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MATHEMATICS **0580/32**

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)	7	**1**	
1(a)(ii)	49	**1**	
1(a)(iii)	7	**1**	
1(b)(i)	12	**1**	
1(b)(ii)	32	**1**	
1(b)(iii)	1	**1**	
1(b)(iv)	6	**1**	
1(c)	$3 \times 2 - (6 - 2) \div 2 = 4$	**1**	

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Question	Answer	Marks	Partial Marks
1(d)	1020	**2**	**B1** for 1020k as final answer or **M1** for [30 =] 2 × 3 × 5 **and** [68 =] 2 × 2 × 17 or for [30 =] 2 × 15 **and** [68 =] 2 × 34 or 2 correct factor trees or correct tables or correct Venn diagram or a list of multiples of both 30 and 68 with at least their first 3 correct or 2 × 2 × 3 × 5 × 17 oe
2(a)(i)	2a final answer	**1**	
2(a)(ii)	$2x^2 - 7x$ final answer	**2**	**B1** for $2x^2$ or $-7x$ in final answer or for $2x^2 - 7x$ seen then spoilt.
2(b)	74	**2**	**B1** for 49 or 25
2(c)(i)	$[m =] \frac{T-20}{35}$ final answer	**2**	**M1** for $T - 20 = 35m$ or $\frac{T}{35} = m + \frac{20}{35}$
2(c)(ii)	1.8	**2**	**FT** *their* **(c)(i)** for 2 marks or 1 mark **M1** for (83 – 20) ÷ 35
2(d)	Correctly eliminates one variable	**M1**	Making the coefficients the same for one of the variables and correct consistent use of addition or subtraction using their equations alternative substitution method. M1 for correct rearrangement of one equation to make either x or y the subject and correct substitution of their rearrangement into 2nd equation.
	[x =] 3	**A1**	If A0 scored **SC1** for 2 values satisfying one of the original equations.
	[y =] −1.5	**A1**	
3(a)	Trapezium	**1**	
3(b)(i)	7.5	**1**	
3(b)(ii)	11 to 11.4	**1**	
3(c)(i)	Translation $\begin{pmatrix} 9 \\ -7 \end{pmatrix}$	**2**	**B1** for each
3(c)(ii)	Reflection $y = -3$ oe	**2**	**B1** for each

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Question	Answer	Marks	Partial Marks
3(c)(iii)	Rotation (0, 0) 90° clockwise	**3**	**B1** for each
3(d)	Trapezium drawn at (−1, 5),(−7, 5),(−7, 11),(−3, 11)	**2**	**B1** for correct enlargement, scale factor 2, but in the wrong position.
4(a)(i)	6 3	**3**	**M2** for (50 – (5 + 12 + 15 + 9)) ÷ 3 or **M1** for 50 – (5 + 12 + 15 + 9)
4(a)(ii)	Correct bar chart	**2**	**FT** *their* table entry for 4 and 5 pets **B1** for 3 or 4 correct heights
4(a)(iii)	2	**1**	
4(a)(iv)	2.16	**3**	**M1** for [0 × 5] + (1 × 12) + (2 × 15) + (3 × 9) + (4 × *their*6) + (5 × their3) **M1** dep for (*their*$\sum fx$) ÷ 50
4(b)(i)	171 126 63	**2**	**B1** for one correct angle or **M1** for $\frac{360}{80} \times k$ where k = 1, 38, 28 or 14
4(b)(ii)	Correct pie chart drawn	**2**	**2FT** provided the sum of their 3 angles is 360° **B1FT** for one correct sector drawn, or one correct FT sector drawn
4(b)(iii)	$\frac{7}{20}$ oe	**1**	
5(a)(i)	Obtuse	**1**	
5(a)(ii)	Alternate angles	**1**	
5(b)	Opposite angles angles in a triangle add to180	**2**	**B1** for each
	52	**1**	
5(c)(i)	Tangent	**1**	
5(c)(ii)	53	**2**	**M1** for (180 – 74) ÷ 2
5(c)(iii)	37	**1**	**FT** for 90 –*their* (c)(ii)

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Question	Answer	Marks	Partial Marks
	Angle between tangent and radius = 90°	**1**	
5(d)	156	**2**	**M1** for $180 - \frac{360}{15}$ or $\frac{(15-2)\times 180}{15}$ oe
6(a)(i)	1 8 16 16 8	**3**	**B2** for 3 or 4 correct or **B1** for 1 or 2 correct
6(a)(ii)	correct curve	**4**	**B3FT** for 8 or 9 correctly plotted points or **B2FT** for 6 or 7 correctly plotted points or **B1FT** for 4 or 5 correctly plotted points
6(a)(iii)	$x = 4$ oe	**1**	
6(b)(i)	Correct line	**2**	**B1** for a line with gradient $\frac{1}{2}$ or a line through (2,7)
6(b)(ii)	$y = \frac{1}{2}x + 6$ oe	**2**	**B1** for $[y =]$ ½ $x + j$ oe or $[y =]$ $kx + 6$ oe $k \neq 0$
6(b)(iii)	(0.6 to 0.9 , 6.2 to 6.5) (6.6 to 6.9 , 9.2 to 9.5)	**2**	**B1FT** for each
7(a)	840 1260	**3**	**B2** for 1 correct answer in correct place or answers reversed or **M1** for $4620 \div 11 \times k$ (k = 1, 2, or 3)
7(b)(i)	$\frac{(100-18)}{100} \times 4620$	**M1**	accept $4620 - \frac{18}{100} \times 4620$ or $4620\left(1 - \frac{18}{100}\right)$

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Question	Answer	Marks	Partial Marks
7(b)(ii)	[$]882	**4**	**B3** for 854.74, 853, 824 OR **M3** for 5 × 72 + (*their* 14 – 5) × 58 oe or **B2** for 14 [bags] or **M1** for 3788.4 ÷ 280 OR **M3** for 5 × 72 + (*their* 9) × 58 oe or **B2** for 9 [bags] or **M1** for (3788.4 – 5 × 280) ÷ 280 oe OR if 0 scored **SC2** for 1056 or **SC1** for 1027 or 998
7(c)	[$]10935 cao	**3**	**M1** for $8500 \times \left(1+\frac{6.5}{100}\right)^4$ oe **A1** for 10934.96…… If A0 scored **SC1** for *their* answer correct to at least 1 decimal place correctly rounded to nearest whole number.
7(d)	*A* With correct comparisons made of the 3 bottles with suitable accuracy shown	**3**	**M2** for 3 correct comparable values or for a correct method to compare 3 bottles shown but not evaluated to enough accuracy. or **M1** for 2 correct comparable values or for a correct method to compare 3 bottles but incorrect or not evaluated.
8(a)(i)	5.5 – 3.6 [= 1.9]	**1**	
8(a)(ii)	3	**1**	

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Question	Answer	Marks	Partial Marks
8(b)	23	**3**	**M2** for 4.7 × 3.6 + 1.9 × 1.7 + 0.5 × 1.9 × *their* **(a)(ii)** or 3.6 ×*their***(a)(ii)** + 5.5 × 1.7 + 0.5 × 1.9 × *their***(a)(ii)** or 5.5 × 4.7 − 0.5 × 1.9 × *their* **(a)(ii)** or 0.5 × (3.6 + 5.5) × *their* **(a)(ii)** + 1.7 × 5.5 or 0.5 × (1.7 + 4.7) × 1.9 + 3.6 × 4.7 or **M1** for 4.7 × 3.6 + 1.9 × 1.7 or 3.6 × *their* **(a)(ii)** + 5.5 × 1.7 or 0.5 × 1.9 × *their* **(a)(ii)** or 5.5 × 4.7 or 0.5 × (3.6 + 5.5) × *their* **(a)(ii)** or 0.5 × (1.7 + 4.7) × 1.9
8(c)	2.76	**1**	
	m^3	**1**	
8(d)	451	**1**	
8(e)	8.31 or 8.309 to 8.311	**2**	**M1** for [0.5]π × 2.3^2 oe
9(a)	25.2	**2**	**M1** for 420 ÷ 1000 × 60 or **B1** for figs 252 final answer
9(b)	21.7 or 21.70…..	**4**	**B2** for 2 h 21 [min] or 2°21° or 2.35 [h] or 141 [min] or **B1** for 2 h 46 [min] or 2°46° or 2.76… [h] or 2.77[h] or 166 [min] or 1416 or 1220 **M1** for 51 ÷ *their* time period

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