Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/23**

Paper 2 Extended **October/November 2018**

MARK SCHEME

Maximum Mark: 70

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 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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	126	**1**	
2	$y(1-2y)$ final answer	**1**	
3	2	**1**	
4	6.59 or 6.594 to 6.595	**1**	
5	$\frac{9}{25}$ oe	**1**	
6(a)	5 000 207	**1**	
6(b)	8.13×10^{-3}	**1**	
7	$-3p-4q$ final answer	**2**	**B1** for $-3p$ or $-4q$
8(a)	0.076 cao	**1**	
8(b)	10 000 cao	**1**	
9	$\frac{1}{4}\times\frac{3}{2}$ or $\frac{3}{12}\div\frac{8}{12}$ oe	**M1**	
	$\frac{3}{8}$ oe	**A1**	Accept equivalent fractions
10	13	**2**	**M1** for $3w=32+7$ or $w-\frac{7}{3}=\frac{32}{3}$ or better
11	$\frac{A-\pi r^2}{\pi r}$ or $\frac{A}{\pi r}-r$ oe final answer	**2**	**M1** for $A-\pi r^2=\pi rl$ or $\pi r^2-A=-\pi rl$ or $\frac{A}{\pi r}=l+r$
12	6.5[0] nfww final answer	**2**	**M1** for 42.5 – 0.25 implied by 42.25
13	1.88… – 0.188.. oe	**M1**	e.g. 18.88… – 1.88… or 18.88… – 0.188…
	$\frac{17}{90}$ or equivalent fraction	**B1**	

Question	Answer	Marks	Partial Marks
14	Reflection $y = x$	**2**	**B1** for each
15	600	**3**	**M2** for $\frac{108 \times 1000 \times 20}{60 \times 60}$ oe or **M1** for $\frac{108 \times 1000}{60 \times 60}$ oe or for figs108 × time oe
16(a)	$\frac{1}{w}$ or w^{-1}	**1**	
16(b)	$27w^9$ final answer	**2**	**B1** for kw^9 or $27w^k$
17	10	**3**	**M1** for $y = k\sqrt{x}$ **M1** for $y =$ *their* $k \times \sqrt{25}$ OR **M2** for $\frac{y}{6} = \sqrt{\frac{25}{9}}$
18	$\frac{1}{x(x+1)}$ oe final answer nfww	**3**	**B1** for common denominator $x(x+1)$ oe **M1** for $x + 1 - x$
19	$[p =]$ 12 $[q =] \frac{12}{5}$ oe	**3**	**B1** for $[p =]$ 12 and **B2** for $[q =] \frac{12}{5}$ or **M1** for $\frac{72}{360}[\times\pi] \times 2 \times 6$ oe
20	$\frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(-2)}}{2(3)}$ oe	**B2**	**B1** for $\sqrt{(-2)^2 - 4(3)(-2)}$ or better or **B1** for $\frac{-(-2) + \sqrt{q}}{2(3)}$ or $\frac{-(-2) - \sqrt{q}}{2(3)}$
	–0.55, 1.22	**B2**	**B1** for each If zero scored, **SC1** for – 0.6 and 1.2 or –0.549 or –0.548… and 1.215… or 0.55 and −1.22 or –0.55 and 1.22 seen in working

Question	Answer	Marks	Partial Marks
21(a)	1.2	**1**	
21(b)	45	**3**	**M2** for $\frac{1}{2}\times10\times12+12(T-10)[=480]$ oe or **M1** for one relevant area OR **M1** for $480-\frac{1}{2}\times10\times12$ implied by 420 **M1** for $\frac{420}{12}$ [+ 10]
22	$\frac{x-1}{x}$ or $1-\frac{1}{x}$ nfww final answer	**4**	**B1** for $x(2x+1)$ **B2** for $(2x+1)(x-1)$ or **B1** for $2x(x-1)+[1](x-1)$ or $x(2x+1)-[1](2x+1)$ or $(2x+a)(x+b)$ where $ab=-1$ or $a+2b=-1$
23	16.6 or 16.60…	**4**	**M3** for $\tan=\frac{4}{\sqrt{12^2+6^2}}$ oe or **M2** for $\sqrt{12^2+6^2}$ or **M1** for 12^2+6^2 oe or **B1** for recognising angle PAC is required
24(a)	$\begin{pmatrix}9 & 3\\ 6 & 9\end{pmatrix}$	**1**	
24(b)	$\begin{pmatrix}2 & 10\\ -1 & 16\end{pmatrix}$	**2**	**B1** for 2 or 3 correct elements
24(c)	$\frac{1}{6}\begin{pmatrix}4 & -2\\ 1 & 1\end{pmatrix}$ oe isw	**2**	**B1** for $k\begin{pmatrix}4 & -2\\ 1 & 1\end{pmatrix}$ soi or det = 6 soi
25(a)	$(x+y)(p-1)$ final answer	**2**	**M1** for $p(x+y)-(x+y)$ or $x(p-1)+y(p-1)$
25(b)	$2(t+7m)(t-7m)$ final answer	**3**	**M2** for $(2t+14m)(t-7m)$ or $(t+7m)(2t-14m)$ or correct answer seen or **M1** for $2(t^2-49m^2)$ or $(t+7m)(t-7m)$ or $2(t+7)(t-7)$

Question	Answer	Marks	Partial Marks
26(a)	$\mathbf{c} + \frac{2}{3}\mathbf{a}$	**2**	**M1** for correct unsimplified form or correct route e.g. $\overrightarrow{OC} + \overrightarrow{CP}$
26(b)(i)	$\frac{2}{5}\mathbf{a} + \frac{3}{5}\mathbf{c}$	**2**	**M1** for correct unsimplified form or correct route e.g. $\overrightarrow{OC} + \overrightarrow{CX}$
26(b)(ii)	3 : 2 oe	**2**	**B1** for $\overrightarrow{OX} = \frac{3}{5}\overrightarrow{OP}$ oe or $\overrightarrow{XP} = \frac{2}{5}\mathbf{c} + \frac{4}{15}\mathbf{a}$