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

November 2021 shadow student-friendly mark scheme (Set 1)

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.

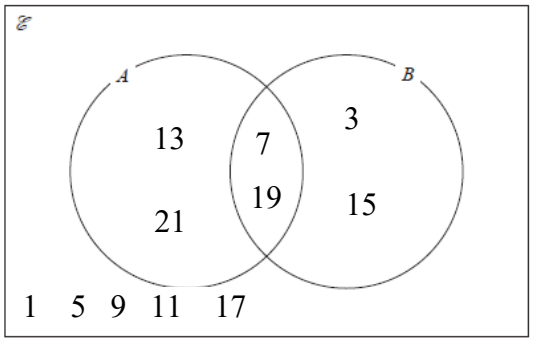
NOTES ON MARKING PRINCIPLES

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 6 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)	4.66 4.9 × 4194 18640 22834 22.834	M1	This mark is given for a method to find a solution
		M1	This mark is given for 22384 seen
		A1	This mark is given for the correct answer only
(b)	For example $7722 \div 18$	M1	This mark is given for a method to simplify to find a solution
	$18\overline{)7722}$ 429	M1	This mark is given for 429 seen
	42.9	A1	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
		M1	This mark is given for 7 and 19 correctly placed
		M1	This mark is given for 3, 13, 15 and 21 correctly placed
		A1	This mark is given for a fully correct Venn diagram

Question 3 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{17}{5} - \frac{5}{3}$	M1	This mark is given for a method to find mixed numbers as improper fractions
	$= \frac{51}{15} - \frac{25}{15} = \frac{26}{15}$	M1	This mark is given for a method to find fractions with a common denominator
	$= 1\frac{11}{15}$	A1	This mark is given for a correct answer only

Question 4 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$25\,000 \times 0.3 = 7500$	P1	This mark is given for a process to find the amount of decrease in the value of Tom's car
	Tom's car at the end of 2020: $25\,000 - 7500 = 17\,500$	P1	This mark is given for a process to find the value of Tom's car at the end of 2020
	Jim's car at the end of 2020: $16\,000 \times .1.1 = 17\,600$	P1	This mark is given for a process to find the value of Jim's car at the end of 2020
	$17\,600 > 17\,500$ Jim's car had the greater value	C1	This mark is given for a correct conclusion supported by correct working

Question 5 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	3 : 8 : 14 $14 - 8 = 6$	M1	This mark is given for a process to find how many more tomatoes Lucy has than Katie using the ratio given in the question
	$30 \div 6 = 5$ Jane, Katie and Lucy have tomatoes in ratio 15 : 40 : 70	M1	This mark is given for process to find the number of tomatoes each person has
	Lucy has $70 - 15$ more tomatoes than Jane $= 55$	A1	This mark is given for the correct answer only

Question 6 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{1}{2}(6 \times h) \times 20 = 600$	P1	This mark is given for a process to find an equation in h for the volume of the prism
	$3h = \frac{600}{20}$	P1	This mark is given for a process to find an equation for the height of the prism
	$h = 10$	A1	This mark is given for a correct answer only

Question 7 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Surface area of cube = $6 \times (2a)^2 = 24a^2$	P1	This mark is given for a process to find an expression for the surface area of the cube
	Surface area of sphere = $4\pi \times 6^2 = 144\pi$	P1	This mark is given for a process to find an expression for the surface area of the sphere
	$24a^2 = 144\pi$ $a^2 = 6\pi$	P1	This mark is given for a process to equate expressions for the surface areas
	$a = \sqrt{k\pi}$ where $k = 6$	C1	This mark is given for showing that $a = \sqrt{k\pi}$

Question 8 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$x^2 - 3x - 28 = 0$	M1	This mark is given for a method to rearrange to find a quadratic equation equal to zero
	$(x + 4)(x - 7) = 0$	M1	This mark is given for a method to factorise the equation
	$x = -4$, $x = 7$	A1	This mark is given for the correct answer only

Question 9 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	1	B1	This mark is given for the correct answer only
(b)	5	B1	This mark is given for the correct answer only
(c)	$\frac{1}{81}$	B1	This mark is given for the correct answer only (or equivalent)
(d)	4	B1	This mark is given for the correct answer only

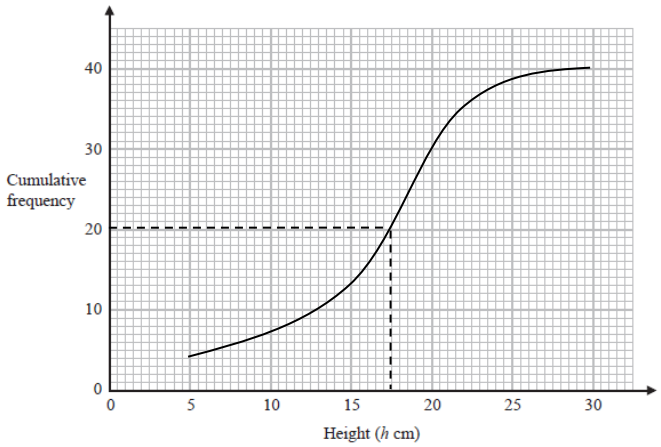
Question 10 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	Area of one of the squares = $\frac{9576}{6}$ cm^2	P1	This mark is given for a process to find the area of one square
	1596 cm^2	P1	This mark is given for a process to find the area of one square
	$\sqrt{1596} \approx 40$ Side of square is 40 cm	A1	This mark is given finding the length of the side of one square (to the nearest whole number)
(b)	Overestimate; $40^2 = 1600$ so $\sqrt{1596} < 40$	C1	This mark is given for a correct reason

Question 11 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$5(3x + 2y) = 4x(2y + 7)$	P1	This mark is given for a process to find an expression equating the area of **A** with the area of **B**
	$15x + 10y = 8xy + 28x$ $10y - 8xy = 13x$	P1	This mark is given for rearranging to find an equation in three terms
	$y(10 - 8x) = 13x$	P1	This mark is given for a process to factorise $10y - 8xy$
	$y = \frac{13x}{10 - 8x}$	A1	This mark is given for the correct answer only (or equivalent expression)

Question 12 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)		B1	This mark is given for at least five of the points (5, 4), (10, 7), (15, 13), (20, 30), (25, 38), and (30, 40) correctly plotted
		B1	This mark is given for a fully correct graph
(b)	17 or 18	B1	This mark is given for an answer in the range 17–18

Question 13 (Total 1 mark)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Tony cannot calculate $36.2\dot{3}6\dot{2} - 0.\dot{3}6\dot{2}$ He needs to find $1000x = 362.\dot{3}6\dot{2}$ so that he can use $1000x - x = 362.\dot{3}6\dot{2} - 0.\dot{3}6\dot{2}$	C1	This mark is given for a correct evaluation

Question 14 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$S = (3x + 7)(5x - 2) - 2x(2x + 4)$	P1	This mark is given for a process to find area of a rectangle with sides with length $3x + 7$ and $5x - 2$
		P1	This mark is given for a process to subtract the area of a rectangle with sides with length $(3x + 7) - (x + 3) = (2x + 4)$ and $2x$
	$A = 15x^2 + 35x - 6x - 14 - 4x^2 - 8x$ $= 11x^2 + 21x - 14$	A1	This mark is given for a completely correct solution

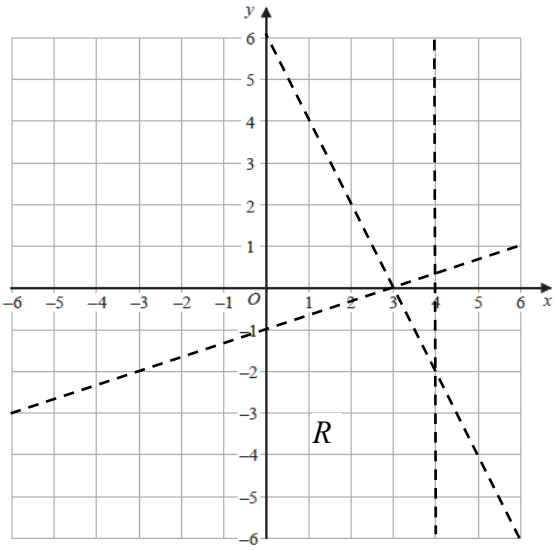
Question 15 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{2(5x+2)+3x}{6x}$	M1	This mark is given for a method to find a correct numerator
		M1	This mark is given for a method to find a correct denominator
	$\frac{10x+4+3x}{6x} = \frac{13x+4}{6x}$	A1	This mark is given for collecting terms to find an answer in the form $\frac{ax+b}{cx}$

Question 16 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Probability of orange, yellow, yellow $= \frac{4}{10} \times \frac{6}{9} \times \frac{5}{8} = \frac{120}{720}$	P1	This mark is given for a process to find the probability of taking one orange sweet then two yellow sweets
	Probability of yellow, orange, yellow $= \frac{6}{10} \times \frac{4}{9} \times \frac{5}{8} = \frac{120}{720}$	P1	This mark is given for a process to find the probability of taking one orange sweet one yellow sweet then one orange sweet
	Probability of yellow, yellow, orange $= \frac{6}{10} \times \frac{5}{9} \times \frac{4}{8} = \frac{120}{720}$	P1	This mark is given for a process to find the probability of taking two yellow sweets then one orange sweet
	$3 \times \frac{120}{720} = \frac{360}{720} = \frac{1}{2}$	A1	This mark is given for a correct answer only

Question 17 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		M1	This mark is given for two of the three lines $3y + 3 = x$, $x = 4$ and $y = 6 – 2x$ correctly drawn
		M1	This mark is given for all three lines $3y + 3 = x$, $x = 4$ and $y = 6 – 2x$ correctly drawn
		A1	This mark is given for a fully correct region with all lines correct

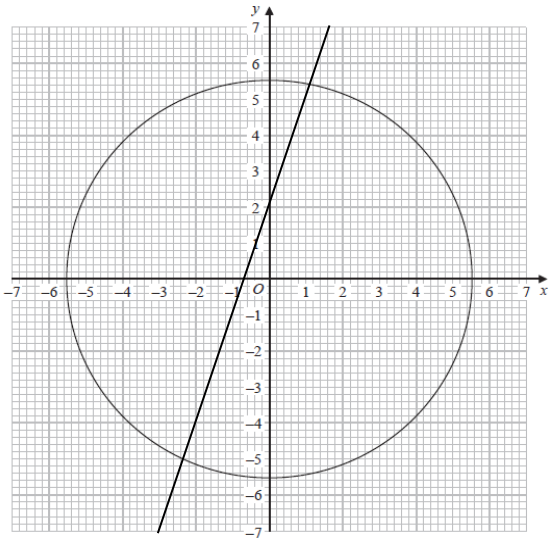
Question 18 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{1}{2}h(a + b) = 70$ where a = length AB and b = length DC	P1	This mark is given for a process to find an equation for the area of the trapezium
	$h = 8 \sin 30° = 8 \times 0.5 = 4$	P1	This mark is given for a process to find the height of the trapezium
	$\frac{4}{2}(a + b) = 70$ $a + b = 35$	P1	This mark is given for a process to find a value for $a + b$
	$a = \frac{3}{7} \times 35$	P1	This mark is given for a process to find the length of AB
	15	A1	This mark is given for a correct answer only

Question 19 (Total 5 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$\frac{8+\sqrt{18}}{6+\sqrt{2}} = \frac{8+3\sqrt{2}}{6+\sqrt{2}}$	P1	This mark is given for a process to write $\sqrt{18}$ as $3\sqrt{2}$ in the fraction
	$\frac{8+\sqrt{18}}{6+\sqrt{2}} \times \frac{6-\sqrt{2}}{6-\sqrt{2}} = \frac{48+18\sqrt{2}-8\sqrt{2}-6}{25-3}$	P1	This mark is given for a process to multiply numerator and denominator by $6 - \sqrt{2}$
	$= \frac{42+10\sqrt{2}}{34}$	P1	This mark is given for a process to collect terms in the form $\frac{a+b\sqrt{2}}{c}$
	$= \frac{21+5\sqrt{2}}{17}$	A1	This mark is given for the correct answer in its simplest form

Question 20 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		P1	This mark is given for drawing the line $y - 3x = 2$ on the diagram
		A1	This mark is given for reading the points $x = 1.1$, $y = 5.4$ from the diagram (Accept answers in the range 1.1 to 1.2 and 5.3 to 5.5)
		A1	This mark is given for reading the points $x = –2.4$, $y = –5.0$ from the diagram (Accept answers in the range –2.3 to –2.5 and –4.9 to –5.1)

Question 21 (Total 6 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)	$f(2) = 9$	M1	This mark is given for a method to find the value of f(2)
	$gf(9) = g(9) = \frac{9}{9} = 1$	A1	This mark is given for a correct answer only
(b)	$fg(x) = 2\left(\frac{9}{x}\right)^2 + 1$	M1	This mark is given for a method to find fg(x)
	$fg(x) = \frac{162}{x^2} + 1$	M1	This mark is given for a method to find the composite function fg
	$h(x) = \sqrt{\frac{162}{x-1}}$	M1	This mark is given for a method to find h(x)
		A1	This mark is given for the correct answer only

Question 22 (Total 4 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$50 + 20x - 2x^2 = -2(x^2 - 10x - 25)$	P1	This mark is given for process to factorise the equation
	$(x^2 - 10x - 25) = (x - 5)^2 - 50$	P1	This mark is given for the start of a process to complete the square
	$-2(x^2 - 10x - 25) = -2(x - 5)^2 + 100$	P1	This mark is given for a full process to complete the square
	(5, 100)	A1	This mark is given for the correct answer only