

Cambridge International Examinations Cambridge International General Certificate of Secondary Education

#### MATHEMATICS

0580/43 May/June 2017

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Paper 4 (Extended) MARK SCHEME Maximum Mark: 130

Published

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#### Abbreviations

caocorrect answer onlydepdependentFTfollow through after erroriswignore subsequent workingoeor equivalentSCSpecial Casenfwwnot from wrong working

soi seen or implied

Question	Answer	Marks	Part marks
1(a)(i)	9550	1	
1(a)(ii)	23 158 750	2FT	<b>FT</b> <i>their</i> (a)(i) × 2425 correctly evaluated <b>M1</b> for <i>their</i> lower bound × 2425
1(a)(iii)	23 160 000	1FT	FT their (a)(ii) rounded to 4 sf
1(a)(iv)	$2.316 \times 10^7$	1FT	<b>FT</b> <i>their</i> <b>(a)(iii)</b> or <i>their</i> <b>(a)(ii)</b> rounded to 3sf or more and in standard form
1(b)	520 nfww	3	<b>M2</b> for $546 \times \frac{100}{(100+5)}$ oe or <b>M1</b> for $105[\%]$ associated with 546 oe
1(c)	3380 or 3376 to 3377	2	<b>M1</b> for $3000 \times \left(1 + \frac{3}{100}\right)^4$ oe
2(a)	38	1	
	118	1	
	62	1FT	<b>FT</b> 180 – <i>their y</i>
2(b)	69	3	<b>B2</b> for $ACB = 42$ or <b>B1</b> for $ADB = 42$ If zero scored, <b>SC1</b> for $ACB = their ADB$
2(c)	107	2	<b>B1</b> 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	<b>B3 FT</b> for 7 or 8 points or <b>B2 FT</b> for 5 or 6 points or <b>B1 FT</b> for 3 or 4 points

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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, <b>SC1</b> for <i>their</i> 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 <i>their</i> 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 17.46nfww	6	<b>B3</b> 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	<b>FT</b> their (a) $\times 8$
4(b)(i)	2.62 or 2.618	3	<b>M2</b> for $[r^2 = ] \frac{280}{13\pi}$ oe or <b>M1</b> for $280 = \pi \times r^2 \times 13$
4(b)(ii)	10.2 or 10.20 or $10\frac{10}{49}$	3	<b>M2</b> for $\frac{280}{14^3}$ [×100] oe
			or <b>B1</b> for 2744 or 14° seen
5(a)(1)	80 33 20	1, 1, 1	
S(a)(11)	1/.3 niww	4	<b>M1</b> for $\sum fx$ with <i>their</i> $f$ 's and $x$ in correct interval including both boundaries <b>M1</b> (dep on 2nd <b>M1</b> ) for $\sum fx \div 200$

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Question	Answer	Marks	Part marks	Cloud
5(b)(i)	$\frac{30}{210}$ oe	2	<b>M1</b> for $\frac{6}{15} \times \frac{5}{14}$ If zero scored, <b>SC1</b> for answer $\frac{36}{225}$ oe	COM
5(b)(ii)	108 210 oe	3	M2 for $\frac{6}{15} \times \frac{9}{14} + \frac{9}{15} \times \frac{6}{14}$ oe or $1 - \frac{9}{15} \times \frac{8}{14} - \frac{6}{15} \times \frac{5}{14}$ or M1 for $\frac{6}{15} \times \frac{9}{14}$ or $\frac{9}{15} \times \frac{6}{14}$ or $\frac{9}{15} \times \frac{8}{14} + \frac{6}{15} \times \frac{5}{14}$ If zero scored, SC1 for answer $\frac{108}{225}$ oe	
5(c)	150	1		
6(a)(i)	Translation	1		
	$\begin{pmatrix} 3\\ -13 \end{pmatrix}$ oe	1		
6(a)(ii)	Enlargement	1		
	$[sf] - \frac{1}{2}$ oe	1		
	(0,-4)	1		
6(b)	Image at (0,0)(0,6)(-4,6)(-4,2)	2	<b>B1</b> for rotation of 90° anticlockwise about the wrong centre or 90° clockwise about (3, -1) or 4 points correct but not joined.	
6(c)	Image at ( 4, 0 ) ( 10, 0 ) ( 10, -4 ) ( 6, -4 )	2	<b>B1</b> 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		

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Question	Answer	Marks	Part marks
7(a)	[x = ] -5	4	M1 for correctly equating one set of coefficients
	[y =] 7 with correct working		M1 for correct method to eliminate one variable
			OR
			M1 for correctly rearranging one equation
			M1 for correct method to eliminate one variable
			<b>A1</b> $x = -5$ <b>A1</b> $y = 7$ both dep on <b>M2</b>
			If zero scored, <b>SC1</b> for 2 values satisfying one of the original equations
			SC1 if no correct working shown, but 2 correct answers given
7(b)	[ <i>a</i> =] 36	3	<b>B2</b> for either correct
	[b=]-6		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)	$\frac{7x^2 - 12x - 10}{(2x - 5)(x - 1)}$ 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	<b>M2</b> for $\frac{\text{sum of products}}{30}$
			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 $\frac{x \times 52 + 45 \times 75 + 11 \times 91}{x + 45 + 11}$ [= 70.3] M1 for clearing <i>their</i> fraction

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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 1257000 to 1258000	OM
9(b)	$[QB \text{ or } x =] 872 \times \tan 1 \text{ seen}$	M2	<b>M1</b> for tan $1 = \frac{QB}{872}$	
	$\tan = their QB \div 525$	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	<b>M1</b> for $\frac{1}{2} \times 525 \times 872 \times \sin 104$	
9(c)(ii)	5.55 or 5.550 to 5.553 nfww	2FT	<b>FT</b> their (c)(i) $\times 100^2 \div 20000^2$ M1 for their (c)(i) $\times 100^2 \div 20000^2$ or restart	
10(a)	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	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)	¢	1		
10(b)(ii)	Ø	1		
10(c)	21, 23, 24, 29	2FT	Correct or <b>FT</b> <b>SC1</b> for 1 omission or 4 correct and 1 extra	
10(d)(i)	5	1FT	Correct or <b>FT</b> if less than 10	
10(d)(ii)	9	1FT	Correct or <b>FT</b> if less than 10	
10(e)	$\subset$ or $\subseteq$	1		

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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	<b>B1</b> for $3n + k$ (any k) or $kn + 2$ ( $k \neq 0$ )
	47	$(n+3)^2 - (3n+2)$ oe isw	1, 2FT	<b>FT</b> <i>their</i> difference expressions $A - B$ <b>M1</b> for expression $an^2 + bn + c$ seen or second differences 2
	$\frac{7}{6}$	$\frac{n+2}{n+1}$ of final answer	1, 2	<b>B1</b> for $\frac{n+k+1}{n+k}$ seen