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GRADE

92.30%

## Graded quiz on Tangent Lines to Functions, Exponents and Logarithms

LATEST SUBMISSION GRADE

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1. Convert  $\frac{1}{49}$  to exponential form, using 7 as the factor.

0 / 1 point

☐  $(7^2)$

☐  $7^{-2}$

☒  $\frac{7}{7^3}$

☐  $49^{-1}$

✗ **Incorrect**

This equals  $\frac{1}{49}$ , but it is not in simplified form. The rule for a factor to a Negative exponent is to divide by the same factor to a positive exponent with the same absolute value.

2. A light-year (the distance light travels in a vacuum in one year) is 9,460 trillion meters. Express in scientific notation.

1 / 1 point

☒  $9.46 \times 10^{15}$  meters.

☐  $9.46 \times 10^{15}$  kilometers

☐  $9460 \times 10^{12}$  meters

☐  $0.946 \times 10^{16}$

✓ **Correct**

9,460 is  $(9.4 \times 10^3)$  meters and one trillion meters is  $10^{12}$  meters.  $(9.4 \times 10^3)(10^{12}) = 9.4 \times 10^{15}$ . A kilometer is 1000 meters.

3. Simplify  $(x^8)(y^3)(x^{-10})(y^{-2})$

1 / 1 point

☐  $(x)(y^{-2})$

☐  $(x^{-80})(y^{-6})$

☐  $(x^2)(y)$

☒  $(x^{-2})(y)$

✓ **Correct**

By the Division and Negative Powers Rule, this is  $(x^{(8-10)})(y^{(3-2)})$

4. Simplify  $[(x^4)(y^{-6})]^{-1}$

1 / 1 point

☐  $\frac{(x^4)}{(y^{-6})}$

☒  $(x^{-4})(y^6)$

- ☐  $\frac{(x^{-4})}{(y^6)}$
- ☐  $(x^3)(y^{-7})$

✓ **Correct**

By the Power to a Power Rule, each of the exponents is multiplied by  $(-1)$

5. Solve for  $x$ :

1 / 1 point

$$\log_2(39x) - \log_2(x - 5) = 4$$

- ☐  $\frac{23}{80}$
- ☒  $\frac{-80}{23}$
- ☐  $\frac{39}{23}$
- ☐  $\frac{80}{38}$

✓ **Correct**

$$\log_2 \frac{39x}{(x-5)} = 4 \text{ by the Quotient Rule.}$$

Since both sides are equal, we can use them as exponents in an equation.

$$2^{\log_2 \frac{39x}{(x-5)}} = 2^4$$

$$\frac{39x}{(x-5)} = 16$$

$$39x = 16 \times (x - 5)$$

$$39x = 16x - 80$$

$$23x = -80$$

$$x = \frac{-80}{23}$$

6. Simplify this expression:

1 / 1 point

- $\left(x^{\frac{1}{2}}\right)^{\frac{-3}{2}}$
- ☐  $x^{\frac{1}{3}}$
- ☐  $x^{\frac{4}{3}}$
- ☐  $x^{-1}$
- ☒  $x^{\frac{-3}{4}}$

✓ **Correct**

We use the Power to a Power Rule -- multiply exponents:

$$x^{\frac{1}{2} \times \frac{-3}{2}} = x^{\frac{-3}{4}}$$

7. Simplify  $\log_2 8 - \log_2 4 - (\log_3 4.5 + \log_3 2)$

1 / 1 point

- ☒ -1
- ☐ 1
- ☐ 0
- ☐ 2

✓ Correct

This is equivalent to:

$$\log_2\left(\frac{8}{4}\right) - \log_3(4.5 \times 2) = 1 - 2 = -1$$

8. If  $\log_3 19 = 2.680$ , what is  $\log_9 19$ ?

1 / 1 point

- ☒ 1.304
- ☐ 5.216
- ☐ 0.4347
- ☐ 0.8934

✓ Correct

To convert from  $\log_3$  to  $\log_9$ , divide by  $\log_3 9$ . Which is equal to 2, so the answer is 1.34

9. If  $\log_{10} b = 1.8$  and  $\log_a b = 2.5752$ , what is  $a$ ?

1 / 1 point

- ☐ 3
- ☒ 5
- ☐ 6
- ☐ 4

✓ Correct

To solve for  $a$  in the formula;

$$\log_a b = \frac{\log_x b}{\log_x a}$$

$$\log_a b = 2.5752 \text{ and } \log_{10} b = 1.8$$

$$\text{Therefore, } \log_{10} a \text{ must equal to } \frac{1.8}{2.5752} = 0.69897$$

Treating both sides of equation  $\log_{10} a = 0.69897$  as exponents of 10 gives  $a = 10^{0.69897} = 5$

10. An investment of 1,600 is worth 7,400 after 8.5 years. What is the continuously compounded rate of return of this investment?

1 / 1 point

- ☐ 20.01
- ☐ 19.01%

- ☐ 17.01%
- ☒ 18.02%

✓ Correct

$$\frac{\ln \frac{7400}{1600}}{8.5} = 0.18017$$

11. A pearl grows in an oyster at a continuously compounded rate of .24 per year. If a 25-year old pearl weighs 1 gram, what did it weigh when it began to form?

1 / 1 point

- ☐ 0.2478
- ☐ 0.02478
- ☐ 0.0002478
- ☒ 0.002478

✓ Correct

$$e^{(0.24 \times 25)} = \frac{1}{x}$$

$$x = \frac{1}{(e^{0.24 \times 25})}$$

$$x = \frac{1}{403.4288}$$

$$x = 0.002478$$

12.  $\log_2 z = 6.754$ . What is  $\log_{10}(z)$ ?

1 / 1 point

- ☐ 1.3508
- ☐ 0.82956
- ☒ 2.03316
- ☐ 0.49185

✓ Correct

$$\frac{\log_2 z}{\log_2 10} =$$

$$(\log_{10} z) \times (\log_2 10) = 3.321928$$

$$\text{Therefore, } \log_{10} z = \frac{6.754}{3.321928} = 2.03316$$

13. Suppose that  $g : \mathbb{R} \rightarrow \mathbb{R}$  is a function, and that  $g(1) = 10$ . Suppose that  $g'(a)$  is negative for every single value of  $a$ . Which of the following could possibly be  $g(1.5)$ ?

1 / 1 point

- ☐  $g(1.5) = 10.1$
- ☒  $g(1.5) = 9.7$

- ☐  $g(1.5) = 11$
- ☐  $g(1.5) = 103.4$

✓ **Correct**

Since the slope of the tangent line to the graph of  $g$  is negative everywhere on the graph, we know that  $g$  is *decreasing* function! And therefore we must have  $g(1.5) < g(1)$ . That is the case here, so this value is at least possible.