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4MA1 June 2027 Paper 1H Best Guess Paper

Higher · Target 4/5 · Mark Scheme

Disclaimer

This independently compiled practice paper is for students preparing for Pearson Edexcel International GCSE Mathematics A (4MA1), Higher Tier, Paper 1H. A calculator may be used.

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Revise the full specification. Attempt the matching question paper before using the mark scheme, model answers and practice resources at www.mygrade9mathstutor.com.

M: method; A: accuracy; B: independent. Accept equivalent valid methods. Accuracy marks require the related method; follow-through applies only where stated. Check the requested units and rounding. Proofs and questions that ask for reasons or algebra must be supported by working.

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Mark Scheme

M: method · A: accuracy · B: independent

Accept equivalent valid methods.

Give credit for the required working.

Calculator allowed · 27 questions · 100 marks · Suggested time: 2 hours.

Video walkthrough playlist

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Question 1 · Prime factorisation · 2 marks

Part	Answer	Marks	Marking guidance
1	$2^2 \times 31$	2	M1: $124 = 2 \times 62 = 2 \times 2 \times 31$. A1: 31 is prime, so the prime factorisation is $2^2 \times 31$.

Question 2 · Mixed-number multiplication · 3 marks

Part	Answer	Marks	Marking guidance
2	$8\frac{2}{5}$, as required.	3	M1: Convert both mixed numbers: $3\frac{1}{5} = \frac{16}{5}$ and $2\frac{5}{8} = \frac{21}{8}$. M1: Multiply: $\frac{16}{5} \times \frac{21}{8} = \frac{336}{40} = \frac{42}{5}$. A1: Convert back: $\frac{42}{5} = 8\frac{2}{5}$. This proves the stated result.

Question 3 · Upper and lower bounds · 2 marks

Part	Answer	Marks	Marking guidance
(a)	1.65 m	1	B1: The measurement is to the nearest 0.1 m, so half the rounding interval is 0.05 m. The upper bound is $1.6 + 0.05 = 1.65$ m.
(b)	1.55 m	1	B1: The lower bound is $1.6 - 0.05 = 1.55$ m. The actual length L satisfies $1.55 \leq L < 1.65$.

Question 4 · Algebra · 6 marks

Part	Answer	Marks	Marking guidance
(a)	$4x - 23$	2	M1: Expand both brackets: $6x - 15 - 2x - 8$. A1: Collect terms: $(6x - 2x) - 15 - 8 = 4x - 23$.
(b)	$6ab(3a - 2b)$	2	M1: The greatest common factor of $18a^2b$ and $12ab^2$ is $6ab$. A1: Divide each term by $6ab$ to obtain $6ab(3a - 2b)$.
(c)	$y > 5$	2	M1: $5y - 3 > 2y + 12$ gives $3y > 15$. A1: Divide by positive 3; the inequality stays in the same direction: $y > 5$.

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Question 5 · Sets and Venn diagrams · 4 marks

Part	Answer	Marks	Marking guidance
(a)	A only: 2, 5, 7, 11; intersection: 3; B only: 6, 9, 12; outside: 1, 4, 8, 10.	3	B1: A = {2, 3, 5, 7, 11} and B = {3, 6, 9, 12}; put 3 in the intersection. B1: Put 2, 5, 7, 11 in A only and 6, 9, 12 in B only. B1: Put 1, 4, 8, 10 outside both circles, inside the universal set. All 12 numbers must appear exactly once.
(b)	$\frac{2}{3}$	1	B1: Correct probability 2/3; accept an equivalent fraction such as 8/12.

Question 6 · Arithmetic sequences and nth term · 4 marks

Part	Answer	Marks	Marking guidance
(a)	$4n + 3$	2	M1: The common difference is 4, so start with 4n. A1: At $n = 1$, $4n = 4$; add 3 to obtain the first term 7. The nth term is $4n + 3$.
(b)	87 is the 21st term.	2	M1: Solve $4n + 3 = 87$: $4n = 84$, so $n = 21$. A1: Since 21 is a positive integer, 87 is a term. Check: $4 \times 21 + 3 = 87$.

Question 7 · Modal class and estimated mean · 4 marks

Part	Answer	Marks	Marking guidance
(a)	$20 < h \leq 30$	1	B1: Highest frequency is 14.
(b)	29 cm	3	M1: Use class midpoints. M1: Sum of products = 1160. A1: $1160 \div 40 = 29$.

Question 8 · Transformations on a coordinate grid · 3 marks

Part	Answer	Marks	Marking guidance
(a)	Rotation 90° clockwise about $(-2, 3)$.	2	B1: 90° clockwise or 270° anticlockwise rotation. B1: Correct centre $(-2, 3)$; all three details required for full marks.
(b)	C: $(-2, 4)$, $(-1, 4)$, $(-2, 2)$.	1	B1: Triangle drawn at $(-2,4)$, $(-1,4)$, $(-2,2)$, joined and labelled C.

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Question 9 · Speed unit conversion · 2 marks

Part	Answer	Marks	Marking guidance
9	25 m/s	2	M1: Convert 90 km to 90,000 m and one hour to 3600 seconds. A1: Speed = 90,000 ÷ 3600 = 25 m/s.

Question 10 · Ratio and mass · 4 marks

Part	Answer	Marks	Marking guidance
10	No; 17.7 kg of beads are needed.	4	M1: There are 7 + 5 = 12 parts, so one part represents 180 ÷ 12 = 15 bags. M1: Small bags: 7 × 15 = 105. Large bags: 5 × 15 = 75. M1: Total mass = 105 × 65 + 75 × 145 = 6825 + 10875 = 17700 grams. A1: 17700 ÷ 1000 = 17.7 kg. This is more than 17 kg, so Zoe is not correct.

Question 11 · Cylinder volume and surface area · 4 marks

Part	Answer	Marks	Marking guidance
11	591 cm^2 (3 significant figures)	4	M1: Use $V = \pi r^2 h$. With r = 5.4 and V = 1100, $h = 1100 \div (\pi \times 5.4^2) = 12.00757\ldots$ cm. M1: Total surface area is the area of both circular ends plus the curved surface: $2\pi r^2 + 2\pi rh$. M1: Using the unrounded height, $TSA = 2\pi(5.4)^2 + 2 \times 1100 \div 5.4 = 590.62509\ldots$ cm^2. A1: To 3 significant figures, TSA = 591 cm^2.

Question 12 · Area of circular paths · 3 marks

Part	Answer	Marks	Marking guidance
12	10π m^2	3	M1: The outer radius is 12 ÷ 2 = 6 m. M1: The path is 2 m wide, so the inner radius is 6 − 2 = 4 m. A1: Subtract the semicircle areas: $\frac{1}{2}\pi(6^2 - 4^2) = \frac{1}{2}\pi(36 - 16) = 10\pi$ m^2.

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Question 13 · Straight-line equation · 3 marks

Part	Answer	Marks	Marking guidance
13	$y = 3x - 1$	3	M1: Gradient $m = (17 - 5) \div (6 - 2) = 12 \div 4 = 3$. M1: Substitute (2, 5) into $y = 3x + c$: $5 = 6 + c$, so $c = -1$. A1: The equation is $y = 3x - 1$; it also gives $y = 17$ when $x = 6$.

Question 14 · Reverse compound depreciation · 3 marks

Part	Answer	Marks	Marking guidance
14	£22,598	3	M1: The annual multiplier is $1 - 0.12 = 0.88$. M1: If the original value is V, then $V \times 0.88^3 = 15{,}400$, so $V = 15{,}400 \div 0.88^3$. A1: $V = 22{,}598.14049\ldots$; to the nearest pound the value was £22,598.

Question 15 · Linear simultaneous equations · 3 marks

Part	Answer	Marks	Marking guidance
15	$x = 4$, $y = 1$	3	M1: Multiply the first equation by 3 and the second by 2: $9x + 6y = 42$ and $10x - 6y = 34$. Add to get $19x = 76$. A1: Therefore $x = 4$. A1: Substitute into $3x + 2y = 14$: $12 + 2y = 14$, so $y = 1$. Both original equations are satisfied.

Question 16 · Probability without replacement · 3 marks

Part	Answer	Marks	Marking guidance
16	$\frac{35}{66}$	3	M1: Different colours can occur in two orders: red then blue, or blue then red. M1: $P(RB) = \frac{7}{12} \times \frac{5}{11}$ and $P(BR) = \frac{5}{12} \times \frac{7}{11}$. A1: Add the mutually exclusive probabilities: $\frac{35 + 35}{132} = \frac{35}{66}$.

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Question 17 · Circle theorems · 4 marks

Part	Answer	Marks	Marking guidance
(a)	65°	2	M1: Angle ABC and the 130° central angle stand on the same minor arc AC. A1: The angle at the centre is twice the angle at the circumference, so ABC = 130° ÷ 2 = 65°.
(b)	115°	2	M1: ABCD is cyclic; opposite angles ABC and ADC sum to 180°. A1: ADC = 180° − 65° = 115°. Alternatively, halve the reflex central angle 230°.

Question 18 · Quadratic sequences · 5 marks

Part	Answer	Marks	Marking guidance
(a)	3, 3, 5	2	M1: Substitute n = 1 and n = 2: 1 − 3 + 5 = 3 and 4 − 6 + 5 = 3. A1: For n = 3: 9 − 9 + 5 = 5. The first three terms are 3, 3, 5.
(b)	Yes; 113 is the 12th term.	3	M1: Set $n^2 - 3n + 5 = 113$, giving $n^2 - 3n - 108 = 0$. M1: Factorise: (n − 12)(n + 9) = 0, so n = 12 or n = −9. A1: A term position must be a positive integer, so n = 12 is valid. Check: 144 − 36 + 5 = 113.

Question 19 · Direct proportion · 3 marks

Part	Answer	Marks	Marking guidance
19	x = 6	3	M1: Direct proportionality gives $y = kx^3$. M1: Use x = 2, y = 40: 40 = 8k, so k = 5. A1: When y = 1080, $1080 = 5x^3$, giving $x^3 = 216$. Take the real cube root: x = 6.

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Question 20 · Similar Triangles and Sightlines · 4 marks

Part	Answer	Marks	Marking guidance
20	14,925 m	4	M1: Measure both heights above Katie's eye level: $2 - 1.6 = 0.4$ m and $400 - 1.6 = 398.4$ m. M1: Similar triangles give total distance to the mountain $\div 15 = 398.4 \div 0.4 = 996$. M1: The total distance from Katie is $996 \times 15 =$ 14,940 m. A1: The question asks for the distance beyond the tree: $14{,}940 - 15 = 14{,}925$ m.

Question 21 · Histogram interpretation · 4 marks

Part	Answer	Marks	Marking guidance
21	24 apples	4	M1: The known class has width $120 - 100 = 20$, so its frequency density is $30 \div 20 = 1.5$. M1: The last bar is 8 fifteenths of the known bar's height, so its density is $1.5 \times \frac{8}{15} = 0.8$. M1: The last class has width $150 - 120 = 30$. A1: Frequency = density $\times$ class width $= 0.8 \times 30 = 24$ apples.

Question 22 · Cosine rule and triangle area · 5 marks

Part	Answer	Marks	Marking guidance
(a)	QR = 19.2 cm	3	M1: Use the cosine rule: $QR^2 = 18^2 + 24^2 - 2(18)(24)\cos 52^\circ$. M1: $QR^2 = 368.068485\ldots$; take the positive square root. A1: QR = 19.185111… cm = 19.2 cm to 3 significant figures.
(b)	170 cm^2	2	M1: Area $= \frac{1}{2} \times 18 \times 24 \times \sin 52^\circ$. A1: Area = 170.210322… cm^2 = 170 cm^2 to 3 significant figures.

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Question 23 · Algebraic fraction subtraction · 3 marks

Part	Answer	Marks	Marking guidance
23	$\frac{2x - 17}{(x + 2)(x - 5)}$, with $x \neq -2, 5$.	3	M1: Use common denominator $(x + 2)(x - 5)$. M1: Combine the numerators: $3(x - 5) - (x + 2) = 3x - 15 - x - 2 = 2x - 17$. A1: The result is $\frac{2x - 17}{(x + 2)(x - 5)}$. No common factor cancels. Original exclusions $x \neq -2, 5$ are not extra marks.

Question 24 · Algebraic fraction simplification · 3 marks

Part	Answer	Marks	Marking guidance
24	$\frac{2x - 3}{2x - 1}$, with $x \neq -4$, $1/2$.	3	M1: Factorise the numerator: $2x^2 + 5x - 12 = (2x - 3)(x + 4)$. M1: Factorise the denominator: $2x^2 + 7x - 4 = (2x - 1)(x + 4)$. A1: Cancel the common factor $x + 4$: $\frac{(2x - 3)(x + 4)}{(2x - 1)(x + 4)} = \frac{2x - 3}{2x - 1}$.

Question 25 · Vectors in a parallelogram · 4 marks

Part	Answer	Marks	Marking guidance
25	$\frac{3}{4}a + \frac{1}{4}c$	4	M1: $AC = OC - OA = c - a$. M1: $AX : XC = 1 : 3$ means $AX = \frac{1}{4}AC = \frac{1}{4}(c - a)$. M1: $OX = OA + AX = a + \frac{1}{4}(c - a)$. A1: Collect the vectors: $OX = \frac{3}{4}a + \frac{1}{4}c$.

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Question 26 · Functions and inverses · 7 marks

Part	Answer	Marks	Marking guidance
(a)	9	1	B1: $f(4) = \frac{2 \times 4 + 1}{4 - 3} = 9$.
(b)	$x = 3$ or $x = -3$	4	M1: Compose the functions: $fg(x) = \frac{2(x^2 - 4) + 1}{(x^2 - 4) - 3} = \frac{2x^2 - 7}{x^2 - 7}$. M1: Set $\frac{2x^2 - 7}{x^2 - 7} = \frac{11}{2}$ and cross-multiply: $2(2x^2 - 7) = 11(x^2 - 7)$. M1: Expand: $4x^2 - 14 = 11x^2 - 77$, so $7x^2 = 63$ and $x^2 = 9$. A1: Therefore $x = 3$ or $x = -3$. Both are valid because $x^2 - 7 = 2$, not zero.
(c)	$f^{-1}(x) = \frac{3x + 1}{x - 2}$, $x \neq 2$.	2	M1: Write $y = \frac{2x + 1}{x - 3}$. Then $xy - 3y = 2x + 1$, so $x(y - 2) = 3y + 1$. A1: Interchange the variables: $f^{-1}(x) = \frac{3x + 1}{x - 2}$, with $x \neq 2$.

Question 27 · Overlapping Squares and Rectangles · 5 marks

Part	Answer	Marks	Marking guidance
27	$\frac{125}{8}\ \text{cm}^2$	5	M1: Let the horizontal projection of PS be d. Since PS = 5 and the vertical separation is 4, $d^2 + 4^2 = 5^2$, so d = 3 cm. M1: Perpendicular square sides have interchanged horizontal and vertical projections: PQ rises 3 cm above AB. Also PB = 4 + 3 = 7 cm and RB = 4 − 3 = 1 cm. M1: Similar triangles give BT ÷ RB = 3 ÷ 4, so $BT = \frac{3}{4}$ cm and $PT = 7 - \frac{3}{4} = \frac{25}{4}$ cm. M1: The part of the square outside the rectangle is triangle PQT: area $= \frac{1}{2} \times \frac{25}{4} \times 3 = \frac{75}{8}\ \text{cm}^2$. A1: Shaded overlap = square area − triangle area $= 25 - \frac{75}{8} = \frac{125}{8}\ \text{cm}^2 = 15.625\ \text{cm}^2$.