

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 $\sin 30^\circ$?

6. A geometric series with a non-zero first term and $r=1.5$ has a finite sum to infinity.

☐ True ☐ False

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

☐ maximum

☐ minimum

☐ root

☐ point of inflection

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

☐ C is always zero

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

☐ it is the area

☐ it marks the limits

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

☐ two distinct roots

☐ no real roots

☐ three roots

☐ one repeated root

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

☐ $y = x$

☐ the y-axis

☐ the x-axis

☐ $y = -x$

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1. **12**

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

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**

$\sin 30^\circ = 1/2 = 0.5$.

6. **False**

The sum to infinity formula only applies when $|r| < 1$. With $r = 1.5$, the series diverges.

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. **$y = x$**

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