
MATHEMATICS

0580/31

Paper 3 (Core)

May/June 2016

MARK SCHEME

Maximum Mark: 104

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
- nfww not from wrong working
- soi seen or implied

Question	Answer	Mark	Part marks
1	(a) (i)	$\frac{2}{5}$ oe	1 Allow 0.4 , 40%
	(ii)	$\frac{3}{5}$ oe	1 Allow 0.6 , 60%
	(iii)	0	1
	(b) (i)	4	1
	(ii)	4.3	3 M1 for $2 \times 3 + 3 \times 2 + 4 \times 6 + 5 \times 4 + 6 \times 5$ or 86 M1dep for <i>their</i> $86 \div 20$ If M0M0 SC1 for 57.5
	(iii) (a)	$\frac{3}{20} \times 360$	1
	(b)	90	2 M1 for $\frac{5}{20}$ oe or $\frac{360}{20}$ oe implied by 18 seen
	(c) (i)	14	2 M1 for $\frac{168}{360}$ oe or $\frac{360}{30}$ oe implied by 12 seen
	(ii)	43.3	3 B1 for [total angle=] 156° M1 for $\frac{\text{their angle}}{360} [\times 100]$ oe If B0M0 SC1 for 53.3
	(iii)	5	2 M1 for $\frac{10}{100} \times 360$ oe or 36
2	(a) (i)	3	1
	(ii)	36	1
	(iii)	49	1
	(iv)	27	1
	(b) (i)	43	1
	(ii)	50	1

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Question	Answer	Mark	Part marks
(c)	$\frac{2}{3}$	1	
(d) (i)	$3^2 \times 5$ or $3 \times 3 \times 5$	2	B1 for 3 and 5 only identified as factors or for a correct product e.g. 9×5 or 3×15
(ii)	15	2	M1 for $3 \times 5 \times 7$ [= 105] or B1 for 3 or 5 as final answer
3 (a)	7034.16	3	M2 for $14 \times 237 \times 2 \times 1.06$ oe or M1 for $14 \times 237 \times 2$ oe or 237×1.06 oe or $237 \times 2 \times 1.06$ oe or $237 \times 1.06 \times 14$ oe
(b)	4.22	2	M1 for $20 - 2 \times 7.89$
(c)	1608 or 408 pm	2	B1 for 45 min soi
(d)	03 00 or 3 am	3	M1 for $270 \div 32.4$ or 8.33[...] or 8 (h) 20 (min) M1dep for 18 40 + <i>their</i> 8.33
(e)	1000	2	M1 for $\frac{1800}{4+5}$ [$\times 5$] oe
4 (a) (i)	Wednesday	1	
(ii)	5	1	accept -5
(iii)	-3 -2 -1 0 1 2 5	1	
(iv)	-6	1	
(b)	2 million or 2 000 000	1	
(c)	115 125	2	B1 for either correct or both correct but reversed
(d)	28.3 or 28.27 to 28.28	4	B1 for radius of 5 cm or 4 cm soi M2 for $\pi \times 5^2 - \pi \times 4^2$ soi or M1 for $\pi \times 5^2$ or $\pi \times 4^2$ soi If 0 scored SC2 for $\pi \times 10^2 - \pi \times 8^2$ or SC1 for $\pi \times k^2$
5 (a) (i)	[0]67	1	
(ii)	135	2	B1 for 9 (cm)
(iii)	Correct diagram	2	B1 for correct bearing B1 for correct length

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Question	Answer	Mark	Part marks
(b) (i)	29	1	
(ii)	252	2FT	M1FT for $180 + 43 + \text{their (b)(i)}$
(c)	445	2	M1 for $267^2 + 356^2$ or better
6 (a) (i)	8	1	
(ii)	-2	3	M1 for first step correctly completed M1FT for second step correctly completed
(b) (i)	$19x + 117$	2	B1 for $19x + c$ or $mx + 117$
(ii)	$15x + 625 = \text{their (b)(i)}$	1	
	127	2	M1FT for the first correct step of <i>their</i> linear equation
7 (a)	Correct image, points at (0,-3), (0,-1), (2,-3) and (4,-1)	2	B1 for one correct movement either horizontal or vertical
(b) (i)	Correct image, points at (0, 6), (8, 6), (4, 2) and (0, 2)	2	B1 for correct scale factor and orientation but incorrect centre
(ii)	$\frac{1}{2}$	1	
(c)	Reflection [in mirror line] $x = -1$ oe	1 1	
(d)	Rotation [centre] (0, 0) oe [angle] 180° oe	1 1 1	SC1,1,1 for Enlargement, SF = -1, centre (0, 0)
8 (a) (i)	73.38	3	B1 for 5.4 or 4.7 soi M1 for a completely correct method
(ii)	160 000	2FT	B1FT for <i>their</i> (a)(i) $\times 2175$ or $159601.5[0]$
(b)	45.8 or 45.80 to 45.81	2	M1 for $\tan [=] 1.8 \div 1.75$
(c)	53 060.4[0]	3	M2 for $50\,000 \times 1.02^3$ oe or M1 for two years compound interest eg $50\,000 \times 1.02^2$ oe implied by 52 020

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Question	Answer	Mark	Part marks
(d)	10	3	M2 for $(\frac{198000}{180000} \times 100) - 100$ oe or $(\frac{198000 - 180000}{180000}) \times 100$ or M1 for $\frac{198000}{180000} [\times 100]$ oe or figs 11 or B1 for 198 000 – 180 000 or 18 000 seen
9 (a)	... 14 ... 20 20 ... 14 ... 0	3	B2 for 3 or 4 correct B1 for 2 correct
(b)	Completely correct curve	4	B3FT for 8 or 9 points correctly plotted or B2FT for 6 or 7 points correctly plotted or B1FT for 4 or 5 points correctly plotted
(c)	(3.5, <i>h</i>)	1	$20 < h \leq 20.4$
(d) (i)	Correct ruled line	1	
(ii)	1.4 5.6	1, 1FT	FT <i>their</i> graph and line