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1MA1 June 2027 Paper 1H Best Guess Paper

Higher · Standard · Model Answers

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This independently compiled practice paper is for students preparing for Pearson Edexcel GCSE Mathematics (1MA1), Higher Tier, Paper 1H. This is a non-calculator paper.

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Model Answers

Step-by-step worked answers.

Use with the matching question paper.

Non-calculator · 24 questions · 80 marks · Suggested time: 1 hour 30 minutes.

Question 1 · Decimal multiplication · 2 marks

$546 \times 43 = 546 \times 40 + 546 \times 3 = 21840 + 1638 = 23478$.

54.6×4.3 has two decimal places in total, so the answer is 234.78.

Answer: 234.78

Question 2 · Prime factor decomposition · 2 marks

$124 = 2 \times 62 = 2 \times 2 \times 31$.

31 is prime, so the prime factorisation is $2^2 \times 31$.

Answer: $2^2 \times 31$

Question 3 · Mixed-number multiplication · 3 marks

Convert both mixed numbers: $3\frac{1}{5} = \frac{16}{5}$ and $2\frac{5}{8} = \frac{21}{8}$.

Multiply: $\frac{16}{5} \times \frac{21}{8} = \frac{336}{40} = \frac{42}{5}$.

Convert back: $\frac{42}{5} = 8\frac{2}{5}$. This proves the stated result.

Answer: $8\frac{2}{5}$, as required.

Question 4 · Percentage profit · 2 marks

Profit $= £184 - £160 = £24$.

Percentage profit $= \frac{24}{160} \times 100\% = 15\%$.

Answer: 15%

Question 5 · Zero, negative and other index laws · 3 marks

Part (a)

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

Answer: $k = 0$

Part (b)

$27 = 3^3$, so $27 \div 3^8 = 3^{3-8} = 3^{-5}$. Therefore $m = -5$.

Answer: $m = -5$

Part (c)

$(7^{-4})^3 \times 7^5 = 7^{-12} \times 7^5 = 7^{-7}$, so $p = -7$.

Answer: $p = -7$

Question 6 · Frequency polygon and modal class · 3 marks

Part (a)

The highest frequency is 24, belonging to the interval $40 < a \leq 50$.

Answer: $40 < a \leq 50$

Part (b)

Use the class midpoints 25, 35, 45, 55 and 65. Plot at least four correct midpoint-frequency points.

All five points (25, 8), (35, 18), (45, 24), (55, 14), (65, 6) are correct and joined consecutively with straight lines; do not join the ends to the axis.

Answer: Join (25, 8), (35, 18), (45, 24), (55, 14), (65, 6) with straight lines.

Question 7 · Linear inequalities and integer solutions · 3 marks

$5x - 3 \leq 2x + 9$ gives $3x \leq 12$.

Divide by positive 3 to obtain $x \leq 4$.

The integer solutions with $x > 0$ are 1, 2, 3 and 4.

Answer: 1, 2, 3, 4

Question 8 · Standard form · 3 marks

Part (a)

Move the decimal point five places right to obtain 4.07; the exponent is -5.

Answer: 4.07×10^{-5}

Part (b)

$(3.2 \times 10^{4}) \times (5 \times 10^{3}) = 16 \times 10^{7}$.

Write in standard form: $16 \times 10^{7} = 1.6 \times 10^{8}$.

Answer: 1.6×10^{8}

Question 9 · Perimeter of a sector · 3 marks

Arc length $= \frac{60}{360} \times 2\pi \times 12$.

The arc length simplifies to 4π cm.

Perimeter includes the two radii: $4\pi + 12 + 12 = 24 + 4\pi$ cm.

Answer: $24 + 4\pi$ cm

Question 10 · Angles in regular polygons · 3 marks

Interior angle of the regular hexagon $= (6 - 2) \times 180^\circ \div 6 = 120^\circ$.

Interior angle of the regular pentagon $= (5 - 2) \times 180^\circ \div 5 = 108^\circ$.

Angles around the common vertex sum to 360°: $a = 360^\circ - 120^\circ - 108^\circ = 132^\circ$.

Answer: 132°

Question 11 · Factorising and solving a quadratic · 3 marks

Part (a)

Find two numbers whose product is 24 and sum is -11: -3 and -8.

Therefore $x^2 - 11x + 24 = (x - 3)(x - 8)$.

Answer: $(x - 3)(x - 8)$

Part (b)

Set each factor equal to zero: $x - 3 = 0$ or $x - 8 = 0$.

Answer: $x = 3$ or $x = 8$

Question 12 · Linear simultaneous equations · 4 marks

Multiply the first equation by 3: $9x + 6y = 42$.

Multiply the second equation by 2: $10x - 6y = 34$. Add to get $19x = 76$.

Therefore $x = 4$.

Substitute into $3x + 2y = 14$: $12 + 2y = 14$, so $y = 1$. Both original equations are satisfied.

Answer: $x = 4$, $y = 1$

Question 13 · Comparing distributions and interquartile ranges · 3 marks

Part (a)

Class A IQR = upper quartile − lower quartile = 70 − 35 = 35.

Answer: 35

Part (b)

Class B has the higher median: 60 compared with 55, indicating higher typical scores.

Class B has the smaller IQR: 70 − 45 = 25, compared with Class A's 35, indicating more consistent scores.

Answer: Class B has higher typical scores and is more consistent.

Question 14 · Combining ratios and fractional reasoning · 3 marks

Scale blue : yellow = 2 : 5 to 4 : 10. Hence red : blue : yellow = 3 : 4 : 10.

There are $3 + 4 + 10 = 17$ parts; yellow accounts for 10 of them.

The fraction of yellow counters is $\frac{10}{17}$, not $\frac{1}{2}$, so Sam is not correct.

Answer: No; the yellow fraction is $\frac{10}{17}$.

Question 15 · Density of mixtures · 3 marks

Mass of A = density × volume = $1.2 \times 300 = 360$ g; mass of B = $0.8 \times 200 = 160$ g.

Total mass = 520 g and total volume = 500 cm^3.

Density of C = $520 \div 500 = 1.04$ g/cm^3.

Answer: 1.04 g/cm^3

Question 16 · Probability without replacement · 3 marks

Different colours can occur in two orders: red then blue, or blue then red.

$P(RB) = \frac{7}{12} \times \frac{5}{11}$ and $P(BR) = \frac{5}{12} \times \frac{7}{11}$.

Add the mutually exclusive probabilities: $\frac{35 + 35}{132} = \frac{35}{66}$.

Answer: $\frac{35}{66}$

Question 17 · Simplifying algebraic fractions · 3 marks

Factorise the numerator: $2x^2 + 5x - 12 = (2x - 3)(x + 4)$.

Factorise the denominator: $2x^2 + 7x - 4 = (2x - 1)(x + 4)$.

Cancel the common factor $x + 4$: $\frac{(2x - 3)(x + 4)}{(2x - 1)(x + 4)} = \frac{2x - 3}{2x - 1}$.

Answer: $\frac{2x - 3}{2x - 1}$, with $x \neq -4, 1/2$.

Question 18 · Exact trigonometric values · 3 marks

$\sin 30^\circ = \frac{1}{2}$, $\cos 60^\circ = \frac{1}{2}$ and $\tan 60^\circ = \sqrt{3}$.

The expression is $(1/2 + 1/2) \div \sqrt{3} = \frac{1}{\sqrt{3}}$.

Rationalise: $\frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$.

Answer: $\frac{\sqrt{3}}{3}$

Question 19 · Vectors in a parallelogram · 3 marks

$\text{AC} = \mathbf{c} - \mathbf{a}$ and $\text{AX} = \frac{1}{4}(\mathbf{c} - \mathbf{a})$.

$\text{OX} = \text{OA} + \text{AX} = \mathbf{a} + \frac{1}{4}(\mathbf{c} - \mathbf{a})$.

Simplify: $\text{OX} = \frac{3}{4}\mathbf{a} + \frac{1}{4}\mathbf{c}$.

Answer: $\frac{3}{4}\mathbf{a} + \frac{1}{4}\mathbf{c}$

Question 20 · Recurring decimals and fractions · 4 marks

$x = 0.222\ldots$; subtract x from 10x to obtain $9x = 2$, so $x = \frac{2}{9}$.

$y = 0.681818\ldots$; $1000y = 681.818\ldots$ and $10y = 6.818\ldots$.

Subtract to get $990y = 675$, so $y = \frac{675}{990} = \frac{15}{22}$.

$xy = \frac{2}{9} \times \frac{15}{22} = \frac{30}{198} = \frac{5}{33}$, as required.

Answer: $xy = \frac{5}{33}$

Question 21 · Loci and regions: area of sectors · 5 marks

The shed blocks 90° at the charging post, leaving a main 270° sector of radius 4a.

Main cutting area $= \frac{270}{360} \times \pi(4a)^2 = 12\pi a^2$.

The cable can wrap around either adjacent corner. Each wrap leaves $4a - 2a = 2a$ and sweeps 90°.

The two extra sectors give $2 \times \frac{90}{360} \times \pi(2a)^2 = 2\pi a^2$. They do not overlap; no cable remains after a further wall.

Total area $= 12\pi a^2 + 2\pi a^2 = 14\pi a^2$.

Answer: $14\pi a^2$

Question 22 · Algebraic proof · 3 marks

Let two consecutive odd integers be $2n + 1$ and $2n + 3$, where n is an integer.

$(2n + 3)^2 - (2n + 1)^2 = 4n^2 + 12n + 9 - (4n^2 + 4n + 1) = 8n + 8$.

$8n + 8 = 8(n + 1)$. Since $n + 1$ is an integer, the difference is always a multiple of 8. Reversing the subtraction also gives a multiple of 8.

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

Question 23 · Completing the square and sketching a quadratic · 8 marks

Part (i)

Factor out -3 from the quadratic and linear terms: $-3(x^2 + 6x) + 4$.

Complete the square: $x^2 + 6x = (x + 3)^2 - 9$.

Substitute and simplify: $-3[(x + 3)^2 - 9] + 4 = 31 - 3(x + 3)^2$.

Answer: $31 - 3(x + 3)^2$

Part (ii)

$31 - 3(x + 3)^2 = 0$ gives $(x + 3)^2 = \frac{31}{3}$.

Take both square roots: $x + 3 = \pm\sqrt{(31/3)} = \pm \frac{\sqrt{93}}{3}$.

Hence $x = -3 \pm \frac{\sqrt{93}}{3} = \frac{\pm\sqrt{93} - 9}{3}$.

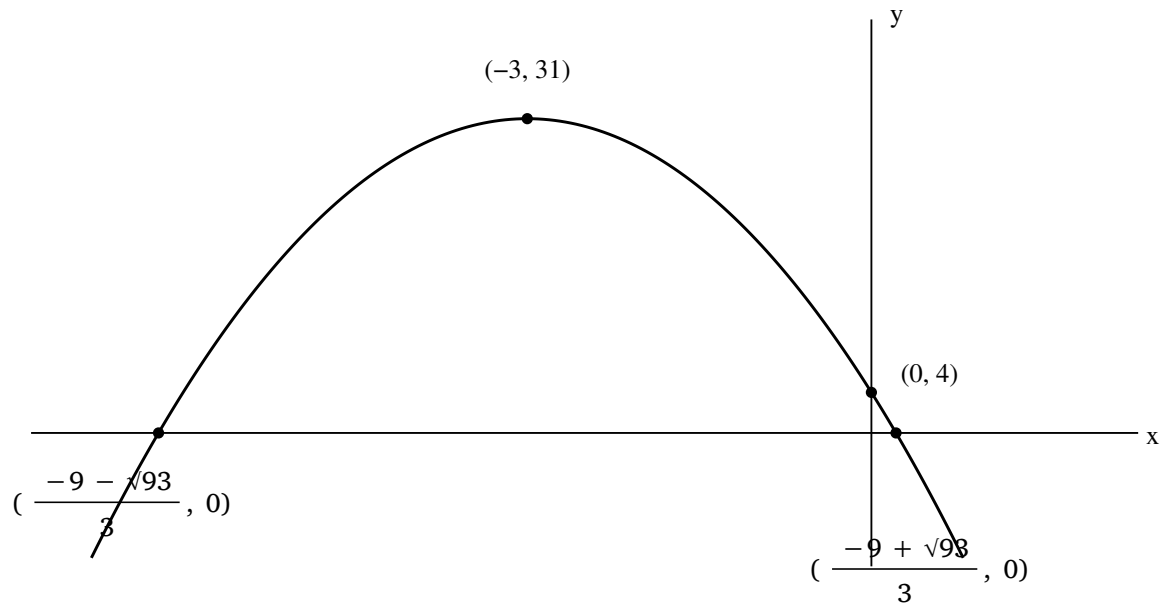
Answer: $x = \frac{\pm\sqrt{93} - 9}{3}$

Part (iii)

The coefficient of x^2 is negative, so draw a downward-opening parabola with maximum at $(-3, 31)$.

Set $x = 0$ to obtain the y-intercept $(0, 4)$. Use the two exact roots from part (ii) for the x-intercepts. The axis of symmetry is $x = -3$.

Answer: Maximum $(-3, 31)$; y-intercept $(0, 4)$; x-intercepts $\left(\frac{-9 - \sqrt{93}}{3}, 0\right)$ and $\left(\frac{-9 + \sqrt{93}}{3}, 0\right)$.



Sketch not to scale.

Question 24 · Advanced indices and prime bases · 5 marks

Use $10^{2n} = 2^{2n} \times 5^{2n}$ and $50^2 = 2^2 \times 5^4$.

Inside the bracket, combine powers and cancel 5^4: the expression becomes 2 raised to $(2n^2 - 6n - 2)$.

Raise to power $\frac{2}{3}$ and write $16 = 2^4$: $\frac{2}{3}(2n^2 - 6n - 2) = 4$.

Rearrange: $2n^2 - 6n - 2 = 6$, so $n^2 - 3n - 4 = 0 = (n - 4)(n + 1)$.

Both real solutions are valid: $n = 4$ or $n = -1$.

Answer: $n = 4$ or $n = -1$