Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/42**

Paper 4 (Extended) **October/November 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 International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2017 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

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	Partial marks
1(a)(i)	4 : 5	**1**	
1(a)(ii)	4 : 5	**1**	
1(a)(iii)	3 : 4	**2**	**B1** for 12 : 16 or answer 4 : 3
1(b)(i)	26.8 or 26.79…	**3**	**M2** for $\frac{15600-11420}{15600}[\times 100]$ or $\frac{11420}{15600}\times 100$ or **M1** for $\frac{11420}{15600}$
1(b)(ii)	16 000 nfww	**3**	**M2** for $15600\times\frac{100}{100-2.5}$ oe or **M1** for 15600 associated with 97.5[%] seen
1(c)	1.6 or $\frac{8}{5}$	**2**	**M1** for $\frac{200\times x\times 15}{100}=48$ oe or **M1** for figs 16
1(d)	2.5 or $\frac{5}{2}$ cao nfww	**3**	**B2** for 2.49[9…] or 102.4[99…] or 1.024[99…] or 2.50 or 102.5 or 1.025 or **M2** for $\sqrt[10]{\frac{256}{200}}$ oe or **M1** for $256=200(x)^{10}$ seen

Question	Answer	Marks	Partial marks
2(a)(i)	1070 or 1072. ..	**3**	**M1** for $\pi \times 8^2 \times 2 \times 8$ **M1** for $\frac{4}{3} \times \pi \times 8^3$ or **M2** for $\frac{2}{3}\pi r^3$ or **M1** for $\pi r^2 2r - \frac{4}{3}\pi r^3$
2(a)(ii)	2.58 or 2.580 to 2.581	**3**	**B2** for $r^3 = \frac{36 \times 3}{2\pi}$ or better or **M1** for $\pi \times r^2 \times 2 \times r - \frac{4}{3} \times \pi \times r^3 = 36$ oe
2(b)(i)	4.24 or 4.241 to 4.242	**4**	**M3** for $(\pi \times 5^2 + \pi \times 5 \times \sqrt{5^2 + 12^2})$ or **M2** for $\pi \times 5 \times \sqrt{5^2 + 12^2}$ or **M1** for $5^2 + 12^2$ or $\pi \times 5^2$
2(b)(ii)	64 cao final answer	**3**	**M2** for $\frac{[k\pi] \times 5^2 \times 12}{[k\pi] \times 1.25^2 \times 3}$ or **M1** for $\frac{1}{3} \times \pi \times 5^2 \times 12$ or $\frac{1}{3} \times \pi \times 1.25^2 \times 3$ OR **M2** for 4^3 or $\left(\frac{1}{4}\right)^3$ seen or **M1** for factor 4 or $\frac{1}{4}$ soi
3(a)	7040 or 7035. …	**3**	**M1** for $\frac{1}{2} \times 100 \times 70$ oe **M1** for $\frac{1}{2} \times 100 \times 110 \times \sin 40$ oe
3(b)	374 or 375 or 374.4 to 374.5….	**5**	**M2** for $110^2 + 100^2 - 2 \times 110 \times 100 \times \cos 40$ oe or **M1** for implicit form **A1** for 5250 or 5247. … (or 72.4 or 72.43 to 72.44) **M1** for $70^2 + 100^2$
3(c)	64.3 or 64.27 to 64.28 nfww	**2**	**M1** for $\sin 40 = \frac{\text{distance}}{100}$ oe
3(d)	235	**3**	**B2** for [angle ACB =] 34.99 to 35 or [angle ABC =] 55[.0…] or **M1** for $\tan[ACB] = \frac{70}{100}$ or $\tan[ABC] = \frac{100}{70}$ or equivalent trig ratio

Question	Answer	Marks	Partial marks
4(a)(i)	Correct translation	**2**	**B1** for translation $\begin{pmatrix}6\\k\end{pmatrix}$ or $\begin{pmatrix}k\\-2\end{pmatrix}$
4(a)(ii)	Correct rotation	**2**	**B1** for rotation 180° but other centre
4(a)(iii)	Correct reflection	**2**	**B1** for reflection in $y = -x$
4(b)(i)	Enlargement [factor] $\frac{1}{2}$ or 0.5 [centre] (0, 0) oe	**3**	**B1** for each
4(b)(ii)	$\begin{pmatrix}\frac{1}{2} & 0\\0 & \frac{1}{2}\end{pmatrix}$ oe	**2**	**B1** for matrix of form $\begin{pmatrix}k & 0\\0 & k\end{pmatrix}$ oe, $k \neq 0$ or 1
4(c)	± 2.5	**3**	**B2** for $25u^2 = 156.25$ or $5u = [\pm]12.5$ or **M1** for $(4u)^2 + (3u)^2$
5(a)	3.2 or 3.15 or 3.152 to 3.153 5.2 or 5.19 or 5.20 or 5.196…	**2**	**B1** for each
5(b)	Correct graph for $0.5 \leqslant x \leqslant 3.5$	**4**	**B3FT** for 6 or 7 correct points or **B2FT** for 4 or 5 correct points or **B1FT** for 2 or 3 correct points
5(c)	1.7 to 1.8	**1FT**	**FT** *their* graph if one answer
5(d)(i)	Any integer $k \geqslant -1$	**1**	
5(d)(ii)	Any integer $k < -1$	**1**	
5(e)	Tangent ruled at $x = -3$	**B1**	
	2.5 to 4	**B2**	**dep** on tangent drawn at $x = -3$ or close attempt at tangent at $x = -3$ **M1** for rise/run also dep on tangent at $x = -3$ or close attempt at tangent at $x = -3$

Question	Answer	Marks	Partial marks
5(f)(i)	$y = 6 - x$ ruled accurately	**M2**	**M1** for correct line but freehand or ruled line gradient –1.1 to –0.9, or through (0, 6) but not $y = 6$
	$2.85 \leqslant x \leqslant 3$	**A1**	
5(f)(ii)	[a =] 8 [b =] –48 [c =] –16	**4**	**B3** for 2 correct or $x^5 + 8x^3 - 48x^2 - 16 = 0$ seen or $-x^5 - 8x^3 + 48x^2 + 16 = 0$ seen or **M2** for correct multiplication by $8x^2$ or **B1** for answers ± 8, ± 48, ± 16 or **M1** for $\frac{x^2 \times x^3 - 8 \times 2}{x^2 \times 8} = 6 - x$ or **M1** for correct multiplication by 8 or **M1** for correct multiplication by x^2
6(a)(i)	280	**1**	
6(a)(ii)	320	**1**	
6(a)(iii)	90	**1**	
6(a)(iv)	10	**2**	**M1** for 90 written
6(b)(i)	250.2 nfww cao	**4**	**M1** for at least 4 correct mid-values **M1** for Σfx **M1 dep on second M1** for $\Sigma fx \div 100$
6(b)(ii)	Correct completion of histogram	**4**	**B1** for each correct block If zero scored, then **SC1** for correct frequency densities seen
6(c)	[22 m] further oe	**1**	
7(a)	$\frac{5}{6}$	**1**	
7(b)	$\frac{4}{36}$ oe	**2**	**M1** for $\frac{2}{6} \times \frac{2}{6}$
7(c)	20	**1**	

Question	Answer	Marks	Partial marks
7(d)(i)	Diagram completed correctly x x 3 3 3 9 x x 2 2 2 6 x x 2 2 2 6 x x 2 2 2 6 x x 1 1 1 3	**2**	**B1** for 3 correct columns or for 4 correct rows
7(d)(ii)(a)	$\frac{9}{36}$ oe	**1FT**	**FT** *their* **(d)(i)**
7(d)(ii)(b)	$\frac{4}{36}$ oe	**1FT**	**FT** *their* **(d)(i)**
7(e)	$\frac{512}{7776}$ oe	**2**	**M1** for $\left(\frac{4}{6}\right)^k \times \frac{2}{6}$ oe $k = 3$, 4 or 5 only
8(a)(i)	$7a + 9p = 354$ oe final answer	**1**	
8(a)(ii)	$[a =]$ 21 $[p =]$ 23	**3**	**M1** for correctly eliminating one variable **A1** for $a = 21$ **A1** for $p = 23$
8(b)(i)	$\frac{2}{x}$	**1**	
8(b)(ii)(a)	$\frac{2}{x} + \frac{3}{x-1} = 2$	**M1**	
	$2(x-1) + 3x = 2x(x-1)$ oe	**M1dep**	Both sides of the equation could be over $x(x-1)$ at this stage Dep on **M1** or 3 term equation with fractions but one sign error
	$2x - 2 + 3x = 2x^2 - 2x$ oe $2x^2 - 7x + 2 = 0$	**A1**	Answer reached with one correctly expanded line seen and no errors seen
8(b)(ii)(b)	$\sqrt{(-7)^2 - 4(2)(2)}$	**B1**	or for $\left(x - \frac{7}{4}\right)^2$
	$\frac{--7 + \sqrt{q}}{2 \times 2}$ or $\frac{--7 - \sqrt{q}}{2 \times 2}$	**B1**	or for $\frac{7}{4} + \text{or} - \sqrt{-1 + \left(\frac{7}{4}\right)^2}$
	3.19 only	**B2**	**B1** for 3.19 with other root or for 3.2 or 3.186… isw other root or for 0.31 or 0.314 or 0.3138 to 0.3139

Question	Answer	Marks	Partial marks
9(a)	3	**1**	
9(b)	$-\frac{2}{5}$ oe	**2**	**M1** for $2(1-2x)=x+4$
9(c)	$-2x-7$ final answer	**2**	**M1** for $1-2(x+4)$
9(d)	26	**2**	**B1** for h(5) soi or **M1** for $\left(x^2+1\right)^2+1$
9(e)	$\frac{1-x}{2}$ oe final answer	**2**	**M1** for $x=1-2y$ or $2x=1-y$ or $\frac{y}{2}=\frac{1}{2}-x$ or $y-1=-2x$
9(f)	$[p=]-20$ $[q=]26$	**4**	**B3** for [hgf(x)] = $4x^2-20x+26$ seen and not spoilt by further working or **M1** for $(1-2x)+4$ **M1 dep** for $(their\ (5-2x))^2+1$ **B1FT dep** for $25-10x-10x+4x^2$
10(a)	5.68 or 5.684 to 5.685	**5**	**M2** for $2x\sqrt{x^2+x^2}$ oe or $2\times\sqrt{2}\times x^2$ or **M1** for $x\sqrt{2}$ or $\sqrt{x^2+x^2}$ oe soi **M1** for $\frac{270}{360}\times\pi\times x^2$ oe **M1** for $0.5\ x^2$ oe
10(b)	4.4[0] or 4.398 to 4.401	**2**	**dep** on a correct value for k in **(a)** **M1** for $\left[x^2\right]=\frac{110}{their\ k}$