



✓ **Congratulations! You passed!**

TO PASS 75% or higher

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100%

## Practice quiz on Exponents and Logarithms

TOTAL POINTS 12

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

1 / 1 point

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

✓ **Correct**

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 point

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

✓ **Correct**

Any real number (except zero) raised to the "zeroth" power = 1.

3. Simplify  $((x - 5)^2)^{-3}$

1 / 1 point

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

✓ **Correct**

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  $\left(\frac{8^2}{8^7}\right)^2$

1 / 1 point

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

✓ **Correct**

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 point

Solve for  $x$

- ☐ 28
- ☐ 7
- ☐ 4
- ☒ 5

✓ Correct

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

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

$$\text{By the Quotient Rule } \log x = \log 5$$

6.  $\log_2(x^2 + 5x + 7) = 0$

1 / 1 point

Solve for  $x$

- ☐  $x = 3$
- ☐  $x = 2$  or  $x = 3$
- ☐  $x = 2$
- ☒  $x = -2$  or  $x = -3$

✓ Correct

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

Use both sides as exponent for 2.

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

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

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

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

$$x = -3 \quad \text{OR}$$

$$x = -2$$

7. Simplify  $\log_2 72 - \log_2 9$

1 / 1 point

- ☐  $\log_2 4$
- ☐ 4
- ☐  $\log_2 63$
- ☒ 3

✓ Correct

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

8. Simplify  $\log_3 9 - \log_3 3 + \log_3 5$

1 / 1 point

- ☒  $\log_3 15$
- ☐  $\log_3 8$
- ☐ 8
- ☐ 15

✓ Correct

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

9. Simplify  $\log_2(3^8 \times 5^7)$

1 / 1 point

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

☐  $(5 \times \log_2 3) + (8 \times \log_2 5)$

☐  $56 \times \log_2 15$

☐  $15 \times \log_2 56$

✓ **Correct**

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 point

☐ 301.03

☐ 500

☒ 332.19

☐ 20

✓ **Correct**

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

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

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

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 point

☐ 10.41%

☒ 13.41%

☐ 12.41%

☐ 11.41%

✓ **Correct**

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

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  $6.25 \times 10^{-10}$  grams weights 1000 Kilograms?

1 / 1 point

☐ 875 days

☐ 0.875 days

☒ 8.75 days

☐ 87.5 days

✓ **Correct**

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

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

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