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

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
	36 2, 18 2, 2, 9 2, 2, 3, 3	1	This mark is given for a complete method to find prime factors, which could be shown on a complete factor tree with no more than one arithmetic error
	$2 \times 2 \times 3 \times 3$	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
	x, $x + 7$, $2x + 14$	1	This mark is given for representing the ages algebraically
	$x + x + 7 + 2x + 14 = 77$ $4x + 21 = 77$	1	This mark is given for a sum of the three expressions
	$x = 14$	1	This mark is given for finding a value of x as the age of Jay
	14 : 21 : 42	1	This mark is given for the answer shown or an equivalent ratio (e.g. 2 : 3 : 6)

Question 3 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$EBC = 35°$ $FDE = 75°$ corresponding angles are equal	1	This mark is given for finding one or two angles using parallel lines
	$FED = 70°$ angles in a triangle sum to 180	1	This mark is given showing method to complete calculation to reach 70°
	$ABF = 70°$ opposite angles in a parallelogram are equal	1	This mark is given for ABF identified as 70°
		1	This mark is given for full appropriate reasons given

Question 4 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\pi \times 4^2 = 50.265\ldots$ $\pi \times 7^2 = 153.938\ldots$ $\pi \times 10^2 = 314.159\ldots$	1	This mark is given for process to find the area of any relevant circle
	$\pi \times 7^2 - \pi \times 4^2$	1	This mark is given for complete method to find the shaded area
	$= 103.673\ldots$	1	This mark is given for the correct answer only
	Daisy is wrong since $\frac{103.313...}{314.159...} = 0.329\ldots$ and $0.329 \neq \frac{1}{3}$	1	This mark is given for a correct comment supported by working

Question 5 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$200 + 3300 + 2000 + 0 + 1800 = 7300$	1	This mark is given for fx with x consistent within intervals
	$7300 \div 20$	1	This mark is given $\Sigma fx \div \Sigma f$
	365	1	This mark is given for the correct answer only
(b)	Yes, since outliers can affect the mean	1	This mark is given for a correct comment

Question 6 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$2x + 6 = 5x - 9$	1	This mark is given for forming an equation
	$3x = 15$ $x = 5$	1	This mark is given for rearranging and solving for x
	$(2 \times 5) + 6 = 16$ or $(5 \times 5) - 9 = 16$	1	This mark is given for substituting 5 into the side length
	$48 \div 16 = 3$ so $y = 3$	1	This mark is given for the correct answer only

Question 7 (Total 1 mark)

Part	Working or answer an examiner might expect to see	Mark	Notes
	The graph is drawn with line segments, rather than a curve	1	This mark is given for a correct statement

Question 8 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		1	This mark is given for the correct use of the 'recurring' symbol
	$0.246,\ 0.\dot{2}4\dot{6},\ 0.24\dot{6},\ 0.246\dot{}$	1	This mark is given for the correct answer only

Question 9 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$50 \div 2.5 = 20$	1	This mark is given for finding James' speed
	$15 \div 20 = 0.75$ hrs = 45 mins	1	This mark is given for finding James' time for 15 km
	$45 - 40 = 40$ mins	1	This mark is given for finding Peter's time for 15 km
	$15 \div 0.6666\ldots$	1	This mark is given for finding Peter's speed
	22.5	1	This mark is given for the correct answer only

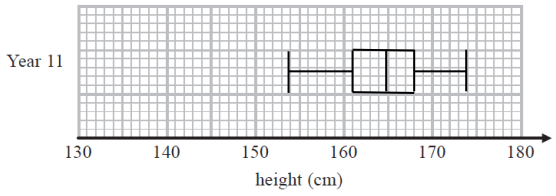
Question 10 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	10	1	This mark is given for the correct answer only
(b)	$125^{\frac{2}{3}} = (\sqrt[3]{125})^2$ or $\sqrt[3]{125} = 5$	1	This mark is given for a start to finding the answer
	25	1	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
	3T + 2C = 7.80 5T + 4C = 14.20	1	This mark is given for setting up two equations
	6T + 4C = 15.60 5T + 4C = 14.20 T = 1.40	1	This mark is given for eliminating one variable
	4.20 + 2C = 7.80 2C = 3.60	1	This mark is given for substituting the value of one variable to find the other
	One tea costs £1.40 and one coffee costs £1.80	1	This mark is given for the correct answer only

Question 12 (Total 5 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)	UQ = 168 Highest value = 174	1	This mark is given for finding the upper quartile or the highest value
	Lowest value = 154 LQ = 161 Median = 165	1	This mark is given for a box plot shown with at least three correctly plotted values from those shown
		1	This mark is given for the correct answer only
(b)	The median height of Year 7 girls is smaller than that of Year 11 girls	1	This mark is given for a statement making a comparison of the medians, in context
	Year 11 girls have a smaller range of heights than Year 7 girls	1	This mark is given for a statement making a comparison of the spreads, in context

Question 13 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$4 \times \frac{450}{15}$	1	This mark is given for a method to work out the total of pies made on Monday
	120	1	This mark is given for the correct answer only
(b)	$5.5 \times \frac{450}{15} = 165$ and $6.5 \times \frac{450}{15} = 195$	1	This mark is given for finding the smallest possible and greatest possible number of steak pies made on Tuesday
	$\frac{165}{450}$	1	This mark is given for the correct answer only

Question 14 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$(y + x) = k(y - x)$	1	This mark is given for setting up an equations from the information given
	$ky - y = x + kx$	1	This mark is given for isolating x and y on opposite sides
	$y(k - 1) = k(x + 1)$ so $y = \frac{k(x+1)}{k-1}$	1	This mark is given for using correct algebra to reach a conclusion

Question 15 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$100x = 43.636\ldots$	1	This mark is given for finding $100x$
	$99x = 43.2$	1	This mark is given for finding $99x$
	$x = \frac{432}{990} = \frac{24}{55}$	1	This mark is given for the correct algebra to reach a conclusion

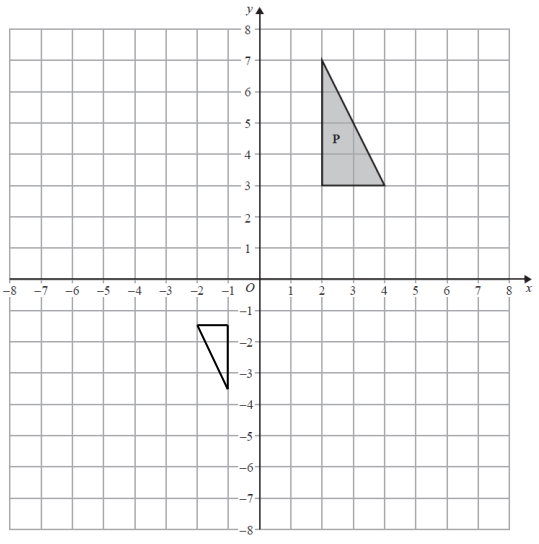
Question 16 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$y = k\sqrt[3]{x}$ $\frac{7}{6} = 2k$ $k = \frac{7}{12}$	1	This mark is given for substituting to find a value for k
	$y = \frac{7}{12} \times 4$	1	This mark is given for finding an expression for y when $x = 64$
	$y = 2\frac{1}{3}$	1	This mark is given for the correct answer only

Question 17 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{1}{2}(n^2 + n + n^2 + n + 2n + 2)$	1	This mark is given for expanding the brackets
	$= \frac{1}{2}(2n^2 + 4n + 2) = n^2 + 2n + 1$ $= (n + 1)^2$ which is square for all integer values of n	1	This mark is given for a complete proof with reference to $(n + 1)^2$ being square for all integers n

Question 18 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		2	These two marks are given for a correct enlargement (position, size and orientation) with coordinate points (–1, –1.5), (–1, –3.5) and (–2, –1.5) [1 mark is given for an enlargement with correct size an orientation in the incorrect position]

Question 19 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$B = (12, 0)$, $E = (0, 6)$ Gradient of **L** $= -\frac{1}{2}$	1	This mark is given for rearranging to find a gradient or positions of B and E
	$A = (–12, 12)$	1	This mark is given for finding the position of A
	Gradient of **M** = 2	1	This mark is given for a finding the gradient of **M**
	Equation of **M** is $y = 2x + 36$	1	This mark is given for the correct answer only

Question 20 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	When $x = 90$, $a \cos x° = 0$ so $b = 1$	1	This mark is given for finding the value of b
	When $x = 0$, $a \cos x° = 2$ so $a = 2$	1	This mark is given for finding the value of a
	When $x = 45$, $2 \cos x° + 1 = 2 \times \frac{1}{\sqrt{2}} + 1$	1	This mark is given for finding an expression for $2 \cos x° + 1$ when $x = 45$
	$1 + \sqrt{2}$	1	This mark is given for the correct answer only

Question 21 (Total 3 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$\frac{6-\sqrt{8}}{\sqrt{2}-1} \times \frac{\sqrt{2}+1}{\sqrt{2}+1}$	1	This mark is given for multiplying the numerator and denominator by $\sqrt{2} + 1$
	$\frac{6\sqrt{2}+1-\sqrt{8}\sqrt{2}-\sqrt{8}}{2-1}$ $= 6\sqrt{2} + 6 – 4 – 2\sqrt{2}$	1	This mark is given for expanding the numerator and collecting terms
	$= 2 + 4\sqrt{2}$ so $a = 2$, $b = 4$	1	This mark is given for the correct answer only

Question 22 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{8}{12} \times 15 = 10$	1	This mark is given for finding a scale factor
	$x = 10 - 8 = 2$	1	This mark is given for the correct answer only
	$(12 + 3) \times 1.5$	1	This mark is given for finding another scale factor
	$x = 22.5 - 8 = 14.5$	1	This mark is given for the correct answer only
		1	This mark is given for describing both assumptions for similarity

Question 23 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$(x - 1)(3x - 2) = 3x^2 - 5x + 2$ $\frac{1}{2} 2x^2 = x^2$	1	This mark is given for deriving expressions for the areas of both the rectangle and triangle
	$2x^2 - 5x + 2 > 0$	1	This mark is given for finding an inequality
	$(2x - 1)(x - 2) > 0$	1	This mark is given for finding a method to solve the inequality
	$x > 2$ and $x > \frac{1}{2}$	1	This mark is given for finding the two critical values
	$x > 2$ only (since $x - \frac{1}{2} < 0$)	1	This mark is given for the correct answer only