Warm Up

Identify the A-, B-, C-, and D-values of each exponential function.
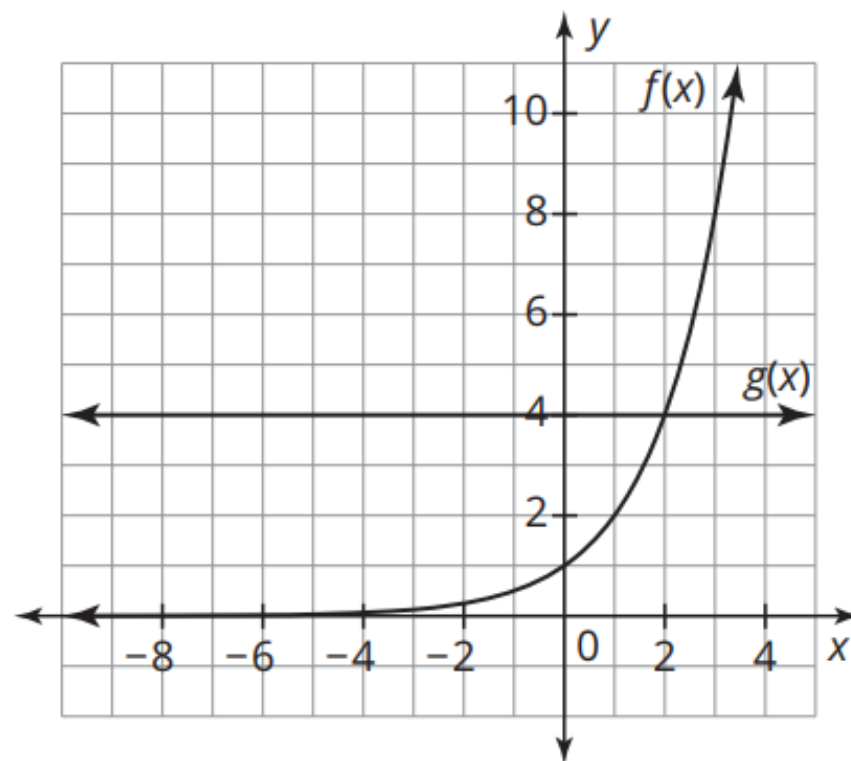
1. $g(x) = 2 \cdot 3^{x+5} - 50$

2. $h(x) = 2^{\frac{x}{5}} + 1$

3. $j(x) = 2^x$

4. $k(x) = 60 \cdot 2^{-x} - 5$

The graph shows the exponential function $f(x) = 2^x$ and the constant function $g(x) = 4$.

1. **Plot and connect points to show $h(x) = f(x) + g(x)$. Write the new function.**

Autumn has two different methods of saving money. Analyze her situation using functions.

1. **Autumn received a graduation gift of $1000 from her wealthy aunt. She placed this money in a savings account with a 4% interest rate, compounded annually.**

   a. **Write a function $f(x)$ to model this situation. Define the variables.**

   b. **What will be the balance in Autumn's account after 5 years? 10 years? 15 years?**

   c. **Estimate when Autumn will have $1600 in her account.**

2. **Autumn also saved $500 that she keeps in a safe at home. She never touches it nor adds to it.**

   a. **Write a function $g(x)$ to model this situation. Define the variables.**

   b. **How much money will Autumn have in the safe after 5 years? 10 years? 15 years?**

   c. **When will Autumn have $1600 in the safe?**

3. Autumn's total savings can be represented as $h(x) = f(x) + g(x)$.
Write a function $h(x)$ to represent this sum and predict what the graph of $h(x)$ will look like.

4. **Graph $f(x)$, $g(x)$, and $h(x)$ on the coordinate plane. Label each function.**
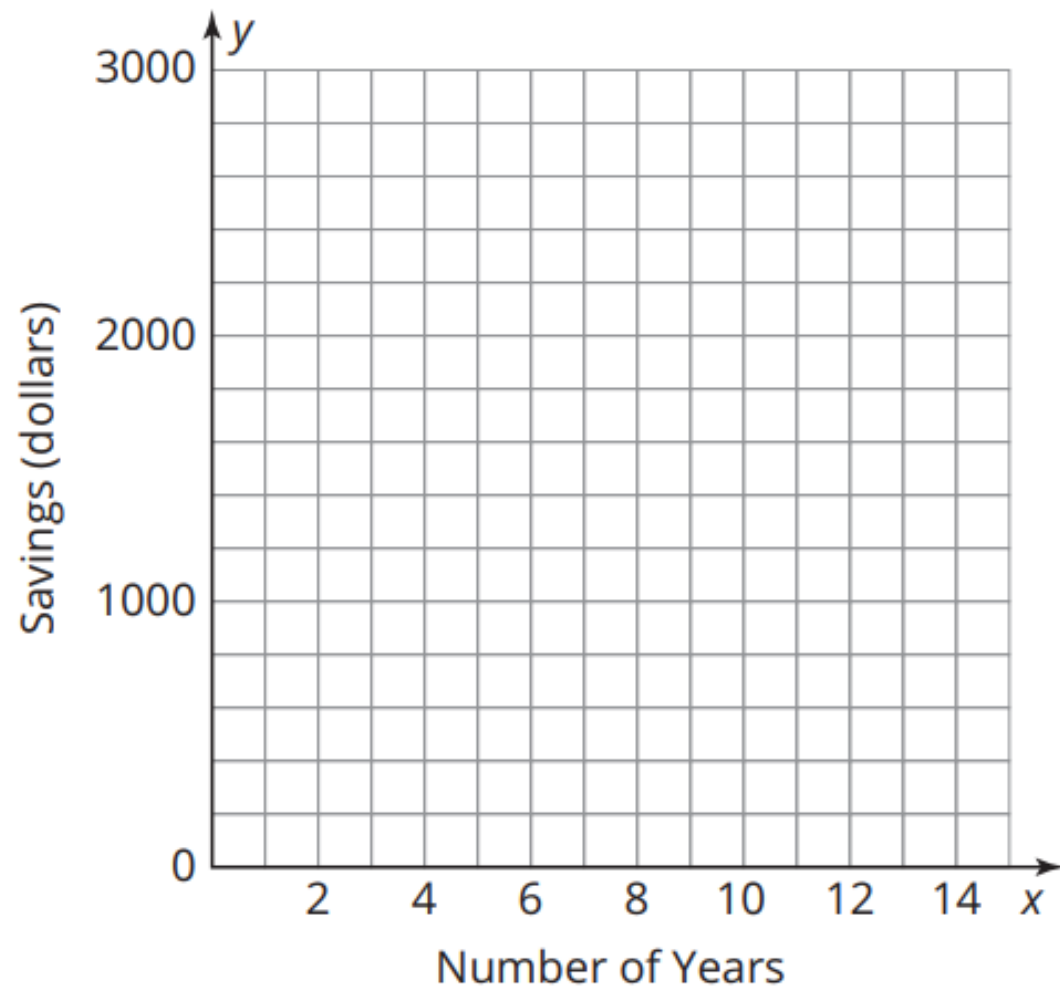
5. Did the graph of $h(x)$ appear as you predicted? How does it relate to what you learned about transformations?

6. How does the graph of $h(x)$ relate to the graphs of $f(x)$ and $g(x)$?

7. The exponential function $h(x)$ can be written in the form $h(x) = A \cdot b^{B(x - C)} + D$. Identify three places where the value of D is evident in the graph of each of the three functions.
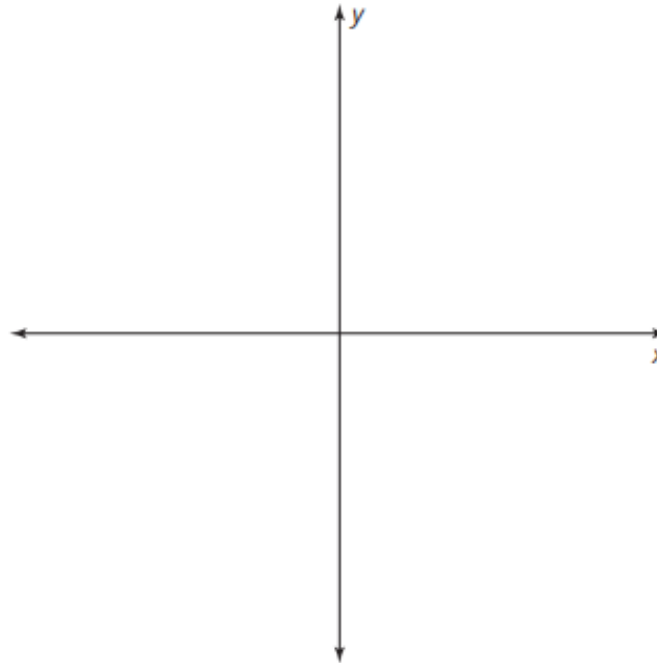
Sketch each of the functions and their sum. Write the sum as a function in general form and identify the *y*-intercept and horizontal asymptote.

1. $f(x) = 2^x + 1$
   $g(x) = -1$
   $h(x) = f(x) + g(x)$

2. $f(x) = 2^{-x} + 4$

$g(x) = 3$

$h(x) = f(x) + g(x)$