Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/42**

Paper 4 (Extended) **May/June 2017**

MARK SCHEME

Maximum Mark: 130

Published

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Question	Answer	Marks	Part marks
1(a)(i)	600 ÷ (11+ 9) × 11 [=330] with no errors seen	**M1**	Could be in separate steps
1(a)(ii)	270	**1**	
1(b)(i)	372 cao nfww	**3**	**B2** for answer 371.7… or **M1** for $330 \times \left(1+\frac{1.5}{100}\right)^{8}$ oe not spoiled After zero scored, **SC1** for answer 42 or 41.7…
1(b)(ii)	12.6 or 12.7 or 12.63 to 12.73	**2**	**M1** for $\frac{\textit{their}\,\textbf{(b)(i)}-330}{330}$ or $\frac{\textit{their}\,\textbf{(b)(i)}}{330}\times 100$ soi by 112.7 or 113 After zero scored, **SC1** for answer 12%
1(c)(i)	$\frac{99}{280}$ cao final answer	**1**	
1(c)(ii)	27.5[0]	**3**	**M2** for $24.75 \div \frac{100-10}{100}$ oe or **M1** for recognising 24.75 as 90[%] oe
1(d)(i)	32 cao	**2**	**M1** for $\left(1-\frac{20}{100}\right)\left(1-\frac{15}{100}\right)$ [x]oe or for 0.15 × 0.8 [x] oe
1(d)(ii)	13 cao	**2**	**M1** for $\left(1-\frac{20}{100}\right)\left(1-\frac{15}{100}\right) \times x = 40.84 - 32$ oe seen or for *their* **(d)(i)** + $\left(1-\left(\frac{\textit{their}\,\textbf{(d)(i)}}{100}\right)\right)x = 40.84$ oe
2(a)(i)	Image at (8, 1), (10, 5), (8, 5)	**2**	**B1** for translation $\begin{pmatrix}6\\k\end{pmatrix}$ or $\begin{pmatrix}k\\-5\end{pmatrix}$ or 3 correct points not joined
2(a)(ii)	Image at (4, 10), (4, 8), (8, 8)	**2**	**B1** for rotation 90˚ anticlockwise but different centre or for rotation 90˚ clockwise about (4, 10) or 3 correct points not joined
2(a)(iii)	Image at (6, 3), (6, 5), (7, 5)	**2**	**B1** for enlargement factor $\frac{1}{2}$ but incorrect centre or 3 correct points not joined
2(b)	Reflection	**1**	
	$y=-x$ oe	**1**	If zero scored, **M1** for correct use of matrix product

Question	Answer	Marks	Part marks
2(c)(i)(a)	$\begin{pmatrix}13\\16\end{pmatrix}$	**2**	**B1** for each in a 2 by 1 matrix or **SC1** for (13 [,] 16)
2(c)(i)(b)	$\begin{pmatrix}2 & 10\\3 & 15\end{pmatrix}$	**2**	**B1** for answer any 2 by 2 matrix
2(c)(i)(c)	$\frac{1}{2}\begin{pmatrix}4 & -3\\-2 & 2\end{pmatrix}$ oe isw	**2**	**B1** for $k\begin{pmatrix}4 & -3\\-2 & 2\end{pmatrix}$ oe soi ($k \neq 0$) or for determinant = 2 oe soi
2(c)(ii)	**NM** or **MP** or $\mathbf{N}^2$ oe or $\mathbf{P}^2$ oe	**1**	
3(a)(i)	175.5 nfww	**4**	**M1** for at least four of 50, 125, 175, 225, 325 soi **M1** for Σfx with x inside or on boundary of each interval **M1** (dep on second **M1**) for $\frac{their\ \Sigma fx}{200}$
3(a)(ii)	Fully correct histogram	**4**	**B1** for each correct bar If zero scored, **B1** for 0.2, 1.32, 0.7, 0.16 seen
3(b)(i)	Fully correct cumulative frequency diagram	**3**	**B1** for correct horizontal plots **B1** for correct vertical plots **B1FT** dep on at least **B1** earned for points joined with smooth increasing curve or polygon If zero scored, **SC1** for 4 correct plotted points
3(b)(ii)(a)	170 to 175	**1**	
3(b)(ii)(b)	152 to 158	**2**	**M1** for 42 to 48 written
4(a)	–1.75 to –1.7	**1**	
	1.7 to 1.75	**1**	
4(b)(i)	Correct ruled solid tangent at (–1.5, 3.5)	**1**	
4(b)(ii)	–7 to –5	**2 dep**	**dep** on close attempt at ruled solid tangent at $x = –1.5$ in part **(b)(i)** **M1** for rise/run dep on close attempt at ruled solid tangent at $x = –1.5$
4(c)(i)	1	**1**	
4(c)(ii)	Correct curve	**3**	**B2** for 4 or 5 correct points or **B1** for 2 or 3 correct points

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Question	Answer	Marks	Part marks
4(d)(i)	–0.95 to –0.8	**1**	
	1.1 to 1.45	**1**	
4(d)(ii)	*their* (–0.95 to –0.8)< x < *their*(1.1 to 1.45) oe	**1FT**	correct or **FT** their **(d)(i)**
4(e)(i)	0.125 oe and 0.03125 oe and 0.000976 to 0.000977 oe	**1**	
4(e)(ii)	0	**1**	accept zero, nought, etc
5(a)(i)	94.2 or 94.3 or 94.24 to 94.26	**2**	**M1** for $\pi \times 3 \times 10$
5(a)(ii)	9.54 or 9.539…	**3**	**M2** for $\sqrt{10^2 - 3^2}$ or **M1** for $h^2 + 3^2 = 10^2$ oe
5(a)(iii)	89.9 or 89.90 to 89.92…	**2**	**M1** for $\frac{1}{3} \times \pi \times 3^2 \times$ *their* **(a)(ii)**
5(b)	108 or 107.9 to 108.1 nfww	**4**	**M3** for $\frac{\pi \times 3 \times 10}{\pi \times 10^2} \times 360$ oe or $\frac{\textit{their}\ \textbf{(a)(i)}}{\pi \times 10^2} \times 360$ oe or $\frac{2 \times \pi \times 3}{2 \times \pi \times 10} \times 360$ oe or **M2** for $\frac{x}{360} \times \pi \times 10^2 = \textit{their}$ **(a)(i)** oe or $\frac{x}{360} \times 2 \times \pi \times 10 = 2 \times 3 \times \pi$ oe or **M1** for $\frac{x}{360} \times \pi \times 10^2$ seen or $\frac{x}{360} \times 2 \times \pi \times 10$ seen
5(c)	46.6 to 46.8	**4**	**M3** for $\frac{\textit{their}\ \textbf{(b)}}{360} \times \pi \times 10^2 - \frac{1}{2} \times 10 \times 10 \times \sin(\textit{their}\ \textbf{(b)})$ oe or **M1** for $\frac{\textit{their}\ \textbf{(b)}}{360} \times \pi \times 10^2$ or *their* **(a)(i)** soi and **M1** for $\frac{1}{2} \times 10 \times 10 \times \sin(\textit{their}\ \textbf{(b)})$ soi
6(a)	$\frac{1}{3}, \frac{6}{7}$ correctly placed	**1**	
	$\frac{4}{7}, \frac{3}{7}$ correctly placed	**1**	

Question	Answer	Marks	Part marks
6(b)	$\frac{2}{21}$ oe	**2**	**M1** for $\frac{2}{3}\times\frac{1}{7}$
6(c)(i)	$\frac{15}{21}$ oe	**3**	**M2** for $\frac{2}{3}\times\frac{6}{7}+\frac{1}{3}\times\frac{3}{7}$ oe or **M1** for $\frac{2}{3}\times\frac{6}{7}$ oe or $\frac{1}{3}\times\frac{3}{7}$ oe seen
6(c)(ii)	50	**2FT**	**FT** (70 × *their* **(c)(i)**) rounded up or down to integer **M1** for 70 × *their* **(c)(i)**
6(d)	$\frac{10}{243}$ oe	**2**	**M1** for $\frac{2}{3}\times\frac{1}{3}\times\frac{1}{3}\times\frac{1}{3}\times\frac{1}{3}[\times k]$ oe nfww where k is positive integer less than 5
7(a)(i)	4.5 or $4\frac{1}{2}$ or $\frac{9}{2}$ final answer	**3**	**M2** for [2](4x + 7) = [2](6x – 2) oe or **M1** for 2(2x + 6) + 2(2x + 1) oe or 4(3x – 1) oe or **M1** for correctly reaching $ax = b$ from *their* linear equation
7(a)(ii)	$(2x+6)(2x+1)=(3x-1)^2$	**M1**	May be seen in different stages
	$5x^2-20x-5\,[=0]$ oe	**B3**	**B1** for $4x^2 + 2x + 12x + 6$ or better **B1** for $9x^2 – 3x – 3x + 1$ or better
	$\frac{-(-20)\pm\sqrt{(-20)^2-4(5)(-5)}}{2(5)}$ oe	**M2**	**FT** their 3 term quadratic provided formula used or complete the square **M1** for $\sqrt{(-20)^2-4(5)(-5)}$ oe or if in form $\frac{-(-20)+\sqrt{q}}{2(5)}$ or $\frac{-(-20)-\sqrt{q}}{2(5)}$ **FT**± *their* quadratic or for completing the square **M2** for $2\pm\sqrt{1+2^2}$ or **M1** for $(x – 2)^2$
	4.24 or 4.236… cao	**B1**	
7(b)(i)	$(x+5)(x-1)$ final answer	**2**	**B1** for $x(x – 1) + 5(x – 1)$ or $x(x + 5) –[1](x + 5))$ or for $(x+a)(x+b)$ where $ab = – 5$ or $a + b = 4$

Question	Answer	Marks	Part marks
7(b)(ii)	$5(x+1)-8x=x(x+1)$ or $5x+5-8x=x^2+x$	**M2**	Could be seen in different stages **M1** for $5(x+1)-8x$ seen or for common denominator of $x(x+1)$ for LHS or both sides soi
	–5 and 1 cao	**A2**	**A1** for $x^2+4x-5\,[=0]$ oe
8(a)	66[.0] or 66.03 to 66.04	**2**	**M1** for tan = $\frac{9}{4}$ oe
8(b)	$\sqrt{3^2+4^2}$ or $\frac{1}{2}\sqrt{6^2+8^2}$	**M1**	Any alternative method must be full and complete and result in exactly 5
8(c)	60.9 or 60.94 to 60.95	**2**	**M1** for tan = $\frac{9}{5}$ oe
8(d)	5.83 or 5.84 or 5.827 to 5.840	**6**	**M1** for [PB or PC =] $\sqrt{9^2+5^2}$ or [XC =] $\sqrt{9^2+5^2}-7.5$ **M1** for angle $BPX = 2\times$ invsin $\frac{3}{their\ PB}$ oe **B1** for [PB or PC =] $\sqrt{106}=10.29$ to 10.30 or XC = 2.79 to 2.8[0] or angle BPX = 33.9 or 33.86 to 33.90… **M2** for $\sqrt{(their\ PB)^2+7.5^2-2\times their\ PB\times 7.5\times\cos(their\ BPX)}$ oe or **M1** for correct implicit equation
9(a)(i)	100	**1**	
9(a)(ii)	92.3 or 92.29… to 92.31	**3**	**M2** for $200\div(2+\frac{10}{60})$ oe or **M1** for 200 ÷ *their* time interval or **M1** for $\frac{10}{60}$ soi oe
9(b)(i)	240 nfww	**3**	**M2** for $\frac{V}{2}\left(\frac{30}{60}+\frac{20}{60}\right)=100$ oe or **M1** for any correct relevant area seen in terms of V
9(b)(ii)	$\frac{2}{9}$ oe	**2FT**	**FT** for *their* **(b)(i)** ÷ 1080 to 3 sf or better **M1** for *their* **(b)(i)** $\times\frac{1000}{3600}$ soi

Question	Answer	Marks	Part marks
10(a)	–11	**1**	
10(b)	7	**2**	**M1** for $3x - 2 = 19$ or better
10(c)	25	**2**	**M1** for $3 \times 3^x - 2$ oe
10(d)	$9x^2 - 8x + 2$ final answer	**3**	**M1** for $(3x-2)^2 + 3x - 2 + x$ oe **B1** for $\left[(3x-2)^2 =\right] 9x^2 - 6x - 6x + 4$ oe
10(e)	$\frac{x+2}{3}$ oe final answer	**2**	**M1** for $x = 3y - 2$ or $y + 2 = 3x$ or $\frac{y}{3} = x - \frac{2}{3}$ or better