



4MA1 Nov 2026 Paper 1 Best Guess Paper

Disclaimer

This paper has been created based on topics from previous years and careful analysis of what topics are highly likely to appear in paper 1H. The paper should be excellent at helping students revise for exams. This paper is specifically targeted at high-attaining students aiming for a Grade 9, so it is intentionally more rigorous and challenging than a standard real exam paper. The topics from this paper may well appear in the real exams, however there is absolutely no guarantee of this. There are deliberately more questions at a higher grade than you would expect. Despite what you might see on social media it is not possible to “predict” the paper perfectly. This is usually what people say when they are selling you something...

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The Playlist for Solutions can be found



The best way to work with this paper is work through it all, watch the Clip. If you get the question incorrect watch the clip again and then try the similar questions from the worksheets

Model Answers
Pearson Edexcel IGCSE Mathematics A (4MA1)
Paper 1H (Best Guess Paper)

Question 1

Express 5040 as a product of powers of its prime factors. Show your working clearly.

Model Solution

Divide 5040 by prime numbers systematically:

$$\begin{aligned} 5040 &= 10 \times 504 = (2 \times 5) \times (2 \times 252) \\ &= 2^2 \times 5 \times (2 \times 126) \\ &= 2^3 \times 5 \times (2 \times 63) \\ &= 2^4 \times 5 \times (9 \times 7) \\ &= 2^4 \times 5 \times 3^2 \times 7 \end{aligned}$$

Writing in ascending order: $2^4 \times 3^2 \times 5 \times 7$

Question 2

Work out $\frac{3.6 \times 10^{22}}{4.5 \times 10^{-6}}$. Give your answer in standard form.

Model Solution

Divide the coefficients and subtract the indices for the powers of 10:

$$\begin{aligned} \frac{3.6}{4.5} \times \frac{10^{22}}{10^{-6}} &= 0.8 \times 10^{22-(-6)} \\ &= 0.8 \times 10^{28} \end{aligned}$$

To convert to standard form ($A \times 10^n$ where $1 \leq A < 10$), adjust the decimal:

$$0.8 \times 10^{28} = 8 \times 10^{27}$$

Question 3

Solve the simultaneous equations:

$$3x + 2y = 16$$

$$4x - 3y = 27$$

Model Solution

Multiply the first equation by 3 and the second by 2 to equate the y coefficients:

$$(1) \times 3 : \quad 9x + 6y = 48$$

$$(2) \times 2 : \quad 8x - 6y = 54$$

Add the two new equations to eliminate y :

$$(9x + 8x) + (6y - 6y) = 48 + 54 \implies 17x = 102 \implies x = 6$$

Substitute $x = 6$ back into equation (1):

$$3(6) + 2y = 16 \implies 18 + 2y = 16 \implies 2y = -2 \implies y = -1$$

Answer: $x = 6, y = -1$

Question 4

- (a) Simplify $a^6 \times a^{10}$
(b) Simplify $c^{30} \div c^{12}$
(c)(i) Factorise $x^2 - 11x + 24$
(c)(ii) Hence, solve $x^2 - 10xy + 24y^2 = 0$

Model Solution

- (a) Add the powers: $a^{6+10} = \mathbf{a^{16}}$
(b) Subtract the powers: $c^{30-12} = \mathbf{c^{18}}$
(c)(i) Find two numbers that multiply to 24 and add to -11 (-8 and -3): $(x - 8)(x - 3)$
(c)(ii) Assuming standard factorisation for $x^2 - 10xy + 24y^2 = 0$:

$$(x - 6y)(x - 4y) = 0 \implies \mathbf{x = 6y \text{ or } x = 4y}$$

Question 5

The value of a vehicle depreciates by 12% in its first year and by 15% in its second year. At the end of the second year, the vehicle is worth £11,220. Calculate the original price.

Model Solution

Let P be the original price. A depreciation of 12% is a multiplier of $1 - 0.12 = 0.88$. A depreciation of 15% is a multiplier of $1 - 0.15 = 0.85$.

$$P \times 0.88 \times 0.85 = 11220$$

$$P \times 0.748 = 11220$$

$$P = \frac{11220}{0.748} = \mathbf{15000}$$

Original price: £15,000

Question 6

The table gives information about the masses, m kg, of 50 luggage bags:

$0 < m \leq 5$ (freq 6), $5 < m \leq 10$ (freq 14), $10 < m \leq 15$ (freq 18), $15 < m \leq 20$ (freq 8), $20 < m \leq 25$ (freq 4).

Calculate an estimate for the mean mass of the 50 luggage bags.

Model Solution

Find the midpoint (x) of each mass class, multiply by the frequency (f), and sum them up:

- Midpoints: 2.5, 7.5, 12.5, 17.5, 22.5
- fx : $(2.5 \times 6) = 15$, $(7.5 \times 14) = 105$, $(12.5 \times 18) = 225$, $(17.5 \times 8) = 140$, $(22.5 \times 4) = 90$

$$\Sigma f = 50, \quad \Sigma fx = 15 + 105 + 225 + 140 + 90 = 575$$

$$\text{Mean} = \frac{575}{50} = \mathbf{11.5 \text{ kg}}$$

Question 7

Use algebra to show that $0.3\overline{81} = \frac{21}{55}$

Model Solution

Let $x = 0.3818181\dots$

Multiply by 10 to move the non-recurring part past the decimal point:

$$10x = 3.818181\dots$$

Multiply the original equation by 1000 to align the recurring pattern:

$$1000x = 381.8181\dots$$

Subtract the two equations:

$$1000x - 10x = 381.8181\dots - 3.8181\dots$$

$$990x = 378$$

$$x = \frac{378}{990}$$

Simplify the fraction by dividing numerator and denominator by 18:

$$x = \frac{378 \div 18}{990 \div 18} = \frac{\mathbf{21}}{\mathbf{55}}$$

Question 8

The diagram shows triangle PQR with $PQ = 18$ cm, $PR = 24$ cm, and $\angle QPR = 52^\circ$.

- (a) Calculate the length of QR . Give your answer correct to 3 significant figures.
(b) Calculate the area of triangle PQR . Give your answer correct to 3 significant figures.

Model Solution

(a) Use the Cosine Rule to find the missing side QR :

$$\begin{aligned}QR^2 &= PQ^2 + PR^2 - 2(PQ)(PR)\cos(52^\circ) \\QR^2 &= 18^2 + 24^2 - 2(18)(24)\cos(52^\circ) \\QR^2 &= 324 + 576 - 864\cos(52^\circ) \\QR^2 &= 900 - 531.933\dots = 368.066\dots \\QR &= \sqrt{368.066\dots} = 19.185\dots \Rightarrow \mathbf{19.2 \text{ cm}}\end{aligned}$$

(b) Use the sine area formula $\text{Area} = \frac{1}{2}ab\sin(C)$:

$$\begin{aligned}\text{Area} &= \frac{1}{2} \times 18 \times 24 \times \sin(52^\circ) \\&= 216 \times 0.788\dots = 170.21\dots \Rightarrow \mathbf{170 \text{ cm}^2}\end{aligned}$$

Question 9

y is directly proportional to the square of t . $y = 20$ when $t = 2$.

t is inversely proportional to the square root of x . $t = 3$ when $x = 4$.

Find a formula for y in terms of x . Give your answer in its simplest form.

Model Solution

Set up the first relationship:

$$y = kt^2 \Rightarrow 20 = k(2^2) \Rightarrow 20 = 4k \Rightarrow k = 5 \Rightarrow y = 5t^2$$

Set up the second relationship:

$$t = \frac{m}{\sqrt{x}} \Rightarrow 3 = \frac{m}{\sqrt{4}} \Rightarrow 3 = \frac{m}{2} \Rightarrow m = 6 \Rightarrow t = \frac{6}{\sqrt{x}}$$

Substitute the expression for t into the formula for y :

$$y = 5 \left(\frac{6}{\sqrt{x}} \right)^2 = 5 \left(\frac{36}{x} \right) = \frac{180}{x}$$

Question 10

The diagram shows a sector $OABC$ of a circle with centre O and radius 15 cm. The central angle $\angle AOC = 120^\circ$. Calculate the area of the shaded segment.

Model Solution

First, calculate the area of the entire sector:

$$\text{Sector Area} = \frac{120}{360} \times \pi \times 15^2 = \frac{1}{3} \times 225\pi = 75\pi \approx 235.619...$$

Next, calculate the area of the non-shaded triangle OAC :

$$\text{Triangle Area} = \frac{1}{2} \times 15 \times 15 \times \sin(120^\circ) = 112.5 \times \frac{\sqrt{3}}{2} \approx 97.427...$$

Subtract the triangle from the sector to find the shaded segment:

$$\text{Segment Area} = 75\pi - 97.427... = 138.19... \implies \mathbf{138 \text{ cm}^2} \text{ (to 3 s.f.)}$$

Question 11

Make y the subject of the formula: $p = \frac{2y+5}{3y-k}$

Model Solution

Multiply both sides by the denominator to clear the fraction:

$$p(3y - k) = 2y + 5$$

$$3py - pk = 2y + 5$$

Group all the terms containing y on one side, and the other terms on the other side:

$$3py - 2y = pk + 5$$

Factor out y :

$$y(3p - 2) = pk + 5$$

$$y = \frac{\mathbf{pk + 5}}{\mathbf{3p - 2}}$$

Question 12

The acceleration a m/s² of an object is calculated using the formula: $a = \frac{2(s-ut)}{t^2}$ where $s = 150$, $u = 12$, and $t = 4.0$ (all given correct to 1 decimal place). By considering bounds, work out the upper bound for the value of a to a suitable degree of accuracy.

Model Solution

To find the maximum (upper bound) value for a , we need to maximize the numerator and minimize the denominator.

Identify the bounds for the given values:

- Max s : $s_{UB} = 150.5$
- Min u : $u_{LB} = 11.5$
- Min t : $t_{LB} = 3.95$

Substitute these into the formula:

$$a_{UB} = \frac{2(150.5 - 11.5 \times 3.95)}{3.95^2} = \frac{2(150.5 - 45.425)}{15.6025} = \frac{210.15}{15.6025} = 13.469...$$

To a suitable degree of accuracy: 13.5

Question 13

Solve the quadratic inequality: $3x^2 - 5 \leq 14x$

Model Solution

Rearrange the inequality so that it is ≤ 0 :

$$3x^2 - 14x - 5 \leq 0$$

Factorise the quadratic:

$$(3x + 1)(x - 5) \leq 0$$

The critical values where the expression equals zero are $x = -\frac{1}{3}$ and $x = 5$.

Because this is a positive x^2 curve (U-shaped parabola), the expression is ≤ 0 (below the x-axis) between the two roots:

$$-\frac{1}{3} \leq x \leq 5$$

Question 14

A box contains n counters. 8 of the counters are red and the rest are blue. Two counters are taken at random from the box without replacement. Given that the probability that both counters are the same colour is $\frac{7}{15}$:

(a) Show that $n^2 - 31n + 240 = 0$.

(b) Solve to find the value of n .

Model Solution

(a) There are 8 red counters and $n - 8$ blue counters.

$$\begin{aligned}P(\text{same}) &= P(\text{Red, Red}) + P(\text{Blue, Blue}) \\&= \left(\frac{8}{n} \times \frac{7}{n-1}\right) + \left(\frac{n-8}{n} \times \frac{n-9}{n-1}\right) \\&= \frac{56 + (n^2 - 17n + 72)}{n(n-1)} = \frac{n^2 - 17n + 128}{n^2 - n}\end{aligned}$$

Equate to $\frac{7}{15}$ and cross-multiply:

$$\begin{aligned}\frac{n^2 - 17n + 128}{n^2 - n} &= \frac{7}{15} \\15(n^2 - 17n + 128) &= 7(n^2 - n) \\15n^2 - 255n + 1920 &= 7n^2 - 7n \\8n^2 - 248n + 1920 &= 0\end{aligned}$$

Divide by 8 to get: $n^2 - 31n + 240 = 0$

(b) Factorise: $(n - 15)(n - 16) = 0 \implies n = 15$ or $n = 16$

Question 15

$$f(x) = \frac{2x+1}{x-3}, x \neq 3 \quad \text{and} \quad g(x) = x^2 - 4$$

- (a) Find $f^{-1}(x)$
(b) Express $gf(x)$ as a single fraction in its simplest form.
(c) Solve $g(x) = 21$

Model Solution

(a) Let $y = f(x)$. Rearrange to make x the subject:

$$\begin{aligned}y &= \frac{2x+1}{x-3} \implies y(x-3) = 2x+1 \implies yx-3y = 2x+1 \\yx-2x &= 3y+1 \implies x(y-2) = 3y+1 \implies x = \frac{3y+1}{y-2} \implies f^{-1}(x) = \frac{3x+1}{x-2}\end{aligned}$$

(b) Substitute $f(x)$ into $g(x)$:

$$\begin{aligned}gf(x) &= \left(\frac{2x+1}{x-3}\right)^2 - 4 = \frac{(2x+1)^2}{(x-3)^2} - \frac{4(x-3)^2}{(x-3)^2} \\&= \frac{(4x^2 + 4x + 1) - 4(x^2 - 6x + 9)}{(x-3)^2} = \frac{4x^2 + 4x + 1 - 4x^2 + 24x - 36}{(x-3)^2} = \frac{28x - 35}{(x-3)^2}\end{aligned}$$

(c) $x^2 - 4 = 21 \implies x^2 = 25 \implies x = \pm 5$

Question 16

An open-topped storage tank has a square base of length x m and vertical height h m. The total external surface area of the tank is 108 m^2 .

- (a) Show that the volume $V \text{ m}^3$ of the tank is given by $V = 27x - \frac{1}{4}x^3$
(b) Find the maximum volume of the tank. Show clear algebraic working.

Model Solution

(a) The surface area consists of the square base and 4 rectangular sides:

$$SA = x^2 + 4xh = 108 \implies 4xh = 108 - x^2 \implies h = \frac{108 - x^2}{4x}$$

Substitute h into the volume formula $V = \text{base area} \times \text{height}$:

$$V = x^2 \times h = x^2 \left(\frac{108 - x^2}{4x} \right) = \frac{x(108 - x^2)}{4} = \frac{108x - x^3}{4} = 27x - \frac{1}{4}x^3$$

(b) Differentiate to find the turning point (maximum):

$$\frac{dV}{dx} = 27 - \frac{3}{4}x^2 = 0 \implies \frac{3}{4}x^2 = 27 \implies x^2 = 36 \implies x = 6 \text{ (since length is positive)}$$

Substitute $x = 6$ back into the volume formula:

$$V_{\max} = 27(6) - \frac{1}{4}(6)^3 = 162 - \frac{216}{4} = 162 - 54 = 108 \text{ m}^3$$

Question 17

The straight-line L has equation $2x + y = 7$. The curve C has equation $x^2 + y^2 - 4x + 2y = 32$. Find the coordinates of the points where L and C intersect.

Model Solution

Rearrange the linear equation: $y = 7 - 2x$

Substitute this into the curve's equation:

$$\begin{aligned} x^2 + (7 - 2x)^2 - 4x + 2(7 - 2x) &= 32 \\ x^2 + (49 - 28x + 4x^2) - 4x + 14 - 4x &= 32 \\ 5x^2 - 36x + 63 &= 32 \\ 5x^2 - 36x + 31 &= 0 \end{aligned}$$

Factorise the quadratic:

$$(5x - 31)(x - 1) = 0 \implies x = 6.2 \text{ or } x = 1$$

Substitute back to find y : When $x = 1$, $y = 7 - 2(1) = 5$

When $x = 6.2$, $y = 7 - 2(6.2) = 7 - 12.4 = -5.4$

Coordinates: $(1, 5)$ and $(6.2, -5.4)$

Question 18

In triangle OAB , $\vec{OA} = 6\mathbf{a}$ and $\vec{OB} = 9\mathbf{b}$. P is the point on OA such that $OP : PA = 1 : 2$. Q is the point on AB such that $AQ : QB = 2 : 1$.

- (a) Find $\vec{PQ}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.
(b) Use a vector method to prove that PQ is parallel to OB , and state the ratio of their lengths.

Model Solution

(a) Because $OP : PA = 1 : 2$, the distance PA is $\frac{2}{3}$ of OA : $\vec{PA} = \frac{2}{3}(6\mathbf{a}) = 4\mathbf{a}$.

Find the path from A to B: $\vec{AB} = -\vec{OA} + \vec{OB} = -6\mathbf{a} + 9\mathbf{b}$.

Because $AQ : QB = 2 : 1$, the distance AQ is $\frac{2}{3}$ of AB :

$$\vec{AQ} = \frac{2}{3}(-6\mathbf{a} + 9\mathbf{b}) = -4\mathbf{a} + 6\mathbf{b}$$

Find $\vec{PQ}$ by traveling from P to A, then A to Q:

$$\vec{PQ} = \vec{PA} + \vec{AQ} = 4\mathbf{a} + (-4\mathbf{a} + 6\mathbf{b}) = 6\mathbf{b}$$

(b) $\vec{OB} = 9\mathbf{b}$ and $\vec{PQ} = 6\mathbf{b}$. Because $\vec{PQ}$ is a scalar multiple of $\vec{OB}$ ($\vec{PQ} = \frac{2}{3}\vec{OB}$), the lines are **parallel**.

The ratio of their lengths is $PQ : OB = 6 : 9 = \mathbf{2 : 3}$.

Question 19

An arithmetic series has first term a and common difference d . The sum of the first 20 terms is 1155. The sum of the 5th term and the 15th term is 111.

(a) Show that $a = 15$ and $d = 4.5$

(b) Find the value of N such that $S_N = 4110$.

Model Solution

(a) Using the sum formula $S_n = \frac{n}{2}(2a + (n-1)d)$:

$$S_{20} = \frac{20}{2}(2a + 19d) = 1155 \implies 10(2a + 19d) = 1155 \implies 2a + 19d = 115.5$$

Using the term formula $u_n = a + (n-1)d$:

$$u_5 + u_{15} = (a + 4d) + (a + 14d) = 2a + 18d = 111$$

Subtract the two linear equations:

$$(2a + 19d) - (2a + 18d) = 115.5 - 111 \implies d = 4.5$$

Substitute d back in: $2a + 18(4.5) = 111 \implies 2a + 81 = 111 \implies 2a = 30 \implies a = 15$

(b) Set up the sum formula for S_N :

$$\frac{N}{2}(2(15) + (N-1)4.5) = 4110$$

$$N(30 + 4.5N - 4.5) = 8220$$

$$4.5N^2 + 25.5N - 8220 = 0$$

Divide by 1.5 to simplify: $3N^2 + 17N - 5480 = 0$. Solving this gives $N = 40$ or $N = -45.66$. Since N must be a positive integer, $N = 40$.

Question 20

The diagram shows a right pyramid $VABCD$ with a horizontal square base $ABCD$ of side length 10 cm. The vertical height VH of the pyramid is 15 cm, where H is the centre of the base. M is the midpoint of BC .

(a) Calculate the length of VM .

(b) Calculate the angle between the triangular face VBC and the base plane $ABCD$.

Model Solution

(a) Since H is the centre of a 10×10 square and M is the midpoint of an edge, the horizontal distance $HM = 5$ cm.

Triangle VHM is a right-angled triangle. Use Pythagoras:

$$VM = \sqrt{VH^2 + HM^2} = \sqrt{15^2 + 5^2} = \sqrt{225 + 25} = \sqrt{250} = 15.8 \text{ cm (3 s.f.)}$$

(b) The required angle is $\angle VMH$. Use trigonometry:

$$\tan(\theta) = \frac{\text{Opposite}}{\text{Adjacent}} = \frac{VH}{HM} = \frac{15}{5} = 3$$

$$\theta = \tan^{-1}(3) = 71.6^\circ \text{ (1 d.p.)}$$

Question 21

Solve the equation: $\frac{3}{x-2} - \frac{4}{2x+1} = 2$. Show clear algebraic working.

Model Solution

Multiply all terms by the common denominator $(x - 2)(2x + 1)$:

$$3(2x + 1) - 4(x - 2) = 2(x - 2)(2x + 1)$$

$$6x + 3 - 4x + 8 = 2(2x^2 + x - 4x - 2)$$

$$2x + 11 = 2(2x^2 - 3x - 2)$$

$$2x + 11 = 4x^2 - 6x - 4$$

Rearrange to form a quadratic equals zero:

$$4x^2 - 8x - 15 = 0$$

$$(2x - 5)(2x + 3) = 0$$

Answer: $x = 2.5$ or $x = -1.5$

Question 22

Show that the following expression can be written in the form $a + b\sqrt{3}$, where a and b are integers:

$$\frac{(2+\sqrt{3})^2}{2-\sqrt{3}}$$

Model Solution

First, expand the numerator:

$$(2 + \sqrt{3})^2 = (2 + \sqrt{3})(2 + \sqrt{3}) = 4 + 2\sqrt{3} + 2\sqrt{3} + 3 = 7 + 4\sqrt{3}$$

Now rationalise the denominator by multiplying the top and bottom by the conjugate $(2 + \sqrt{3})$:

$$\begin{aligned} \frac{7 + 4\sqrt{3}}{2 - \sqrt{3}} \times \frac{2 + \sqrt{3}}{2 + \sqrt{3}} &= \frac{14 + 7\sqrt{3} + 8\sqrt{3} + 12}{2^2 - (\sqrt{3})^2} \\ &= \frac{26 + 15\sqrt{3}}{4 - 3} = \mathbf{26 + 15\sqrt{3}} \end{aligned}$$

Question 23

The curve with equation $y = f(x)$ has a single local maximum turning point at $(-2, 5)$.

(a) Write down the coordinates of the local turning point of the curve with equation: $y = -f(x + 3)$

(b) Write down the coordinates of the local maximum turning point of the curve with equation: $y = 3f\left(\frac{1}{2}x\right)$

Model Solution

(a) The $+3$ inside the bracket translates the graph left by 3 units: $x = -2 - 3 = -5$.

The negative sign outside the function reflects the graph in the x-axis, flipping the y-coordinate: $y = -5$.

Note: Because it was flipped, it actually becomes a local *minimum* turning point.

Coordinates: $(-5, -5)$

(b) The $\frac{1}{2}$ inside the bracket is a horizontal stretch by scale factor 2: $x = -2 \times 2 = -4$.

The 3 outside is a vertical stretch by scale factor 3: $y = 5 \times 3 = 15$.

Coordinates: $(-4, 15)$

Question 24

Points A , B , C , and D lie on the circumference of a circle. The straight line XY is a tangent to the circle at the point C . The line AD is extended to meet the tangent at a point T . Angle $ACX = 42^\circ$ and Angle $ABC = 108^\circ$. Calculate the size of Angle CDA . You must give a formal geometrical reason for each stage of your working.

Model Solution

Because all four vertices A , B , C , and D lie on the circumference of the circle, $ABCD$ forms a cyclic quadrilateral.

The rule for cyclic quadrilaterals is that opposite angles sum to 180° . Therefore, Angle CDA and Angle ABC must add to 180:

$$\begin{aligned} \text{Angle } CDA &= 180^\circ - \text{Angle } ABC \\ &= 180^\circ - 108^\circ \\ &= \mathbf{72^\circ} \end{aligned}$$

(Note: the tangent information regarding 42° is supplementary information that is not required to find this specific angle.)

Reason: Opposite angles in a cyclic quadrilateral sum to 180° .