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Cambridge IGCSE™

MATHEMATICS **0580/33**

Paper 3 (Core) **May/June 2024**

MARK SCHEME

Maximum Mark: 104

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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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 descriptions 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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Mathematics-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, non-integer 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 or sign 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 A or B 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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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 marks, awarded for a valid method applied to the problem.

A Accuracy mark, awarded 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
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

Question	Answer	Marks	Partial Marks
1(a)(i)	Correct bars at [blue] 10 and [orange] 5	**3**	**M1** for 40 – *their*(11 + 6 + 8) oe **M1** for *their* 15 ÷ (1 + 2) oe
1(a)(ii)	Red	**1**	
1(b)(i)	Correct pie chart	**4**	**B2** for correct angles 189, 108, 63 soi or **B1** for 1 correct angle soi or **M1** for $\frac{360}{40} \times k$ where k is 1, 21, 12 or 7 AND **B2FT** for two correct FT sectors drawn provided the sum of their 3 stated angles is 360° or **B1FT** for one correct sector drawn or one correct FT sector drawn
1(b)(ii)	30	**1**	

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Question	Answer	Marks	Partial Marks
2(a)(i)	11 45	**2**	**B1** for 39 [m] or 1 [h] 42 [m] or 102 [m]
2(a)(ii)	08 44	**3**	**B2** for 40 [m] or **M1** for 4 ÷ 6 [×60] oe
2(a)(iii)	75	**2**	**M1** for $\frac{45}{3}$ [×5] oe
2(b)	1.92	**3**	**M2** for (11.64 – 2.4 × 1.25) ÷ 4.5 oe or **M1** for 2.4 × 1.25 oe
2(c)(i)	84	**2**	**M1** for $\frac{140}{2+3}$ [× k] oe where k = 1, 2 or 3
2(c)(ii)	234	**1**	
2(c)(iii)	470.40 cao	**2**	**M1** for $420\times\left(1+\frac{12}{100}\right)$ oe or **B1** for 50.40
3(a)	Correct enlargement	**2**	**B1** for 2 sides correct length
3(b)(i)	4,3	**1**	
3(b)(ii)(a)	Reflection $x = -1$ oe	**2**	**B1** for each
3(b)(ii)(b)	Translation $\begin{pmatrix} 3 \\ -5 \end{pmatrix}$	**2**	**B1** for each
3(b)(ii)(c)	Rotation (0,0) 180°	**3**	**B1** for each
4(a)	800	**1**	
4(b)	1 2 3 6 9 18	**2**	**B1** for 4 or 5 correct no extras or 6 correct and 1 extra or for 1×18 and 2×9 and 3×6
4(c)	[57 =] 3× 19 oe	**1**	
4(d)	4096	**1**	
4(e)	640	**1**	
4(f)	$1\frac{1}{2}$ or 1.5	**1**	

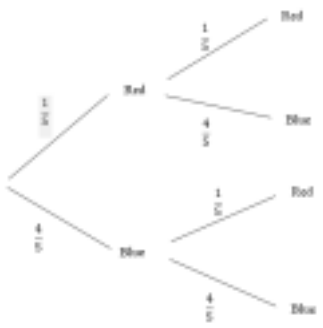
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Question	Answer	Marks	Partial Marks
4(g)	Any correct fraction	**1**	
4(h)	Any correct irrational number	**1**	
4(i)	36	**2**	**B1** for any of 2, 3, 4, 6, 9, 12, 18 as answer or **M1** for 2×2×3×3 oe as answer or [72 =] 2×2×2 ×3×3 **and** [180 =] 2×2 ×5× 3×3 or a complete list of factors of 72 **and** 180 or 2 correct factor trees or tables or Venn diagram
5(a)(i)	326	**1**	
5(a)(ii)	reflex	**1**	
5(b)	*c* *d*	**2**	**B1** for each
5(c)	138	**1**	
5(d)	73°	**2**	**M1** for 180 – 90 – 17 oe or 90 – 17 or angle *B* marked as 90°
5(e)	40	**2**	**M1** for 360 ÷ (180 – 171) oe or $\frac{180(n-2)}{n} = 171$ oe
5(f)	23.6 or 23.57 to 23.58	**2**	**M1** for sin […. =] $\frac{7.4}{18.5}$ oe
6(a)	80	**2**	**M1** for 15×4 + 7×2 + 6 oe
6(b)	36	**1**	
6(c)	$1\frac{1}{2}$ or 1.5	**2**	**M1** for $4x = 18 - 12$ or $x + \frac{12}{4} = \frac{18}{4}$ oe
6(d)	$23x - 34$ final answer	**2**	**M1** for $23x$ or -34 in the final answer or for $18x - 24$ or $5x - 10$ or $23x - 34$ seen then spoilt
6(e)	[*r* =] $\frac{T+6}{5}$ oe final answer	**2**	**M1** for $5r = T + 6$ or $\frac{T}{5} = r - \frac{6}{5}$
6(f)	$5x + 6 = 4(x + 6)$ oe	**B2**	**B1** for $5x$ or $5x + 6$ or $x + 6$

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Question	Answer	Marks	Partial Marks
	18	**3**	**M1FT** for [$5x + 6 =$] $4x + 24$ **M1FT** for $5x - 4x = 24 - 6$
7(a)(i)	Arrow at $\frac{1}{6}$	**1**	
7(a)(ii)	$\frac{1}{2}$ oe	**1**	
7(a)(iii)	0	**1**	
7(b)	$\frac{4}{5}$ cao	**2**	**B1** for $\frac{12}{15}$ oe
7(c)(i)	$\frac{3}{4}$ oe	**1**	
7(c)(ii)	1	**1**	
7(c)(iii)	$\frac{3}{16}$ oe	**1**	
7(d)(i)		**2**	**B1** for $\frac{4}{5}$ on the first branch or $\frac{1}{5}$ in both correct places in second branches
7(d)(ii)	$\frac{16}{25}$ oe	**2**	**FT** for **2** marks or **1** mark for 2 fractions less than 1 **M1FT** for $\frac{4}{5}\times\frac{4}{5}$
8(a)	56.2 or 56.16	**2**	**M1** for $\frac{8.2+12.6}{2}\times 5.4$ oe
8(b)	6.8	**2**	**M1** for $\frac{1}{2}\times 4.5 \times b = 15.3$ or better
8(c)	9.33 or 9.325 to 9.327	**2**	**M1** for $58.6 \div [2]\pi$
8(d)	223 or 222.8 to 222.91	**4**	**M1** for 28×12 or 336 **M1** for $\pi \times 6^2$ oe **M1** for *their* 336 − *their* 113
9(a)	[$y =$] $4x + 3$	**1**	

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Question	Answer	Marks	Partial Marks
9(b)	$-\frac{1}{2}$ oe	**3**	**B1** for $5 = 2 - 6a$ **M1** for rearranging *their* linear equation to $ra = s$
9(c)(i)	3 –6 3	**2**	**B1** for 2 correct
9(c)(ii)	correct curve	**4**	**B3FT** for 8 or 9 points plotted accurately or **B2FT** for 6 or 7 points plotted accurately or **B1FT** for 4 or 5 points plotted accurately
9(c)(iii)	$x = 0$	**1**	
9(c)(iv)	2.3 to 2.6	**1**	**FT** *their* point of intersection

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