Pre-Calculus   Name_____

Chapter 4 Take home Test   Period____

Evaluate each expression.

1) $\log_6 -36$

2) $\log_{216} 6$

Condense each expression to a single logarithm.

3) $2\log_3 11 + \log_3 5 + \dfrac{\log_3 6}{3}$

4) $\dfrac{3\log_2 5}{2} + \dfrac{\log_2 6}{2} + \dfrac{\log_2 11}{2}$

Expand each logarithm.

5) $\log_8 \left(ab^3 \cdot c^5\right)$

6) $\log_7 \left(w\sqrt[3]{x} \cdot y \cdot z\right)$

Identify the domain and range of each.

7) $f(x) = \log_5 (2x - 3) - 4$

8) $f(x) = \log_3 (3x - 1) - 1$

Solve each equation, exact values only. NO DECIMALS.

9) $\log_9 \left(n^2 + 19\right) = \log_9 \left(-12n - 1\right)$

10) $\log_{19} \left(4m^2 - 6m\right) = \log_{19} \left(-9 + 3m^2\right)$

11) $\log_2 9 + \log_2 x^2 = 4$

12) $\log_4 x - \log_4 (x - 4) = \log_4 53$

Rewrite each equation in logarithmic form.

13) $p^{-6} = 127$

14) $20^m = n$

Rewrite each equation in exponential form.

15) $\log_x \dfrac{33}{20} = y$

16) $\log_{15} \dfrac{1}{15} = -1$

Use the properties of logarithms and the logarithms provided to rewrite each logarithm in terms of the variables given.

17) $\log_8 5 = U$
    $\log_8 12 = V$
    $\log_8 9 = W$
    Find $\log_8 \dfrac{125}{9}$

18) $\log_7 12 = X$
    $\log_7 8 = Y$
    $\log_7 5 = Z$
    Find $\log_7 1225$

Solve each equation, exact values only. NO DECIMALS.

19) $243^{-2n} = 81^{-3n + 1}$

20) $625^{3m} \cdot \left(\dfrac{1}{5}\right)^{3m} = 5^4$

21) $7^{-4r} + 9 = -78$

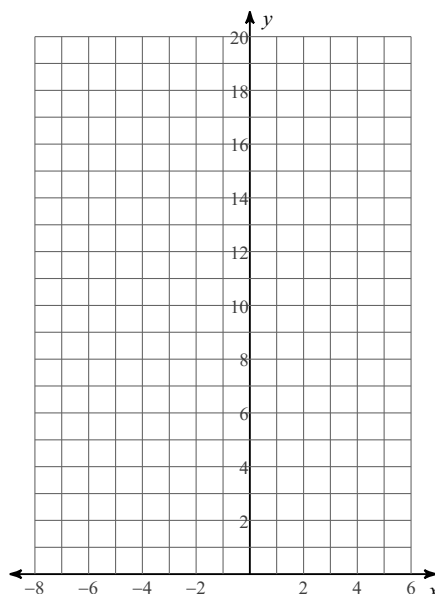22) $5 \cdot 20^{10a} = 18$

Solve the exponential model.

23) A car engine runs at a temperature of 190°F. When the engine is turned off, it cools according to Newton's Law of Cooling with constant K = 0.0341, where the time is measured in minutes. Find the time needed for the engine to cool to 90°F if the surrounding temperature is 60°F.

Sketch the graph of each function.

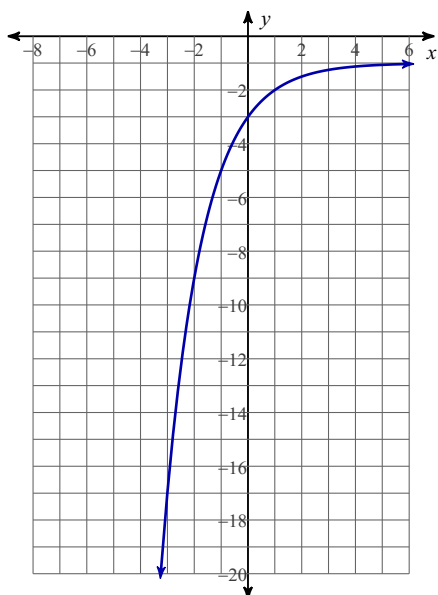24) $f(x) = -\dfrac{1}{4} \cdot 2^{x-2} - 2$
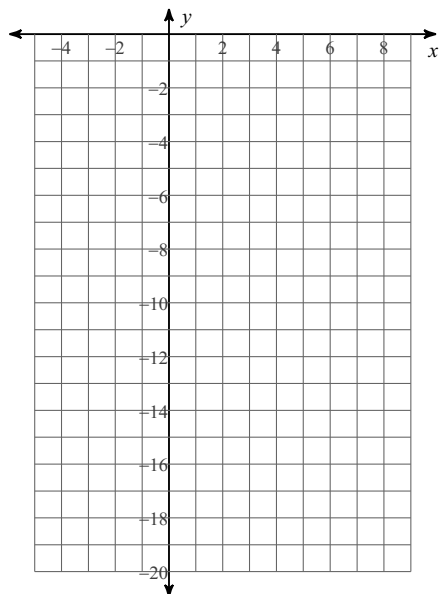
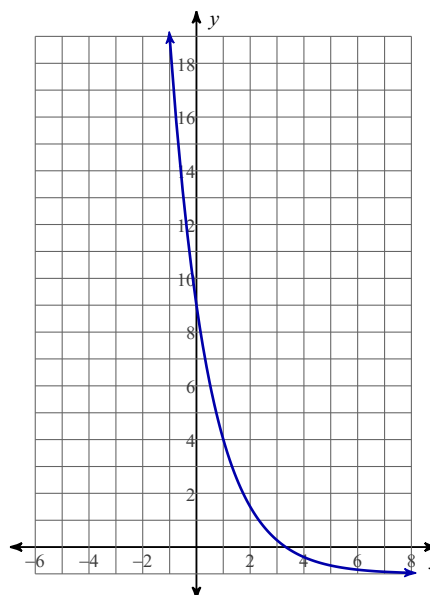25) $f(x) = 4 \cdot \left(\dfrac{1}{2}\right)^{x+1} + 1$

Write an equation for each graph.

26)

27)

28) A sample of bismuth-210 decayed to 33% of its original mass after 8 days.

   a.   Find the half-life of this element.
   b.   Find the mass remaining after 12 days.

29) Suppose that $12,000 is invested in a savings account paying 5.6% interest per year.

   a.   Write the formula for the amount in the account after t years if interest is compounded monthly.
   b.   Find the amount in the account after 3 years if interest is compounded daily.

   c.   How long will it take for the amount in the account to grow to $20,000 if interest is compounded semiannually?