Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education (9–1)

MATHEMATICS **0980/02**

Paper 2 (Extended) **For examination from 2019**

MARK SCHEME

Maximum Mark: 70

Specimen

This document consists of **6** printed pages.

Cambridge Assessment International Education

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	5.34×10^7	**1**	

Question	Answer	Marks	Partial Marks
2	9 [h] 30 [min] cao	**1**	

Question	Answer	Marks	Partial Marks
3	$\frac{1}{4}$ or 0.25	**1**	

Question	Answer	Marks	Partial Marks
4(a)	7	**1**	
4(b)	Any number except 3, 7 or 20	**1**	

Question	Answer	Marks	Partial Marks
5	0.2 oe	**2**	**M1** for $1 – (0.15 + 0.3 + 0.35)$

Question	Answer	Marks	Partial Marks
6	8×10^3 or 8000 nfww	**2**	**M1** for $w + 4 \times 10^3 = 1.2 \times 10^4$ oe or $5w + 20 \times 10^3 = 6 \times 10^4$ oe

Question	Answer	Marks	Partial Marks
7	Parallel	**1**	
	Same length	**1**	

Question	Answer	Marks	Partial Marks
8	$2n^2 + 3$ oe final answer	**2**	**M1** for a quadratic expression as final answer or $2n^2 + 3$ oe in working

Question	Answer	Marks	Partial Marks
9	$\frac{23}{90}$ oe, must be fraction	**2**	**M1** for $25.\dot{5} – 2.\dot{5}$ oe e.g. $2.55^r – 0.25^r$ or **B1** for $\frac{k}{90}$

Question	Answer	Marks	Partial Marks
10	7	**2**	**B1** for 120.5 or 113.5 seen

Question	Answer	Marks	Partial Marks
11	$\frac{1}{5}\begin{pmatrix}-2 & -1\\ 11 & 3\end{pmatrix}$ oe	**2**	**M1** for $k\begin{pmatrix}-2 & -1\\ 11 & 3\end{pmatrix}$ soi or $\frac{1}{5}\begin{pmatrix}a & b\\ c & d\end{pmatrix}$ or det = 5 soi

Question	Answer	Marks	Partial Marks
12	$\frac{8}{3}$	**1**	**B1** or $\frac{40}{15}$ accept $\frac{3}{8}$ or $\frac{15}{40}$
	$\frac{4}{5} \times$ *their* $\frac{3}{8}$ oe	**1**	**M1** or $\frac{12}{15} \div$ *their* $\frac{40}{15}$ or equivalent division with fractions with common denominators
	$\frac{3}{10}$ cao	**1**	

Question	Answer	Marks	Partial Marks
13(a)	11	**1**	
13(b)	8	**2**	**FT** $30 - 2 \times$ *their* **(a)** or **M1** for $4 \times 7 = 2(x - 1) + FG$ oe or $4(x - 4) = 2(x - 1) + FG$ oe or $2 \times 7 + 2(x - 4) = 2(x - 1) + FG$ oe Allow x to be *their* **(a)** in each case

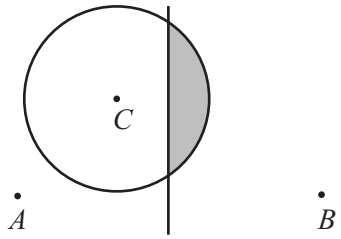
Question	Answer	Marks	Partial Marks
14	684	**3**	**M2** for $0.95 \times 4 \times 3 \times 60$ or **M1** for 0.95×4 [$\times 3$] or $4 \times 3 \times 60$ or $0.95 \times 3 \times 60$ or $0.95 \times 4 \times 60$

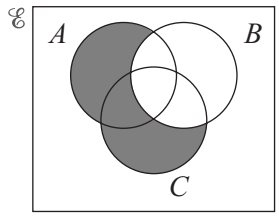
Question	Answer	Marks	Partial Marks
15	$\frac{2x-23}{(x+2)(2x-5)}$ final answer	**3**	**B1** for a common denominator of $(x + 2)(2x - 5)$ **B1** for $3(2x - 5) - 4(x + 2)$ or better or **SC2** for final answer $\frac{2x-7}{(x+2)(2x-5)}$ or **SC1** for numerator of $2x - 7$ in final answer

Question	Answer	Marks	Partial Marks
16(a)(i)	0.5 or –0.5 or $\frac{1}{2}$ or $-\frac{1}{2}$	**1**	
16(a)(ii)	4	**1**	
16(b)	1.37 or 1.37[4…]	**1**	

Question	Answer	Marks	Partial Marks
17(a)	$[y =] 2x + 3$ cao	**3**	**M2** for correct unsimplified equation or **B1** for gradient = (11 – 3) ÷ (4 – 0) or better and **B1** for $c = 3$
17(b)	$-\frac{1}{2}$ oe	**1**	**FT** –1 ÷ *their m*

Question	Answer	Marks	Partial Marks
18(a)	78	**3**	**M2** for $5 \times 12 + \frac{1}{2} \times 12 \times (8 - 5)$ or $\frac{1}{2} \times 6 \times (5 + 8) \times 2$ oe or **M1** for 5×12, $\frac{1}{2} \times 12 \times (8 - 5)$, $\frac{1}{2} \times 6 \times (5 + 8)$ or $12 \times 8 - (\ldots)$
18(b)	1170	**1**	**FT** 15 × *their* **(a)**

Question	Answer	Marks	Partial Marks
19(a)		**1**	Correct circle, radius 4 cm centre *C*
19(b)		**2**	**B2** for correct bisector with 2 pairs of correct arcs or **B1** for correct bisector with no/wrong arcs
19(c)		**1**	Correct complete boundary and correct shading. Dep on at least **B1** in **(b)**

Question	Answer	Marks	Partial Marks
20(a)(i)	4	**1**	
20(a)(ii)	{3, 9}	**1**	
20(a)(iii)	fewer than 6 numbers from {1, 3, 5, 7, 9, 11} or ∅	**1**	
20(b)		**1**	

Question	Answer	Marks	Partial Marks
21(a)	$m = 2$ $n = -10$	**2**	**B1** for $m = 2$ **B1** for $n = -10$ If 0 scored **SC1** for $(x + 2)^2$ in working or $x^2 + 2mx + m^2 + n$ and equating coefficients $2m[x] = 4[x]$ or $m^2 + n = -6$

Question	Answer	Marks	Partial Marks
21(b)	**1.16** or 1.16[2…] from completing square	**2**	**FT** *their* **(a)** dep on negative *n* **B1** for $(x + \textit{their } m)^2 = -\textit{their } n$ or **SC1** for correct answer from using formula or for both answers 1.16 **and** –5.16 whatever method used

Question	Answer	Marks	Partial Marks
22(a)	44	**2**	**M1** for 48 soi
22(b)	24	**2**	**M1** for 40 or 16 or both lines drawn from 15 **and** 45 across and down to the horizontal axis
22(c)	5	**2**	**M1** for answer 55 or line or mark on graph indicating 55

Question	Answer	Marks	Partial Marks
23(a)	0.4 or $\frac{2}{5}$	**1**	
23(b)	1430	**3**	**M2** for correct, complete, area statement e.g. $120 \times 10 + \frac{1}{2} \times 20 \times 8 + \frac{1}{2} \times 30 \times 10$ oe or **M1** for one area calculation e.g. 10×120 or $\frac{1}{2} \times 20 \times 8$ or $\frac{1}{2} \times 30 \times 10$
23(c)	11.9 or 11.91 to 11.92	**1**	**FT** *their* **(b)** ÷ 120

Question	Answer	Marks	Partial Marks
24(a)	$9x^2$	**1**	
24(b)	$\frac{x-5}{3}$	**2**	**M1** for correct first algebraic step e.g. $y - 5 = 3x$ or $\frac{y}{3} = x + \frac{5}{3}$ or better or for interchanging *x* and *y*, e.g. $x = 3y + 5$, this does not need to be the first step
24(c)	$9x + 20$ cao final answer	**2**	**M1** for $3(3x + 5) + 5$