FREE PRACTICE EXAM · MARK SCHEME

Edexcel IAL P1 Pure Mathematics 1 Practice Exam: Mark Scheme

Pearson Edexcel International A Level Mathematics · 22 questions · 60 marks

- M marks are for a correct method; A marks for an accurate answer that follows a correct method.
- Accept any correct method that reaches a correct answer, unless the question says which method to use.
- Practise these topics online with instant feedback: alevelmathrevision.com/alevel-frontend/alevel-unit.html?course=ial&unit=1

Question 1 — 2 marks

1. M1 for recognising the negative power creates a reciprocal, $\frac{1}{16^{1/4}}$.
2. A1 for $\frac{1}{2}$.

Question 2 — 2 marks

1. M1 for a correct attempt to factorise, e.g., $(3x+2)(x-4)=0$.
2. A1 for the correct solutions $x=-\frac{2}{3}$ and $x=4$.

Question 3 — 2 marks

1. M1 for setting the discriminant to zero: $k^2-4(1)(9)=0$.
2. A1 for solving $k^2=36$ to find $k=\pm 6$.

Question 4 — 2 marks

1. M1 for substituting x with $-x$ to reflect across the y-axis (or identifying the y-intercept stays the same and gradient sign flips).
2. A1 for the correct equation $y=-2x+3$.

Question 5 — 2 marks

1. M1 for rewriting as $y=4x^{\frac{1}{2}}$ and multiplying by the power.
2. A1 for $2x^{-\frac{1}{2}}$ (or $\frac{2}{\sqrt{x}}$).

Question 6 — 2 marks

1. M1 for calculating the y-coordinates $1^3=1$ and $1.1^3=1.331$ and substituting into the gradient formula $\frac{1.331-1}{1.1-1}$.
2. A1 for evaluating the gradient as exactly 3.31.

Question 7 — 2 marks

1. M1 for integrating the left side to give $\frac{k}{3}x^3-2x^2+c$ and comparing coefficients.
2. A1 for $\frac{k}{3}=\frac{5}{3} \implies k=5$.

Question 8 — 2 marks

1. M1 for using $\theta=\frac{l}{r}$ to write $\frac{8\pi}{20}$.
2. A1 for simplifying to $\frac{2\pi}{5}$ radians.

Question 9 — 2 marks

1. M1 for recognising that the maximum value occurs when $\cos x=-1$.
2. A1 for evaluating $8-3(-1)=11$.

Question 10 — 2 marks

1. M1 for applying the rearranged cosine rule: $\cos Q=\frac{5^2+5^2-6^2}{2(5)(5)}$.
2. A1 for evaluating to get $\cos Q=\frac{25+25-36}{50}=\frac{14}{50}=\frac{7}{25}$.

Question 11 — 3 marks

1. M1 for scaling an equation to eliminate or using substitution, e.g., $y=11-2x$.
2. M1 for substituting and solving for x: $4x-3(11-2x)=17 \implies 10x-33=17 \implies x=5$.
3. A1 for stating the final correct solution $x=5, y=1$.

Question 12 — 3 marks

1. M1 for calculating the gradient of the original line segment: $m=\frac{9-1}{5-1}=\frac{8}{4}$.
2. M1 for finding the original gradient is 2 and applying $m_1m_2=-1$.
3. A1 for stating the perpendicular gradient is -0.5 (or $-\frac{1}{2}$).

Question 13 — 3 marks

1. M1 for setting $y=0$ and factoring out x: $x(x^2-9)=0$.
2. M1 for fully factorising using the difference of two squares: $x(x-3)(x+3)=0$.
3. A1 for stating all three coordinates: $(0,0)$, $(3,0)$, and $(-3,0)$.

Question 14

3 marks

1. M1 for reciprocating the fraction to remove the negative index: $(\frac{9}{25})^{3/2}$.
2. M1 for taking the square root of both numerator and denominator: $(\frac{3}{5})^3$.
3. A1 for $\frac{27}{125}$.

Question 15

3 marks

1. M1 for writing the equation in factored form $y = k(x-1)(x-5)$.
2. M1 for substituting $(0,-5)$ to find k: $-5 = k(-1)(-5) \implies 5k = -5 \implies k = -1$.
3. A1 for expanding $y = -1(x^2 - 6x + 5) = -x^2 + 6x - 5$, giving $a = -1, b = 6, c = -5$.

Question 16

3 marks

1. M1 for setting up the gradient equation: $\frac{5-1}{2p-p} = 4$.
2. M1 for simplifying the algebraic expression: $\frac{4}{p} = 4$.
3. A1 for solving to get $p = 1$.

Question 17

3 marks

1. M1 for expanding the numerator to $x^2 + 2x - 8$.
2. M1 for dividing by x^2 to obtain the individual terms $1 + 2x^{-1} - 8x^{-2}$.
3. A1 for the correct derivative $-2x^{-2} + 16x^{-3}$.

Question 18

3 marks

1. M1 for recognising that the second curve is a translation of the first curve, $y = f(x+1)$.
2. M1 for determining this translates the graph 1 unit to the left.
3. A1 for subtracting 1 from the x-coordinate to give the new minimum at $(1, 3)$.

Question 19

3 marks

1. M1 for using the segment area formula: $A = \frac{1}{2}(9^2)(1.6 - \sin 1.6)$.
2. M1 for ensuring calculator is in radians and evaluating $1.6 - \sin 1.6 \approx 0.6004$.
3. A1 for the final area calculation yielding $24.3\ \text{cm}^2$.

Question 20

4 marks

1. M1 for stating that the tangent gradient must be -4.
2. M1 for finding $\frac{dy}{dx} = -x^{-2}$ and equating to -4: $-\frac{1}{x^2} = -4 \implies x^2 = \frac{1}{4}$.
3. M1 for solving to get $x = \frac{1}{2}$ or $x = -\frac{1}{2}$.
4. A1 for providing both full coordinate pairs: $(\frac{1}{2}, 2)$ and $(-\frac{1}{2}, -2)$.

Question 21

4 marks

1. M1 for rewriting the denominator as $x^{\frac{1}{2}}$.
2. M1 for dividing each term by $x^{\frac{1}{2}}$ to get $x^{\frac{3}{2}} + 4x^{-\frac{1}{2}}$.
3. M1 for integrating to get $\frac{x^{\frac{5}{2}}}{\frac{5}{2}} + \frac{4x^{\frac{1}{2}}}{\frac{1}{2}}$.
4. A1 for the fully simplified expression $\frac{2}{5}x^{\frac{5}{2}} + 8x^{\frac{1}{2}} + c$.

Question 22

5 marks

1. M1 for rearranging the linear equation to $x = 5 - 2y$.
2. M1 for substituting into the quadratic equation: $(5-2y)^2 + y^2 = 10$.
3. M1 for expanding and simplifying to a quadratic in y: $25 - 20y + 4y^2 + y^2 = 10 \implies 5y^2 - 20y + 15 = 0 \implies y^2 - 4y + 3 = 0$.
4. M1 for solving to get $y = 1$ and $y = 3$.
5. A1 for the correct solution pairs: $x = 3, y = 1$ and $x = -1, y = 3$.

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