



MATHEMATICS

0580/31

Paper 3 (Core)

May/June 2017

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
nfw	not from wrong working
soi	seen or implied

Question	Answer	Marks	Part marks
1(a)(i)	$78 \div 3 \times (3 + 5 + 6)$ [= 364]	1	
1(a)(ii)	[kit] 130 [travel] 156	3	M1 for $364 \div (3 + 5 + 6) \times 5$ (or $\times 6$ if travel first) or $78 \div 3 \times 5$ (or $\times 6$ if travel first) A1 for one of kit or travel correct If zero scored, SC1 for kit + travel = 286
1(b)	84	2	M1 for $3 \div 13[\times 364]$ or $364 - (10 \div 13 \times 364)$ or B1 for 280
1(c)	320.32 final answer	2	M1 for $(100 - 12) \div 100 [\times 364]$ or B1 for 43.68
1(d)(i)	$W + 6 + L = 24$ oe	1	
1(d)(ii)	$3W + 6 = 54$ isw	1	
1(d)(iii)	[W=] 16	2	M1 for $3W = 54 - 6$ or $W + 2 = 18$ or better or correct first step from an equation in W only
	[L=] 2	1FT	FT is 18 – <i>their</i> W If zero scored, SC1 for both correct but reversed
2(a)	Quadrilateral	1	
2(b)	Enlargement	1	
	[Scale factor] 3	1	
	[Centre] $(-3, -1)$	1	
2(c)	Translation	1	
	$\begin{pmatrix} 10 \\ -7 \end{pmatrix}$	1	
2(d)	Vertices $(6, 2)$, $(7, -1)$, $(8, -1)$, $(9, 1)$	2	B1 for a correct reflection in $x = k$ or $y = 2$

Question	Answer	Marks	Part marks
2(e)	Vertices $(-2, -2)$, $(1, -3)$, $(1, -4)$, $(-1, -5)$	2	B1 for a 'correct' 90° clockwise rotation about the origin If zero scored, SC1 for correct size and orientation but wrong position
3(a)(i)	4	1	
3(a)(ii)	2	1	
3(a)(iii)	2.5	3	M1 for $[(0 \times 4) + (1 \times 6) + (2 \times 6) + (3 \times 2) + (4 \times 9) + (5 \times 3)]$ oe M1 dep their total $\div 30$ soi
3(a)(iv)	4 bars correct height, correct width and correct gaps	2	B1 for 2 bars correct heights and widths, or 4 correct heights
	Correct vertical scale shown	1	
3(b)	6 values correctly placed 14 16 [9] 39 [11] 14 11 [36] 25 [30] [20] [75]	2	B1 for 3, 4 or 5 correctly placed
3(c)(i)	144	2	M1 for $30 \div 75 [\times 360]$ oe
3(c)(ii)	96	1FT	FT 240 – their (c)(i)
3(d)	Correct line from centre to circumference, angles 144° and 96°	1FT	FT their angles provided they sum to 240°
4(a)(i)	Radius	1	
4(a)(ii)	[Angle between] tangent [and] radius	1	
4(a)(iii)	41	1	
4(a)(iv)	Corresponding [angles]	1	
4(a)(v)	Similar	1	
4(a)(vi)(a)	6.21 or 6.211 to 6.212	2	M1 for $\tan 49 = \frac{OB}{5.4}$ or better
4(a)(vi)(b)	8.23 or 8.229 to 8.231	2FT	M1 for $\cos 49 = \frac{5.4}{OA}$ or better or for $5.4^2 + \text{their (vi)(a)}^2$ or better
4(a)(vi)(c)	16.8 or 16.76 to 16.77	2FT	M1 for their (vi)(a) $\times 5.4 \div 2$
4(b)	5×180	1	

Question	Answer	Marks	Part marks
5(a)	7 -2 7 14	3	B2 for 3 correct B1 for 2 correct
5(b)	Correct smooth curve	4	B3FT for 8 or 9 correct plots or B2FT for 6 or 7 correct plots or B1FT for 4 or 5 correct plots
5(c)(i)	Ruled line, $x = -1$, drawn	1	
5(c)(ii)	$x = -1$ oe	1	
5(d)(i)	Ruled line L drawn, joining (-5, 7) and (0, -3)	2	B1 for one of the points correct and line drawn, or both points correct and no or wrong line.
5(d)(ii)	-3.3 to -3.5, -0.5 to -0.7	2FT	B1FT for one correct.
5(d)(iii)	-2	2	M1FT for <i>their</i> $\frac{\text{Rise}}{\text{Run}}$ from part (d)(i) or <i>their</i> $\frac{y_2 - y_1}{x_2 - x_1}$ If zero scored, SC1 for answer 2
6(a)	17 35	1	
6(b)(i)	17 51	1FT	B1 for <i>their</i> (a) + 16 minutes
6(b)(ii)	18 40 cao	1	
6(b)(iii)	4 nfw	2	B1 for 36 minutes or 32 minutes
6(b)(iv)	14.2 cao	4	M2 for $8.5 \div \text{their } 36 \times 60$ soi or M1 for $8.5 \div \text{their } 36$ or $\text{their } 36 \div 60$ soi or $8.5 \div \text{time in mins} \times 60$ A1 for 14.17 or 14.16 to 14.17 If A0 then SC1 for <i>their</i> answer ≥ 2 decimal places rounded to 1 decimal place
7(a)	2	1	
7(b)	3 dots correctly placed 4 crosses correctly placed	1	
7(c)	18 28 10 12	1,1 1	If zero scored, SC1 for <i>their</i> $18 + 10$
7(d)(i)	Add two more each time oe	1	
7(d)(ii)	154	2	M1 for $12^2 + 12 - 2$
7(e)(i)	$2n + 2$ oe final answer	2	B1 for $2n + j$ or $kn + 2$ ($k \neq 0$ or 1)

Question	Answer	Marks	Part marks
7(e)(ii)	49	2	M1 for <i>their (e)(i)</i> = 100 provided (e)(i) is algebraic soi
8(a)(i)	4.4	1	
8(a)(ii)	660	1FT	<i>their (a)(i)</i> × 150
8(a)(iii)	220	1	
8(b)	14 [cm] from <i>Q</i>	2	M1 for $2100 \div 150$ soi
	100° from <i>Q</i>	1	
8(c)(i)	3.82 cao	2	M1 for $2100 \div 550$
8(c)(ii)	3[h] 49[min]	1FT	<i>their</i> time correctly converted
9(a)(i)	4800	1	
9(a)(ii)	192	2	M1 for $2 \times 58.5 + 5 \times 15$ or B1 for 117 or 75 seen
9(a)(iii)	208	2FT	M1 for [6000 –] (<i>their (a)(i)</i> + <i>their (a)(ii)</i> + 800) oe
9(a)(iv)	42	2FT	M1 for <i>their (a)(iii)</i> ÷ 4.95
9(b)	2315.25 cao	3	M2 for 2000×1.05^3 oe or M1 for 2000×1.05^2 oe If zero scored, SC1 for 315.25