



Cambridge IGCSE™

MATHEMATICS (US)

0444/03

Paper 3 (Core)

For examination from 2020

MARK SCHEME

Maximum Mark: 104

Specimen

This document has **6** pages. Blank pages are indicated.

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.

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 mark, awarded for a valid method applied to the problem.
A Accuracy mark, given 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

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
nfw	not from wrong working
oe	or equivalent
SC	special case
soi	seen or implied

Question	Answer	Marks	Partial Marks
1	14 292	4	M2 for $12\,000 \times (1.06)^3$ or M1 for $(12\,000 + 12\,000 \times 0.06) \times 0.06$ and M1 dep correct method for the next 2 years A1 cao (\$)14 292(.19(2)) B1 FT <i>their</i> answer rounded to the nearest dollar If M0 then maximum SC2 for 2292 or SC1 for 2292.2 or 2292.19(2) or 2300
2(a)	Isosceles	1	
2(b)	$p = 50$ $q = 80$ $r = 50$ $s = 50$ $t = 80$	5	B1 for each FT for $180 - 2p$ FT for $= p$ FT for $= p$ FT for $= q$ or $180 - 2p$
3(a)(i)	135	1	
3(a)(ii)	75	1	
3(b)	Correct ruled lines	B1	Only if (a)(i) + (a)(ii) = 210°
	3 correctly labeled sectors	B1	Independent of previous marks
3(c)(i)	$\frac{10}{24}$ oe	1	Accept decimals, percentages
3(c)(ii)	$\frac{15}{24}$ oe	1	
3(c)(iii)	$\frac{19}{24}$ oe	1	
3(d)(i)	0	1	
3(d)(ii)	1	1	SC1 for $\frac{0}{12}$ and $\frac{12}{12}$ or $\frac{0}{24}$ and $\frac{24}{24}$ in parts (i) and (ii)
3(e)	Labeled arrows correctly positioned by eye	3	FT <i>their</i> probabilities from (b) B1 for each
4(a)	1	1	
4(b)	1	1	accept 'no rotational symmetry'
4(c)	Correct rotation drawn	2	B1 for 180° rotation about any other point or for $\pm 90^\circ$ rotation about <i>O</i>
4(d)	reflection (only) in <i>x</i> -axis oe	2	B1 for each Enlargement, s.f. = -1, centre (0, 0) is 2 marks
5(a)	0.68×450	M1	
	306	A1	
	$2 \times 450 + 306 (= 1206)$	M1	dep allow 900 or $450 + 450$

Question	Answer	Marks	Partial Marks
5(b)	2814	3	B2 for $1206 + 1005 + 603$ or M1 for $1206 \div 6$ (implied by 201) or $450 \div 6$ or $306 \div 6$ and M1 dep for $\times (6 + 5 + 3)$ oe
5(c)	4955	2	M1 for 500×9.91 implied by figs 4955
6(a)(i)	6	2	M1 for $6x = 36$ or $3x = 18$ oe
6(a)(ii)	72	2	FT $2 \times$ <i>their (a)(i)</i> \times <i>their (a)(i)</i> M1 FT for $6 \times 12, 2 \times 36, 2 \times 6 \times 6$
6(b)(i)	1.5 or $1\frac{1}{2}$ or $\frac{3}{2}$	2	M1 for $3y - y = 3$ oe [unknown on one side]
6(b)(ii)	$4z + 2 = 10z - 1$	1	accept any equivalent equation in z If (b)(ii) is left blank may recover mark if $4z + 2 = 10z - 1$ seen in (b)(iii)
6(b)(iii)	0.5 or $\frac{1}{2}$	3	B1 for correct single z term and B1 for correct single constant term
6(c)(i)	$a - b = 3$ oe $4a + b = 17$ oe	2	B1 for each
6(c)(ii)	$(a =) 4$ and $(b =) 1$	3	B2 for <i>either (a =) 4 or (b =) 1</i> or M1 for correctly eliminating one of the variables
7(a)	8 7 10 9 8 18	3	B2 for 4 or 5 correct, B1 for 2 or 3 correct accept tallies if in 5s, accept $\frac{8}{60}$, $\frac{7}{60}$ etc.
7(b)	6	1	
7(c)	4	2	M1 for evidence of ranking (cumulative frequency)
7(d)	3.9	3	M1 FT for $8 \times 1 + 7 \times 2 + 10 \times 3 + 9 \times 4 + 8 \times 5 + 18 \times 6$ or $8 + 14 + 30 + 36 + 40 + 108$ (min 3) (or 236) M1 FT dep for /60 [both M marks may be by the table] answer of 3.93(3333) is M2 implied 39.3(33...) is M1 implied
8(a)	-6, -12, -36, 36, 12, 6	3	B1 for ± 36 , B1 for ± 12 , B1 for ± 6 , or B1 for any 3 correct

Question	Answer	Marks	Partial Marks
8(b)	correct graph	4	B2 FT for 10 or 11 points, B1 FT for 8 or 9 points B1 for smooth branches of rectangular hyperbola (not joined)
8(c)	1.6 to 1.8	1	FT <i>their</i> reading at $y = 21$
8(d)	36, 9, 0, 9, 36	2	B1 for 4 correct
8(e)	correct graph	4	B2 FT for 11 or 12 points, B1 FT for 9 or 10 points B1 for smooth parabola
8(f)	3.2 to 3.4, 10.0 to 12.0	1	
9(a)(i)	43[.0] or 43.00 to 43.01...	2	M1 for $\pi \times 3.7^2$
9(a)(ii)	10[.0] or 9.996 to 9.998...	2	FT $430 \div \textit{their (a)(i)}$ evaluated to 3 s.f. or better M1 for $430 \div \textit{their (a)(i)}$
9(b)(i)	(length) = 22.2 (width) = 14.8 (height) = 20	3	B1 for each FT $2 \times \textit{their (a)(ii)}$
9(b)(ii)	6570 or 6571...	2	FT $\textit{their L} \times \textit{W} \times \textit{H}$ from (b)(i) M1 for $L \times W \times H$ (substituted)
9(b)(iii)	78.5 or 78.52 to 78.54	3	FT $5160 \div \textit{their (b)(ii)} \times 100$ but only if answer < 100 B1 for 12×430 or 5160 and M1 for $5160 \div \textit{their (b)(ii)} \times 100$
10(a)(i)	$\tan QPR = 10.3 \div 7.2$	M1	M1 for complete longer method
	55(.0)	A1	
10(a)(ii)	125 cao	1	
10(b)(i)	$125 - 98$ or $180 - (98 + 55)$	1	accept $55 + 98 + 27 = 180$ do not accept $180 - 153$
10(b)(ii)	6.4 or 6.40...	2	M1 for $14.1 \times \sin 27^\circ$ oe (allow full correct long methods) e.g., M1 for PR (Pythag, sin, or cos) and RS (Pythag), then A1 for 6.40... or M1 for PR (Pythag, sin, or cos) and RS (tan), then A1 for 6.40...
10(b)(iii)	38.0 or 38.0...	1	FT $31.6 + \textit{their (b)(ii)}$
10(c)	8.44 or 8.444 to 8.445	2	FT $\textit{their (b)(iii)} \div 4.5$ M1 for $\textit{their (b)(iii)} \div 4.5$
11(a)	42, 56 cao 71, 97 cao	4	B1 for each
11(b)	$n(n + 1)$ oe	2	M1 for attempt at length \times width involving n or $n\text{th}(n\text{th} + 1)$ or $k(k + 1)$ where k is any variable
11(c)	12	2	M1 for $2n^2 - 1 = 287$