

A-Level Mathematics

Name: _____ Score: _____

1. Solve $|x - 2| < 3$. The solution is $-1 < x < ?$ What is the upper bound?

2. Evaluate $\log_2(8)$.

3. The secant function $\sec \theta$ is equal to:

☐ $1 / \sin \theta$

☐ $1 / \tan \theta$

☐ $1 / \cos \theta$

☐ $\cos \theta / \sin \theta$

4. The derivative of $\ln x$ is $1/x$. What is its value at $x = 4$?

5. What is $\int e^x dx$?

☐ $e^x + C$

☐ $e^{x+1} + C$

☐ $\ln x + C$

☐ $x e^x + C$

6. If $f(a)$ and $f(b)$ have opposite signs (and f is continuous between them), then between a and b there is:

☐ no root

☐ at least one root

☐ a maximum only

☐ always exactly two roots

7. By the remainder theorem, what is the remainder when $p(x) = x^2 + 3x + 2$ is divided by $(x - 1)$?

8. What is $\ln(e^5)$?

9. $\sec^2\theta \equiv 1 - \tan^2\theta$.

☐ True ☐ False

10. The product rule says $(uv)'$ equals:

☐ $uv' - u'v$

☐ $u'v - uv'$

☐ $u'v'$

☐ $u'v + uv'$

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1. **5**

$|x - 2| < 3$ means $2 - 3 < x < 2 + 3$, i.e. $-1 < x < 5$.

2. **3**

$2^3 = 8$, so $\log_2(8) = 3$.

3. **$1 / \cos \theta$**

$\sec \theta = 1/\cos \theta$; $\csc \theta = 1/\sin \theta$; $\cot \theta = 1/\tan \theta$.

4. **0.25**

$d/dx(\ln x) = 1/x = 1/4 = 0.25$.

5. **$e^x + C$**

e^x is its own integral (and derivative): $\int e^x dx = e^x + C$.

6. **at least one root**

A sign change of a continuous function guarantees a root between a and b.

7. **6**

Remainder = $p(1) = 1 + 3 + 2 = 6$.

8. **5**

$\ln$ and e are inverses, so $\ln(e^5) = 5$.

9. **False**

The correct identity is $\sec^2 \theta \equiv 1 + \tan^2 \theta$ (plus, not minus).

10. **$u'v + uv'$**

The product rule: $(uv)' = u'v + uv'$.