 1$ 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 $\dfrac{y}{32} = \dfrac{(4+1)^3}{(3+1)^3}$
(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 $r + r + \dfrac{1}{4} \times 2\pi r$ 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 $\sin A = \dfrac{11 \times \sin 30}{their\,6.21}$ or $\cos A = \dfrac{12.4^2 + (their\,(b))^2 - 11^2}{2 \times 12.4 \times their\,(b)}$ or **M1** for $\dfrac{11}{\sin A} = \dfrac{their\,6.21}{\sin 30}$ 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 $\dfrac{103950}{1.05 \text{ or } 1.1}$ oe or **M2** for 1.05×1.1 **M1** for $103\,950 = 105\%$
	(b)		2028	**3**	**M2** for $1.05^n = \dfrac{200\,000}{103\,950}$ where $n > 1$ or **M1** for $103\,950 \times 1.05^n$ 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 $\dfrac{60}{360} \times \pi \times 3^2$
(ii)	12.5 or $1.5\pi + 4.5\sqrt{3}$ oe or 12.50 to 12.51	3	**M2** for $0.5 \times 3 \times \dfrac{3}{\cos 60} \times \sin 60 + their(\text{a})$ oe or **M1** for $\dfrac{3}{\cos 60}$
(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 $\dfrac{60}{360} \times \pi \times (their6)^2$
(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 + $ $\quad 4.5 \times \sqrt{3} + 18 \times \sqrt{3} + 72 \times \sqrt{3}$ 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)	$\left(\dfrac{x}{x+y}\right)^2$ oe final answer	2	**B1** for $\dfrac{x}{x+y}$
(ii)	$2 \times \dfrac{xy}{(x+y)^2}$ oe final answer	3	**M2** for $\dfrac{x}{(x+y)} \times \dfrac{y}{(x+y)}$ oe or **B1** for $\dfrac{y}{x+y}$ seen
(b) (i)	$\dfrac{x(x-1)}{(x+y)(x+y-1)}$ oe final answer	3	**B2** for $\dfrac{x-1}{x+y-1}$ or **B1** for $x+y-1$ seen
(ii)	$2 \times \dfrac{xy}{(x+y)(x+y-1)}$ oe final answer	3	**M2** for $\dfrac{x}{(x+y)} \times \dfrac{y}{(x+y-1)}$ oe or **B1** for $\dfrac{y}{x+y-1}$ seen