Cambridge Assessment International Education

# Cambridge IGCSE™

**MATHEMATICS** **0580/42**

Paper 4 (Extended) **October/November 2020**

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.

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This document consists of **9** printed pages.

## 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.

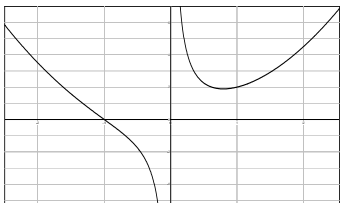
| Maths-Specific Marking Principles | |
|---|---|
| 1 | Unless a particular method has been specified in the question, full marks may be awarded for any correct method. However, if a calculation is required then no marks will be awarded for a scale drawing. |
| 2 | Unless specified in the question, answers 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. |

**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) | 9080 cao | 3 | **B2** for 9078 to 9081… <br> or **M1** for 813 × *their* 11h 10min |
| 1(b)(i) | 654 or 653.5… | 2 | **M1** for 10260 ÷ 15 h 42 min oe |
| 1(b)(ii)(a) | 21.8 or 21.82 to 21.83 | 1 | |
| 1(b)(ii)(b) | 4.58 or 4.59 cao | 2 | **M1** for 470 ÷ (10260 ÷ 100) oe <br> or 100 ÷ *their* **(b)(ii)(a)** |
| 1(c) | 12.97 | 1 | |
| 2(a) | Translation <br> $\begin{pmatrix} 1 \\ -6 \end{pmatrix}$ | 2 | **B1** for each |
| 2(b)(i) | Image at (0, 1), (–3, 1), (–3, 2) | 2 | **B1** for reflection in $x = k$ or $y = 1$ |
| 2(b)(ii) | Image at (5, –4), (5, –1), (4, –1) | 2 | **B1** for rotation 90° anticlockwise with other centre or for rotation 90° clockwise about (6, 0) |
| 2(b)(iii) | Image at (–1, –2), (–7, –2), (–7, –4) | 2 | **B1** for enlargement, factor –2 with other centre |
| 3(a)(i) | 2210 or 2208 or 2208.2, or 2208.16… | 2 | **M1** for $2000 \times \left(1+\frac{2}{100}\right)^5$ oe |
| 3(a)(ii) | 10.4 or 10.5 or 10.40 to 10.41 | 2 | **M1** for $\frac{\textit{their}\,\textbf{(a)(i)} - 2000}{2000}$ [×100] or <br> $\frac{\textit{their}\,\textbf{(a)(i)}}{2000} \times 100$ or $\left(1+\frac{2}{100}\right)^5 - 1$ or <br> $\left(1+\frac{2}{100}\right)^5 \times 100$ oe |
| 3(a)(iii) | 12 | 3 | **B2** for 11.3 or 11.26 to 11.27 <br> **OR** <br> **M2** for [2000 ×] $\left(1+\frac{2}{100}\right)^{11}$ oe <br> or [2000 ×] $\left(1+\frac{2}{100}\right)^{12}$ oe seen <br> or **M1** for [2000 ×] $\left(1+\frac{2}{100}\right)^{n}$ oe, $n > 5$ oe <br> or for $2000 \times \left(1+\frac{2}{100}\right)^{n}$ = or > or ⩾ 2500 <br> oe |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 3(b) | 490 cao | **3** | **M2** for $p\times\left(1-\frac{4}{100}\right)^{16}=255$ oe soi by 490.0...<br>or **M1** for $p\times\left(1-\frac{4}{100}\right)^{n}=255$ oe, $n>1$ oe |
| 4(a)(i) | 25 | **1** | |
| 4(a)(ii) | 10 nfww | **2** | **B1** for [lq =] 22 or [uq =] 32 |
| 4(a)(iii) | 27 | **1** | |
| 4(a)(iv) | 6 | **2** | **B1** for 114 written |
| 4(b)(i) | 27.9 or 27.91 to 27.92 nfww | **4** | **M1** for mid-values<br>**M1** for $\sum fx$ where $x$ lies within or on boundary of correct interval<br>**M1 dep** $\sum fx \div 120$ dep on second M1 |
| 4(b)(ii) | 7.6 | **2** | **M1** for $\frac{18}{10}$ oe or $\frac{38}{20}$ oe<br>or **B1** for [multiplier] 4 or ¼ |
| 5(a) | 1.48 | **3** | **B2** for $7x + 2 = 12.36$ or better<br>or **M1** for $3x + 2(2x + 1)$ [= 12.36] or better |
| 5(b) | 1.75 or $1\frac{3}{4}$ | **3** | **B2** for $18x - 14x = 7$ or better<br>or **M1** for $18x = 7(2x + 1)$ |
| 5(c) | [0].8 oe | **3** | **B2** for $4(2x + 1) = 13x$<br>or **M1** for $\frac{4}{x}=\frac{13}{2x+1}$ oe<br>or correct equation to find number of cakes |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 5(d) | $\frac{20}{x}+\frac{10}{2x+1}=45$ oe | **M2** | **B1** for $\frac{20}{x}$ seen or $\frac{10}{2x+1}$ seen |
| | $90x^2 - 5x - 20$ [= 0] oe | **B2** | **B1** for $\frac{20(2x+1)+10x}{x(2x+1)}$ = 45 or better |
| | $(9x + 4)(2x - 1)$ [= 0] or for $\frac{--1\pm\sqrt{(-1)^2-4(18)(-4)}}{2(18)}$ oe | **M2** | **FT** *their* 3-term quadratic<br>**M1** for factors that give two correct terms when expanded<br>or for correct discriminant or correct $\frac{-b}{2a}$ provided quadratic formula is in correct form |
| | [0].5 or $\frac{1}{2}$ final answer | **B1** | |
| 6(a)(i) | $\frac{1}{3}$ oe | **1** | |
| 6(a)(ii) | 0 | **1** | |
| 6(a)(iii) | $\frac{1}{6}$ oe | **1** | |
| 6(b)(i) | $\frac{1}{15}$ oe | **2** | **M1** for $\frac{2}{6}\times\frac{1}{5}$ or equivalent method |
| 6(b)(ii) | $\frac{4}{15}$ oe | **3** | **M2** for $\frac{2}{6}\times\frac{1}{5}+\frac{3}{6}\times\frac{2}{5}$ or equivalent method<br>or **M1** for $\frac{2}{6}\times\frac{1}{5}$ oe seen or $\frac{3}{6}\times\frac{2}{5}$ oe seen |
| 6(c) | $\frac{7}{18}$ oe | **3** | **M2** for $\left(\frac{1}{6}\right)^2+\left(\frac{2}{6}\right)^2+\left(\frac{3}{6}\right)^2$ oe<br>or **M1** for one correct product seen or sample space with 14 correct pairs identified |
| 7(a) | 2, 4.5 | **2** | **B1** for each |
| 7(b) | Correct graph<br>  | **4** | **B3 FT** for 6 or 7 correct points FT *their* table<br>or **B2 FT** for 4 or 5 correct points FT *their* table<br>or **B1 FT** for 2 or 3 correct points FT *their* table |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 7(c)(i) | –0.5 to –0.4 | **1** | |
| 7(c)(ii) | $y = 1 - x$ ruled<br>**and**<br>–1.9 to –1.75 | **2** | **M1** for [$y$ =] $1 - x$ or $\left[x^2 + \frac{1}{x} =\right] 1 - x$ soi<br>or **B1** for –1.9 to –1.75 |
| 7(d) | Any integer $\geq 2$ | **1** | |
| 8(a) | [$v$ = ] 40<br>[$w$ = ] 80<br>[$x$ = ] 40<br>[$y$ = ] 100<br>[$z$ = ] 60 | **5** | **B1** for each<br>**FT** angle $z$ as 140 – *their w* |
| 8(b) | 24 | **3** | **M2** for $360 - 11x = 2 \times 2x$ oe<br>or **M1** for $360 - 11x$ seen<br>or obtuse angle $KOL = 2 \times 2x$ oe |
| 8(c)(i) | angle $ADX$ = angle $BCX$ oe<br>same segment oe<br><br>angle $DAX$ = angle $CBX$ oe<br>same segment oe<br><br>angle $AXD$ = $BXC$ oe<br>[vertically] opposite oe | **M2** | Accept in any order<br>**M1** for one correct pair with reason<br><br>If 0 scored, **SC1** for two correct pairs of equal angles identified with incorrect/no reasons |
| | corresponding angles are equal oe | **A1** | |
| 8(c)(ii)(a) | 8.75 or 8¾ | **2** | **M1** for $\frac{8}{10} = \frac{7}{DX}$ oe |
| 8(c)(ii)(b) | 81.8 or 81.78 to 81.79 | **4** | **M2** for [cos[$BXC$] =] $\frac{5^2 + 7^2 - 8^2}{2 \times 5 \times 7}$ oe<br>or **M1** for $8^2 = 5^2 + 7^2 - 2 \times 5 \times 7 \times \cos(...)$ oe<br>**A1** for $\frac{10}{70}$ oe |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 9(a) | 315 or 314.5 to 315.0 | **6** | **M1** for $\tan 70 = \dfrac{\text{height}}{\frac{1}{2}(8-5)}$ oe or better seen<br>**M1dep** for $\frac{1}{2}(8+5)\times$ *their* height or better seen **dep** on trig attempt for height<br>**M2** for $12 \times \dfrac{\frac{1}{2}(8-5)}{\cos 70}$ oe or better seen<br>or **M1** for $\dfrac{\frac{1}{2}(8-5)}{\cos 70}$ oe or better seen<br>**M1** for $8 \times 12$ oe isw and $5 \times 12$ oe isw |
| 9(b)(i) | 8 – ½ (8 – 5) or 5 + ½ (8 – 5) | **M1** | |
| 9(b)(ii) | 13.6 or 13.64 to 13.65 | **2** | **M1** for $12^2 + (6.5)^2$ oe |
| 9(b)(iii) | 16.8 or 16.9 or 16.79 to 16.91… nfww | **2** | **M1** for identifying angle *GAX* from a diagram or from working or better |
| 10(a)(i) | 10 | **1** | |
| 10(a)(ii) | –19 | **1** | FT 1 – 2 *their* **(a)(i)** |
| 10(b) | $\dfrac{1-x}{2}$ oe final answer | **2** | **M1** for $x = 1 - 2y$ or $y + 2x = 1$ or $\dfrac{y}{2} = \dfrac{1}{2} - x$ or $y - 1 = -2x$ or better |
| 10(c) | $\dfrac{1}{2}$ oe | **1** | |
| 10(d) | $4x^2 - 8x + 2$ final answer | **4** | **M1** for $(1 - 2x)(1 - 2x) - (1 - 2(1 - 2x))$ or better<br>**B1** for $1 - 2x - 2x + 4x^2$<br>**B1** for $-(1 - 2 + 4x)$ or better or [+] $1 - 4x$ or for correct answer seen then spoiled |
| 10(e) | $x$ final answer | **1** | |
| 10(f) | 3125 | **1** | |
| 10(g) | 25 | **1** | |
| 10(h) | –2 | **2** | **B1** for $\dfrac{1}{25}$ or 0.04 |
| 11(a) | A : –3 $17 - 4n$ oe | **3** | **B1** for –3<br>**B2** for $17 - 4n$ oe<br>or **B1** for $k - 4n$ oe or $17 - pn$ oe, $p \neq 0$ |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| | B : 124 $n^3 - 1$ oe | **3** | **B1** for 124<br>**B2** for $n^3 - 1$ oe<br>or **B1** for any cubic |
| | C : $\frac{11}{128}$ $\frac{n+6}{2^{n+2}}$ oe | **4** | **B1** for $\frac{11}{128}$<br>**B3** for $\frac{n+6}{2^{n+2}}$ oe<br>or **B2** for $2^{n+2}$ oe seen<br>or **B1** for $2^k$ oe or $n + 6$ seen |
| 11(b) | $\frac{p+1}{2q}$ oe | **2** | **B1** for $p + 1$ or $2q$ oe |