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CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 Paper 4 (Extended) **October/November 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)	171	**1**	
(b)	10	**1**	
(c)	172	**1**	
(d)	4	**2**	**B1** for 170 or 174 seen
(e)	172.1	**2**	**M1** for attempt at $\sum fx$ soi by 24099 or 172 or 172.1...
2 (a)	2.83 or 2.828...	**3**	**B2** for $\sqrt{8}$ or $2\sqrt{2}$ final answer or **M2** for $2^2 + 2^2$ or **M1** for correct sketch
(b)	225 cao	**2**	**B1** for 45 soi by e.g. 135 If 0 scored **SC1** for 224.9 to 225.1
(c)	8 cao	**2**	**M1** for 2 × 3 + 0.5 × 2 × 2 oe
3 (a)	Positive	**1**	
(b) (i)	12.15	**1**	
(ii)	66	**1**	
(c) (i)	$y = 37.2 + 2.37x$	**2**	Range 37.20 to 37.21 and 2.369 to 2.370 **B1** for $37.2 + kx$, or $a + 2.37x$, If 0 scored, **SC1** for $37 + 2.4x$
(ii)	82 or 82.2...	**1**	**FT** *their* (i)

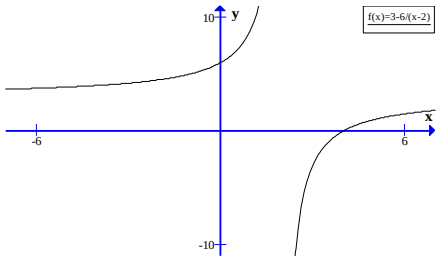
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Question	Answer	Mark	Part Marks
4 (a)	48	**1**	
(b)	84	**2**	**FT** (180 – 2 × *their* (a)), *their* (a) ≠ 45 **M1** for (180 – 2 × *their* (a)) *their* (a) ≠ 45
(c)	42	**1**	**FT** *their* (b) ÷ 2
(d)	69 cao	**2**	**B1** for angle *OBC* or *OAC* = 21 or angle *ABC* = 69
(e)	55.5	**2**	**FT** *their* (d) **M1** for (180 – *their* (d)) ÷ 2
5 (a)	36.7 or 36.68 to 36.69	**2**	**B1** for at least 3 of (7.5, 17.5, 30, 42.5, 70) soi by 4402.5 Accept 37.2 or 37.18 to 37.19 for full marks and 3 of (8, 18, 30.5, 43, 70.5) soi for **B1**
(b)	0.8, 3.6, 2.6, 2.7, 1.47 or 1.466 to 1.467, 0.7	**3**	**B2** for 4 or 5 correct or **B1** for 2 or 3 correct
6 (a)	Reflection $y = x$	**2**	**B1** for each
(b)	Rotation, centre (2, 3) 90 [anticlockwise] or 270 clockwise	**2**	**B1** for each
(c)	Translation $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$	**2**	**B1** for each
(d)	Enlargement, centre (0, 0) [SF] $\frac{1}{3}$ oe	**2**	Allow reduction **B1** for each
7	Correctly equating one set of coefficients	**M1**	Equation $x =$ or $y =$ from one equation Note – a correct sketch showing intersection in third quadrant scores **M2** (other sketches may score the **M1** for $y = \ldots$ seen)
	Correct method to eliminate one variable	**M1**	Correct substitution into other equation
	$x = -2$ $y = -\frac{1}{2}$	**B2**	**B1** for each If zero scored **SC1** for correct substitution into one of original equations and evaluation to find other variable

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Question	Answer	Mark	Part Marks
8 (a)	$\frac{\sqrt{8}}{3}$ or $\frac{2\sqrt{2}}{3}$ or $\sqrt{\frac{8}{9}}$	**3**	**M2** for $\frac{\sqrt{3^2-1^2}}{3}$ or **M1** for $3^2 - 1^2$ If 0 scored, **SC1** for 0.943 or 0.9428... or $\sqrt{0.889}$
(b) (i)	[cos$B$] = $\frac{9^2+10^2-11^2}{2\times9\times10}$ oe	**2**	**M1** for $11^2 = 9^2 + 10^2 - 2\times9\times10\times\cos B$
(ii)	$0.5 \times 9 \times 10 \times$ *their* exact (a)	**M2**	**M1** for $0.5 \times 9 \times 10 \times$ *their* (a) (*their* (a) must be < 1)
	Leading to $30\sqrt{2}$	**A1**	Cancelling seen or $\frac{180\sqrt{2}}{6}$ or $\frac{90\sqrt{2}}{3}$ or $\frac{60\sqrt{2}}{2}$ seen
9 (a)	21.5 or 21.45 to 21.46…	**2**	**M1** for $100 - \pi \times 5^2$ oe
(b) (i)	5.77 or 5.773 to 5.774	**2**	**M1** for tan60 = $\frac{10}{x}$ oe
(ii)	21.5 or 21.54 to 21.55	**2**	**M1** for $10 + 2 \times$ *their* (b)(i) oe or $10 + \frac{10}{\sin 60}$ oe
(iii)	100 to 101.0… nfww	**4**	**M3** for $0.5 \times 10 \times$ *their* (b)(i) + $0.5 \times 10 \times$ *their* (b)(i) + $0.5 \times 10 \times 10 \sin 60$ oe or **M2** for any 2 of these or **M1** for any 1 of these OR **M3** for $0.5 \times$ (*their*(b)(ii))$^2 \times \sin 60 - 10^2$ oe or **M2** for $0.5 \times$ (*their*(b)(ii))$^2 \times \sin 60$ oe or **M1** for *their* attempt at area of triangle *ABC* – 100

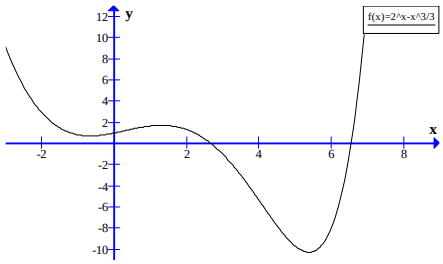
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Question	Answer	Mark	Part Marks
10 (a)	Fully correct curve  	**3**	**B2** for both branches but with serious 'curl back' and/or overlap. or **B1** for 1 branch
(b)	$x = 2$ $y = 3$	**2**	**B1** for each
(c)	[x =] -4 [x =] 3	**2**	**B1** for each
(d)	$x < -4$ $2 < x < 3$	**1** **2**	**FT** *their* –4 from (c) **FT** *their* 2 from (b) and *their* 3 from (c) **B1** for each
(e) (i)	Translation $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$	**2**	**B1** for each
(ii)	Translation $\begin{pmatrix} 0 \\ 3 \end{pmatrix}$	**2**	**B1** for each
11 (a)	216 n^3 oe	**1** **1**	
(b)	43 $n^2 + n + 1$ oe	**1** **3**	**M2** for $pn^2 + qn + c$ $p, q, c \neq 0$ or **M1** for second differences = 2 or $pn^2 + c$ or $pn^2 + qn$
(c)	173 $n^3 - n^2 - n - 1$ oe	**1** **3**	**FT** *their* (a) – *their* (b) **FT** *their* (a) – *their* (b) **M2** for $pn^3 + qn^2 + rn + c$ $p, q, r, c \neq 0$ or n^3 – *their* (b) or **M1** for third differences = 6 or for $pn^3 + qn^2 + c$ or $pn^3 + qn^2 + rn$ or $pn^3 + rn + c$

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Question	Answer	Mark	Part Marks
12 (a) (i)	144π	2	**M1** for $\frac{2}{3} \times \pi \times 6^3$
(ii)	108π	2	**M1** for $2\pi \times 6^2 + \pi \times 6^2$ If 0 scored **SC1** for 72π
(b) (i)	12 or 11.99 to 12.01 nfww	3	**M2** for $\frac{their\,(a)(i) \times 16}{\frac{4}{3}\pi}$ oe or **M1** for $\frac{4}{3} \times \pi \times r^3 = their$(a)(i) × 16
(ii)	1 : 3 or $\frac{1}{3}$:1 cao nfww	3	**M2** for $4 \times \pi \times (their(b)(i))^2 : 16 \times their(a)(ii)$ oe or **M1** for $4 \times \pi \times (their(b)(i))^2$ or $16 \times their(a)(ii)$
13 (a)	$\frac{p^3q^2}{6}$ final answer	3	**M1** for correct use of $a\log b$ **M1** for correct use of $\log a \pm \log b$
(b) (i)	1.29 or 1.292…	3	**M2** for $\frac{\log 6}{\log 4}$ or $\log_4 6$ or sketch of $y = 4^x$ and $y = 6$ oe or **M1** for $x\log 4 = \log 6$ or sketch of $y = 4^x$
(ii)	$6x^2 - 5x - 7 = 0$	**B2**	or **B1** for 3 terms correct in expansion $6x^2 - 9x + 4x - 6$
	$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4 \times 6 \times (-7)}}{2 \times 6}$	**M1**	**FT** *their* three term quadratic or for sketch of parabola with minimum point **Alternative** If sketch of parabola with minimum point and $y = 1$ and no three term quadratic seen, allow **B3**
	$x = 1.57$ or 1.574... $x = -0.741$[01...]	**B2**	**B1** for each

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Question	Answer	Mark	Part Marks
14 (a)	Fully correct curve 	**4**	**B1** for correct graph for $x < 0$, minimum point seen above x-axis **B1** for correct graph for $0 < x < 2$, maximum point seen higher than minimum point **B1** for minimum point seen below x-axis, $2 < x < 8$ If 0 or 1 scored, **SC2** instead for 'correct curve' except stationary point of inflexion instead of LH minimum and maximum
(b)	0.729 or 0.7287... –10.3 or –10.26...	**2**	**B1** for each
(c)	(1.31 or 1.311 to 1.312, 1.73[0])	**2**	**B1** for each co-ordinate
(d)	–2.82, 0.364, 4.23, 5.76 or –2.824 to –2.823 0.3643 to 0.3644 4.228 to 4.229 5.758…	**4**	**B1** for each If 0 scored **SC2** for −2.8, 0.36, 4.2, 5.8 or **SC1** for three of these.

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