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1MA1 June 2027 Paper 3H Best Guess Paper

Higher · Standard · Mark Scheme

Disclaimer

This independently compiled practice paper is for students preparing for Pearson Edexcel GCSE Mathematics (1MA1), Higher Tier, Paper 3H. 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 · 20 questions · 80 marks · Suggested time: 1 hour 30 minutes.

Question 1 · Scale models · 3 marks

M1 — Convert metres to centimetres.

M1 — Divide the actual length by 200.

A1 — Correct model length in centimetres.

Answer: 39 cm

Question 2 · Upper and lower bounds · 2 marks

Part (a)

B1 — Correct upper bound.

Answer: 1.65 m

Part (b)

B1 — Correct lower bound.

Answer: 1.55 m

Question 3 · Reverse percentages · 2 marks

M1 — After a 20% reduction, the sale price represents 80% of the original price.

A1 — Original price = £72 ÷ 0.8 = £90.

Answer: £90

Question 4 · Expanding and factorising · 4 marks

Part (a)

M1 — Expand both brackets: $6x - 15 - 2x - 8$.

A1 — Collect terms: $(6x - 2x) - 15 - 8 = 4x - 23$.

Answer: $4x - 23$

Part (b)

M1 — The greatest common factor of $18a^2b$ and $12ab^2$ is 6ab.

A1 — Divide each term by 6ab to obtain $6ab(3a - 2b)$.

Answer: $6ab(3a - 2b)$

Question 5 · Median, mode and range · 3 marks

B1 — For $q = 12$.

B1 — For $r = 19$.

B1 — For $p = 3$.

Answer: $p = 3 = 12 = 19$
$q \quad r$

Question 6 · Transformations · 4 marks

Part (a)

B1 — Rotation.

B1 — 90° clockwise, or 270° anticlockwise.

B1 — Correct centre $(-2, 3)$.

Answer: Rotation 90° clockwise about $(-2, 3)$.

Part (b)

B1 — Triangle drawn at $(-2,4)$, $(-1,4)$, $(-2,2)$, joined and labelled C.

Answer: C: $(-2, 4)$, $(-1, 4)$, $(-2, 2)$.

Question 7 · Probability and ratio · 4 marks

M1 — Find the total of 120 counters.

M1 — Find remaining probability 0.4 or remaining count 48.

M1 — Use blue fraction 3/8 of the remaining counters.

A1 — 18 blue counters.

Answer: 18 blue counters

Question 8 · Ratios, percentages and fractions · 5 marks

M1 — Combine the ratios: books : DVDs : records = 20 : 12 : 3.

M1 — Books left = 60% of 20 = 12 parts; DVDs left = 5/6 of 12 = 10 parts; records left = 3 parts.

M1 — The remaining 25 parts represent 150 items, so one part represents 150 ÷ 25 = 6 items.

M1 — Books sold = 8 parts and DVDs sold = 2 parts, giving 10 sold parts.

A1 — Number sold = 10 × 6 = 60 items.

Answer: 60 items

Question 9 · Product rule for counting · 3 marks

M1 — For a first digit of 5 or 7 there are 2 × 4 × 6 × 5 = 240 codes: four even final digits and six then five unused middle digits.

M1 — For a first digit of 6 or 8 there are 2 × 3 × 6 × 5 = 180 codes: only three even final digits remain.

A1 — Total = 240 + 180 = 420 codes.

Answer: 420 codes

Question 10 · Cubic graphs · 6 marks

Part (a)

B1 — At least two of the three missing entries correct.

B1 — All three missing entries correct.

Answer: $-1,\ 1,\ 3$

Part (b)

M1 — Accurately plot table values.

A1 — Smooth curve with correct turning-point shape.

Answer: Graph of $y = x^3 - 3x + 1$

Part (c)

M1 — Suitable straight line $y = 2$.

A1 — A correctly read solution to 1 decimal place. Accept readings consistent with the drawn curve, within 0.1 of $-1.532\ldots$, $-0.347\ldots$ or $1.879\ldots$. All three are shown for completeness.

Answer: $x \approx -1.5, -0.3, 1.9$

Question 11 · Quadratic sequences · 5 marks

Part (a)

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.

Answer: 3, 3, 5

Part (b)

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: $144 - 36 + 5 = 113$.

Answer: Yes; 113 is the 12th term.

Question 12 · Similar triangles and sightlines · 4 marks

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.

Answer: 14,925 m

Question 13 · Histogram interpretation · 4 marks

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 × class width $= 0.8 \times 30 = 24$ apples.

Answer: 24 apples

Question 14 · Iterative population decay · 3 marks

M1 — Use two annual multiplications.

M1 — Find $k^2 = 4050/5000$.

A1 — Positive multiplier 0.9.

Answer: $k = 0.9$

Question 15 · Quadratic inequalities · 4 marks

M1 — Factorise $3x^2 - 14x - 5 = (3x + 1)(x - 5)$.

A1 — The critical values are $x = -1/3$ and $x = 5$.

M1 — The quadratic has positive leading coefficient, so it is positive outside the roots.

A1 — The inequality is strict: $\{x : x < -1/3\} \cup \{x : x > 5\}$. Neither endpoint is included.

Answer: $\{x : x < -1/3\} \cup \{x : x > 5\}$

Question 16 · Tangent to a circle · 4 marks

M1 — The radius from (3, 2) to A(7, 5) has gradient $\frac{5 - 2}{7 - 3} = \frac{3}{4}$.

M1 — The tangent is perpendicular to the radius, so its gradient is $-\frac{4}{3}$.

M1 — Using A(7, 5), its equation is $y - 5 = -\frac{4}{3}(x - 7)$.

A1 — Multiply by 3 and rearrange: $3y - 15 = -4x + 28$, so $4x + 3y = 43$.

Answer: $4x + 3y = 43$

Question 17 · Composite and inverse functions · 7 marks

Part (a)

B1 — $f(4) = \dfrac{2 \times 4 + 1}{4 - 3} = 9$.

Answer: 9

Part (b)

M1 — Compose the functions: $fg(x) = \dfrac{2(x^2 - 4) + 1}{(x^2 - 4) - 3} = \dfrac{2x^2 - 7}{x^2 - 7}$.

M1 — Set $\dfrac{2x^2 - 7}{x^2 - 7} = \dfrac{11}{2}$ 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.

Answer: $x = 3$ or $x = -3$

Part (c)

M1 — Write $y = \dfrac{2x + 1}{x - 3}$. Then $xy - 3y = 2x + 1$, so $x(y - 2) = 3y + 1$.

A1 — Interchange the variables: $f^{-1}(x) = \dfrac{3x + 1}{x - 2}$, with $x \neq 2$.

Answer: $f^{-1}(x) = \dfrac{3x + 1}{x - 2}$, $x \neq 2$.

Question 18 · Algebraic compound increase · 4 marks

M1 — Form the correct product of successive percentage multipliers.

M1 — Obtain a correct quadratic equation.

M1 — Solve the quadratic correctly by a valid method.

A1 — $x = 14$ only, rejecting -164 because the changes are increases.

Answer: $x = 14$

Question 19 · Bearings and trigonometry · 4 marks

B1 — Included angle at P = 66°.

M1 — Correct cosine-rule method to obtain AB; accept an equivalent coordinate method.

M1 — Correct method to obtain the required bearing, e.g. sine/cosine rule and angle geometry or atan2 of coordinate differences.

A1 — 154°, with correct clockwise bearing and rounding.

Answer: 154°

Question 20 · Overlapping squares and rectangles · 5 marks

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 = $\frac{1}{2} \times \frac{25}{4} \times 3 = \frac{75}{8}$ cm^2.

A1 — Shaded overlap = square area − triangle area = $25 - \frac{75}{8} = \frac{125}{8}$ cm^2 = 15.625 cm^2.

Answer: $\frac{125}{8}$ cm^2