Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

MATHEMATICS	**0580/43**
Paper 4 (Extended)	**May/June 2017**
MARK SCHEME	
Maximum Mark: 130	

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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2017 series for most Cambridge IGCSE®, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

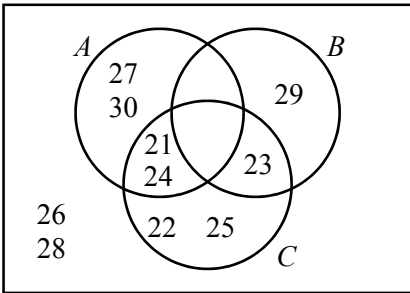This document consists of **7** printed pages.

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	Marks	Part marks
1(a)(i)	9550	**1**	
1(a)(ii)	23 158 750	**2FT**	**FT** *their* **(a)(i)** $\times$ 2425 correctly evaluated **M1** for *their* lower bound $\times$ 2425
1(a)(iii)	23 160 000	**1FT**	**FT** *their* **(a)(ii)** rounded to 4 sf
1(a)(iv)	2.316×10^7	**1FT**	**FT** *their* **(a)(iii)** or *their* **(a)(ii)** rounded to 3sf or more and in standard form
1(b)	520 nfww	**3**	**M2** for $546 \times \dfrac{100}{(100+5)}$ oe or **M1** for 105[%] associated with 546 oe
1(c)	3380 or 3376 to 3377	**2**	**M1** for $3\,000 \times \left(1 + \dfrac{3}{100}\right)^4$ oe
2(a)	38	**1**	
	118	**1**	
	62	**1FT**	**FT** 180 – *their y*
2(b)	69	**3**	**B2** for $ACB = 42$ or **B1** for $ADB = 42$ If zero scored, **SC1** for $ACB = their\ ADB$
2(c)	107	**2**	**B1** for $QPS = 73$ or [reflex] $QOS = 214$
3(a)	0 2.25 2 1.25	**4**	**B1** for each
3(b)	Fully correct smooth curve	**4**	**B3 FT** for 7 or 8 points **or B2 FT** for 5 or 6 points **or B1 FT** for 3 or 4 points

Question	Answer	Marks	Part marks
3(c)	1	**1**	
3(d)(i)	$[y =] x + 1$	**1**	
3(d)(ii)	−2.2 to −2.1	**1**	
	−0.45 to −0.4	**1**	
	0.51 to 0.6	**1**	If zero scored, **SC1** for *their* line in **(d)(i)** drawn. It must be of the form $y = mx + c$ ($m \neq 0$) and drawn 'fit for purpose'
3(e)	$-1.33 < k < 0$ to 0.1	**2FT**	**FT** Strict ft of *their* max point and min point dep on cubic graph or accept correct answer from calculus **B1** for each If zero scored, **SC1** for two correct values reversed
4(a)(i)	17.5 or 17.46....nfww	**6**	**B3** for triangle height 3.46[4...] or $\sqrt{12}$ oe or **M2** for $\sqrt{4^2 - 2^2}$ or **M1** for $h^2 + 2^2 = 4^2$ **and M2** for $2 \times 7 + \frac{1}{2} \times 2 \times their\ h$ oe or **M1** for $\frac{1}{2} \times 2 \times their\ h$
4(a)(ii)	140 or 139.6 to 139.7...	**1FT**	**FT** *their* **(a)** $\times 8$
4(b)(i)	2.62 or 2.618…	**3**	**M2** for $[r^2 =]\ \dfrac{280}{13\pi}$ oe or **M1** for $280 = \pi \times r^2 \times 13$
4(b)(ii)	10.2 or 10.20… or $10\frac{10}{49}$	**3**	**M2** for $\dfrac{280}{14^3}$ [×100] oe or **B1** for $2\,744$ or 14^3 seen
5(a)(i)	80 33 20	**1, 1, 1**	
5(a)(ii)	17.3 nfww	**4**	**M1** for 5, 15, 22.5, 27.5, 40 soi **M1** for $\sum fx$ with *their* f's and x in correct interval including both boundaries **M1** (dep on 2nd **M1**) for $\sum fx \div 200$

Question	Answer	Marks	Part marks
5(b)(i)	$\dfrac{30}{210}$ oe	**2**	**M1** for $\dfrac{6}{15} \times \dfrac{5}{14}$ If zero scored, **SC1** for answer $\dfrac{36}{225}$ oe
5(b)(ii)	$\dfrac{108}{210}$ oe	**3**	**M2** for $\dfrac{6}{15} \times \dfrac{9}{14} + \dfrac{9}{15} \times \dfrac{6}{14}$ oe or $1 - \dfrac{9}{15} \times \dfrac{8}{14} - \dfrac{6}{15} \times \dfrac{5}{14}$ or **M1** for $\dfrac{6}{15} \times \dfrac{9}{14}$ or $\dfrac{9}{15} \times \dfrac{6}{14}$ or $\dfrac{9}{15} \times \dfrac{8}{14} + \dfrac{6}{15} \times \dfrac{5}{14}$ If zero scored, **SC1** for answer $\dfrac{108}{225}$ oe
5(c)	150	**1**	
6(a)(i)	Translation	**1**	
	$\begin{pmatrix} 3 \\ -13 \end{pmatrix}$ oe	**1**	
6(a)(ii)	Enlargement	**1**	
	[sf] $-\dfrac{1}{2}$ oe	**1**	
	(0, −4)	**1**	
6(b)	Image at (0, 0) (0, 6) (−4, 6) (−4, 2)	**2**	**B1** for rotation of 90º anticlockwise about the wrong centre or 90º clockwise about (3, −1) or 4 points correct but not joined.
6(c)	Image at (4, 0) (10, 0) (10, −4) (6, −4)	**2**	**B1** for reflection in $y = k$ or in $x = 1$ or 4 points correct but not joined
6(d)	Enlargement	**1**	
	[sf] 3	**1**	
	Origin oe	**1**	

Question	Answer	Marks	Part marks
7(a)	$[x =]$ –5 $[y =]$ 7 with correct working	4	**M1** for correctly equating one set of coefficients **M1** for correct method to eliminate one variable OR **M1** for correctly rearranging one equation **M1** for correct method to eliminate one variable **A1** $x = -5$ **A1** $y = 7$ both dep on **M2** If zero scored, **SC1** for 2 values satisfying one of the original equations **SC1** if no correct working shown, but 2 correct answers given
7(b)	$[a =]$ 36 $[b =]$ –6	3	**B2** for either correct or **M1** for $a = b^2$ or for $x^2 + bx + bx + b^2$ or better or for $(x - 6)^2$ seen and **M1** for $2b = -12$ soi
7(c)	$\dfrac{7x^2 - 12x - 10}{(2x - 5)(x - 1)}$ oe final answer nfww	4	**B1** for common denom $(2x - 5)(x - 1)$ seen oe isw **M1** for $x(x - 1) + (3x + 2)(2x - 5)$ soi isw **B1** for $6x^2 - 15x + 4x - 10$ soi
8(a)(i)	4 points correctly plotted	2	**B1** for 2 or 3 points correctly plotted
8(a)(ii)	Positive	1	
8(b)	mean 3.1	3	**M2** for $\dfrac{\text{sum of products}}{30}$ or **M1** for at least 4 correct products soi
	median 3	2	**M1** for 15.5 oe indicated
	mode 5	1	
	range 5	1	
8(c)	24 nfww	3	**M1** for $\dfrac{x \times 52 + 45 \times 75 + 11 \times 91}{x + 45 + 11}$ $[= 70.3]$ **M1** for clearing *their* fraction

Question	Answer	Marks	Part marks
9(a)	1120 or 1121.	4	**M2** for $[AC^2 =]$ $525^2 + 872^2 - 2 \times 525 \times 872 \times \cos 104$ or **M1** for implicit version **A1** for 1257 000 to 1258 000
9(b)	[QB or $x =$] $872 \times \tan 1$ seen	M2	**M1** for $\tan 1 = \dfrac{QB}{872}$
	tan = *their QB* ÷ 525	M1	
	1.7 or 1.660 to 1.661 nfww	A1	dep on **M3**
9(c)(i)	222 000 or 222 100. .... or 222 101	2	**M1** for $\dfrac{1}{2} \times 525 \times 872 \times \sin 104$
9(c)(ii)	5.55 or 5.550 to 5.553 nfww	2FT	**FT** *their* **(c)(i)** $\times 100^2 \div 20 000^2$ **M1** for *their* **(c)(i)** $\times 100^2 \div 20 000^2$ or restart
10(a)		4	All 8 regions correct **M3** for 6 or 7 regions correct **M2** for 4 or 5 regions correct **M1** for 3 regions correct
10(b)(i)	$\notin$	1	
10(b)(ii)	$\varnothing$	1	
10(c)	21, 23, 24, 29	2FT	Correct or **FT** **SC1** for 1 omission or 4 correct and 1 extra
10(d)(i)	5	1FT	Correct or **FT** if less than 10
10(d)(ii)	9	1FT	Correct or **FT** if less than 10
10(e)	$\subset$ or $\subseteq$	1	

Question		Answer	Marks	Part marks
11	64	$(n+3)^2$ oe final answer	**1, 2**	**M1** for a quadratic expression seen or second differences 2
	17	$3n+2$ oe final answer	**1, 2**	**B1** for $3n+k$ (any k) or $kn+2$ $(k \neq 0)$
	47	$(n+3)^2 - (3n+2)$ oe isw	**1, 2FT**	**FT** *their* difference expressions $A - B$ **M1** for expression $an^2 + bn + c$ seen or second differences 2
	$\dfrac{7}{6}$	$\dfrac{n+2}{n+1}$ oe final answer	**1, 2**	**B1** for $\dfrac{n+k+1}{n+k}$ seen