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1MA1 June 2027 Paper 2H Best Guess Paper

Higher · Standard · Mark Scheme

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This independently compiled practice paper is for students preparing for Pearson Edexcel GCSE Mathematics (1MA1), Higher Tier, Paper 2H. A calculator may be used.

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Revise the full specification. Attempt the matching question paper before using the mark scheme, model answers and practice resources at www.mygrade9mathstutor.com.

M: method; A: accuracy; B: independent. Accept equivalent valid methods. Accuracy marks require the related method; follow-through applies only where stated. Check the requested units and rounding. Proofs and questions that ask for reasons or algebra must be supported by working.

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Mark Scheme

M: method · A: accuracy · B: independent

Accept equivalent valid methods.

Give credit for the required working.

Calculator allowed · 21 questions · 80 marks · Suggested time: 1 hour 30 minutes.

Question 1 · Arithmetic sequences · 4 marks

Part (a)

M1 — The common difference is 4, so start with 4n.

A1 — At n = 1, 4n = 4; add 3 to obtain the first term 7. The nth term is 4n + 3.

Answer: 4n + 3

Part (b)

M1 — Solve 4n + 3 = 87: 4n = 84, so n = 21.

A1 — Since 21 is a positive integer, 87 is a term. Check: 4 × 21 + 3 = 87.

Answer: 87 is the 21st term.

Question 2 · Currency exchange · 4 marks

M1 — Bureau A gives 1200 × 0.92 = 1104 euros.

M1 — Bureau B deducts its fee first: 1200 − 20 = 1180 US dollars are converted.

M1 — Bureau B gives 1180 × 0.95 = 1121 euros.

A1 — 1121 − 1104 = 17 euros, so Bureau B gives 17 more euros.

Answer: Bureau B; 17 more euros.

Question 3 · Modal class and estimated mean · 4 marks

Part (a)

B1 — Highest frequency is 14.

Answer: $20 < h \leq 30$

Part (b)

M1 — Use class midpoints.

M1 — Sum of products = 1160.

A1 — 1160 ÷ 40 = 29.

Answer: 29 cm

Question 4 · Venn diagrams and probability · 4 marks

Part (a)

B1 — A = {2, 3, 5, 7, 11} and B = {3, 6, 9, 12}; put 3 in the intersection.

B1 — Put 2, 5, 7, 11 in A only and 6, 9, 12 in B only.

B1 — Put 1, 4, 8, 10 outside both circles, inside the universal set. All 12 numbers must appear exactly once.

Answer: A only: 2, 5, 7, 11; intersection: 3; B only: 6, 9, 12; outside: 1, 4, 8, 10.

Part (b)

B1 — Correct probability 2/3; accept an equivalent fraction such as 8/12.

Answer: $\frac{2}{3}$

Question 5 · Surface area of a cylinder · 3 marks

M1 — Total surface area includes two circular ends and the curved surface: $2\pi r^2 + 2\pi rh$.

M1 — Substitute r = 5.4 and h = 12: $2\pi(5.4)^2 + 2\pi(5.4)(12) = 187.92\pi$.

A1 — $187.92\pi = 590.36809\ldots$ cm^2, which is 590 cm^2 to 3 significant figures.

Answer: 590 cm^2 (3 significant figures)

Question 6 · Speed conversion · 2 marks

M1 — Convert 90 km to 90,000 m and one hour to 3600 seconds.

A1 — Speed = 90,000 ÷ 3600 = 25 m/s.

Answer: 25 m/s

Question 7 · Equation of a straight line · 3 marks

M1 — Gradient $m = (17 - 5) \div (6 - 2) = 12 \div 4 = 3$.

M1 — Substitute (2, 5) into $y = 3x + c$: $5 = 6 + c$, so $c = -1$.

A1 — The equation is $y = 3x - 1$; it also gives $y = 17$ when $x = 6$.

Answer: $y = 3x - 1$

Question 8 · Ratio and mass · 4 marks

M1 — There are $7 + 5 = 12$ parts, so one part represents $180 \div 12 = 15$ bags.

M1 — Small bags: $7 \times 15 = 105$. Large bags: $5 \times 15 = 75$.

M1 — Total mass $= 105 \times 65 + 75 \times 145 = 6825 + 10875 = 17700$ grams.

A1 — $17700 \div 1000 = 17.7$ kg. This is more than 17 kg, so Zoe is not correct.

Answer: No; 17.7 kg of beads are needed.

Question 9 · Reverse compound depreciation · 3 marks

M1 — The annual multiplier is $1 - 0.12 = 0.88$.

M1 — If the original value is V, then $V \times 0.88^3 = 15{,}400$, so $V = 15{,}400 \div 0.88^3$.

A1 — $V = 22{,}598.14049\ldots$; to the nearest pound the value was £22,598.

Answer: £22,598

Question 10 · Connected right-angled triangles · 4 marks

M1 — Correct cosine relationship for BD.

A1 — BD = 6.535668420… cm; accept 6.54 cm.

M1 — Pythagoras subtracting BD^2 from 10^2, with an unrounded intermediate value.

A1 — AB = 7.57 cm to 3 significant figures.

Answer: 7.57 cm (3 significant figures)

Question 11 · Graphical inequalities and integer points · 3 marks

Part (a) [2 marks]
Draw dashed lines $x = 1$, $y = 11$, $y = 2x - 5$ and $y = (15 - 3x)/2$.
B1 - At least three correct dashed boundary lines.
B1 - All four correct dashed boundaries and the common region shaded and labelled R.
Part (b) [1 mark]
B1 - n = 7.

Question 12 · Circle theorems · 4 marks

B1 — Both radii are perpendicular to their tangents.

M1 — Use the angle sum of quadrilateral OAPB, or the equivalent tangent-angle theorem.

A1 — Angle AOB = 124°, with correct reasoning.

B1 — Angle ACB = 62°, using the angle-at-the-centre theorem.

Answer: 62°

Question 13 · Cumulative frequency and interquartile range · 5 marks

Part (a)

B1 — Add successive frequencies: 14; 14 + 28 = 42; 42 + 22 = 64; 64 + 12 = 76; 76 + 4 = 80.

Answer: 14, 42, 64, 76, 80

Part (b)

M1 — At least four correctly plotted non-origin points against upper class boundaries.

A1 — All five upper-boundary points, with a reasonable increasing curve or straight segments starting at (0, 0).

Answer: Graph through (0, 0), (10, 14), (20, 42), (30, 64), (40, 76), (50, 80).

Part (c)

M1 — Read the 20th and 60th cumulative-frequency positions and subtract the lower quartile from the upper quartile.

A1 — Approximately 16 km; accept 15–17 km with quartile readings consistent with the student's graph.

Answer: Approximately 16 km

Question 14 · Direct proportion · 3 marks

M1 — Direct proportionality gives $y = kx^3$.

M1 — Use $x = 2$, $y = 40$: $40 = 8k$, so $k = 5$.

A1 — When $y = 1080$, $1080 = 5x^3$, giving $x^3 = 216$. Take the real cube root: $x = 6$.

Answer: $x = 6$

Question 15 · Rearranging a formula · 3 marks

M1 — Multiply by $x - 3$: $y(x - 3) = 2x + 5$, so $xy - 3y = 2x + 5$.

M1 — Collect and factor the x terms: $xy - 2x = 3y + 5$, so $x(y - 2) = 3y + 5$.

A1 — Divide by $y - 2$: $x = \frac{3y + 5}{y - 2}$. The restriction is not a separate marking point.

Answer: $x = \frac{3y + 5}{y - 2}$, $y \neq 2$.

Question 16 · Upper bound of speed · 4 marks

B1 — 230 km correct to the nearest 10 km gives an upper distance bound of 235 km.

B1 — 4.5 hours correct to 1 decimal place gives a lower time bound of 4.45 hours.

M1 — An upper speed bound uses the largest distance divided by the smallest time: $235 \div 4.45$.

A1 — The bound is 52.80898… km/h, or 52.8 km/h to 3 significant figures.

Answer: 52.8 km/h

Question 17 · Similar solids · 4 marks

M1 — Surface-area ratio $B : A = 90 : 40 = 9 : 4$.

M1 — The linear scale factor from A to B is $\sqrt{(9 \div 4)} = \frac{3}{2}$.

M1 — The volume scale factor is $\frac{27}{8}$.

A1 — Volume of $B = 120 \times \frac{27}{8} = 405$ cm^3.

Answer: 405 cm^3

Question 18 · Three-dimensional trigonometry · 4 marks

M1 — The projection of BH onto plane ABCD is BD. The required angle is HBD.

M1 — BD $= \sqrt{(10^2 + 6^2)} = \sqrt{136}$ cm.

M1 — In right triangle BDH, $\tan\theta = \frac{DH}{BD} = \frac{5}{\sqrt{136}}$.

A1 — $\theta = \tan^{-1}(5 \div \sqrt{136}) = 23.20706\ldots^\circ$, which rounds to 23.2°.

Answer: 23.2°

Question 19 · Non-linear simultaneous equations · 5 marks

M1 — Substitute correctly to eliminate y.

M1 — Correct quadratic, including equivalent multiples.

M1 — Apply a valid method to solve the quadratic.

A1 — Both exact x-values, allowing equivalent surd forms.

A1 — Both corresponding y-values, paired correctly with x; exact values required.

Answer: $x = 1 + \frac{3\sqrt{2}}{2}$, $y = -1 + 3\sqrt{2}$; or $x = 1 - \frac{3\sqrt{2}}{2}$, $y = -1 - 3\sqrt{2}$.

Question 20 · Algebraic probability · 5 marks

M1 — Let the total number of counters be N. Probability of two red counters is $\frac{5}{N} \times \frac{4}{N-1}$.

M1 — Set this equal to $\frac{5}{14} : \frac{20}{N(N-1)} = \frac{5}{14}$.

M1 — Cross-multiply and simplify: $N(N-1) = 56$, so $N^2 - N - 56 = 0$.

M1 — Factorise: $(N-8)(N+7) = 0$.

A1 — Reject $N = -7$ because a number of counters must be positive. $N = 8$ gives $\frac{5}{8} \times \frac{4}{7} = \frac{5}{14}$, as required.

Answer: 8 counters

Question 21 · Algebraic cosine rule · 5 marks

M1 — Cosine rule gives $7^2 = x^2 + (x + 2)^2 - 2x(x + 2)\cos 60^\circ$.

M1 — Use $\cos 60^\circ = \frac{1}{2}$ and expand: $49 = x^2 + 2x + 4$.

M1 — Rearrange to $x^2 + 2x - 45 = 0$, or $(x + 1)^2 = 46$.

M1 — Take square roots: $x = -1 \pm \sqrt{46}$.

A1 — Reject the negative value because x is a length. The exact answer is $x = \sqrt{46} - 1$.

Answer: $x = \sqrt{46} - 1$