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MATHEMATICS **0580/32**

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)	Frequencies 4, 7, 3, 5, 1	2	**B1** for 3 or 4 correct in frequency column or for fully correct tally in tally column or for 4, 7, 3, 5, 1 in tally column
(ii)	Correct bar chart	3FT	**B1** for linear vertical scale **B2FT** for all bars correct height and equal width, with equal gaps or no gaps or **B1FT** for all bars correct height with unequal widths and/or gaps or at least four bars correct height and equal width, with equal gaps or no gaps
(iii)	3	1	
(b)	$\frac{11}{20}$ final answer	2	**M1** for $\frac{550}{1000}$ oe seen
(c)	Three correct evaluated, to at least 3 significant figures, consistent divisions	M2	**M2** implied by 2.67 or 2.66… **and** 2.52 **and** 2.59… or **M1** for one correct evaluated division soi, implied by one of 2.67 or 2.66…, 2.52, 2.59… [$/litre] or one of 2.40/0.9 = 2.7, 3.15/1.25 = 2.5, 3.50/1.35 = 2.6
	1.25 litre bottle indicated	A1	Dependent on M2
(d)	145 155	1, 1	**B1** for both correct in reverse order
2 (a) (i)	21 or 28	1	
(ii)	16 or 81	1	
(iii)	27	1	
(iv)	17 or 61 or 67 or 71	1	
(b)	$\sqrt{2}$ **and** π	1	
(c)	$7 \times (5 - 2 + 3) = 42$	1	

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Question	Answer	Mark	Part marks
(d) (i)	0.9 or $\frac{9}{10}$	1	
(ii)	625	1	
(iii)	0.0625 or $\frac{1}{16}$	1	
(e) (i)	$2^2 \times 3 \times 5$ or $2 \times 2 \times 3 \times 5$	2	**B1** for prime factors 2, 3 and 5 (and no others) identified or a correct product eg 6×10, 4×15, 5×12, $4 \times 3 \times 5$ etc
(ii)	180	2	**M1** for $2\times2\times3\times3$ or $2^2\times3^2$ [= 36] or **B1** for any other multiple of 180 or for listing at least 5 multiples of each with maximum one error
3 (a) (i)	11 04	1	
(ii)	11 50	1FT	
(iii)	38	1	
(b)	4.5	1	
(c) (i)	2.2	2	**B1** for 11 or 2200 seen
(ii)	150°	1	
(iii)	Correct position	2	**B1** for bearing 195° **B1** for distance 2.5 cm
(iv)	3770 or 3769.9 to 3770.4	4	**B2** for diameter 1200 [metres] soi or **B1** for diameter 6 [cm] soi **M1** for $\pi \times$ *their* diameter soi
4 (a) (i)	18	2	**M1** for $4 \times 3 \times 1.5$
(ii)	Correct net	3	**B2** for 6 rectangles correctly positioned to form net of cuboid or **B1** for two 4 cm by 3 cm rectangles, two 4 cm by 1.5 cm rectangles and two 3 cm by 1.5 cm rectangles seen
(b) (i)	$16x + 8$ or $8(2x + 1)$	2	**M1** for $2(5x + 4 + 3x)$ oe or $16x + k$ as answer or for $3x + 4$ or $2x - 1$ seen

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Question	Answer	Mark	Part marks
(ii)	4	2FT	**M1FT** for *their* (b)(i) = 72 if *their* (b)(i) is linear
(iii)	176	3	**M2FT** for $(5x + 4) \times (x + 1) + (2x - 1) \times (2x)$ or better soi or $(2x) \times (3x) + (3x + 4) \times (x + 1)$ or better soi or $(5x + 4) \times (3x) - (3x + 4) \times (2x - 1)$ or better soi or **M1FT** for two sides length from ($5x + 4$, $3x$, $2x$, $x + 1$, $2x - 1$, $3x + 4$) evaluated soi
5 (a) (i)	7.5	2	**M1** for (5+9+12+3+7+4+10+11+5+9) ÷ 10 or better
(ii)	4 points correct	2	**B1** for 3 correct
(iii)	Positive	1	
(iv)	Ruled line of best fit	1	
(v)	84 to 96	1FT	**FT** their positive line of best fit
(vi)	(Point) below /lower than/right of/under line (of best fit)	1	
(b) (i)	5 : 3 : 2	2	**M1** for 75 : 45 : 30 or better
(ii)	2244	2	**M1** for [2550 ×] 0.88 oe
(iii)	495	3	**M2** for 36 × 120 + 0.15 × 4500 soi or **M1** for 36 × 120 or 0.15 × 4500 soi
6 (a) (i)	Ruled continuous line $y = 3$	1	
(ii)	Ruled continuous line $x = 1$	2	**B1** for (1, –4) plotted or **B1** for any line perpendicular to *their* $y = 3$ drawn
(b)	–8, 4, 4, –8	2	**B1** for 3 correct
(c)	Completely correct curve	4	**B3FT** for 7 or 8 points correctly plotted **B2FT** for 5 or 6 points correctly plotted **B1FT** for 3 or 4 points correctly plotted
(d)	(–1.5, 4.1 to 4.4)	1	
(e)	–2.5 to –2.7 and –0.3 to –0.5	2FT	**FT** intersection of *their* (a)(i) with *their* curve **B1FT** for one correct

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Question	Answer	Mark	Part marks
7 (a) (i)	25	1	
(ii)	57	1	
(b)	[$\angle BCA$ =] 180 – 49 – 41 = 90°	B1	
	Angle [in a] semicircle	B1	
(c)	14.6 or 14.58…	2	**M1** for $\cos 35 = \frac{PR}{17.8}$ or better
(d)	19.3 or 19.31…	3	**M2** for [KL =] $\sqrt{28.9^2 - 21.5^2}$ or better or **M1** for $28.9^2 = KL^2 + 21.5^2$ or better
8 (a) (i)	Correct reflection vertices (4, –5), (5, –5) and (4, –7)	2	**B1** for reflection in $y = k$
(ii)	Translation	1	
	$\begin{pmatrix} -7 \\ -5 \end{pmatrix}$	1	
(iii)	Rotation	1	
	90° [anticlockwise] oe	1	
	[centre] (0, 0) oe	1	
(b)	Correct enlargement	2	**B1** for correct size and orientation, incorrect position
9 (a) (i)	38	2	**M1** for 4 × 5 – 3 × −6 or better or **B1** for 20 or 18 or –18 seen
(ii)	$\frac{p+3t}{4}$ oe	2	**M1** for $4r = p + 3t$ or $\frac{p}{4} = r - \frac{3t}{4}$
(b)	$9x + 7$ final answer	2	**B1** for $12x - 8$ or $-3x + 15$ or $9x$ or + 7 seen in working
(c)	$4a(3b - 5a)$ final answer	2	**M1** for $a(12b - 20a)$ or $4(3ab - 5a^2)$ or $2a(6b - 10a)$ or $2(6ab - 10a^2)$

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