NAME: ____________________ PERIOD: __________ DATE: __________

Homework Problem Set

Describe the transformation(s) of the parent function, $f(x) = 4^x$, for each of the following functions.

1. $f(x) = -4^{x+3}$

• Translate Horizontally left 3
• Reflect over x-axis

2. $f(x) = \frac{1}{4} \cdot 4^x + 20$

• Vertical Shrink of $\frac{1}{4}$
• Translate Vertically up 20

3. $f(x) = 4^{x-1} - 25$

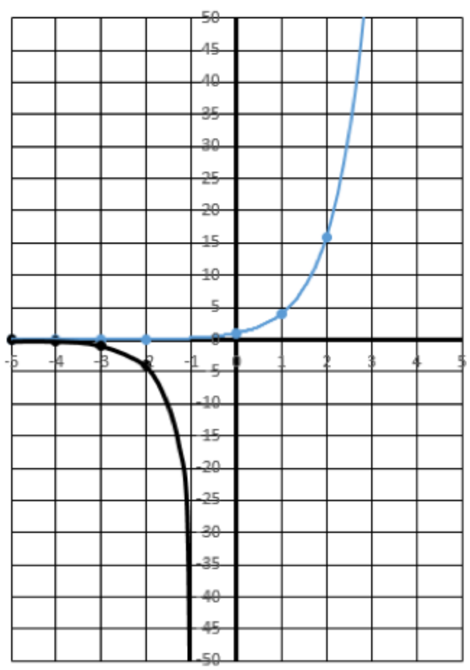
• Translate Horizontally right 1
• Translate Vertically Down 25

4. $f(x) = 6 \cdot 4^{2x}$

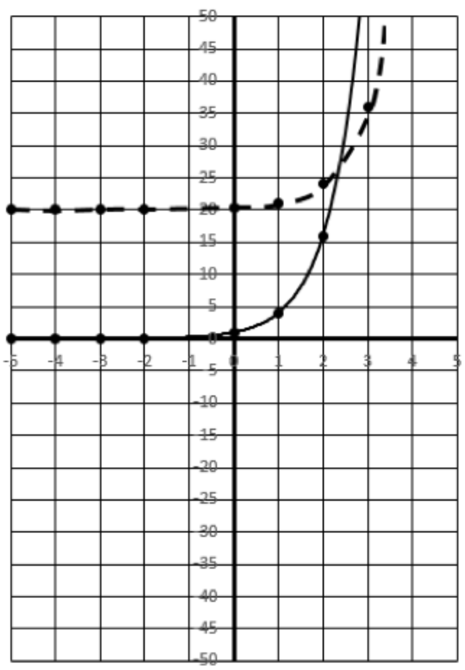
• Horizontal Shrink of $\frac{1}{2}$
• Vertical Stretch of 6

Graph each of the functions. The parent graph $g(x) = 4^x$ is drawn on each grid.

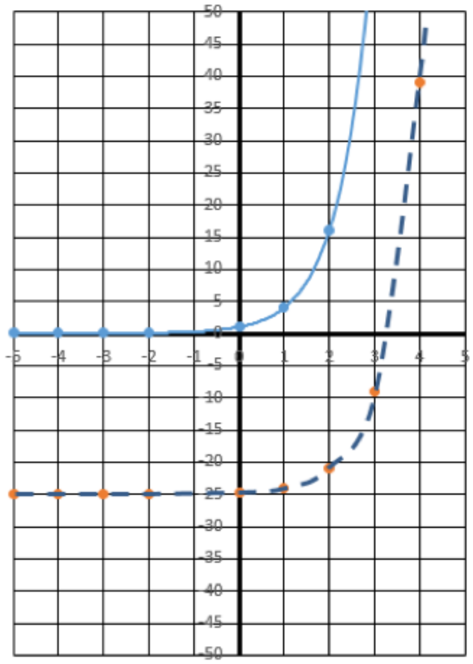
5. $f(x) = -4^{x+3}$



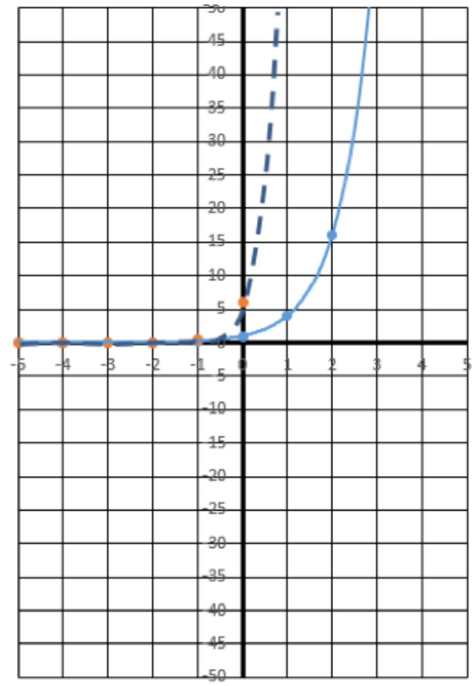
6. $f(x) = \frac{1}{4} \cdot 4^x + 20$



7. $f(x) = 4^{x-1} - 25$



8. $f(x) = 6 \cdot 4^{2x}$



Write the equation for the function described below. All are using the parent function $f(x) = 6^x$.

9. shift up 30 and left 5

$g(x) = 6^{x+5} + 30$

10. reflect over the x-axis and shift right 2

$g(x) = -6^{x-2}$

11. vertically stretch by a factor of 7

$g(x) = 7 \cdot 6^x$

12. reflect over the y-axis and horizontally stretch by a factor of 2

$g(x) = 6^{-\frac{1}{2}x}$

13. shift down 7 and right 3

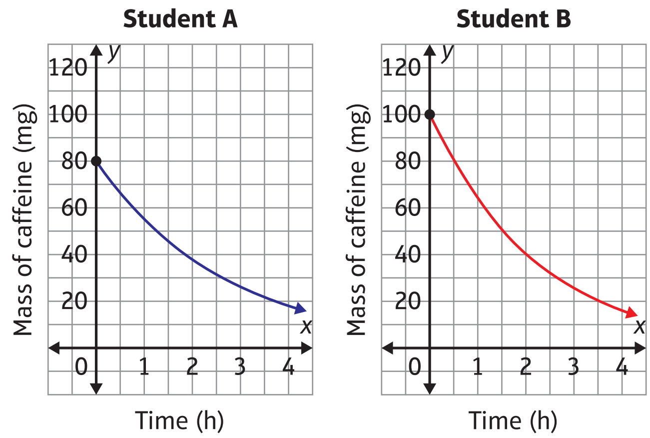
$g(x) = 6^{x-3} - 7$

14. stretch vertically by a factor of 3

$g(x) = 3 \cdot 6^x$

Spiral REVIEW—Applications of Exponential Growth

15. Two students drink a soda that contains caffeine. The amount of caffeine was measured over an 8-hour period. The data is shown in the graphs below.



A. How much caffeine was initially ingested by each student? Which feature of the graphs gives this piece of information?

Look at y-intercept

STUDENT A: 80mg
STUDENT B: 100mg

B. Is this situation an example of exponential growth or exponential decay? How do you know?

Exponential Decay.
because it is decreasing.

C. Which student processed the caffeine more quickly? How do you know?

STUDENT B → That student started with more caffeine, but ended with about the same amt as Student A.

16. The population of Kelowna in 2011 was 117,000. The population growth rate was 3.4%.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A. Use the equation $P(t) = a \cdot b^t$ to write a function that models the population growth of Kelowna, where $P(t)$ is the population of the city t years after 2011.

$a = 117{,}000$ $b = 1.034$

$P(t) = 117{,}000 \cdot (1.034)^t$

B. According to this model, what is the projected population of Kelowna in the year 2020 to the nearest thousand people?

2020 − 2011 = 9 years after.

$P(9) = 117{,}000 \cdot (1.034)^9$

$\approx$ 158,000 people

17. If you have \$10,000 to invest at 2.8% per year and the equation $y = a \cdot b^t$ is an appropriate model for the investment. With $a = 10000$ and $b = 1.028$, How much money would you have after 10 years? (Assuming you don't add or take out any money to the account.)

$f(x) = 10{,}000 \cdot (1.028)^x$

$f(10) = 10{,}000 \cdot (1.028)^{10}$

$= \$13{,}180.48$

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