Cambridge Assessment International Education

Cambridge IGCSE™

MATHEMATICS **0580/41**

Paper 4 (Extended) **May/June 2020**

MARK SCHEME

Maximum Mark: 130

Published

Students did not sit exam papers in the June 2020 series due to the Covid-19 global pandemic.

This mark scheme is published to support teachers and students and should be read together with the question paper. It shows the requirements of the exam. The answer column of the mark scheme shows the proposed basis on which Examiners would award marks for this exam. Where appropriate, this column also provides the most likely acceptable alternative responses expected from students. Examiners usually review the mark scheme after they have seen student responses and update the mark scheme if appropriate. In the June series, Examiners were unable to consider the acceptability of alternative responses, as there were no student responses to consider.

Mark schemes should usually be read together with the Principal Examiner Report for Teachers. However, because students did not sit exam papers, there is no Principal Examiner Report for Teachers for the June 2020 series.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the June 2020 series for most Cambridge IGCSE™ and Cambridge International A & AS Level components, and some Cambridge O Level components.

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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.

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Maths-Specific Marking Principles	
1	Unless a particular method has been specified in the question, full marks may be awarded for any correct method. However, if a calculation is required then no marks will be awarded for a scale drawing.
2	Unless specified in the question, answers may be given as fractions, decimals or in standard form. Ignore superfluous zeros, provided that the degree of accuracy is not affected.
3	Allow alternative conventions for notation if used consistently throughout the paper, e.g. commas being used as decimal points.
4	Unless otherwise indicated, marks once gained cannot subsequently be lost, e.g. wrong working following a correct form of answer is ignored (isw).
5	Where a candidate has misread a number in the question and used that value consistently throughout, provided that number does not alter the difficulty or the method required, award all marks earned and deduct just 1 mark for the misread.
6	Recovery within working is allowed, e.g. a notation error in the working where the following line of working makes the candidate's intent clear.

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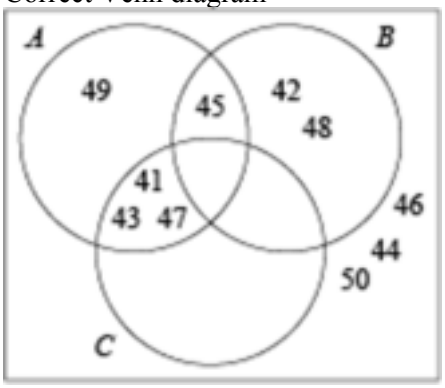
Abbreviations

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)	7680	**2**	**M1** for $0.24 \times 32\,000$ oe
1(a)(ii)	34 240	**2**	**M1** for $32\,000 \times \frac{100+7}{100}$ oe
1(b)	5306.04	**2**	**M1** for $5000 \times \left(1+\frac{2}{100}\right)^3$ oe
1(c)	26.7 or 26.66... to 26.67	**4**	**B3** for 96 or $\frac{96}{360}$ oe OR **M3** for $(1-\frac{1}{5}) \times (1-\frac{2}{3}) \times 100$ oe or **M2** for $(1-\frac{1}{5})$ and $(1-\frac{2}{3})$ oe OR **M1** for $360 \div 5$ [$\times 4$] oe **M1** for *their* $288 \div 3$ [$\times 2$]
1(d)	33 500	**2**	**M1** for $36\,515 \div \frac{100+9}{100}$ oe
1(e)	6525	**4**	**M3** for $\left(\frac{65}{45}-\frac{63}{45}\right)[A]=290$ oe or **M2** for $\left(\frac{13}{9}-\frac{7}{5}\right)[A]=290$ oe or **M1** for correct attempt to convert to a common ratio value for Arjun or for $\frac{13}{9}-\frac{7}{5}$ oe
2(a)(i)	$1.5 < h \leqslant 1.6$	**1**	
2(a)(ii)	1.62 or 1.623… nfww	**4**	**M1** for 1.35, 1.45, 1.55, 1.65, 1.75 1.85 soi **M1** for Σfx **M1 dep** for *their* $\Sigma fx \div 120$

Question	Answer	Marks	Partial Marks
2(b)(i)	$\frac{14}{120}$ oe	**1**	
2(b)(ii)	$\frac{21}{20060}$ oe	**4**	**M3** for $3\left(\frac{14}{120}\times\frac{7}{119}\times\frac{6}{118}\right)$ or **M2** for $\frac{14}{120}\times\frac{7}{119}\times\frac{6}{118}$ isw or **M1** for $\frac{14}{120}, \frac{7}{119}, \frac{6}{118}$ After 0 scored, **SC1** for answer $\frac{343}{864000}$ or $\frac{343}{288000}$ oe
2(c)(i)	55, 79, 106, 120	**2**	**B1** for 2 or 3 correct
2(c)(ii)	Correct diagram	**3**	**B1** for correct horizontal plots **B1FT** for correct vertical plots **B1FT dep on at least B1** for reasonable increasing curve or polygon through *their* 6 points If 0 scored **SC1** for 5 out of 6 points correctly plotted
2(d)(i)	1.62 to 1.63	**1**	
2(d)(ii)	1.57 to 1.58	**2**	**B1** for 48 soi
3(a)	75.6	**2**	**M1** for $5.2 \times 7 + \frac{1}{2} \times 1.6 \times 7^2$
3(b)(i)	$2a - 3b$ final answer	**2**	**B1** for answer $2a + kb$ or $ka - 3b$ or for $2a - 3b$ seen in working
3(b)(ii)	$\frac{3}{4}$	**2**	**B1** for $\frac{45x}{60x}$ oe single fraction
3(c)(i)	−5	**1**	
3(c)(ii)	−0.25 or $-\frac{1}{4}$	**3**	**M1** for $20 - 12x = 23$ or for $5 - 3x = \frac{23}{4}$ **M1** for correct completion to $ax = b$ FT *their* first step
3(d)	$9x^6$	**2**	**B1** for $9x^k$ or kx^6
3(e)	$6x^2 - 7xy - 5y^2$	**2**	**M1** for 3 terms out of 4 from $6x^2 - 10xy + 3xy - 5y^2$

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Question	Answer	Marks	Partial Marks
4(a)	Triangle at (–4, –4) (–1, –3) (–4, –3)	**2**	**B1** for correct points not joined or for reflection in any $y = k$ or for reflection in $x = –1$
4(b)	Triangle at (1, 1) (1, 4) (2, 4)	**2**	**B1** for correct points not joined or rotation 90 clockwise around any point or rotation 90 anticlockwise around (0, 0)
4(c)	Translation $\begin{pmatrix} 5 \\ -6 \end{pmatrix}$	**2**	**B1** for translation or correct vector oe
5(a)	Correct Venn diagram 	**3**	**B2** for 8 or 9 numbers correct or **B1** for 6 or 7 numbers correct
5(b)(i)	41, 43, 47	**1**	**FT** *their* Venn diagram
5(b)(ii)	44, 46, 49, 50	**1**	**FT** *their* Venn diagram
5(c)	0	**1**	**FT** *their* Venn diagram
6(a)	$y \geqslant x$ oe	**1**	
6(b)	$2.25x + 1.5y \leqslant 22.5$ oe	**M1**	
	One step shown to $3x + 2y \leqslant 30$	**A1**	
6(c)	$y = 10$ ruled	**1**	Broken line
	$3x + 2y = 30$ ruled	**B2**	Solid line **B1** for line passing through (0, 15) or (10, 0)
	$y = x$ ruled	**B1**	Solid line
	Correct region indicated	**B1**	
6(d)	412	**2**	**M1** for (4, 9) identified or for evaluation $40x + 28y$ for an integer point in the region ($x > 0$ and $y > 0$)
7(a)	$[BC^2 =] 80^2 + 115^2 – 2 \times 80 \times 115 \cos 72$ oe	**M1**	
	118.06…	**A2**	**A1** for 13939…

Question	Answer	Marks	Partial Marks
7(b)	67.8 or 67.9 or 67.83 to 67.88	**3**	**M2** for [sin B =] $\frac{115\times\sin 72}{118.1}$ oe or **M1** for $\frac{115}{\sin B}=\frac{118.1}{\sin 72}$ oe
7(c)(i)	255	**3**	**B1** for bearing of B from A is 75 soi **M1** for 180 + 75 oe
7(c)(ii)	[00]7.2	**2**	**M1** for *their* **(c)(i)** – *their* **(b)** –180
7(d)	11.8 or 11.82 to 11.83	**3**	**M1** for 115 ÷ 35 oe **M1** for *their* speed in m/s × 60 × 60 ÷ 1000
7(e)	76.1 or 76.08 to 76.09	**3**	**M2** for $\frac{\text{distance}}{80}=\sin 72$ oe or **M1** for distance required is perpendicular to AC soi
8(a)(i)	Correct sketch	**2**	**B1** for correct shape but inaccurate
8(a)(ii)	Rotational [symmetry] order 2 [centre] (180, 0)	**2**	**B1** for rotational [symmetry]
8(b)	48.6 or 48.59 to 48.60 and 131.4 or 131.40 to 131.41	**3**	**B2** for 48.6 or 48.59 to 48.60 or 131.4 or 131.40 to 131.41 or **M1** for sin x = 0.75 or better If 0 scored, **SC1** for two answers adding to 180
8(c)(i)	$(x + 5)^2 – 11$	**2**	**M1** for $(x + 5)^2 + k$ or $(x + \textit{their}\ 5)^2 + 14 – (\textit{their}\ 5)^2$ or $a = 5$
8(c)(ii)	Sketch of U-shaped parabola with a minimum indicated at (–5, –11) with no part of graph in 4th quadrant	**3**	**FT** *their* $(x + 5)^2 – 11$ provided in that form **B1** for U shape curve **B1FT** for turning point at (–5, k) or (k, –11)
9(a)	39[.0] or 39.03 to 39.04…	**3**	**M2** for $\frac{165}{360}\times 2\times\pi\times 8 + 16$ or **M1** for $\frac{165}{360}\times 2\times\pi\times 8$
9(b)	2.71 or 2.708…	**4**	**M3** for $\sqrt{\frac{\frac{165}{360}[\times\pi]\times 8^2}{4[\times\pi]}}$ oe or **M2** for $r^2=\frac{\frac{165}{360}[\times\pi]\times 8^2}{4[\times\pi]}$ oe or **M1** for $\frac{165}{360}\times\pi\times 8^2$ oe seen

Question	Answer	Marks	Partial Marks
9(c)(i)	3.67 or 3.666 to 3.667	**2**	**M1** for $\frac{165}{360} \times 2[\times\pi] \times 8 = 2[\times\pi] \times r$ or better or for $\frac{165}{360}[\times\pi] \times 8^2 = [\pi\times]r \times 8$ or better
9(c)(ii)	100 or 100.0 to 100.1… final answer	**4**	**M3** for $\frac{1}{3}\pi \times their(c)(i)^2 \times \sqrt{8^2 - their\ \text{radius}^2}$ or **M2** for $\sqrt{8^2 - their\ \text{radius}^2}$ or **M1** for $(their\ (c)(i))^2 + h^2 = 8^2$
10(a)(i)	15.7 or 15.65...	**3**	**M2** for $\sqrt{(4-10)^2 + (4--3)^2}$ oe or **M1** for $(-4-10)^2 + (4--3)^2$ oe
10(a)(ii)	$\frac{-10-4}{4--3}$ [= –2] oe	**M1**	
	10 = –2(–3) + c Or –4 = –2(4) + c and correct completion to $y = -2x + 4$	**A1**	
10(a)(iii)	$y = \frac{1}{2}x + \frac{11}{4}$ oe	**4**	**M1** for grad = ½ soi **M1** for [midpoint =] (½, 3) **M1** for substitution of (1/2, 3) into *their* $y = mx + c$ oe
10(b)(i)	$\left(-\frac{1}{3}, -\frac{22}{27}\right)$ oe and (–5, 50)	**6**	**B2** for $3x^2 + 16x + 5$ Or **B1** for one correct **M1** for derivative = 0 or *their* derivative = 0 **M1** for $[x =] -\frac{1}{3}$ and $[x =] -5$ **B1** for $-\frac{22}{27}$ and 50
10(b)(ii)	$\left(-\frac{1}{3}, -\frac{22}{27}\right)$ minimum (–5, 50) maximum with correct reasons	**3**	**B2** for one correct with reason or **M1** for correct attempt e.g. 2nd derivatives, gradients or sketching