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Cambridge IGCSE™

MATHEMATICS

0580/43

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.

This document consists of **8** 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
nfw	not from wrong working
soi	seen or implied

Question	Answer	Marks	Partial Marks
1(a)	1260	2	M1 for $15 \times 54 + 25 \times 18$
1(b)	38 800	2	M1 for $37054 \div \left(1 - \frac{4.5}{100}\right)$ oe
1(c)(i)	15 : 12 : 28	2	M1 for correct attempt to find a common multiple for the women oe
1(c)(ii)	216	3	M2 for $224 \div \text{their } 28 \times \text{their } (15 + 12)$ or M1 for $224 \div \text{their } 28$
1(d)	55.25	2	M1 for $8 + 0.5$ or $6 + 0.5$ seen
1(e)	156 or 156.3...	2	M1 for $\left(1 + \frac{1.5}{100}\right)^{30}$
2(a)(i)	triangle with vertices at (-2, -1) (-8, -1) (-2, -5)	2	B1 for correct reflection in $y = x$
2(a)(ii)	triangle with vertices at (-1, -1) (-1, -7) (3, -7)	2	B1 for translation by $\begin{pmatrix} k \\ -9 \end{pmatrix}$ or $\begin{pmatrix} -2 \\ k \end{pmatrix}$
2(b)(i)	Enlargement [centre] (-7, 8) [sf] $\frac{1}{2}$	3	B1 for each
2(b)(ii)	Rotation [centre] (0, 0) 90° clockwise oe	3	B1 for each
3(a)	correct diagram	4	B1 for median line correctly drawn at 148 B1 for 105 soi B1 for whisker at 159 soi
3(b)	6.48	3	M1 for $(5 \times 8) + (6 \times 2) + (12 \times 7) + \dots$ M1dep for $\text{their } \sum fx \div \text{their } (8 + 2 + 12 + 2 + 0 + 1)$
4(a)	$m \geq 3.4$ oe final answer	2	M1 for $12 + 5 \leq 8m - 3m$ or better or $3m - 8m \leq -5 - 12$ or better

Question	Answer	Marks	Partial Marks
4(b)	$x = -0.75$ oe	3	M1 for $15(2x+5) = 14(3-x)$ B1 for $30x + 75 = 42 - 14x$ or better
4(c)	$3x^2 - 16x - 35 [= 0]$ or $3y^2 - 8y - 51 [= 0]$	M3	M1 for $x^2 + 2(4-x)^2 = 67$ or $(4-y)^2 + 2y^2 = 67$ seen B1 for $16 - 8x + x^2$ or $16 - 8y + y^2$
	$(3x+5)(x-7) [= 0]$ or $(3y-17)(y+3) [= 0]$	M1	or for correct factors for <i>their</i> equation or for correct use of quadratic formula or completing the square for <i>their</i> equation
	$x = 7, y = -3$ $x = -\frac{5}{3}, y = 5\frac{2}{3}$	B2	B1 for $x = 7, x = -\frac{5}{3}$ or for $y = -3, y = 5\frac{2}{3}$ or for a correct pair of x and y values
5(a)	$(4x-5)(x+3) + (x+1)(x-3) = 342$ or $2x(4x-5) - (3x-6)(x-3) = 342$	M2	M1 for $(4x-5)(x+3)$ or $(x+1)(x-3)$ or for $2x(4x-5)$ or $(3x-6)(x-3)$
	$4x^2 + 12x - 5x - 15$ oe and $x^2 + x - 3x - 3$ oe seen OR $8x^2 - 10x$ and $3x^2 - 15x + 18$ seen	M2	M1 for each
	$5x^2 + 5x - 18 = 342$ leading to $x^2 + x - 72 = 0$	A1	no errors or omission
5(b)	$(x+9)(x-8)$	M2	B1 for $(x+a)(x+b)$ where $ab = -72$ or $a+b = 1$ and a, b are integers
	8, -9	B1	
5(c)	86	2	FT for $12 \times \text{their } x - 10$ (x positive) B1 for any one of 27, 11, 16 seen or for $2x + 2x + 4x - 5 + 4x - 5$ oe or better soi
5(d)	22.2 or 22.16 to 22.17	2	M1 for $\tan = \frac{11}{27}$ or $\frac{\text{their } x + 3}{4 \times \text{their } x - 5}$
6(a)(i)	29.5 or 29.50...	4	M2 for $\frac{11^2 + 5.3^2 - 6.9^2}{2 \times 11 \times 5.3}$ or M1 for $6.9^2 = 11^2 + 5.3^2 - 2 \times 11 \times 5.3 \cos x$ A1 for 0.87[0...] oe

Question	Answer	Marks	Partial Marks
6(a)(ii)	13.4 or 13.38...	4	B1FT 84 – <i>their</i> (a)(i) M2 for $\frac{11}{\sin 42} \times \sin 54.5$ or M1 for implicit form
6(b)	2700	4	M2 for $15 \times 2.5 \times 20 \times 60 \times 60$ or M1 for $15 \times 2.5 \times 20$ M1 for <i>their</i> volume $\div 1000$ If 0 scored, SC1 for figs 27 with no working
7(a)(i)	$\frac{3}{4}, \frac{1}{4}, \frac{2}{5}, \frac{3}{5}, \frac{2}{5}, \frac{3}{5}$	2	B1 for one correct pair
7(a)(ii)	$\frac{3}{10}$ oe	2	FT <i>their</i> tree diagram M1 for $\frac{3}{4} \times \frac{2}{5}$
7(a)(iii)	$\frac{11}{20}$ oe	3	M2 for $\frac{3}{4} \times \frac{3}{5} + \frac{1}{4} \times \frac{2}{5}$ or M1 for $\frac{3}{4} \times \frac{3}{5}$ or $\frac{1}{4} \times \frac{2}{5}$
7(b)	$\frac{36}{125}$ oe	3	M2 for $\left(\frac{2}{5}\right)^2 \times \frac{3}{5} \times 3$ oe or M1 for $\left(\frac{2}{5}\right)^2 \times \frac{3}{5}$
7(c)	$\frac{3}{28}$ oe	2	M1 for $\frac{3}{4} \times \frac{1}{7}$
8(a)	12	2	M1 for $150 = \frac{(n-2) \times 180}{n}$ or $\frac{360}{180-150}$ oe
8(b)(i)	45	2	B1 for angles at <i>M</i> or <i>K</i> = 45 or angle at <i>L</i> = 90
8(b)(ii)	85	2	B1 for either angle in alt segment = 58
8(b)(iii)	72	2	B1 for either angle at <i>J</i> or <i>H</i> = 108 or angle at <i>F</i> = 72
8(c)	$OA = OB = OC = OD$ Radii	B1	
	$AB = CD$ chords equidistant from centre are equal	B1	
	SSS implies congruent	B1	

Question	Answer	Marks	Partial Marks
9(a)(i)	$\frac{3}{8}$	2	M1 for $8y = 3x + 20$ or better
9(a)(ii)	(0, 2.5) oe	1	
(b)(i)	15.6 or 15.62...	3	M2 for $\sqrt{(9 - -3)^2 + (-2 - 8)^2}$ oe seen or M1 for $(9 - -3)^2$ or $(-2 - 8)^2$ oe seen
9(b)(ii)	$y = -\frac{5}{6}x + 4$ oe	3	M1 for gradient $\frac{-2 - 8}{9 - -3}$ oe M1 for substituting (6, -1) into a linear equation oe
9(b)(iii)	$y = \frac{6}{5}x - \frac{3}{5}$ oe	4	M1 for gradient -1 / <i>their</i> $\left(-\frac{5}{6}\right)$ B1 for midpoint at (3, 3) M1 for <i>their</i> midpoint substituted into $y = \text{their } m \times x + c$ oe
10(a)(i)	$x + 5$	2	B1 for linear equation with positive gradient or intercept 5
10(a)(ii)	$2 \sin x$ oe	2	B1 for recognition of sin or $\cos(x - 90)$
10(b)	tangent ruled at P	B1	
	1.3 to 1.4	B2	dep on tangent drawn M1 for rise/run
11(a)	4	1	
11(b)	52	2	M1 for $f(8)$ seen or $7 \times \frac{2x}{x-3} - 4$
11(c)	$7x^2 - 4$	1	
11(d)	$\frac{7x^2 - 21x + 12}{2(x-3)}$ or $\frac{7x^2 - 21x + 12}{2x-6}$ final answer	3	M1 for $(7x-4)(x-3) + 2 \times 2x$ B1 for denominator $2(x-3)$ or $2x-6$
11(e)	-3	2	M1 for $7x + 14 - 4 = -11$
11(f)	$[p =] 0$ and $[p =] 1$	2	B1 for each
12(a)(i)	$\left(-\frac{1}{2}, 4\right)$ and $\left(\frac{1}{2}, 2\right)$	5	B2 for $12x^2 - 3 [= 0]$ or B1 for $12x^2$ or -3 M1 for their derivative $= 0$ or $dy/dx = 0$ B1 for $[x =] -\frac{1}{2}$ and $\frac{1}{2}$ or one coordinate pair correct

Question	Answer	Marks	Partial Marks
12(a)(ii)	$\left(-\frac{1}{2}, 4\right)$ Max with reason $\left(\frac{1}{2}, 2\right)$ Min with reason	3	B2 for one correct with reason or M1 for correct attempt to find e.g. 2nd derivative/gradients/sketch
12(b)	line $y = x + 3$ ruled	M2	B1 for $[y =]x + 3$ identified or rules $y = x + k$ or $y = px + 3$
	-0.7 to -0.8 2.7 to 2.8	A1	