MATHEMATICS **0580/33**

Paper 3 (Core) **October/November 2016**

MARK SCHEME

Maximum Mark: 104

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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This document consists of **5** printed pages.

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)		258[.00] 25.56 758.56	1 1 1FT	**FT** 475 + *their* two previous answers
	(b)	(i)	85	1	
		(ii)	739.2[0]	3	**M1** for 4400 – 3740 or soi by 660 **M1** for *their* 660 × 1.12 oe
	(c)		26.75 cao	1	
	(d)		Van <u>and</u> 12.6 > 12.4 oe or 0.0792 < 0.0806 or 0.982 < 1	2	**B1** for 12.6[…] or 0.0806[…] or 0.982[…]
	(e)		2800	2	**M1** for [2×] 4200 ÷ (1 + 2) oe or soi by 1400
2	(a)	(i)	[0].45	1	
		(ii)	6.115 or 6.12	2	**M1** for adding the lengths (soi by 48.92) ÷ 8
	(b)	(i)	4 correct points	2	**B1** for 2 or 3 correct points
		(ii)	Negative	1	
		(iii)	No [because] the faster an athlete runs the further they jump oe	1	Accept any correct statement
		(iv)	Correct ruled line of best fit	1	
		(v)	Correct distance from *their* line of best fit	1FT	**Strict 1FT** from straight line with negative gradient

Question	Answer	Mark	Part marks
3 **(a)** **(i)**	35	**1**	
(ii)	74	**1**	
(b)	43 **and** valid reasons	**3**	reasons include exterior angle [of a triangle] equals the sum of the interior opposite angles or angles on a straight line [sum to 180] and angles in a triangle [sum to 180] **B2** for 43 or **M1** for 180 – 128 soi by 52 or 128 – 85 **B1** for valid reasons
(c)	32.2 or 32.23…	**2**	**M1** for sin [… =] 8 ÷ 15 oe
(d) **(i)**	$[AB] = \sqrt{300^2 + 225^2}$	**2**	**M1** for $300^2 + 225^2$
(ii)	15 35	**4**	**M1** for 375 ÷ 450 or [0].833[…] **M1** for *their* [0].833 × 60 or soi by 50 **M1** for 14 45 + *their* 50 soi
4 **(a)** **(i)**	*B* correct *C* correct with arcs	**1** **2FT**	**B1** for *C* correct without arcs or correct pair of arcs or correct lengths reversed with arcs If zero scored, **SC1** for *AB*=8 or *AC*=6 or *BC*=5
(ii)	[0]37 to [0]41	**1**	Correct or **FT**
(iii)	203	**2**	**M1** for 180 + 23
(b)	Correct perpendicular bisector of *PT* with arcs	**2**	**B1** for correct perpendicular bisector of *PT* with no / incorrect arcs or two correct pairs of intersecting arcs
	arc centre *W* radius 6 cm	**2**	**B1** for any arc centred on *W*
	both points marked on intersection of line and arc	**1dep**	**dep** on an attempt at bisector and attempt at the arc

Question	Answer	Mark	Part marks
5 **(a)** **(i)**	64 81 and no others	**2**	**B1** for 1 correct and no others or 2 correct and 1 wrong
(ii)	90k	**1**	accept any multiple of 90
(iii)	1, 3, 9, 27 only	**2**	**B1** for three correct and no extras or four correct and one extra
(iv)	16	**2**	**B1** for 2, 4 or 8 as answer
(b)	$\dfrac{11}{6}$ oe	**B1**	
	$\dfrac{11}{6} \times \dfrac{5}{2}$ oe	**M1**	**FT** *their* $\dfrac{11}{6}$
	$\dfrac{55}{12}$ oe	**A1**	
	$4\dfrac{7}{12}$	**B1**	**Dep** on A1
(c) **(i)**	20 Add 3 oe	**1** **1**	
(ii)	–7 Subtract 8 oe	**1** **1**	
(iii)	16 Differences increase by 1 oe	**1** **1**	
(iv)	125 Cube numbers	**1** **1**	
6 **(a)**	6h oe	**1**	
(b) **(i)**	4x oe	**1**	
(ii)	x^2 oe	**1**	
(c)	7.5	**5**	**M1** for $2x + 1 + x + 3 + 2x + 1 + x + 3$ oe **M1** for $6x + 8$ or *their* expression simplified correctly **M1** for *their* $6x + 8 = 53$ **M1** for a correct first step in solving *their* linear equation
(d)	6a + b final answer	**2**	**B1** for 6a or [+] b
(e) **(i)**	5x – 20 final answer	**1**	
(ii)	$x^3 + 3x$ final answer	**2**	**B1** for x^3 or [+] 3x
(f)	4x(2x – 1) final answer	**2**	**B1** for $x(8x - 4)$ or $4(2x^2 - x)$ or $2(4x^2 - 2x)$ or $2x(4x - 2)$

	Question		Answer	Mark	Part marks
7	(a)		Correct reflection	1	
	(b)		Correct translation	2	**B1** for either correct horizontal or vertical movement
	(c)		Rotation [about] (0,0) oe 90° [anti-clockwise] oe	1 1 1	
	(d)		Enlargement [centre] (0,0) oe [sf] 2	1 1 1	
8	(a)		15 8 … 0 … 0 … 8	3	**B1** for 8 and 8 in the correct place **B1** for 0 and 0 in the correct place **B1** for 15 in the correct place
	(b)		Correct curve	4	**B3FT** for 7 or 8 correctly plotted points or **B2FT** for 5 or 6 correctly plotted points or **B1FT** for 3 or 4 correctly plotted points
	(c)		Correct ruled line	1	
	(d)		−1.8 or −1.7 or −1.6 3.6 or 3.7 or 3.8	2FT	**B1FT** for one correct or **B1FT** for both correct answers as co-ordinates or **B1FT** for both answers correct to more than 1dp
9	(a)		325 150 450 75	3	**B2** for 3 correct or **B1** for 1 or 2 correct or **M1** for 45 ÷ 18 soi by 2.5
	(b)	(i)	632	2	**M1** for (395 × 8) ÷ 5 oe
		(ii)	0.632	1FT	**FT** *their* (b)(i) ÷ 1000