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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 $2 \times 3 + 0.5 \times 2 \times 2$ 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 <i>their</i> (i)

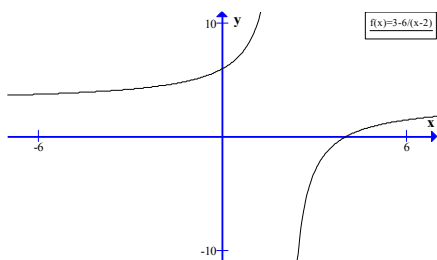
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Question	Answer	Mark	Part Marks
4			
(a)	48	1	
(b)	84	2	FT $(180 - 2 \times \text{their (a)})$, $\text{their (a)} \neq 45$ M1 for $(180 - 2 \times \text{their (a)}) \text{ their (a)} \neq 45$
(c)	42	1	FT $\text{their (b)} \div 2$
(d)	69 cao	2	B1 for angle OBC or $OAC = 21$ or angle $ABC = 69$
(e)	55.5	2	FT their (d) M1 for $(180 - \text{their (d)}) \div 2$
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 $y = \dots$ 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) $[\cos B] = \frac{9^2+10^2-11^2}{2 \times 9 \times 10}$ oe	2	M1 for $11^2 = 9^2 + 10^2 - 2 \times 9 \times 10 \times \cos B$
	(ii) $0.5 \times 9 \times 10 \times \text{their exact (a)}$	M2	M1 for $0.5 \times 9 \times 10 \times \text{their (a)}$ (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 $\tan 60 = \frac{10}{x}$ oe
(ii)	21.5 or 21.54 to 21.55	2	M1 for $10 + 2 \times \text{their (b)(i)}$ oe or $10 + \frac{10}{\sin 60}$ oe
(iii)	100 to 101.0... nfw	4	M3 for $0.5 \times 10 \times \text{their (b)(i)} + 0.5 \times 10 \times \text{their (b)(i)} + 0.5 \times 10 \times 10 \sin 60$ oe or M2 for any 2 of these or M1 for any 1 of these OR M3 for $0.5 \times (\text{their (b)(ii)})^2 \times \sin 60 - 10^2$ oe or M2 for $0.5 \times (\text{their (b)(ii)})^2 \times \sin 60$ oe or M1 for their attempt at area of triangle ABC – 100

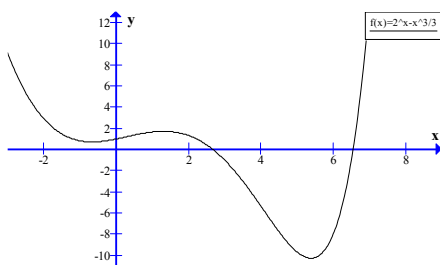
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Question	Answer	Mark	Part Marks
10 (a)	Fully correct curve 	3	B2 for both branches but with serious 'curl back' and/or overlap. or B1 for 1 branch
(b)	$x = 2$ $y = 3$	2	B1 for each
(c)	$[x =] -4$ $[x =] 3$	2	B1 for each
(d)	$x < -4$ $2 < x < 3$	1 2	FT <i>their</i> -4 from (c) FT <i>their</i> 2 from (b) and <i>their</i> 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 <i>their</i> (a) – <i>their</i> (b) FT <i>their</i> (a) – <i>their</i> (b) M2 for $pn^3 + qn^2 + rn + c$ $p, q, r, c \neq 0$ or n^3 – <i>their</i> (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 nfw	3	M2 for $\frac{their(a)(i) \times 16}{\frac{4}{3}\pi}$ oe or M1 for $\frac{4}{3} \times \pi \times r^3 = their(a)(i) \times 16$
(ii)	1 : 3 or $\frac{1}{3} : 1$ cao nfw	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)	$\frac{p^3 q^2}{6}$ 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 <i>their</i> three term quadratic or for sketch of parabola with minimum point
	$x = 1.57$ or $1.574...$ $x = -0.741[01...]$	B2	Alternative If sketch of parabola with minimum point and $y = 1$ and no three term quadratic seen, allow B3 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 <u>instead</u> 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.