1. Pure Mathematics 1

Starter Quiz · 课前小测

A-Level Mathematics Name: _____ Score: _____

1. For $x^2 + 4x + 1 = 0$, what is the discriminant $b^2 - 4ac$?

   _____

2. If $f(x) = x^2$ and $g(x) = x + 1$, what is $fg(2) = f(g(2))$?

   _____

3. What is the gradient of the line through (2, 3) and (6, 11)?

   _____

4. π radians equals how many degrees?

   _____

5. What is the exact value of $\sin 30°$?

   _____

6. The graph of $y = f^{-1}(x)$ is the reflection of $y = f(x)$ in the line:

   ☐ $y = x$

   ☐ the x-axis

   ☐ the y-axis

   ☐ $y = -x$

7. At a stationary point, if the second derivative $f''(x) > 0$, the point is a:

   ☐ minimum

   ☐ maximum

   ☐ point of inflection

   ☐ root

8. Why does an indefinite integral include "+ C"?

   ☐ many curves share the same derivative, differing by a constant

   ☐ C is always zero

   ☐ it marks the limits

   ☐ it is the area

9. If $b^2 - 4ac < 0$, the quadratic equation has:

   ☐ no real roots

☐ one repeated root

☐ two distinct roots

☐ three roots

10. Only a one-one function has an inverse function.

☐ True ☐ False

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Answers · 答案

A-Level Mathematics

1. **12**

   $b^2 - 4ac = 4^2 - 4(1)(1) = 16 - 4 = 12$ (> 0, so two distinct real roots).

2. **9**

   $g(2) = 3$, then $f(3) = 3^2 = 9$.

3. **2**

   $m = (11 - 3) / (6 - 2) = 8/4 = 2$.

4. **180**

   By definition, π radians = 180°.

5. **0.5**

   $\sin 30° = 1/2 = 0.5$.

6. **y = x**

   An inverse reflects the original graph in the line $y = x$; a point (a, b) becomes (b, a).

7. **minimum**

   $f'' > 0$ means the curve bends upward — a minimum; $f'' < 0$ gives a maximum.

8. **many curves share the same derivative, differing by a constant**

   Differentiating a constant gives 0, so the original could have had any constant — hence + C.

9. **no real roots**

   A negative discriminant means the parabola never crosses the x-axis — no real roots.

10. **True**

    If two inputs gave the same output, the reverse rule would be ambiguous — so only one-one functions are invertible.