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

November 2017 student-friendly mark scheme

Please note that this mark scheme is not the one used by examiners for making scripts. It is intended more as a guide to good practice, indicating where marks are given for correct answers. As such, it doesn't show follow-through marks (marks that are awarded despite errors being made) or special cases.

It should also be noted that for many questions, there may be alternative methods of finding correct solutions that are not shown here – they will be covered in the formal 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. B1 – 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. Some questions 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).

Question 1 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$5x - 6 = 3x - 3$	1	This mark is given for expanding brackets
	$5x - 6 - 3x = -3$ $2x - 6 = -3$	1	This mark is given for isolating x on one side of the equation
	$2x = 3$ $x = 1\frac{1}{2}$	1	This mark is given for the correct answer only

Question 2 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$5.64 \div 12 = 0.47$	1	This mark is given for finding the cost of one bottle
	$50 - 47 = 3$	1	This mark is given for finding the profit on the sale of one bottle
	$\frac{3}{47} \times 100 = 6.4$ (to one decimal place)	1	This mark is given for the correct answer only

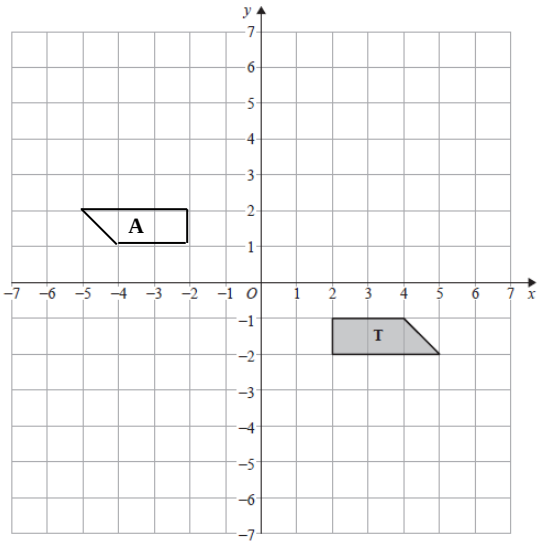
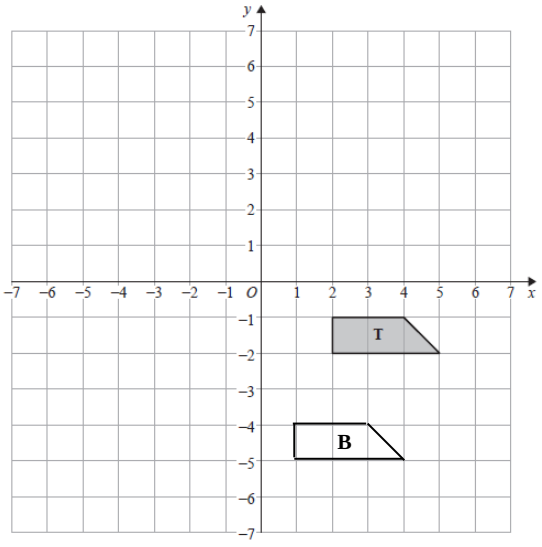
Question 3 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\pi \times 80 = 251.327\ldots$	1	This mark is given for finding the length of the circumference of the circle
	$251.327 \div 8 = 31.4\ldots$	1	This mark is given for the correct answer only
(b)	No, the mean distance stays the same because the total distance and the number of points stays the same	1	This mark is given for a correct comment

Question 4 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	B : Y = 2 : 1	1	This mark is given for a correct ratio for the blue and yellow cubes
	B : Y : G = 2 : 1 : 8	1	This mark is given for a correct ratio for the blue, yellow and green cubes
	$\frac{1}{2+1+8} = \frac{1}{11}$	1	This mark is given for the answer shown or an equivalent fraction

Question 5 (Total 2 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
		1	This mark is given for a shape labelled **A** with coordinates (–2, 1), (–4, 1), (–2, 2) and (–5, 2)
		1	This mark is given for a shape labelled **B** with coordinates (1, –4), (3, –4), (1, –5) and (4, –5)

Question 6 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	6	1	This mark is given for the correct answer only
(b)	5	1	This mark is given for the correct answer only
(c)	$100^a = 10^{2a}$, $1000^b = 10^{3b}$	1	This mark is given for writing 100^a or 1000^b as a power of 10
	$10^{2a} \times 10^{3b} = 10^{2a + 3b}$ thus $w = 2a + 2b$	1	This mark is given for a correct conclusion

Question 7 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$7.5^2 - 6^2$	1	This mark is given for a method to find the third length of the right angled triangle shown
	$7.5^2 - 6^2 = 56.25 - 36 = 20.25$ $\sqrt{20.25} = 4.5$	1	This mark is given for finding the third length of the right angled triangle shown
	$24 - 4.5 - 10 = 9.5$	1	This mark is given for finding a length for a right angled triangle to be able to calculate angle *CDA*
	$\tan CDA = \frac{6}{9.5}$	1	This mark is given for finding the tangent of the angle *CDA*
	angle *CDA* = 32.3°	1	This mark is given for an answer in the range 32.2–32.3

Question 8 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\sqrt{\frac{1.0654058}{0.1402633}} = 7.595756$	1	This mark is given for any of 1.0654058, 1.402633 or 7.595756 seen
	2.7560399…	1	This mark is given for the correct answer only
(b)	2.76	1	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
	$5 \times 4\frac{1}{2} = 22\frac{1}{2}$	1	This mark is given for finding how many hours are worked by five cleaners in total
	$22\frac{1}{2} \div 3 = 7\frac{1}{2}$	1	This mark is given for finding how many hours each of three cleaners would need
	$8 \times 8.20 = 65.60$	1	This mark is given for the correct answer only

Question 10 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	Between 0 and 20 seconds	1	This mark is given for the correct answer only
	When the gradient of the graph is greatest	1	This mark is given for a correct comment
(b)	$\frac{360}{20} = 18$	1	This mark is given for the correct answer only

Question 11 (Total 3 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	Area for Adley pie chart = $\pi \times 5^2 = 25\pi$ Area of Bridford pie chart = $\pi \times 4^2 = 16\pi$ Angle for 0–19 on Adley = 70°	1	This mark is given for finding areas for the two circles and an angle for 0–19
	$\frac{70}{360} \times \frac{25\pi}{41\pi}$	1	This mark is given for a method to find the proportion of 0–19 year olds in Bridford
	0.119	1	This mark is given for the correct answer in the range 0.118 – 0.119

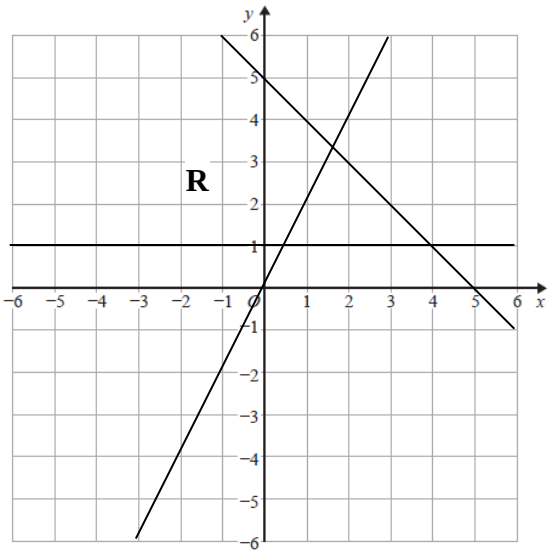
Question 12 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$RST = \frac{(12-2)\times 180}{12} = 150$	1	This mark is given for finding an interior angle of a regular 12-sided polygon
	$STR = \frac{180-150}{2}$	1	This mark is given for a method to find the size of *STR*
	15	1	This mark is given for the correct answer only

Question 13 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$50\,000 \times 1.02^8$	1	The mark is given for a method to find the increase in value after 8 years
	58 600	1	This mark is given for the correct answer only
(b)	$325\,000 \div 250\,000 = 1.3$	1	This mark is given for finding a multiplier
	$(1.3)^{\frac{1}{6}} = 1.0447\ldots$	1	This mark is given for a method to find the percentage increase each year
	4.5	1	This mark is given in the range 4.4 – 4.5

Question 14 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	lines $y = 1$, $x + y = 5$ and $y = 2x$ drawn	2	These two marks are given for all lines correctly drawn (1 mark is given for any two lines correctly drawn)
		1	This mark is given for a fully correct region indicated with all lines correct

Question 15 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	No; Tracey should multiply 8 and 9	1	This mark is given for correct comment
(b)	$12 \times 11 = 132$	1	This mark is given for staring a method to find the number of games played
	$\frac{132}{2} = 66$	1	This mark is given for the correct answer only

Question 16 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$(x - 2) = \pm\sqrt{3}$	1	This mark is given for a method to solve the equation
	$x = \sqrt{3} - 2, \sqrt{3} + 2$ $= 0.268, 3.73$	1	This mark is given for both correct answers only

Question 17 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)		3	These three marks are given for a fully correct histogram with axes scaled and labelled. (2 marks are given for all bars in correct proportions; 1mark is given for two correct bars)
(b)	$30 + 51 + 36 + (\frac{1}{3} \times 18) = 123$	1	This mark is given for a method to find the number of students in the interval
	$\frac{123}{150}$	1	This mark is given for the answer shown or a equivalent fraction or percentage

Question 18 (Total 1 mark)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$1 – 0.02 = 0.98$	1	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
	$M = \left(\frac{-3+1}{2}, \frac{-6+4}{2}\right) = (–1, –1)$ $N = \left(\frac{1+5}{2}, \frac{4-2}{2}\right) = (3, 1)$	1	This mark is given for a method to find the coordinates of *M* or *N*
	Gradient of $MN = \frac{1--1}{3--1}$ Gradient of $PR = \frac{-6--2}{-3-5}$	1	This mark is given for a method to find the gradient of *MN* or *PR*
	Gradient of $MN = \frac{1}{2}$ Gradient of $PR = \frac{1}{2}$	1	This mark is given for finding the gradient of *MN* or *PR*
	The gradients of both lines = $\frac{1}{2}$; so *MN* is parallel to *PR*	1	This mark is given for a correct conclusion supported by working

Question 20 (Total 5 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$OAB = 90°$; $OCB = 90°$	1	This mark is given for identifying a right angle in the diagram
	$AB = CB = 10 \times \tan 60° = 10\sqrt{3}$	1	Thismark is given for finding the length of *AB* or *CB*
	Area $OAC = \frac{120}{360} \times \pi \times 10^2 = 104.72\ldots$	1	This mark is given finding the area of the sector
	Area OAB = OBC $= \frac{1}{2} \times 10 \times 10\sqrt{3} = 50\sqrt{3}$	1	This mark is given for finding the area of the right angled triangle *OAB* or *OBC*
	Shaded area = area $OABC$ – area OAC $= (2 \times 50\sqrt{3}) - 104.72 = 68.5$	1	This mark is given for a correct answer in the range 68.4 – 68.6

Question 21 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{4}{12} \times \frac{3}{11} \times \frac{2}{10}$	1	This mark is given for a method to find the probability of taking 3 red counters
	$\frac{1}{55}$	1	This mark is given for the answer shown or an equivalent fraction
(b)	$\frac{5}{15} \times \frac{4}{14} \times \frac{3}{13}$	1	This mark is given for calculating a relevant probability
	$= \frac{2}{91}$, so more likely since $0.022 > 0.018$	1	This mark is given for a correct conclusion supported by working

Question 22 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$g(3) = 3a + b = 20$	1	This mark is given for finding an equation for g(3)
	$g(1) = a + b$	1	This mark is given for finding g(1)
	$f^{-1}(x) = \frac{x-3}{5}$	1	This mark is given for finding $f^{-1}(x)$
	$f^{-1}(33) = g(1) = a + b = \frac{33-3}{5} = 6$	1	This mark is given for finding an the equation $a + b = 6$
	$3a + b = 20$ $a + b = 6$ $2a = 14$, so $a = 7$ and $b = -1$	1	This mark is given for finding the values of a and b

Question 23 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\sqrt{x} + 1 = k \times 1$	1	This mark is given for expressing the common ratio algebraically
	$\frac{1}{\sqrt{x}-1} = \frac{\sqrt{x}+1}{1}$	1	This mark is given for setting up an appropriate equation in x
	$(\sqrt{x} - 1) \times (\sqrt{x} + 1) = 1$ $x - 1 = 1$ $x = 2$	1	This mark is given for the correct answer only
(b)	$(\sqrt{2} + 1) \times (\sqrt{2} + 1)^2$	1	This mark s given for showing that the 5th term = 3rd term × (common ratio)^2
	$= 2\sqrt{2} + 4 + \sqrt{2} + 2 + 2\sqrt{2} + 1$ $= 7 + 5\sqrt{2}$	1	This mark is given for a correct conclusion supported by working