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# Practice quiz on Exponents and Logarithms

**NÚMERO TOTAL DE PONTOS 12**

1. Re write the number $784 = 2 \times 2 \times 2 \times 2 \times 7 \times 7$ using exponents. **1 / 1 ponto**

- $(2 \times 7)^6$
- $(2^6)(7^6)$
- $(2^4)(7^2)$
- $(16^4)(49^2)$

**Correto**
For this type of problem, count the number of times each relevant factor
appears in the product. That number is the exponent for that factor.

2. What is $(x^2 - 5)^0$? **1 / 1 ponto**

- $-4$
- $(x^2) - 5$
- $(x^2)$
- $1$

**Correto**
Any real number (except zero) raised to the"zeroith" power $= 1$.

3. Simplify $((x-5)^2)^{-3}$ **1 / 1 ponto**

- $(x-5)^{-1}$
- $(x-5)$
- $(x-5)^{-6}$
- $(x-5)^{-5}$

**Correto**

By Rule 2, "Power to a Power," multiply the exponents and get:

$$(x-5)^{(2\times -3)} = (x-5)^{-6}$$

By the definition of negative exponents, this is equal to $\frac{1}{(x-5)^6}$

4. Simplify $(\frac{8^2}{8^7})^2$ **1 / 1 ponto**

- $8^{-10}$
- $8^{-4}$
- $8^{-1}$
- $8^{-5}$

**Correto**

We can first simplify what is inside the parenthesis to $8^{-5}$ using the Division and Negative Powers Rule.

Then apply division and negative powers-- the result is the same.

$$\frac{8^4}{8^{14}} = 8^{-10}$$

5. $\log 35 = \log 7 + \log x$ **1 / 1 ponto**

Solve for $x$

- (●) 5
- ( ) 4
- ( ) 7
- ( ) 28

✓ **Correto**

$\log(x) = \log 35 - \log 7$

$$\log(x) = \log\left(\frac{35}{7}\right)$$

By the Quotient Rule $\log x = \log 5$

6. $\log_2(x^2 + 5x + 7) = 0$ **1 / 1 ponto**

Solve for $x$

- ( ) $x = 3$
- (●) $x = -2$ or $x = -3$
- ( ) $x = 2$ or $x = 3$
- ( ) $x = 2$

✓ **Correto**

We use the property that $b^{\log_b a} = a$

Use both sides as exponent for 2.

$$2^{\log_2 x^2+5x+7} = 2^0$$

$$x^2 + 5x + 7 = 1$$

$$x^2 + 5x + 6 = 0$$

$$(x + 3)(x + 2) = 0$$

$x = -3$ OR

$x = -2$

7. Simplify $\log_2 72 - \log_2 9$ **1 / 1 ponto**

- $\log_2 63$
- 4
- 3
- $\log_2 4$

✓ **Correto**

By the quotient rule, this is $\log_2 \frac{72}{9} = \log_2 2^3 = 3$

8. Simplify $\log_3 9 - \log_3 3 + \log_3 5$ **1 / 1 ponto**

- $\log_3 15$

- $\log_3 8$
- $8$
- $15$

**Correto**

By the Quotient and Product Rules, this is $\log_3 \frac{9 \times 5}{3} = \log_3 15$

9. Simplify $\log_2(3^8 \times 5^7)$ **1 / 1 ponto**

- $(5 \times \log_2 3) + (8 \times \log_2 5)$
- $(8 \times \log_2 3) + (7 \times \log_2 5)$
- $15 \times \log_2 56$
- $56 \times \log_2 15$

**Correto**

We first apply the Product Rule to convert to the sum: $\log_2(3^8) + \log_2(5^7)$. Then apply the power and root rule.

10. If $\log_{10} y = 100$, what is $\log_2 y = ?$ **1 / 1 ponto**

- 332.19
- 500
- 20
- 301.03

**Correto**

Use the change of base formula, $\log_a b = \dfrac{\log_x b}{\log_x a}$

Where the "old" base is $x$ and the "new" base is $a$.

So $\dfrac{100}{\log_{10}(2)} = \dfrac{100}{0.30103} = 332.19$

11. A tree is growing taller at a continuous rate. In the past 12 years it has grown from 3 meters to 15 meters. What is its rate of growth per year? **1 / 1 ponto**

- 11.41%
- 13.41%
- 12.41%
- 10.41%

**Correto**

$$\frac{\ln \frac{15}{3}}{12} = 0.1341$$

12. Bacteria can reproduce exponentially if not constrained. Assume a colony grows at a continually compounded rate of $400\%$ per day. How many days before a colony with initial mass of $6.25 \text{ X } 10^{-10}$ grams weights $1000$ Kilograms? **1 / 1 ponto**

- 0.875 days
- 875 days
- 8.75 days
- 87.5 days

**Correto**

**Correto**

$$6.25 \times 10^{-10} \times e^{4t} = 10^6$$

$$4t = \ln\ \left(\frac{10^6}{(6.25 \times 10^{-10})}\right) = 35.00878$$

$$t = \ln\ \frac{10^6}{6.25 \times 10^{-10}} = 8.752195$$