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1MA1 Nov 2026 Paper 3H
Normal Higher · Worked Solutions

Disclaimer

This independent Best Guess practice resource prepares students for Pearson Edexcel GCSE Mathematics 1MA1 Higher Tier Paper 3 (calculator). It covers accessible and challenging Higher questions, not just one target grade.

This is not an official Pearson Edexcel paper or a guarantee of the questions that will appear. Revise the full specification.

Attempt all 20 questions, show your working, then use the matching mark scheme, worked solutions and available worksheets and clips at www.mygrade9mathstutor.com.

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Walkthrough playlist

Calculator allowed · 20 questions · 80 marks · Suggested time: 1 hour 30 minutes.
Answer every question. Give appropriate units and show all stages of your working.

Question 1 · Scale Drawing and Zero Powers

The scale is 1 : 200. Model length = 78 ÷ 200 = 0.39 metres.

Convert metres to centimetres: 0.39 × 100 = 39 cm.

Any non-zero number raised to the power zero is 1, so $7^0 = 1$.

Answer: (a) 39 cm; (b) 1

Question 2 · Averages Problem Solving

Step 1: The median is the middle value, which falls halfway between 10 and q.
(10 + q)/2 = 11 ⇒ 10 + q = 22 ⇒ q = 12.

Step 2: The mode is the most frequent number (19). Because r appears twice, both r values must be 19.

Step 3: The range is 16. The range is the largest value (19) minus the smallest value (p).
19 – p = 16 ⇒ p = 3.

Answer: p = 3, q = 12, r = 19

Q2 clip

Practice worksheet

Question 3 · Upper and Lower Bounds

Step 1: Degree of accuracy is 0.1 m. Half of this is 0.05 m.

Step 2: Upper bound = 1.6 + 0.05 = 1.65 m.

Step 3: Lower bound = 1.6 - 0.05 = 1.55 m.

Answer: Upper = 1.65 m, Lower = 1.55 m

Q3 clip

Practice worksheet

Question 4 · Expanding Double Brackets

(a) Expand: $x^2 + 7x - 4x - 28 = x^2 + 3x - 28$.

(b) Factorise: Highest common factor is $6cw^2$. Expression becomes $6cw^2(3c^4 + 5w)$.

(c) Solve: Multiply both sides by 4: $7x - 2 = 4(3x + 1) \Rightarrow 7x - 2 = 12x + 4$. Rearrange: $-5x = 6 \Rightarrow x = -1.2$.

Answer: (a) $x^2 + 3x - 28$, (b) $6cw^2(3c^4 + 5w)$, (c) $x = -1.2$

Q5(a) clip

Practice worksheet

Q5(b) clip

Practice worksheet

Q5(c) clip

Practice worksheet

Question 5 · Reverse Bearings

Step 1: Since the bearing is less than 180°, add 180°.

Step 2: 75° + 180° = 255°.

Answer: 255°

Q6 clip

Practice worksheet

Question 6 · Volume of a Cylinder

Step 1: Use formula $V = \pi r^2 h$.

Step 2: $V = \pi \times 4.5^2 \times 10 = 202.5\pi = 636.172...$ cm³.

Step 3: Round to 3 significant figures.

Answer: 636 cm³

Q7 clip

Practice worksheet

Question 7 · Exchange Rates and Ratios

Step 1: Convert £600 to Euros: 600 × 1.15 = €690.

Step 2: Find savings portion (2 parts out of 5): €690 × (2/5) = €276.

Step 3: Convert savings back to Pounds at new rate: €276 ÷ 1.18 = £233.898...

Step 4: Round to nearest penny.

Answer: £233.90

Q4 clip

Practice worksheet

Question 8 · Speed, Distance and Time

Step 1: Convert distance to metres: 135 km = 135,000 m.

Step 2: Convert time to seconds: 1.5 hours × 3600 = 5400 seconds.

Step 3: Speed = Distance / Time = 135,000 / 5400 = 25 m/s.

Answer: 25 m/s

Q8 clip

Practice worksheet

Question 9 · Probability and Ratio

54 orange counters represent probability 0.45, so there are 54 ÷ 0.45 = 120 counters.

Blue and yellow together have probability 1 – 0.15 – 0.45 = 0.4, so there are 120 × 0.4 = 48.

Blue:yellow = 3:5. Blue counters are 3/8 of the 48, giving 48 × 3/8 = 18.

Answer: 18 blue counters

Q9 clip

Practice worksheet

Question 10 · Zero, Negative and Combined Indices

(a) Any non-zero number raised to the power 0 equals 1. Since $5^k = 1$, k = 0.

(b) Write 27 as a power of 3, then subtract indices when dividing:
$27/3^8 = 3^3/3^8 = 3^{3-8} = 3^{-5}$.
Therefore m = –5.

(c) Multiply indices for a power of a power, then add indices when multiplying:
$(7^{-4})^3 \times 7^5 = 7^{-12} \times 7^5 = 7^{-7}$.
Therefore p = –7.

Answer: (a) k = 0 (b) m = –5 (c) p = –7

Q11 clip

Practice worksheet

Question 11 · Compound Percentage Change

Step 1: Apply depreciation multipliers: 85,000 × 0.88 × 0.85 = 63,580.

Step 2: Set up year 3 multiplier: 63,580 × (1 + x/100) = 66,759.

Step 3: 1 + x/100 = 66,759 / 63,580 = 1.05 ⇒ x = 5.

Answer: x = 5

Q12 clip

Practice worksheet

Question 12 · Angles in a Regular Polygon

Interior angle = 180° – 360°/11 = 147.2727…°.

BCDE is an isosceles trapezium. Its angles at C and D are both 147.2727…°, so its two equal base angles total 360° – 2 × 147.2727…° = 65.4545…°.

∠DEB = 65.4545…° ÷ 2 = 32.7272…°.

∠BEF = 147.2727…° – 32.7272…° = 114.5454…°. Round only the final answer.

Answer: 114.5°

Q13 clip

Practice worksheet

Question 13 · Counting Security Codes

The first digit is 5, 6, 7 or 8. The final digit must be even.
If the first digit is 5 or 7, there are 2 × 4 × 6 × 5 = 240 codes.
If the first digit is 6 or 8, only three even digits remain for the last position: 2 × 3 × 6 × 5 = 180 codes.
Add the disjoint cases: 240 + 180 = 420.

Answer: 420

Question 14 · Cubic Graph

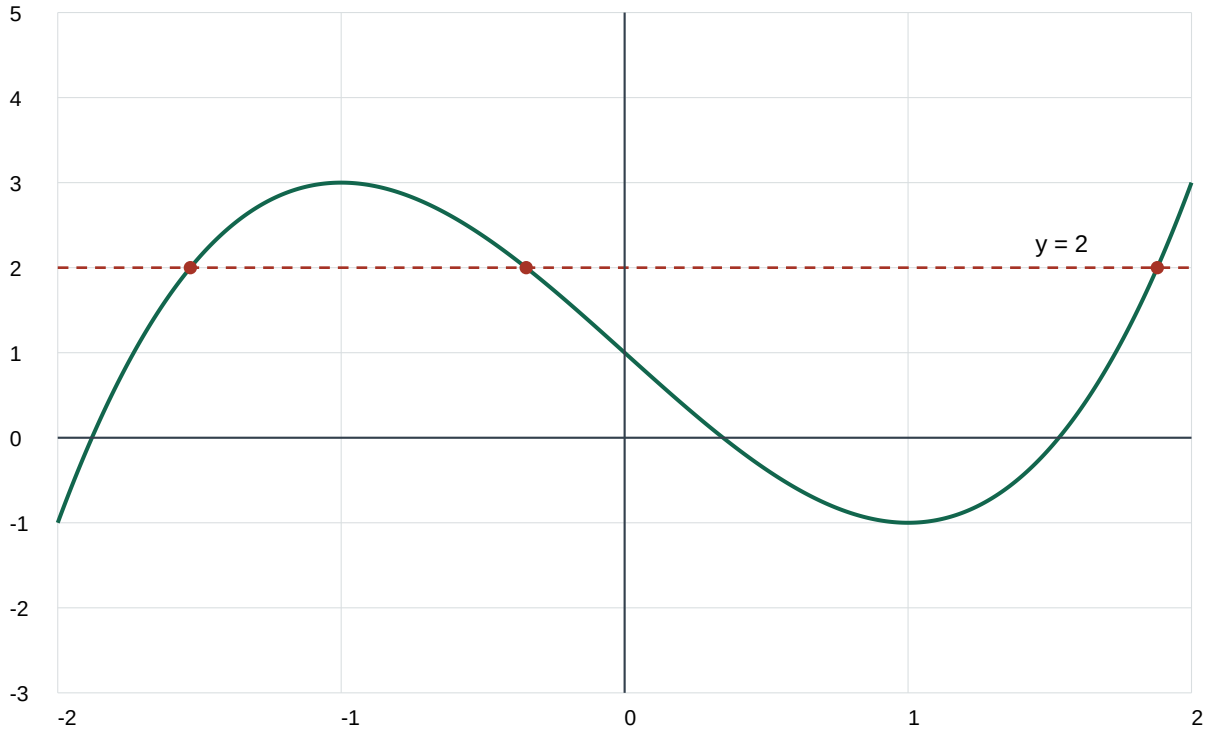
(a) At x = –2: y = –8 + 6 + 1 = –1. At x = 0: y = 1. At x = 2: y = 8 – 6 + 1 = 3.

(b) Plot the table points and draw a smooth cubic. The exact values at x = –0.5 and 1.5 are 2.375 and –0.125; the table rounds them to 2.4 and –0.1.

(c) The equation $x^3 – 3x – 1 = 0$ is equivalent to $x^3 – 3x + 1 = 2$, so draw the horizontal line y = 2.

Read all three intersections: x ≈ –1.532…, –0.347… and 1.879…. Round each to one decimal place.

Answer: Missing values: –1, 1, 3; solutions: –1.5, –0.3, 1.9



Intersections give x = -1.5, -0.3, 1.9 (1 decimal place).

Q14 clip

Practice worksheet

Question 15 · Completing the Square

(a) Factor 2 from the x-terms: $2(x^2 - 6x) + 23$.

$x^2 - 6x = (x - 3)^2 - 9$, so $2[(x - 3)^2 - 9] + 23 = 2(x - 3)^2 + 5$.

(b) The square is zero at $x = 3$, giving $y = 5$. The minimum turning point is (3, 5).

Answer: (a) $2(x - 3)^2 + 5$; (b) (3, 5)

Q19 clip

Practice worksheet

Question 16 · Iterative Population Decay

From the start of 2018 to the start of 2020 there are two annual transitions.

$P_{2020} = k^2 P_{2018}$, so $4050 = 5000k^2$.

$k^2 = 4050/5000 = 0.81$. The population multiplier is positive, so $k = \sqrt{0.81} = 0.9$.

Check: $5000 \times 0.9 = 4500$ after one year, then $4500 \times 0.9 = 4050$ after two.

Answer: k = 0.9

Q20 clip

Practice worksheet

Question 17 · 3D Pythagoras and Trigonometry

Step 1: Length VM: half base = 5 cm, height = 15 cm. $VM = \sqrt{(15^2 + 5^2)} = \sqrt{250} = 15.8$ cm.

Step 2: Angle with base: $\tan(\theta) = 15 / 5 = 3 \Rightarrow \theta = 71.6°$.

Answer: VM = 15.8 cm, Angle = 71.6°

Q17 clip

Practice worksheet

Question 18 · Histogram Densities and the Median

(a) Total frequency: a + b = 160 − 30 − 60 = 70.
Histogram height is proportional to frequency density. The densities are a/5 and b/15.
The given height ratio gives a/5 = 2b/15, so 3a = 2b.
Substitute b = 70 − a: 3a = 140 − 2a, hence a = 28 and b = 42.
Check: the first density is 30/10 = 3, represented by 6 cm, so the height scale is 2 cm per density unit.

(b) Cumulative frequencies are 30, 58, 118, 160. The median position is $160 \div 2 = 80$.
Since $58 < 80 \leq 118$, the class interval which contains the median is $15 < w \leq 25$.
Answer: (a) $a = 28$, $b = 42$; (b) $15 < w \leq 25$.

Question 19 · Proof with Consecutive Odd Numbers

Let two consecutive odd integers be 2n + 1 and 2n + 3, where $n \in \mathbb{Z}$.
$(2n + 3)^2 - (2n + 1)^2 = (4n^2 + 12n + 9) - (4n^2 + 4n + 1)$
$= 8n + 8 = 8(n + 1)$.
Because n + 1 is an integer, the difference is a multiple of 8. Reversing the subtraction changes the sign, but it is still a multiple of 8.

Answer: 8(n + 1), hence a multiple of 8

Question 20 · Similar Cones and Surface Area

The removed cone has volume fraction 1 − 19/27 = 8/27 of the original.
The cones are similar, so the linear scale factor is $\sqrt[3]{(8/27)} = 2/3$.
Surface areas scale with the square of the linear factor: $(2/3)^2 = 4/9$.
The smaller cone's total surface area is $540\pi \times 4/9 = 240\pi$ cm².

Answer: 240π cm²