Cambridge IGCSE

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MATHEMATICS **0626/04**

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

MARK SCHEME

Maximum Mark: 84

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.

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

MARK SCHEME NOTES

The following notes are intended to aid interpretation of mark schemes in general, but individual mark schemes may include marks awarded for specific reasons outside the scope of these notes.

Types of mark

M   Method marks, awarded for a valid method applied to the problem.

A   Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. For accuracy marks to be given, the associated Method mark must be earned or implied.

B   Mark for a correct result or statement independent of Method marks.
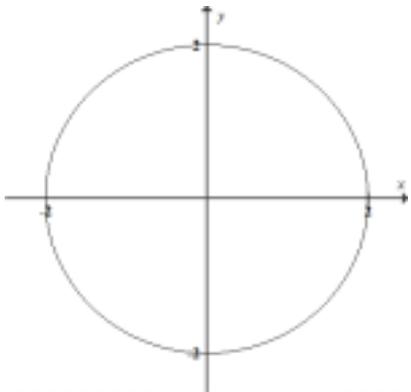
When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation '**dep**' is used to indicate that a particular M or B mark is dependent on an earlier mark in the scheme.

Abbreviations

awrt	answers which round to
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
nfww	not from wrong working
oe	or equivalent
rot	rounded or truncated
SC	Special Case
soi	seen or implied

Question	Answer	Marks	Part Marks
1	5	**2**	**B1** for two from 60, 0.5 and 9 soi
2	$\dfrac{4}{9}$	**2**	**M1** for $\dfrac{9}{4}$ or $\dfrac{1}{2\frac{1}{4}}$ or $\dfrac{1}{2.25}$ or $\dfrac{1}{their\,9/4}$
3	Correct bisector drawn with 2 correct pairs of arcs	**2**	**M1** for correct bisector with incorrect or no arcs or 2 correct pairs of arcs seen.
4(a)	1000	**2**	**M1** for 10^3 or $\left(10^6\right)^{\frac{1}{2}}$ or $\sqrt{1000000}$ $\sqrt{1000000}$ or $\sqrt{1000\times1000}$
4(b)	$\dfrac{1}{5}$ oe	**1**	
4(c)	3	**2**	**M1** for $27^{\frac{1}{3}}$ or 27 or $(32-5)$ seen
5	$[y=]-2x+5$ final answer	**3**	**B2** for $[y=]mx+5,\ m\neq0$ or $[y=]-2x+c$ or for $[y=]\,(their\,-2)x+their\,c$ provided calculation for *their* −2 seen and *their c* follows *their m* or **B1** for $[y=]mx+5$ and **M1** for $\dfrac{5-(-1)}{0-3}$ oe or for correct substitution of $(3,-1)$ or $(0,5)$ into *their* linear equation,
6(a)	$\begin{pmatrix}17\\-6\end{pmatrix}$	**2**	**B1** for $\begin{pmatrix}12\\-4\end{pmatrix}$ or $\begin{pmatrix}17\\k\end{pmatrix}$ or $\begin{pmatrix}k\\-6\end{pmatrix}$ or $\begin{pmatrix}17\\-6\end{pmatrix}$
6(b)	$[a=]\dfrac{1}{2}$, $[b=]4$	**2**	**B1** for each or **M1** for $4a-2b=-6$ or $[0a+]\,3b=12$
7	$[x=]4$, $[y=]-3$	**4**	**M1** for two correct equations with a common coefficient for *x* or *y*; allow one error in arithmetic or for correct rearrangement of one of the equations to either $x=\ldots$ or $y=\ldots$; allow one sign error **M1** for correct elimination of *x* or *y*; allow one further error in arithmetic **A1** for one correct answer from correct working If M0 scored, **SC1** for both of *their* answers satisfying one of the original equations

Question	Answer	Marks	Part Marks
8(a)	3.5cm circle centre A	1	
8(b)	Correct region shaded	2	**B1** for arc centre B, radius 7cm, crossing a circle centre A twice and **B1FT** for correct region shaded, following through *their* intersecting circles
9(a)	$5y(x-4y)$ final answer	2	**M1** for $5(xy-4y^2)$ or $y(5x-20y)$ or $5y(x-4y)$ **Error! Digit expected.**seen
9(b)(i)	$(w-1)(w+1)$	1	
9(b)(ii)	9800	2	**M1** for $(99-1)(99+1)$ seen or for $w = 99$ substituted into *their* (b)(i)

10	$-6, 8$	3	**M2** for $(x+6)(x-8)$
			 or **M1** for $(x+a)(x+b)$ $(x \pm 6)(x \pm 8)$
			      where $ab = -48$ or $a + b = -2$
			      or for $x(x-8)+6(x-8)$
			      or $x(x+6)-8(x+6)$
			 After M1, **SC1** for $x = -their\ a, x = -their\ b$
			
			 If 0 scored, **SC1** for an answer of -6 or 8

11	$1\dfrac{23}{30}$ final answer	3	**M1** for use of common denominator of $30k$ with at least one correct numerator seen. **M1** for $2\dfrac{18k}{30k}-\dfrac{25k}{30k}$ or $1\dfrac{48k}{30k}-\dfrac{25k}{30k}$ or $\dfrac{78k}{30k}-\dfrac{25k}{30k}$ or $2-\dfrac{7k}{30k}$ oe seen
12	$x = \dfrac{y+z}{w}$ oe isw	2	**M1** for correct first step: $y + z = wx$ or $\dfrac{y}{w} = x - \dfrac{z}{w}$ If 0 scored then **SC1** for $\dfrac{y+z}{w}$ or $x = \dfrac{y}{w}+z$ or $x = \dfrac{y-z}{w}$ oe

Question	Answer	Marks	Part Marks
13	Circle passing through (0, 2), (2, 0), (−2, 0), (0, −2) and axis intercepts labelled	**2**	**M1** for a circle drawn centre (0,0) or for a circle of radius 2 units or for points (0, 2), (2, 0), (−2, 0) and (0, –2) labelled
14(a)	Correct bar drawn, height 0.2, width 25-40 and vertical axis labelled correctly.	**3**	**B2** for correct bar drawn or **M1** for 0.9 found and 0.2 seen, or reference to area of 6 small grid rectangles for missing bar **B1** for frequency density scale correctly labelled on *y*-axis
14(b)(i)	25	**1**	
14(b)(ii)	68	**2**	**M1** for $9 + \dfrac{4}{5} \times their\,10$ or 17 seen
15(a)	Reflection $y = -x$ oe	**2**	**B1** for each More than one transformation scores zero.
15(b)	$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$	**2**	**M1** for one column or one row correct or **SC1** for $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$
16(a)	$5\sqrt{3}$ cao	**1**	
16(b)	$\dfrac{22}{4-\sqrt{5}} \times \dfrac{4+\sqrt{5}}{4+\sqrt{5}}$	**M1**	
	$\dfrac{22\left(4+\sqrt{5}\right)}{16\left[+4\sqrt{5}-4\sqrt{5}\right]-5}$	**M1**	Allow $\sqrt{5}\sqrt{5}$ for 5 and 4^2 for 16
	Completion to $8+2\sqrt{5}$	**A1**	At least one more correct step to be seen If 0 scored, **SC1** for $k = 2$

Question	Answer	Marks	Part Marks
17(a)	$\dfrac{1}{2}$ or 0.5	2	**M1** for $\cos 30 = \dfrac{\sqrt{3}}{2}$ or $\tan 30 = \dfrac{1}{\sqrt{3}}$ or $\cos 30 \times \tan 30 = \sin 30$ or final answer $\sin 30$
17(b)	45° and 135°	4	**M1** for $\sin x = \dfrac{\sqrt{2}}{2}$ **A1** for $[x=]45°$ **M1** for $180 - their\,45$ or diagrammatic representation **A1** for $[x=]135°$ with no extra values within range
18(a)	$\begin{pmatrix} 12 & -19 \\ -16 & 17 \end{pmatrix}$	2	**M1** for 2 or 3 correct values
18(b)(i)	$\begin{pmatrix} 0.1 & -0.3 \\ 0.2 & 0.4 \end{pmatrix}$ oe	2	**M1** for $4 \times 1 - 3 \times (-2)$ soi, or $\begin{pmatrix} 1 & -3 \\ 2 & 4 \end{pmatrix}$ soi
18(b)(ii)	$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$	1	
19	$[a=]$ 24, $[b=]$ 32	4	**B1** for $a + b = 56$ soi **M1** for $2(a + b) = b + 80$ oe soi **A1** for $b = 32$ **A1** for $a = 24$ Alternative method: **B1** for angle $LMO = 34$ soi **B1** for $b = 32$ **M1** for $2(a + b) = b + 80$ or $2(a + their\,b) = their\,b + 80$ **A1** for $a = 24$
20(a)(i)	$\dfrac{1}{6}$ oe	2	**M1** for $\dfrac{6}{10} \times \dfrac{5}{9} \times \dfrac{4}{8}$
20(a)(ii)	$\dfrac{5}{6}$ oe	1	**FT** for $1 - their$ (a)(i)
20(b)(i)	$\dfrac{5}{36}$ oe	2	**M1** for $\dfrac{5}{6} \times \dfrac{1}{6}$

Question	Answer	Marks	Part Marks
20(b)(ii)	$\left(\dfrac{5}{6}\right)^{n-1} \times \dfrac{1}{6}$ oe	2	**B1** for $\left(\dfrac{5}{6}\right)^{n-1}$ seen or **SC1** for final answer $\left(\dfrac{5}{6}\right)^{n} \times \dfrac{1}{6}$ or pattern clearly identified but poor or incorrect notation used in final answer.

21	$x^3 + 2x^2 - 9x - 18$
	 final answer
		3	**M2** for $x^3 + 2x^2 - 9x - 18$ with one error
			
			      or $\left(x^2 - 9\right)\left(x + 2\right)$
			      or $\left(x^2 - x - 6\right)\left(x + 3\right)$
			      or $\left(x^2 + 5x + 6\right)\left(x - 3\right)$ clearly attempted,
			      with no more than one error
			
			 or **M1** for $\left(x^2 + 3x - 3x - 9\right)$ allow one error
			        or $\left(x^2 - 3x + 2x - 6\right)$ allow one error
			        or $\left(x^2 + 3x + 2x + 6\right)$ allow one error

22	$[a =]$ 2, $[b =]$ 54	5	**M1** for differentiation **A1** for correct $4ax^3 + b$ **M1dep** for substituting $x = 0$ into *their* $\dfrac{\mathrm{d}y}{\mathrm{d}x}$, and equating to 54 **M1dep** for substituting $x = -1$ into *their* $\dfrac{\mathrm{d}y}{\mathrm{d}x}$ and equating to 46