

GCSE Mathematics (1MA1) – Higher Tier Paper 2H

October 2016 mock paper mark scheme

NOTES ON MARKING PRINCIPLES

Guidance on the use of codes within this mark scheme

M1 – method mark. This mark is generally given for an appropriate method in the context of the question. This mark is given for showing your working and may be awarded even if working is incorrect.

P1 – process mark. This mark is generally given for setting up an appropriate process to find a solution in the context of the question.

A1 – accuracy mark. This mark is generally given for a correct answer following correct working.

This mark is given for – working mark. This mark is usually given when working and the answer cannot easily be separated.

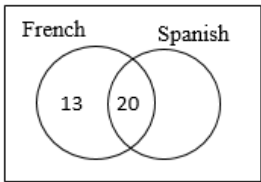
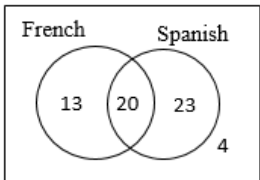
C1 – communication mark. This mark is given for explaining your answer or giving a conclusion in context supported by your working.

In some cases full marks can be given for a question or part of questions where no working is seen. However, it is wise to show working for one small slip could lead to all marks being lost if no working is shown.

Some questions (such as QWC) require all working to be shown; in such questions, no marks will be given for an answer with no working (even if it is a correct answer).

Note that in some cases a correct answer alone will not score marks unless supported by working; these situations are made clear in the mark scheme. Examiners are prepared to award zero marks if the student's response is not worthy of credit according to the mark scheme.

Question 1 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)		B1	This mark is given for 13 and 20 in the correct positions in the Venn diagram
	$43 - 20 (= 23)$ $60 - 43 - 13 (= 4)$	M1	This mark is given for a method to find the number of students who study only Spanish, , or the number of students who study neither French nor Spanish,
		A1	This mark is given for a fully correct Venn diagram
(b)	$\frac{4}{60}$	B1	This mark is given for $\frac{4}{60}$ (or an equivalent fraction)

Question 2 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Rotation, 90° anti-clockwise (or 270° clockwise, centre $(0, -1)$)	M1	This mark is given for seeing one of these terms used.
	Rotation 90° anti-clockwise with centre $(0, -1)$	A1	This mark is given for the correct answer only

Question 3 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	e.g. rain, school day, measurement error	C1	This mark is given for a correct reason for low attendance in hot weather
(b)	Positive	B1	This mark is given for the correct answer only
(c)		B1	This mark is given for answer in range 15 – 25
(d)	e.g. data out of range, number of children will be negative	C1	This mark is given for a correct explanation of why it would not be sensible to use the scatter graph

Question 4 (Total 5 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$FE = (28 - 6 - 6) \div 2 (= 8)$ or $AB = (28 - 6 - 6 - 3 - 3) \div 2 (= 5)$	P1	This mark is given for a process to process to find the distance FE or AB
	$AFE = \frac{4 \times 8}{2} (= 16)$ $CDE = \frac{6 \times 3}{2} (= 9)$ $\frac{5 \times 4}{2} (= 10)$ $\frac{2 \times 3}{2} (= 3)$	P1	This mark is given for a process to process to find area of a triangle in the diagram
	$8 \times 4 + 2 \times 3 - (16 + 9)$ or $\frac{5 \times 4}{2} + \frac{2 \times 3}{2}$ or $(6 \times 8) - (5 \times 2) - (16 + 9)$	P1	This mark is given for a process to complete process for shaded area
	13	A1	This mark is given for the correct answer only
	m ²	C1	This mark is given independently for stating the correct units

Question 5 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$4x + y = 10$ $4x - 20y = 52$ $21y = -42$ or $20x + 5y = 50$ $x - 5y = 13$ $21x = 63$	M1	This mark is given for a method to correct process to eliminate one variable (allowing one arithmetic error)
	$4x - 2 = 10$ or $x + 10 = 13$ or $12 + y = 10$ or $3 - 5y = 13$	M1	This mark is given for a method for substituting the found value in one of the equations or an appropriate method after starting again
	$x = 3, y = -2$	A1	This mark is given for the correct answer only

Question 6 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes															
(a)		M1	This mark is given for a method to 2 or 3 entries correct entries in the table															
	<table><tr><td>x</td><td>0.5</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>y</td><td>6</td><td>3</td><td>1.5</td><td>1</td><td>0.75</td><td>0.6</td><td>0.5</td></tr></table>	x	0.5	1	2	3	4	5	6	y	6	3	1.5	1	0.75	0.6	0.5	A1
x	0.5	1	2	3	4	5	6											
y	6	3	1.5	1	0.75	0.6	0.5											
(b)		M1	This mark is given (dependent on the first method mark being given) for 6 or 7 points plotted from the table															
		A1	This mark is given for the correct graph drawn															

Question 7 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	UK £98, USA £94.40 UK \$140.14, USA \$134.99 UK €134.25, USA €129.30	P1	This mark is given for a process to process to compare the price in the USA
	UK £98, Germany £102.19 UK \$140.14, Germany \$146.14 UK €134.25, Germany €139.99	P1	This mark is given for a process to process to compare the price in Germany
	USA, with reasons Postage or travel costs	A1 C1	This mark is given for the correct conclusion with correct figures in consistent currencies to compare This mark is given for a reason why not to buy from another country

Question 8 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$5a = 8b = 6c$ or two ratios with common value for b 24 : 15 and 15 : 20	P1	This mark is given for a process to form an equation linking 3 variables
	e.g. 48 : 30 : 40	P1	This mark is given for a process to find an unsimplified ratio
	24 : 15 : 20	A1	This mark is given for the correct answer only

Question 9 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	36 000	B1	This mark is given for the correct answer only
(b)	$(2.8 \div 4.7) \times 10^{-2-5}$ or $0.5957... \times 10^{-7}$ or $5.957... \times 10^{-8}$ or 0.00000005957...	M1	This mark is given for a method multiply the two terms
	5.96×10^{-8}	A1	This mark is given for the correct answer only

Question 10 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(i)	$y \propto x^2$	B1	This mark is given for the correct answer only
(ii)	$y = kx^n$	M1	This mark is given for a method to for representing the proportionality as an equation
	$400 \div 5^2$ and $576 \div 6^2$ (= 16)	M1	This mark is given for a method for finding the coefficient of x^2
	$y = 16x^2$	A1	This mark is given for the correct answer only

Question 11 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\tan x = \frac{h}{d}$	P1	This mark is given for a process to find a trigonometric relationship
	$\tan^{-1} \frac{4d}{d}$	P1	This mark is given for a process to substitute $h = 4d$ and solve
	76.0	A1	This mark is given for an answer in the range 75.9 – 76.0
(b)	Decreases value of h	C1	This mark is given for a correct statement

Question 12 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\begin{array}{cccc} 3 & 8 & 15 & 24 \\ & 5 & 7 & 9 \\ & & 2 & 2 \end{array}$ <p>2nd difference of 2 implies $1n^2$ or $1^2 + \dots, 2^2 + \dots, 3^2 + \dots$</p>	M1	This mark is given for a correct deduction from differences
	$3 = 1^2 + 2, 8 = 2^2 + 4, 15 = 3^2 + 6, 24 = 4^2 + 8$	M1	This mark is given for a method link $1^2, 2^2, 3^2$ with 2, 4, 6
	$n^2 + 2n$	A1	This mark is given for the correct answer only (or an equivalent expression)
	31 is not a power of 2	C1	This mark is given for a correct explanation

Question 13 (Total 4 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
(i)	$\frac{8}{40}$ or $\frac{30}{8}$ or $\frac{8}{30}$	P1	This mark is given for starting a process to work out an estimate for the number of ducks
	$\frac{8}{40} = \frac{30}{n}$ or $\frac{8}{30} = \frac{40}{n}$ or $\frac{30 \times 40}{8}$	P1	This mark is given for a correct process to work out an estimate for the number of ducks
	150	A1	This mark is given for the correct answer only
(ii)	If tags fell off, Alex will have overestimated the number of ducks	C1	This mark is given for a correct explanation

Question 14 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	3^{4n} or 5^4 or $(3^{-n})^{-4}$ or 0.2^{-4}	M1	This mark is given for one of these terms seen in an attempt to set up an equation to solve
	$3^{4n} = 5^4$ or $(3^{-n})^{-4} = 0.2^{-4} = 625$	A1	This mark is given for the correct answer 625 only

Question 15 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{80}{360} \times \pi \times 30^2 (= 628.32\dots)$	P1	This mark is given for a process to find the area of sector <i>AOB</i>
	$\frac{1}{2} \times 30^2 \times \sin 80^\circ (= 443.16\dots)$	P1	This mark is given for a process to find the area of triangle <i>AOB</i>
	$628.32\dots - 443.16\dots (= 185.16\dots)$	P1	This mark is given for a process to process to find the area of the segment
	$\frac{185.16\dots}{\pi \times 30^2} \times 100$	P1	This mark is given for a process to find the area shaded as a percentage of the area of the circle
	6.55	A1	This mark is given for an answer in the range 6.5 – 6.6

Question 16 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$x + y \leq 7$ rather than $x + y \leq 6$ $x \geq 0$ rather than $y \geq 0$ $y \geq x + 2$ rather than $y \leq x + 2$	B2	Two marks are given for two errors identified; one mark is given for one error identified

Question 17 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	When $t = 1$, speed = 3.6 When $t = 4$, speed = 9.6	M1	This mark is given for a method to for using values 3.6 and 9.6
	$\frac{1}{2} \times 1 \times ((3.6 + 9.6) + 2(6.4 + 8.4))$	M1	This mark is given for a method to for substituting values into trapezium rule
	21.4	A1	This mark is given for the correct answer only
(b)	An estimate of distance covered...	C1	This mark is given for a correct statement
	...in metres	C1	This mark is given for the correct units
	An underestimate, since the chords are under the curve	C1	This mark is given for a correct statement

Question 18 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$95 \times 94 (= 8930)$ or $87 \times 86 (= 7482)$	M1	This mark is given for a method to find the combinations for any two roles
	$95 \times 94 \times 87 \times 86$	M1	This mark is given for a method to find the total of all combinations
	66 814 260	A1	This mark is given for the correct answer only

Question 19 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{12-7}{11-9} (= \frac{1}{4})$	P1	This mark is given for a process to find the gradient of the line PQ
	$x = -9 + (\frac{2}{5} \times 20) \quad (= -1)$ $y = 7 + (\frac{2}{5} \times 5) \quad (= 9)$ Coordinates of M are $(-1, 9)$	P1	This mark is given for a process to process to find the x or y coordinate of the point M
	gradient of line $L = \frac{-1}{\frac{1}{4}} (= -4)$	P1	This mark is given for a process to method to find gradient of line L
	$y = -4x + c$ when $x = -1$ and $y = 9$, $c = 5$	M1	This mark is given for a method to substitution of found values for x , y and M into equation for straight line
	$y = -4x + 5$	A1	This mark is given for the correct answer only

Question 20 (Total 4 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$pq^0 = 5 \Rightarrow p = 5$	B1	This mark is given for finding the value of p
	$405 = 5q^4$	M1	This mark is given for a method to find an equation in q
	$q = \sqrt[4]{81} (= 3)$	M1	This mark is given for a method to find the value of q
	$k = (5 \times 3^2) = 45$	A1	This mark is given for the correct answer only

Question 21 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\overrightarrow{BA} = \mathbf{a} - 3\mathbf{b}$ or $\overrightarrow{YA} = \frac{1}{2}(\mathbf{a} - 3\mathbf{b})$	M1	This mark is given for a method to represent BA or YA as vectors
	$\overrightarrow{XY} = \mathbf{b} + \frac{1}{2}(\mathbf{a} - 3\mathbf{b})$ or $\overrightarrow{YZ} = \mathbf{a} + \frac{1}{2}(\mathbf{a} - 3\mathbf{b})$ or $\overrightarrow{XZ} = 2\mathbf{a} - 2\mathbf{b}$	M1	This mark is given for a method to represent one of XY , YZ or XZ as vectors
		M1	This mark is given for a method to represent a second of XY , YZ or XZ as vectors
(b)	$\overrightarrow{XY} = \frac{1}{2}(\mathbf{a} - \mathbf{b})$ or $\overrightarrow{YZ} = \frac{3}{2}(\mathbf{a} - \mathbf{b})$ or $\overrightarrow{XZ} = 2(\mathbf{a} - \mathbf{b})$	M1	This mark is given for a method to simplify at least two vector terms to enable comparison of two of \overrightarrow{XY} , \overrightarrow{XZ} and \overrightarrow{YZ}
	\overrightarrow{XY} , \overrightarrow{XZ} and \overrightarrow{YZ} are each multiples of $(\mathbf{a} - \mathbf{b})$ and so are parallel; point Y is common, so X , Y and Z lie on a straight line	C1	This mark is given for a complete proof with reference to two of \overrightarrow{XY} , \overrightarrow{XZ} and \overrightarrow{YZ} being parallel and a common point