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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
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Part marks
1(a)(i)	78 ÷ 3 × (3 + 5 + 6) [= 364]	**1**	
1(a)(ii)	[kit] 130 [travel] 156	**3**	**M1** for 364 ÷ (3 + 5 + 6) × 5 (or × 6 if travel first) or 78 ÷ 3 × 5 (or × 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 ÷ 13[× 364] or 364 – (10 ÷ 13 × 364) or **B1** for 280
1(c)	320.32 final answer	**2**	**M1** for (100 – 12) ÷ 100 [× 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 – *their 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 × 4)+] (1 × 6) + (2 × 6) + (3 × 2) + (4 × 9) + (5 × 3) oe **M1 dep** *their* total ÷ 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 ÷ 75 [× 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 + *their* **(vi)(a)**^{2} or better
4(a)(vi)(c)	16.8 or 16.76 to 16.77	**2FT**	**M1** for *their* **(vi)(a)** × 5.4 ÷ 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 *their* $\frac{Rise}{Run}$ from part **(d)(i)** or *their* $\frac{y_2 - y_1}{x_2 - x_1}$ If zero scored, **SC1** for answer 2
6(a)	17 35	**1**	
6(b)(i)	17 51	**1FT**	**B1** for *their* **(a)** + 16 minutes
6(b)(ii)	18 40 cao	**1**	
6(b)(iii)	4 nfww	**2**	**B1** for 36 minutes or 32 minutes
6(b)(iv)	14.2 cao	**4**	**M2** for 8.5 ÷ *their* 36 × 60 soi or **M1** for 8.5 ÷ *their* 36 or *their* 36 ÷ 60 soi or 8.5 ÷ time in mins × 60 **A1** for 14.17 or 14.16 to 14.17 If **A0** then **SC1** for *their* 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 *their* 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)

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Question	Answer	Marks	Part marks
7(e)(ii)	49	**2**	**M1** for *their* **(e)(i)** = 100 provided **(e)(i)** is algebraic soi
8(a)(i)	4.4	**1**	
8(a)(ii)	660	**1FT**	*their* **(a)(i)** × 150
8(a)(iii)	220	**1**	
8(b)	14 [cm] from *Q*	**2**	**M1** for 2100 ÷ 150 soi
	100° from *Q*	**1**	
8(c)(i)	3.82 cao	**2**	**M1** for 2100 ÷ 550
8(c)(ii)	3[h] 49[min]	**1FT**	*their* time correctly converted
9(a)(i)	4800	**1**	
9(a)(ii)	192	**2**	**M1** for 2 × 58.5 + 5 × 15 or **B1** for 117 or 75 seen
9(a)(iii)	208	**2FT**	**M1** for [6000 –] (*their* **(a)(i)** + *their* **(a)(ii)** + 800) oe
9(a)(iv)	42	**2FT**	**M1** for *their* **(a)(iii)** ÷ 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

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