6. F · Exponentials and logarithms

Starter Quiz ·

AQA · A-Level · Mathematics

Name: _____ Score: _____

1. Solve 2^x=32.

   _____

2. Find $\log_2(1/8)$.

   _____

3. Solve 3^x=27.

   _____

4. Find the power exponent for the given power data.

   _____

5. Find Q at t=4 hours.

   _____

6. For positive x and y, ln(x+y)=ln x+ln y.

   ☐ True ☐ False

7. The constant exponential 1^x has a logarithmic inverse for all positive inputs.

   ☐ True ☐ False

8. Every polynomial root obtained after combining logarithms satisfies the original log equation.

   ☐ True ☐ False

9. Plotting ln y against x linearises every power model y=ax^p.

   ☐ True ☐ False

10. A constant exponential proportional rate means the same absolute amount is lost in each equal time interval.

    ☐ True ☐ False

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1. **5.0**

   $32=2^5$, so x=5.

2. **-3.0**

   2^(−3)=1/8, so the logarithm is −3.

3. **3.0**

   $27=3^3$, so x=3.

4. **2.0**

   The log-log gradient is ln16/ln4=2.

5. **40.0**

   80e^(−ln2)=40.

6. **False**

   A fitted exponential is a model, not a guarantee. Specify the time units and range of use. A negative k describes decay; a negative starting amount usually contradicts the context.

7. **False**

   Neither ln0 nor the logarithm of a negative real number exists in the real-number course. A negative logarithm output is allowed: ln(1/e)=−1. Base 1 is permitted for an exponential constant but not for a logarithm. For a base below 1 the exponential approaches zero as x tends to positive infinity, and the inverse has the opposite increasing/decreasing direction from the a>1 case.

8. **False**

   Combining or expanding logs does not erase their original domains. $\ln(u^2)=2\ln|u|$ for u≠0; writing 2lnu additionally needs u>0. Do not take a real logarithm of a zero or negative right-hand side in a^x=b. For base 1, 1^x=b has all real x when b=1 and no solutions otherwise; the log quotient is not available.

9. **False**

   For the power fit the gradient is the exponent, not its logarithm. For the exponential fit the gradient is the logarithm of the base, not the base itself. The power graph's intercept corresponds to x=1 because ln x=0 there; the exponential intercept corresponds to x=0. Nonpositive observations cannot be logged directly. An exponential log-y plot may include x=0 or negative x; the log-log power plot cannot.

10. **False**

    The exponent must be dimensionless: changing hours to minutes changes k by a factor 1/60. A half-life is not the time to reach zero; positive A times an exponential stays positive for finite time. Absolute losses vary with the amount although the proportional rate is fixed. A first whole-period threshold needs adjacent integer checks rather than only a continuous crossing time.