NAME:

# Unit 5 Test (Lessons 37–44)

**Answer all parts of the open response problem.**

**1)** Complete the problems about exponents and logarithms.

**A)** Determine the exponential function that contains the points shown in the table.

| $x$ | $y$ |
|---|---|
| $-1$ | $36$ |
| $0$ | $12$ |
| $1$ | $4$ |
| $2$ | $\frac{4}{3}$ |
| $3$ | $\frac{4}{9}$ |

**B)** Using your function from part A, describe what would happen to the function if $h = -2$ and $k = 1$. Then write the new function, $g(x)$.

**C)** Rewrite the equation $\ln 8 + 2\ln x = 3\ln 5$ using the properties of logarithms.

**D)** If $\log 5 = P$ and $\log 2 = Q$, what is the expression for $\log 800$? Show your work.

**Multiple Choice**

**____ 2)** What is the inverse of the equation $y = \ln(x - 8) + 17$?

**A)** $y = e^x + 9$

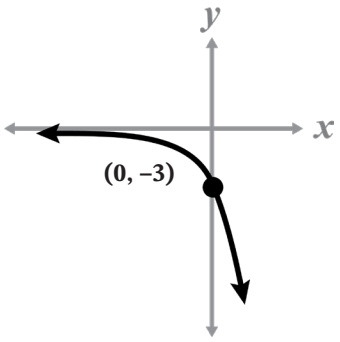
**B)** $y = 8 + e^{x+17}$

**C)** $y = 8 + e^{x-17}$

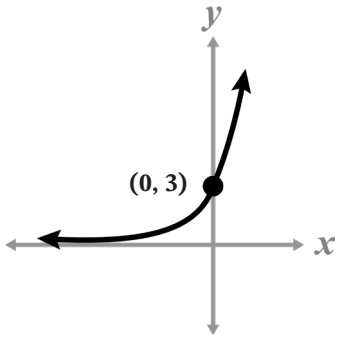
**D)** $y = -8 + e^{x-17}$

**____ 3)** Graph: $y = -3(2)^x$

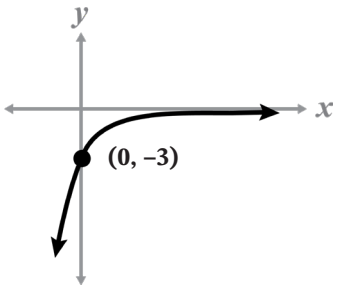
**A)**




**B)**




**C)**

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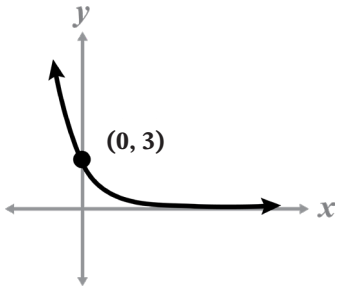



**____ 4)** Using common logarithms, determine the approximate value for: $7^{0.3x} = 52$

**A)** 0.6091 **B)** 1.6416 **C)** 2.0305 **D)** 6.7685

**____ 5)** If $V = \dfrac{4\pi r^3}{3}$, then $\ln V$ is equivalent to:

**A)** $\ln 4 + \ln \pi + 3 \ln r - \ln 3$

**B)** $\ln 4 + \ln \pi + \ln r$

**C)** $\ln \pi + \dfrac{4}{3} \ln r - \ln 3$

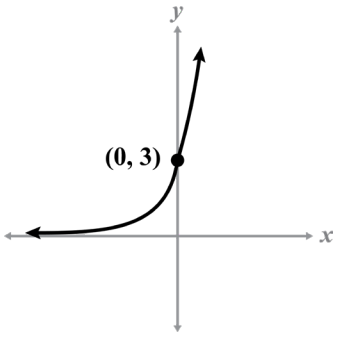
**D)** $\ln \pi + 3 \ln r - \ln \dfrac{4}{3}$

**____ 6)** Determine the domain for the equation: $y = \log_4(x - 1)$

**A)** $(-\infty, +\infty)$ **B)** $[1, +\infty)$ **C)** $(1, +\infty)$ **D)** $(-\infty, 1)$

**____ 7)** Which graph transforms $y = 3^{x+1}$ down two units and right one unit?

**A)**

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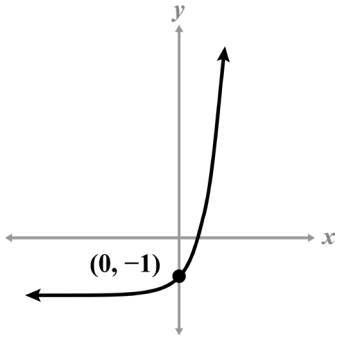
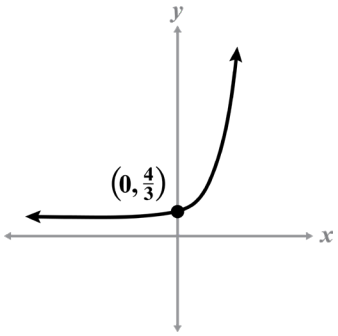
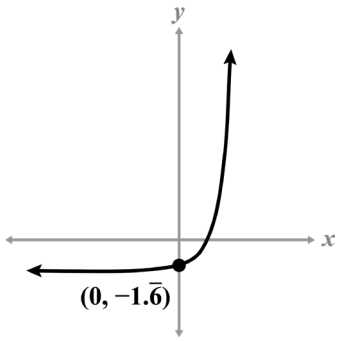



**C)**




**D)**




**____ 8)** To determine how quickly algae grows in a pond, scientists approximate the square footage covered with algae. On day zero, algae covers $0.25$ square feet of the pond. By the third day, $31.25$ square feet of the pond is covered in algae. Write an exponential equation that models the spread of algae.

**A)** $y = 10.\overline{3}x + 0.25$

**B)** $y = 0.25(5)^x$

**C)** $y = 0.22(11.18)^x$

**D)** $y = 5(0.25)^x$

**____ 9)** Solve: $\ln(2x+3) + \ln(x+5) = 2\ln(x+3)$

**A)** $x = -1$ **B)** $x = -1, -6$ **C)** $x = 1$ **D)** $x = 1, 6$

**____ 10)** Solve: $32^{2x-3} = 8^{2x+5}$

**A)** $0$ **B)** $2$ **C)** $7.5$ **D)** no solution

**____ 11)** If $\log 2 \approx 0.301$ and $\log 3 \approx 0.477$, approximate the value of $\log 48$.

**A)** $0.3528$ **B)** $0.4852$ **C)** $1.681$ **D)** $2.209$

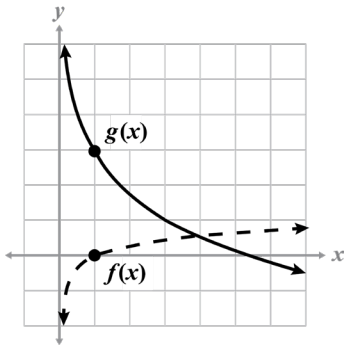
____ **12)** Which pair of functions matches the transformation from $f(x)$ to $g(x)$ on the coordinate plane?

**A)** $f(x) = 3 - 4\log_a x$
$g(x) = \log_a x$

**B)** $f(x) = \log_a x$
$g(x) = 3 - \frac{1}{4}\log_a x$

**C)** $f(x) = \log_a x$
$g(x) = 3 + 4\log_a x$

**D)** $f(x) = \log_a x$
$g(x) = 3 - 4\log_a x$




____ **13)** A family invested \$4500 in a high yield savings account at a rate of 4.45% compounded quarterly. If the money will be used to help pay for college in fifteen years, how much money will be in the account? Round to the nearest whole dollar.

**A)** \$2282 **B)** \$8709 **C)** \$8772 **D)** \$8737

____ **14)** Write the expression as a single logarithm.

$\log_n 3 + \log_n x + \frac{1}{2}\log_n z - 3\log_n y$

**A)** $\log_n\left(\frac{xz}{2y}\right)$

**B)** $\log_n\left(\frac{3xz}{2y^3}\right)$

**C)** $\log_n\left(\frac{3x\sqrt{z}}{y^3}\right)$

**D)** $\log_n\left(\frac{3x\sqrt{z}}{y^{31}}\right)$

____ **15)** A new car depreciates at a rate of 12% per year. If you purchased your car for \$15,000, when will it be worth approximately \$5000?

**A)** less than one year

**B)** about 3 years

**C)** about 8.5 years

**D)** about 9.5 years

____ **16)** Solve $-4 \cdot \log_2(7x + 1) = -12$ for the value of $x$.

**A)** $\frac{5}{7}$ **B)** 1 **C)** $\frac{9}{7}$ **D)** no solution

**____ 17)** Describe the transformation from $f(x)$ to $g(x)$.

$f(x) = 10^x \qquad g(x) = 1 + 3(10)^{8-x}$

**A)** From $f(x)$, $g(x)$ is stretched, then translated left three units, and up one unit.

**B)** From $f(x)$, $g(x)$ is stretched, then translated right three units, and up one unit.

**C)** From $f(x)$, $g(x)$ shifts from growth to decay, is stretched, then translated left eight units, and up one unit.

**D)** From $f(x)$, $g(x)$ shifts from growth to decay, is stretched, then translated right eight units, and up one unit.

**____ 18)** Evaluate: $\log_9 27$

**A)** $x = \frac{1}{3}$ **B)** $x = \frac{2}{3}$ **C)** $x = \frac{3}{2}$ **D)** $x = 3$

**____ 19)** Solve: $36^{3x-4} > 216^{x-4}$

**A)**


**B)**


**C)**


**D)**


**____ 20)** Rewrite $4^3 = 64$ as a logarithmic equation.

**A)** $\log_4 3 = 64$ **B)** $\log_3 4 = 64$

**C)** $\log_{64} 3 = 4$ **D)** $\log_4 64 = 3$

**____ 21)** Compare $y = \log x$ and $y = \ln x$. Select the true statement.

**A)** The graphs cannot be compared because they do not have the same base.

**B)** The natural log and the common log are the same graph.

**C)** The common log is steeper than the natural log and both have an intercept at the point $(1, 0)$.

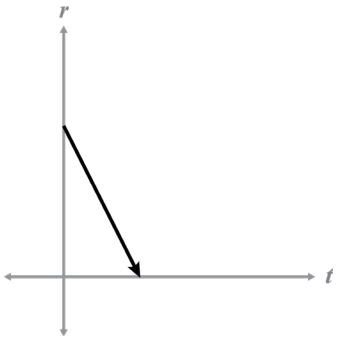
**D)** The natural log is steeper than the common log and both have an intercept at the point $(1, 0)$.

____ **22)** If $\log_2 x = 5$, $x$ is equal to:

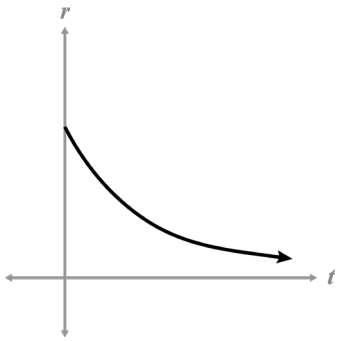
**A)** 2.5 **B)** 10 **C)** 25 **D)** 32

____ **23)** Select the graph that best represents radioactive decay of an element, *r*, over time, *t*.

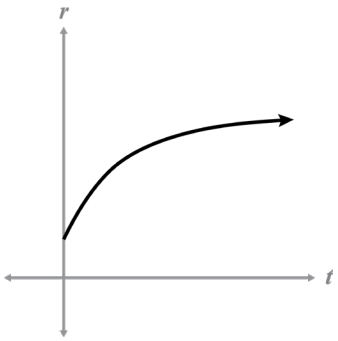
**A)**



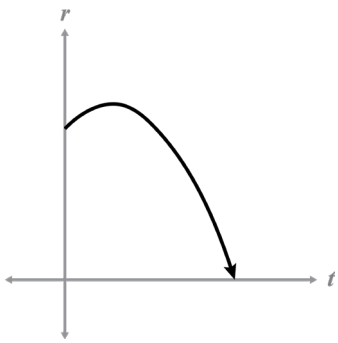

**B)**




**C)**




**D)**




____ **24)** If $\log_b a = 2$, which of the following is true?

**A)** $a = b^2$ **B)** $b = a^2$ **C)** $a = 2b$ **D)** $b = 2a$

____ **25)** Name the end behavior of the logarithmic function that has an intercept of $(1, 0)$.

**A)** As $x \to +\infty, f(x) \to -\infty$, and as $x \to 1, f(x) \to 0$

**B)** As $x \to -\infty, f(x) \to +\infty$, and as $x \to +\infty, f(x) \to 0$

**C)** As $x \to -\infty, f(x) \to +\infty$, and as $x \to 0, f(x) \to +\infty$

**D)** As $x \to +\infty, f(x) \to -\infty$, and as $x \to 0, f(x) \to +\infty$