Name _____

**HW 5-9**

1. Which of the following statements is true about a data set, its scatterplot, and its corresponding semi-log plot, where the vertical axis is logarithmically scaled?

A) Data that follows an exponential pattern will have a curved semi-log plot.

B) Data that follows a linear pattern will have an exponential semi-log plot.

C) Data that follows an exponential pattern will have a linear semi-log plot.

D) Data that follows a logarithmic pattern will have a linear semi-log plot.

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2.

Let $f(x) = 2 \cdot 3^x$. Which of the following could represent the graph of the semi-log plot, $y = \log(f(x))$?

A)

B)

C)

D)
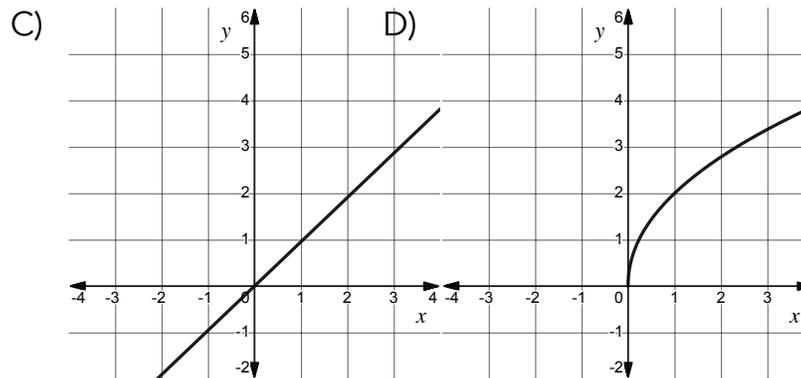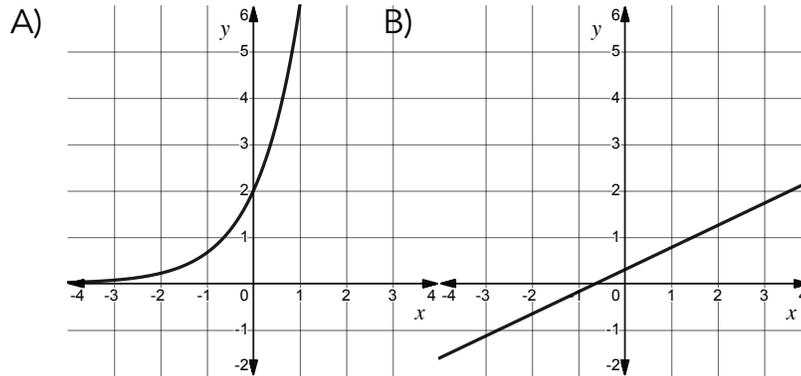
⊞3.   A population of insects is growing exponentially and can be modeled by the function f , where $f(x)$ is the population after x years and $f(0)$ represents the population in 2015 . The semi-log plot $y = \ln f(x)$ is modeled by the equation $y = 8.37793 + 0.037x$.

a. To the nearest insect, what is the insect population in 2015 ?

b. What is the annual growth rate of the insect population? Round to the nearest tenth.

⊞4.   The table gives values for $\ln f(x)$ for some function f . Which of the following statements best describe f ?

| x	3	4	5	6
$\ln f(x)$	10	12	14	16

A) f is an exponential function because the values of x and $\ln f(x)$ both form arithmetic sequences.

B) f is a linear function because the values of x and $\ln f(x)$ both form arithmetic sequences.

C) f is a logarithmic function because there is a constant rate of change in $\ln f(x)$.

D) f is an exponential function because the values of $\ln f(x)$ increase faster than the values of x .

▦5.   The number of people with accounts on a dating app can be
            modeled by the function $A(t) = 470(1.047)^t$ where t is the
            number of months since the app was launched. A semi-log plot
            of this data includes points of the form $(t, \log A(t))$.

            a. Explain why the semi-log plot shows a linear pattern.

            b. Find the y -intercept of the semi-log plot and interpret its
               meaning in the context of the model.

            c. Find the slope of the semi-log plot and interpret its meaning in
               the context of the model.

6.

The graph of a function g is shown. Which of the following is guaranteed about the values of constants m and b in the equation $\ln g(x) = mx + b$?

A) $m < 0$

B) $b > 0$

C) $0 < m < 1$

D) $b > 2$
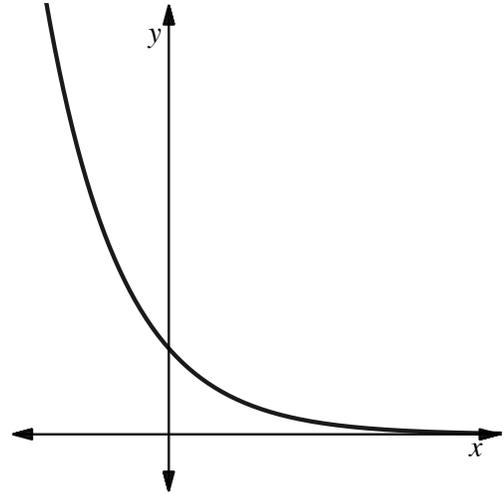
7.   A table of some values for a function f, where $g(x) = \ln f(x)$ is shown. Which of the following statements is true about the function g?

x	0	1	2	3	4
$f(x)$	1	3	9	27	81

A) g is an exponential function because g has outputs changing additively.

B) g is a linear function because g has outputs changing additively.

C) g is a power function because g has a constant difference over equal intervals of x.

D) g is a logarithmic function because g has outputs changing multiplicatively.

8. A population of 50 bacteria cells doubles in size every hour. The equation for the number of bacteria in the petri dish can be modeled by be $B(t) = 50(2)^t$, where t is the time, in days, and y is the number of bacteria cells. A semi-log plot of this data includes points of the form $(t, \log B(t))$.

a. Explain why the semi-log plot shows a linear pattern.

b. Find the y -intercept of the semi-log plot and interpret its meaning in the context of the model.

c. Find the slope of the semi-log plot and interpret its meaning in the context of the model.

9. A frog population in a small pond grows exponentially and can be modeled by the function f , where $f(x)$ is the population after x months and $f(0)$ represents the population in February. The semi-log plot $y = \ln f(x)$ is modeled by the equation $y = 4.44265 + 0.1655x$.

a. To the nearest frog, what is the insect population in February?

b. What is the annual growth rate of the frog population? Round to the nearest percent.