



MATHEMATICS (US)

0444/23

Paper 2 (Extended)

October/November 2016

MARK SCHEME

Maximum Mark: 70

Published

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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
nfw	not from wrong working
soi	seen or implied

Question	Answer	Mark	Part marks
1	36	1	
2	n^7	1	
3	B	1	
4 (a)	2.47×10^6	1	
(b)	7.9×10^{-3}	1	
5	$\frac{23}{30}$ cao	2	M1 for $\frac{3 \times 6 + [1 \times] 5}{5 \times 6}$ oe
6	Thursday	2	M1 for 5.4 found or at least two of: 3.8, 3.6 and 4 found
7	0.4^2 0.22 $\left(\frac{1}{2}\right)^2$ $\sqrt{0.09}$	2	M1 for decimal conversion 0.25 and 0.3 and 0.16
8 (a)	$\frac{1}{2}$ oe	1	
(b)	$\frac{3}{2}$ oe	1	
9	5	2	M1 for speed \times time
10	$8\sqrt{3}$	2	B1 for $3\sqrt{3}$ or $5\sqrt{3}$ seen
11	9600	2	M1 for $20000 \times \left(1 - \frac{40}{100}\right) \times \left(1 - \frac{20}{100}\right)$ oe
12	18	2	M1 for $\left[\frac{1}{2} \times\right] \frac{4}{3} \times \pi \times 3^3$
13	120	1	
	4	1	SC1 for answers reversed

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Question	Answer	Mark	Part marks
14 (a)	30	1	
(b)	47.5	2	M1 for 4.5×5 oe
15 (a)	68	1	
(b)	9	2	M1 for $360 \div 40$ oe or $\frac{180(n-2)}{n} = 140$ oe
16	0.5 oe nfw	3	M1 for $d = \frac{k}{(w+1)^2}$ or better M1 for $[d =] \frac{\text{their } k}{(9+1)^2}$ or M2 for $2(4+1)^2 = d(9+1)^2$
17	$y = 2x$ oe	3	M1 for $\frac{1-3}{12-8}$ oe M1 for perpendicular gradient \times their $\frac{1-3}{12-8} = -1$ oe If M0 scored, SC1 for answer $y = kx$ $k \neq 2$ or 0
18 (a)	-16	1	
(b)	1	1	
(c)	$2 - 3x$ final answer	2	M1 for $1 - (3x - 1)$
(d)	$1 - x$ oe final answer	1	
19 (a)	Correct tangent $2.1 \leq \text{grad} \leq 3.9$	B1 2	No daylight between tangent and curve at point of contact. Consider point of contact as midpoint between two vertices of daylight, the midpoint must be between $x = 0.8$ and $x = 1.2$ dep on B1 M1 for $\frac{\text{rise}}{\text{run}}$ also dep on any tangent drawn or close attempt at tangent at any point Must see correct or implied calculation from a drawn tangent
(b)	$(-2, 8)$	1	

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Question	Answer	Mark	Part marks
20 (a)	$[w =] \pm \frac{2}{3}$	2	M1 for $w^2 = \frac{4}{9}$ soi by $\frac{2}{3}$
(b)	$[y =] 32$	2	M1 for $y = 4^{\frac{5}{2}}$ oe
21	30 nfw	3	B2 for $\sin x = \frac{1}{2}$ or M1 for $\frac{1}{2} \times 12 \times 20 \sin x [= 60]$
22	1 3.5 1	4	B3 for 2 correct B2 for 1 correct or M1 for 2, 7, [...] and 2 seen [FD's]
23	$\frac{7n}{2t+3m}$ final answer	4	M1 for $7n(6p-1)$ seen and M2 for $(2t+3m)(6p-1)$ seen or M1 for $2t(6p-1) + 3m(6p-1)$ or $6p(2t+3m) - 1(2t+3m)$
24	$y \leq -\frac{3}{5}x + 6$ oe $x \geq 2$ oe $y > x$ oe final answers	5	SC4 for $y < -\frac{3}{5}x + 6, x > 2, y \geq x$ oe or B3 for $y \leq -\frac{3}{5}x + 6$ oe or B2 for $y = -\frac{3}{5}x + 6$ oe or B1 for gradient = $-\frac{3}{5}$ oe soi and B2 for $x \geq 2$ and $y > x$ oe or B1 for either $x \geq 2$ or $y > x$ oe or for $x = 2$ and $y = x$ with incorrect inequalities
25 (a) (i)	75	2	M1 for angle $XAC = 90$ or $ABC = 90$ soi
(ii)	150	1	
(iii)	75	1FT	FT <i>their (a)(i)</i> or <i>their (a)(ii)</i> $\div 2$
(b)	40	2	M1 for $\frac{\text{angle}}{360} \times \pi \times 18 = [2\pi]$ oe