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Boost Your Skills & Grades in Grade 9 Maths

1MA1 Nov 2026 Paper 2H Normal Higher · Worked Solutions

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This independent Best Guess practice resource prepares students for Pearson Edexcel GCSE Mathematics 1MA1 Higher Tier Paper 2 (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 21 questions, show your working, then use the matching mark scheme, worked solutions and linked worksheets and clips at www.mygrade9mathstutor.com.

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Video walkthrough



Calculator allowed · 21 questions · 80 marks · Suggested time: 1 hour 30 minutes.
Answer every question. Give appropriate units and show all stages of your working.

Question 1 · Arithmetic Sequences

(a) The sequence increases by 4 each time, so the formula starts with $4n$. The “zeroth” term before the 3 would be $3 - 4 = -1$. The n th term is $4n - 1$.

(b) Set the expression equal to 87 and solve:

$$4n - 1 = 87 \Rightarrow 4n = 88 \Rightarrow n = 22.$$

Because n resolves to a whole number, 87 is exactly the 22nd term in the sequence.

Answer: (a) $4n - 1$ (b) 87 is the 22nd term

Question 2 · Polygons and Isosceles Triangles

Step 1: Angles in quadrilateral PQRS add to 360° .

$$\angle PSR = 360^\circ - (65^\circ + 105^\circ + 75^\circ) = 115^\circ.$$

Step 2: T, S and R lie on a straight line, so the adjacent angles at S add to 180° .

$$\angle PST = 180^\circ - 115^\circ = 65^\circ.$$

Step 3: Triangle PST is isosceles because $PT = PS$. Its base angles at T and S are equal.

The marked angle x is at T, so $x = 65^\circ$.

Answer: $x = 65^\circ$

Question 3 · Inequalities

(a) Solve it exactly like a normal equation. Add 5 to both sides: $3x > 15$. Divide by 3: $x > 5$.

(b) Draw an open circle at 5 on the number line (to signify it does not equal 5), and draw a straight line/arrow pointing to the right.

Answer: (a) $x > 5$ (b) Open circle at 5; arrow to the right

Question 4 · Estimated Mean from Grouped Data

Step 1: Identify the midpoints for each class interval (x):

2.5, 7.5, 12.5, 17.5, 22.5.

Step 2: Multiply each midpoint by its frequency to create an fx column:

$$6 \times 2.5 = 15$$

$$14 \times 7.5 = 105$$

$$18 \times 12.5 = 225$$

$$8 \times 17.5 = 140$$

$$4 \times 22.5 = 90$$

Step 3: Sum the fx values: $15 + 105 + 225 + 140 + 90 = 575$.

Step 4: Divide by the total frequency (50): $575 \div 50 = 11.5$ kg.

Answer: Estimated mean = 11.5 kg

Question 5 · Algebra

(a) Apply the power of 5 to the coefficient ($2^5 = 32$) and multiply the indices ($(p^3)^5 = p^{15}$). Result: $32p^{15}$.

(b) Expand the brackets:

$$2p(4p - 3) = 8p^2 - 6p \text{ and } -p(p - 4) = -p^2 + 4p.$$

Collect the like terms:

$$8p^2 - p^2 - 6p + 4p = 7p^2 - 2p.$$

(c) Rearrange $t = 4c + d$. Subtract d from both sides: $t - d = 4c$. Divide by 4: $c = (t - d)/4$.

Answer: (a) $32p^{15}$ (b) $7p^2 - 2p$ (c) $c = (t - d)/4$

Question 6 · Forming Equations with Shapes

Step 1: Opposite sides of a rectangle are equal in length. Equate the two algebraic expressions: $5x - 1 = 3x + 5$.

Step 2: Solve for x . $2x = 6 \Rightarrow x = 3$.

Step 3: Find the vertical height by substituting x into an expression.

$$5(3) - 1 = 14 \text{ cm.}$$

Step 4: Calculate the area using base $\times$ height. $14 \times 24 = 336 \text{ cm}^2$.

Answer: Area = 336 cm^2

Question 7 · Fractions, Percentages & Ratio

Step 1: Find the value of one ratio part. Total parts = $7 + 3 + 2 = 12$.

$$720 \div 12 = 60.$$

Step 2: Find the total quantities of each bulb. Tulips = 420, Crocus = 180, Daffodils = 120.

Step 3: Calculate the yellow quantities for each type:

$$\text{Yellow Tulips: } 40\% \text{ of } 420 = 168.$$

$$\text{Yellow Crocus: } (2/3) \times 180 = 120.$$

$$\text{Yellow Daffodils: } (3/4) \times 120 = 90.$$

Step 4: Total the yellow bulbs: $168 + 120 + 90 = 378$.

Answer: 378 yellow bulbs

Question 8 · Reverse Percentages

After a 12% decrease, 88% remains; after a further 15% decrease, 85% of that amount remains.

The final value is therefore $0.88 \times 0.85 = 0.748$ of the original value.

$$\text{Original price} = 11220 \div 0.748 = 15000. \text{ Check: } 15000 \times 0.88 \times 0.85 = 11220.$$

Answer: £15000

Question 9 · Density of a Sphere

Step 1: Find the sphere's volume using $V = \frac{4}{3}\pi r^3$.

$$V = \frac{4}{3}\pi \times 2.4^3 = 57.905835... \text{ cm}^3.$$

Step 2: Density = mass $\div$ volume.

$$\text{Density} = 385 \div 57.905835... = 6.648725... \text{ g/cm}^3.$$

Step 3: Round to 3 significant figures. Keep the unrounded volume until the final calculation.

Answer: 6.65 g/cm³

Question 10 · Transformations

(a) A 90° anticlockwise rotation around (0, 0) maps (x, y) to (−y, x). The vertices (3, 1), (5, 1), (3, 2) move to (−1, 3), (−1, 5), (−2, 3). Connect these to draw Triangle C.

(b) To enlarge from centre (5, 1) with scale factor 3, multiply the vector distance from the centre to each point by 3.

The point at (5, 1) remains at (5, 1).

Point (3, 1) moves from 2 left to 6 left at (−1, 1).

Point (3, 2) moves from 2 left, 1 up to 6 left, 3 up at (−1, 4).

Connect these to draw Triangle B.

Answer: (a) C: (−1, 3), (−1, 5), (−2, 3)

(b) B: (−1, 1), (−1, 4), (5, 1)

Question 11 · Probability Trees

(a) The branches for the first event sum to 1:

Rain = 0.35, Does not rain = 0.65.

For the second event, the "Rains" branches are Cancelled = 0.8, Not Cancelled = 0.2.

The "Does not rain" branches are Cancelled = 0.1, Not Cancelled = 0.9.

(b) Calculate the probability of cancellation by multiplying along the two successful pathways and summing them:

$$(0.35 \times 0.8) + (0.65 \times 0.1) = 0.28 + 0.065 = 0.345.$$

Answer: (a) Complete the tree with the probabilities above

(b) P(cancelled) = 0.345

Question 12 · Straight Line Equations

Step 1: Find the gradient of line L_1 by rearranging its equation into the format $y = mx + c$.

$$3y - 2x = 12 \Rightarrow 3y = 2x + 12 \Rightarrow y = \frac{2}{3}x + 4.$$

The gradient m is $\frac{2}{3}$.

Step 2: Because L_2 is parallel, it has the exact same gradient: $m = \frac{2}{3}$.

Step 3: Because L_2 passes directly through the y -axis at coordinate (0, 5), its y -intercept $c = 5$.

Answer: $y = \frac{2}{3}x + 5$

Question 13 · The Quadratic Formula

Step 1: Compare $5x^2 - 6x - 3 = 0$ with $ax^2 + bx + c = 0$.

$a = 5$, $b = -6$, $c = -3$.

Step 2: Substitute into $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

$$x = \frac{6 \pm \sqrt{(-6)^2 - 4 \times 5 \times (-3)}}{10}$$
$$= \frac{6 \pm \sqrt{96}}{10}.$$

Step 3: Calculate both roots:

$$x = 1.579795... \text{ or } x = -0.379795...$$

Step 4: Round both values to 3 significant figures. The final zero in -0.380 is needed to show 3 significant figures.

Answer: $x = 1.58$ or $x = -0.380$

Question 14 · Quadratic Sequences

First differences are 5, 7, 9 and 11. Second differences are all 2, so the coefficient of n^2 is $2 \div 2 = 1$.

Subtract 1, 4, 9, 16 and 25 from the five terms. The remainder is 1, 3, 5, 7 and 9, whose n th term is $2n - 1$.

Add the two expressions: $n^2 + 2n - 1$. Check $n = 1$ gives 2 and $n = 5$ gives 34.

Answer: $n^2 + 2n - 1$

Question 14 video solution



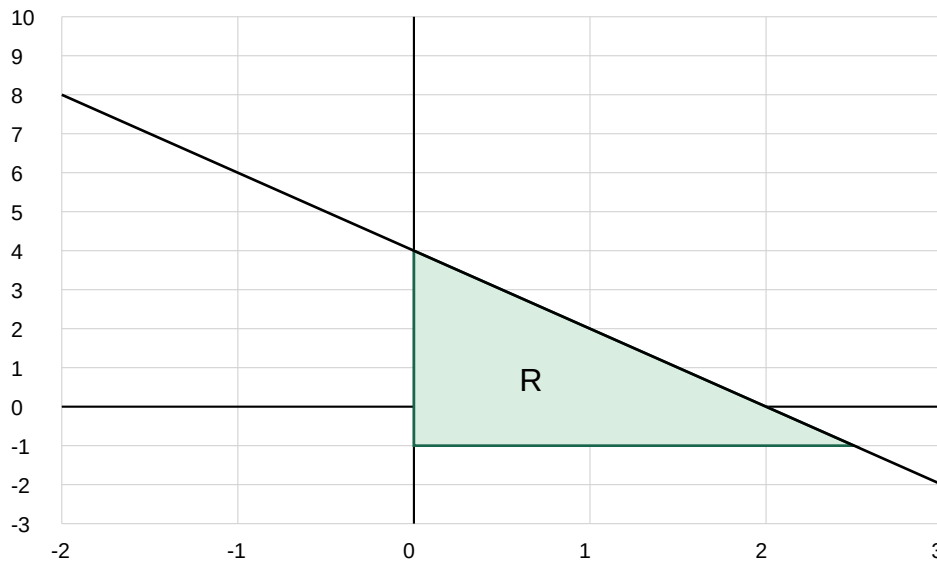
Question 15 · Graphical Inequalities

(a) Substitute $x = -2, 0, 2$ and 3 to get the points $(-2, 8)$, $(0, 4)$, $(2, 0)$ and $(3, -2)$. Join them with a straight line across the specified range.

(b) $x \geq 0$ means right of the y -axis; $y \geq -1$ means above the horizontal line $y = -1$; $y \leq -2x + 4$ means below the sloping line.

The common region is the triangle bounded by $(0, -1)$, $(0, 4)$ and $(2.5, -1)$. Include the boundaries because all inequalities allow equality. Shade it and label it R.

Answer: See the annotated graph



Question 16 · Inverse and Composite Functions

(a) Step 1: Write $y = (3x - 5)/2$ and make x the subject:

$$2y = 3x - 5 \Rightarrow 2y + 5 = 3x \Rightarrow x = (2y + 5)/3.$$

(a) Step 2: Express this rearrangement as the inverse function:

$$f^{-1}(x) = (2x + 5)/3.$$

(b) Step 1: In $gf(3)$, apply f first:

$$f(3) = (3 \times 3 - 5)/2 = 2.$$

(b) Step 2: Substitute 2 into g :

$$g(2) = 2 \times 2^2 + 1 = 9.$$

Answer: (a) $f^{-1}(x) = (2x + 5)/3$ (b) $gf(3) = 9$

Question 17 · Non-Right-Angled Trigonometry

(a) QR is opposite the included 52° angle. Use the cosine rule:

$$QR^2 = 18^2 + 24^2 - 2 \times 18 \times 24 \cos 52^\circ.$$

$QR = 19.185111\dots$ cm, so $QR = 19.2$ cm to three significant figures.

(b) Area = $\frac{1}{2}ab \sin C = \frac{1}{2} \times 18 \times 24 \times \sin 52^\circ = 170.210322\dots$ cm².

Answer: QR = 19.2 cm; area = 170 cm² (3 s.f.)

Question 18 · Distance from a Velocity-Time Graph

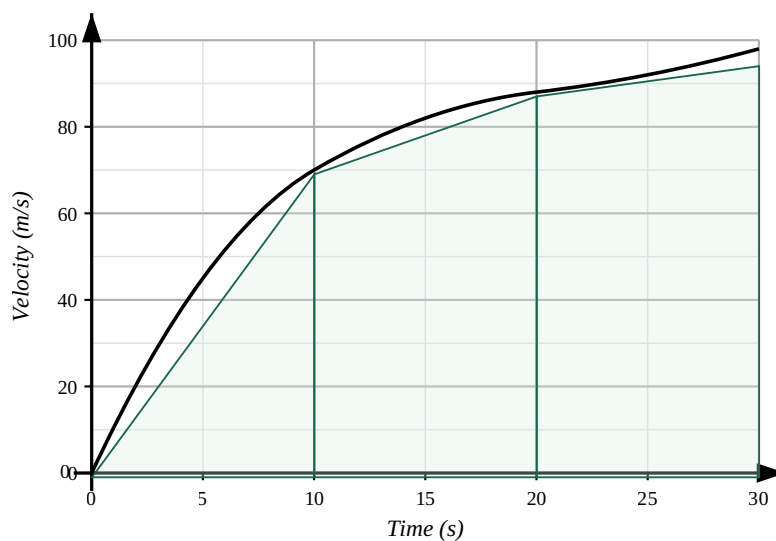
Distance travelled is the area under the velocity-time graph.

Three equal strips over 30 seconds have width 10 seconds. Example graph readings at $t = 0, 10, 20$ and 30 are approximately $0, 70, 88$ and 95 m/s.

Trapezium estimate = $10[\frac{1}{2}(0 + 95) + 70 + 88] = 10 \times 205.5 = 2055$ m.

Slightly different graph readings produce slightly different estimates; reasonable estimates supported by working are accepted.

Answer: Approximately 2055 m



Question 18 video solution



Question 19 · Circle-Theorem Reasoning

Opposite angles in cyclic quadrilateral ABCD sum to 180° , so $\angle ADC = 180^\circ - 108^\circ = 72^\circ$.

A, D and T lie on a straight line. Therefore $\angle TDC = 180^\circ - 72^\circ = 108^\circ$, using angles on a straight line.

In triangle TDC, $\angle DCT = 42^\circ$ is given. Angles in a triangle sum to 180° , so $\angle DTC = 180^\circ - 108^\circ - 42^\circ = 30^\circ$.

The rays TA and TD are the same ray, so $\angle ATC = \angle DTC = 30^\circ$.

Answer: 30°

Question 20 · Probability Without Replacement

(a) $P(\text{two red}) = (8/n)(7/(n-1))$. $P(\text{two blue}) = ((n-8)/n)((n-9)/(n-1))$. These disjoint events add.

$$[56 + (n-8)(n-9)]/[n(n-1)] = 7/15.$$

Expand the numerator: $n^2 - 17n + 128$. Multiply through:

$$15n^2 - 255n + 1920 = 7n^2 - 7n.$$

Rearrange and divide by 8: $n^2 - 31n + 240 = 0$.

(b) $(n-15)(n-16) = 0$, so $n = 15$ or $n = 16$. Both are valid because there are 8 red counters and a positive number of blue counters.

Check $n = 15$: $(56 + 7 \times 6)/(15 \times 14) = 7/15$.

Check $n = 16$: $(56 + 8 \times 7)/(16 \times 15) = 7/15$.

Answer: $n = 15$ or $n = 16$

Question 21 · Vector Geometry Proof

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

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

$OQ = OA + AQ = 2a + 6b$. Then $PQ = OQ - OP = 6b$.

(b) $OB = 9b$ and $PQ = 6b$, so $PQ = \frac{2}{3}OB$. One vector is a positive scalar multiple of the other; therefore the lines are parallel.

The length ratio is $|PQ|:|OB| = 6:9 = 2:3$.

Answer: $PQ = 6b$; PQ parallel to OB ; $PQ:OB = 2:3$