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4MA1 Nov 2026 Paper 1 Best Guess Paper

Higher · Standard · Worked Solutions

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This independently compiled practice paper is designed for students preparing for Pearson Edexcel International GCSE Mathematics A (4MA1), Higher Tier, Paper 1H. It covers a range of accessible and challenging Higher Tier questions for standard exam practice, rather than focusing only on a particular target grade. A calculator may be used.

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Video walkthrough

Calculator allowed · 25 questions · 100 marks · Suggested time: 2 hours.
Attempt every question. Show your working, then review the mark scheme and worked solutions.

Paper 1H · Standard Higher · Worked Solutions

International GCSE Mathematics A 4MA1 · November 2026 · Calculator allowed · 25 questions · 100 marks

Question 1 · Mixed-number Subtraction · 2 marks

Convert the mixed numbers: 3 1/5 = 16/5 and 1 2/3 = 5/3.

Use denominator 15: 16/5 – 5/3 = 48/15 – 25/15 = 23/15.

Convert back to a mixed number: 23/15 = 1 8/15. This proves the stated result.

Answer: 1 8/15, as required

Question 2 · Linear Sequences · 2 marks

The terms increase by 4, so the nth term has the form 4n + c.

For n = 1, 4 + c = 7, so c = 3.

The nth term is 4n + 3. This gives 7, 11, 15, 19, 23 for n = 1, 2, 3, 4, 5.

Answer: 4n + 3

Question 3 · Standard Form · 2 marks

Divide the coefficients: 3.6 ÷ 4.5 = 0.8.

For powers of 10, subtract the exponents: 22 – (–6) = 28.

The result is 0.8×10^{28}. Move the decimal point one place right and reduce the power by one: 8×10^{27}.

Answer: 8×10^{27}

Question 4 · Upper and Lower Bounds · 2 marks

The measurement is rounded to the nearest 0.1 m, so half the rounding interval is 0.05 m.

(a) Upper bound = 1.6 + 0.05 = 1.65 m.

(b) Lower bound = 1.6 – 0.05 = 1.55 m.

The true length L satisfies $1.55 \leq L < 1.65$ metres.

Answer: (a) 1.65 m; (b) 1.55 m.

Question 5 · Index Laws and Quadratic Factorising · 5 marks

(a) Multiplying powers with the same base adds their indices: $a^6 \times a^{10} = a^{16}$.

(b) Dividing powers with the same base subtracts their indices: $c^{30} \div c^{12} = c^{18}$.

(c)(i) Find two numbers whose product is 24 and whose sum is –10: –4 and –6. Thus $x^2 - 10x + 24 = (x - 4)(x - 6)$.

(c)(ii) $(x - 4)(x - 6) = 0$, so $x - 4 = 0$ or $x - 6 = 0$.

Answer: (a) a^{16}; (b) c^{18}; (c)(i) $(x - 4)(x - 6)$; (ii) $x = 4$ or 6

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Question 6 · Linear Simultaneous Equations · 3 marks

Multiply $3x + 2y = 16$ by 3: $9x + 6y = 48$.

Multiply $4x – 3y = 27$ by 2: $8x – 6y = 54$.

Add the equations: $17x = 102$, so $x = 6$.

Substitute into $3x + 2y = 16$: $18 + 2y = 16$, so $y = –1$.

Check the second equation: $4(6) – 3(–1) = 27$.

Answer: $x = 6$, $y = –1$

Question 7 · Estimated Mean · 3 marks

Use the class midpoints: 2.5, 7.5, 12.5, 17.5 and 22.5 kg.

Multiply by the frequencies: $2.5 \times 6 = 15$; $7.5 \times 14 = 105$; $12.5 \times 18 = 225$; $17.5 \times 8 = 140$; $22.5 \times 4 = 90$.

Add the products: $15 + 105 + 225 + 140 + 90 = 575$.

Estimated mean = $575 \div 50 = 11.5$ kg. This is an estimate because the original individual masses are unknown.

Answer: 11.5 kg

Question 8 · Volume of a Cylinder · 3 marks

For a cylinder, volume = $\pi r^2 h$.

Substitute radius 4.5 cm and height 10 cm: $V = \pi \times 4.5^2 \times 10 = 202.5\pi$ cm³.

$V = 636.172512...$ cm³, which rounds to 636 cm³ to 3 significant figures.

Answer: 636 cm³ (3 significant figures)

Question 9 · Ratio and Currency Exchange · 5 marks

Convert £600 into euros: $600 \times 1.15 = €690$.

The spending-to-saving ratio is 3 : 2. There are 5 parts, so the saving share is 2/5.

Euros saved = $2/5 \times €690 = €276$.

At the new rate £1 = €1.18, divide by 1.18: $€276 \div 1.18 = £233.898305...$.

To the nearest penny, Carlos receives £233.90.

Answer: £233.90

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Question 10 · Compound Percentage Change · 4 marks

After a 12% reduction, the multiplier is 0.88: £85000 × 0.88 = £74800.

After the second year's 15% reduction: £74800 × 0.85 = £63580.

The third-year multiplier is £66759 ÷ £63580 = 1.05.

A multiplier of 1.05 is an increase of 5%, so x = 5.

Check: £63580 × 1.05 = £66759.

Answer: x = 5

Question 11 · Trigonometry in a Trapezium · 3 marks

Drop a perpendicular from C to the base AD. The extra horizontal length beside this perpendicular is 24.3 – 18 = 6.3 cm.

The right triangle has vertical height 15 cm. Let θ be the acute angle between the downward perpendicular and CD.

$\tan\theta = 6.3/15$, so $\theta = \tan^{-1}(6.3/15) = 22.7824...°$.

The marked angle x also includes the right angle between BC and the downward perpendicular: $x = 90° + \theta = 112.7824...°$.

Therefore x = 112.8° to 1 decimal place.

Answer: x = 112.8° (1 decimal place)

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Question 12 · Cumulative Frequency · 8 marks

(a) Add frequencies successively: 8; 8 + 15 = 23; 23 + 37 = 60; 60 + 10 = 70; 70 + 7 = 77; 77 + 3 = 80.

(b) Plot cumulative frequency at upper boundaries: (200,8), (300,23), (400,60), (500,70), (600,77), (700,80). Start at (100,0) and join with a smooth increasing curve.

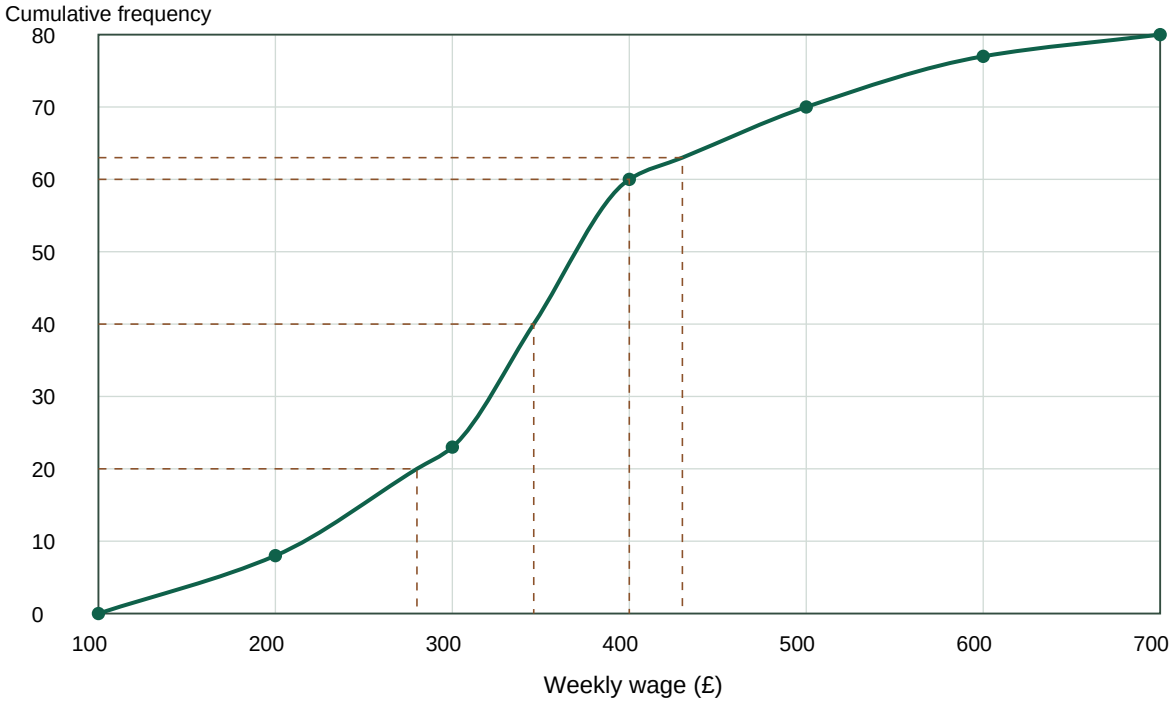
(c) There are 80 workers, so the median is at cumulative frequency 40. Read across to the curve and down to the wage axis: approximately £346.

(d) Lower quartile: CF = 80/4 = 20, giving about £280. Upper quartile: CF = 3 × 80/4 = 60, giving £400. IQR ≈ £400 – £280 = £120.

(e) At £430, CF ≈ 63. This counts wages up to £430. Wages above £430: 80 – 63 ≈ 17 workers.

Graph answers are estimates. Small variations are acceptable when they are consistent with a correctly drawn curve.

Answer: (a) 8,23,60,70,77,80; (c) ≈ £346; (d) ≈ £120; (e) ≈ 17 workers



Question 13 · Recurring Decimals · 3 marks

Let x = 0.38181818… . The recurring block is 81; the initial 3 does not recur.

Multiply by 10: 10x = 3.8181818… . Multiply by 1000: 1000x = 381.8181818… .

Subtract the equations; the identical recurring tails cancel: 1000x – 10x = 381 – 3.

Thus 990x = 378, so x = 378/990. Divide numerator and denominator by 18 to get 21/55.

Answer: 0.38181818… = 21/55

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Question 14 · Combined Proportion · 4 marks

y is directly proportional to t^2, so $y = kt^2$. Use $y = 20$ when $t = 2$: $20 = 4k$, hence $k = 5$ and $y = 5t^2$.

t is inversely proportional to $\sqrt{x}$, so $t = c/\sqrt{x}$. Use $t = 3$ when $x = 4$: $3 = c/2$, hence $c = 6$.

Substitute $t = 6/\sqrt{x}$ into $y = 5t^2$: $y = 5(6/\sqrt{x})^2 = 5 \times 36/x = 180/x$.

Answer: $y = 180/x$

Question 15 · Circle Theorems · 3 marks

A, B, C and D lie on the same circle, so ABCD is a cyclic quadrilateral.

Opposite angles of a cyclic quadrilateral sum to 180°. The angle at B is opposite the required angle at D.

Therefore $\angle CDA = 180° - \angle ABC = 180° - 108° = 72°$.

The tangent information is not needed for this direct valid method.

Answer: $\angle CDA = 72°$

Question 16 · Quadratic Inequalities · 3 marks

Start with $3x^2 - 5 \leq 14x$. Move all terms to the left: $3x^2 - 14x - 5 \leq 0$.

Factorise: $3x^2 - 14x - 5 = (3x + 1)(x - 5)$. The boundary values are $x = -1/3$ and $x = 5$.

The coefficient of x^2 is positive, so the quadratic is zero or negative between its roots. Include both roots because the inequality is ≤.

Answer: $-1/3 \leq x \leq 5$

Question 17 · Rearranging a Formula · 3 marks

Square both sides: $p^2 = (2y + 5)/(3y - k)$.

Multiply by $3y - k$: $p^2(3y - k) = 2y + 5$. Expand: $3p^2y - p^2k = 2y + 5$.

Collect the y terms: $3p^2y - 2y = p^2k + 5$. Factor: $y(3p^2 - 2) = p^2k + 5$.

Divide by $3p^2 - 2$ to make y the subject.

Answer: $y = (p^2k + 5)/(3p^2 - 2)$

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Question 18 · Non-linear Simultaneous Equations · 5 marks

The line gives $y = 7 - 2x$. Substitute into the curve: $x^2 + (7 - 2x)^2 - 4x + 2(7 - 2x) = 32$.

Expand: $x^2 + 49 - 28x + 4x^2 - 4x + 14 - 4x = 32$.

Collect terms and subtract 32: $5x^2 - 36x + 31 = 0$. Factorise: $(5x - 31)(x - 1) = 0$.

Hence $x = 31/5$ or $x = 1$. For $x = 1$, $y = 7 - 2 = 5$. For $x = 31/5$, $y = 35/5 - 62/5 = -27/5$.

Keep x and y paired: the two intersection points are (1,5) and (31/5,–27/5).

Answer: (1,5) and (31/5,–27/5)

Question 19 · Rationalising a Surd Denominator · 4 marks

Expand the numerator: $(2 + \sqrt{3})^2 = 4 + 4\sqrt{3} + 3 = 7 + 4\sqrt{3}$.

Rationalise by multiplying top and bottom by $2 + \sqrt{3}$, the conjugate of $2 - \sqrt{3}$.

Denominator: $(2 - \sqrt{3})(2 + \sqrt{3}) = 4 - 3 = 1$.

Numerator: $(7 + 4\sqrt{3})(2 + \sqrt{3}) = 14 + 7\sqrt{3} + 8\sqrt{3} + 12 = 26 + 15\sqrt{3}$.

Divide by 1. The required integers are $a = 26$ and $b = 15$.

Answer: $26 + 15\sqrt{3}$

Question 20 · Solving Algebraic Fractions · 5 marks

The denominators require $x \neq 2$ and $x \neq -1/2$.

Multiply $3/(x - 2) - 4/(2x + 1) = 1$ by $(x - 2)(2x + 1)$: $3(2x + 1) - 4(x - 2) = (x - 2)(2x + 1)$.

Expand: $6x + 3 - 4x + 8 = 2x^2 - 3x - 2$.

Collect terms: $2x^2 - 5x - 13 = 0$.

Use the quadratic formula: $x = (5 \pm \sqrt{129})/4$.

The two roots are 4.08945... and –1.58945.... Neither is excluded by the denominators.

To 3 significant figures: $x = 4.09$ or $x = -1.59$.

Answer: x = 4.09 or x = –1.59 (3 significant figures)

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Question 21 · Inverse and Composite Functions · 6 marks

(a) Let $y = (2x + 1)/(x – 3)$. Multiply by $x – 3$: $xy – 3y = 2x + 1$.

Collect the terms containing x: $xy – 2x = 3y + 1$, so $x(y – 2) = 3y + 1$ and $x = (3y + 1)/(y – 2)$.

Replace the input letter y by x: $f^{-1}(x) = (3x + 1)/(x – 2)$, $x \neq 2$.

(b) gf(x) means g(f(x)), so $gf(x) = [(2x + 1)/(x – 3)]^2 – 4$.

Use denominator $(x – 3)^2$: numerator $= (2x + 1)^2 – 4(x – 3)^2 = (4x^2 + 4x + 1) – (4x^2 – 24x + 36) = 28x – 35$.

Thus $gf(x) = (28x – 35)/(x – 3)^2$, $x \neq 3$.

(c) $g(x) = 21$ gives $x^2 – 4 = 21$, so $x^2 = 25$ and $x = \pm 5$.

Answer: (a) $(3x + 1)/(x – 2)$; (b) $(28x – 35)/(x – 3)^2$; (c) $x = \pm 5$

Question 22 · Vector Geometry Proof · 6 marks

(a) OP : PA = 1 : 2, so $OP = \frac{1}{3}\,OA = \frac{1}{3} \times 6a = 2a$.

$AB = OB – OA = 9b – 6a$. Since AQ : QB = 2 : 1, $AQ = \frac{2}{3}\,AB = 6b – 4a$.

$OQ = OA + AQ = 6a + (6b – 4a) = 2a + 6b$.

Therefore $PQ = OQ – OP = (2a + 6b) – 2a = 6b$.

(b) $OB = 9b$, so $PQ = 6b = \frac{2}{3}\,OB$. These non-zero vectors are scalar multiples, which proves that PQ is parallel to OB.

The positive scalar $\frac{2}{3}$ also gives the length ratio $|PQ| : |OB| = 6 : 9 = 2 : 3$.

Answer: (a) $PQ = 6b$; (b) PQ ∥ OB, with length ratio 2 : 3.

Question 23 · Arithmetic Series Proof and Sums · 5 marks

(a) The sum formula is $S_n = n/2[2a + (n – 1)d]$. For 20 terms, $10(2a + 19d) = 1155$, so $2a + 19d = 115.5$.

The 5th term is $a + 4d$ and the 15th is $a + 14d$. Their sum is 111, so $2a + 18d = 111$.

Subtract the second equation from the first: $d = 115.5 – 111 = 4.5$.

Substitute back: $2a + 18 \times 4.5 = 111$. Thus $2a = 30$ and $a = 15$, as required.

(b) Set $S_n = 4110$: $N/2[30 + 4.5(N – 1)] = 4110$.

Multiply by 2 and simplify: $4.5N^2 + 25.5N – 8220 = 0$. Divide by 1.5: $3N^2 + 17N – 5480 = 0$.

Factorise: $(N – 40)(3N + 137) = 0$. The roots are $N = 40$ and $N = –137/3$.

N counts terms and must be a positive integer, so $N = 40$. Check: $40/2[30 + 39 \times 4.5] = 4110$.

Answer: (a) $a = 15$, $d = 4.5$; (b) $N = 40$.

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Question 24 · Transforming Function Graphs · 4 marks

The original turning point is (–2,5).

(a) In $y = -f(x + 3)$, $x + 3$ shifts the graph 3 units left: (–2,5) → (–5,5). The outside minus reflects in the x-axis: (–5,5) → (–5,–5).

The mapped turning-point coordinates are (–5,–5). Reflection in the x-axis changes the original maximum into a minimum.

(b) In $y = 3f(\frac{1}{2}x)$, the inside factor ½ stretches horizontal coordinates by factor 2: (–2,5) → (–4,5).

The outside factor 3 stretches vertical coordinates by factor 3: (–4,5) → (–4,15).

Answer: (a) (–5,–5); (b) (–4,15)

Question 25 · Storage Tank Optimisation · 7 marks

(a) The tank has one square base of area x^2 and four side walls of area xh each. It has no top: $x^2 + 4xh = 108$.

Rearrange: $4xh = 108 - x^2$, so $h = (108 - x^2)/(4x) = 27/x - x/4$.

Volume = base area × height: $V = x^2h = x^2(27/x - x/4) = 27x - \frac{1}{4}x^3$.

(b) Differentiate: $dV/dx = 27 - \frac{3}{4}x^2$.

At a stationary point, $27 - \frac{3}{4}x^2 = 0$, so $x^2 = 36$. Since x is a length, $x = 6$ m.

The second derivative is $d^2V/dx^2 = -\frac{3}{2}x$. At $x = 6$ it equals –9, which is negative, so the stationary point is a maximum.

Substitute $x = 6$: $V = 27 \times 6 - \frac{1}{4} \times 6^3 = 162 - 54 = 108$ m³. The height is $h = 27/6 - 6/4 = 3$ m.

Answer: Maximum volume 108 m³, when x = 6 m and h = 3 m.