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Graded quiz on Tangent Lines to Functions, Exponents and Logarithms

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

- (●) 7^{-2}
- ( ) $\frac{7}{7^3}$
- ( ) 49^{-1}
- ( ) (7^2)

✓ **Correct**
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. **0 / 1 point**

- (●) 9460×10^{12} meters
- ( ) 0.946×10^{16}
- ( ) 9.46×10^{15} meters.
- ( ) 9.46×10^{15} kilometers

! **Incorrect**
$9,460$ is (9.4×10^3) 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**

- ( ) $(x^{-80})(y^{-6})$
- (●) $(x^{-2})(y)$
- ( ) $(x)(y^{-2})$
- ( ) $(x^2)(y)$

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

4. Simplify $[(x^4)(y^{-6})]^{-1}$ **0 / 1 point**

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

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

5. Solve for x: **0 / 1 point**

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

- ○ $\frac{80}{38}$
- ○ $\frac{39}{23}$
- ◉ $\frac{23}{80}$
- ○ $\frac{-80}{23}$

Incorrect

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

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

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

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

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

$39x = 16x - 80$

$23x = 80$

$x =$

Give it another try! Review your math and work through the problem again.

6. Simplify this expression: 1 / 1 point

$(x^{\frac{1}{2}})^{\frac{-3}{2}}$

- ○ $x^{\frac{4}{3}}$
- ◉ $x^{\frac{-3}{4}}$
- ○ $x^{\frac{1}{3}}$
- ○ x^{-1}

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 $\log_{10} 1000 + \log_{10} \frac{1}{10000}$ 1 / 1 point

- ◉ -1
- ○ $\frac{1}{10}$
- ○ 1
- ○ $\log_{10} -10$

Correct

By the Product Rule, this is:

$\log_{10}(\frac{1000}{10000}) = \log_{10}(\frac{1}{10}) = -1$

8. If $\log_3 19 = 2.680$, what is $\log_9 19$? 1 / 1 point

- ○ 0.8934
- ○ 0.4347
- ◉ 1.304
- ○ 5.216

✓ 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
- ○ 6
- ○ 4
- ◉ 5

✓ Correct

To solve for a in the formula;

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

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

Therefore, $\log_{10} a$ 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

- ○ 19.01%
- ◉ 18.02%
- ○ 17.01%
- ○ 20.01

✓ 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

- ◉ 0.002478
- ○ 0.2478
- ○ 0.0002478
- ○ 0.02478

✓ 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

- 0.82956
- 0.49185
- 1.3508
- ◉ 2.03316

✓ Correct

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

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

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

13. Suppose that $g : \mathbb{R} \to \mathbb{R}$ 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

- $g(1.5) = 10.1$
- $g(1.5) = 103.4$
- $g(1.5) = 11$
- ◉ $g(1.5) = 9.7$

✓ 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.