**Algebra 2 Honors**                                          Name_____

**Notes/Guided Practice: 4.7 Transforming Exponential and Logarithmic Functions**

For each function, identify the parent function and three key points located on the parent function.  Then, describe how the graph is transformed from the graph of its parent function.  Use this information to graph each function.
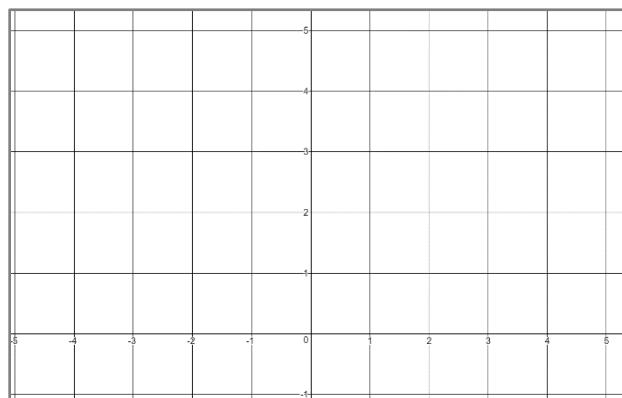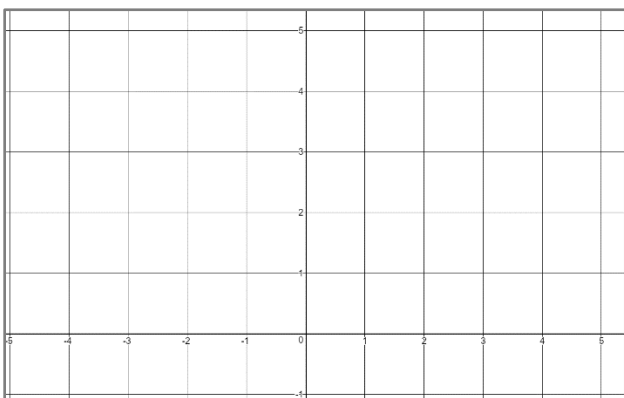
1.  $g(x) = 2^{-x} + 1$

| $x$ | Parent Function $f(x) =$ |
|---|---|
| | |
| | |

| $x$ | $g(x)$ |
|---|---|
| | |

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

| $x$ | Parent Function $f(x) =$ |
|---|---|
| | |
| | |

| $x$ | $g(x)$ |
|---|---|
| | |

3.  $g(x) = e^{-x+1}$

| $x$ | Parent Function $f(x) =$ |
|---|---|
| | |
| | |

| $x$ | $g(x)$ |
|---|---|
| | |

4.  $g(x) = -\dfrac{1}{3}\left(5^{x}\right)$

| $x$ | Parent Function $f(x) =$ |
|---|---|
| | |
| | |

| $x$ | $g(x)$ |
|---|---|
| | |
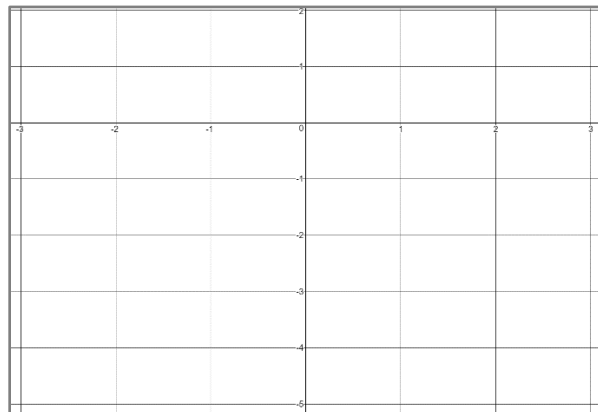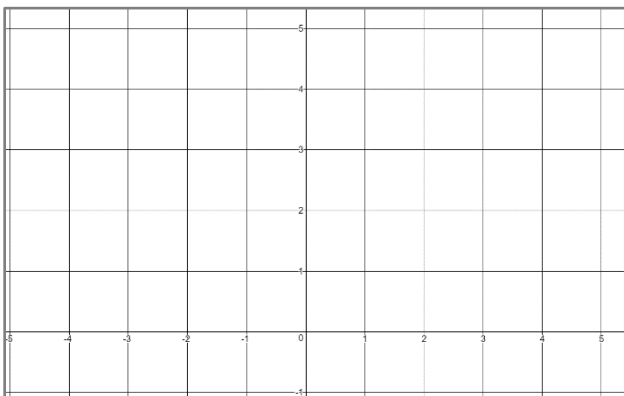
5. $g(x) = 5\log x - 2$

| x | Parent Function $f(x) =$ |
|---|---|
| | |

| x | $g(x)$ |
|---|---|
| | |
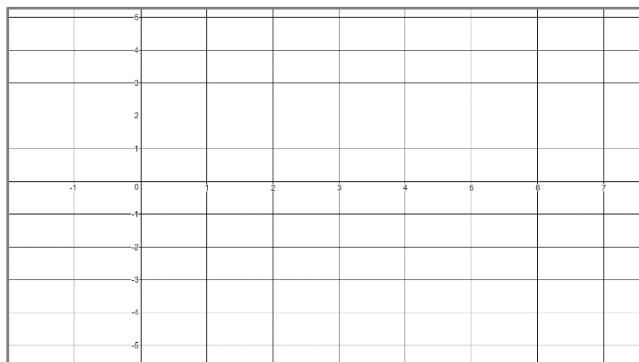
6. $g(x) = \ln(-x + 2)$

| x | Parent Function $f(x) =$ |
|---|---|
| | |

| x | $g(x)$ |
|---|---|
| | |
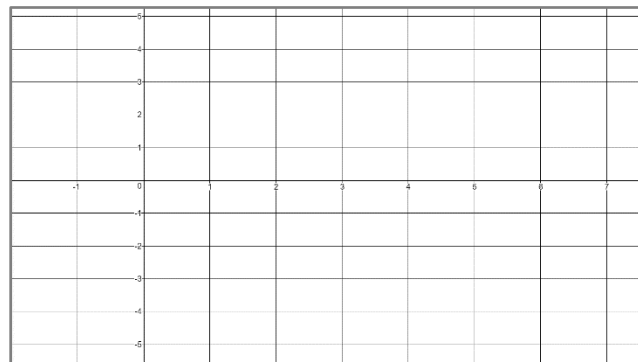
7. $g(x) = -\ln(x + 1) - 2$

| x | Parent Function $f(x) =$ |
|---|---|
| | |

| x | $g(x)$ |
|---|---|
| | |
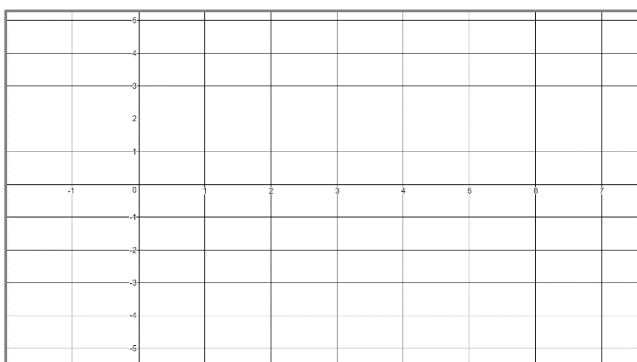
8. $g(x) = 2\log(x + 3)$

| x | Parent Function $f(x) =$ |
|---|---|
| | |

| x | $g(x)$ |
|---|---|
| | |
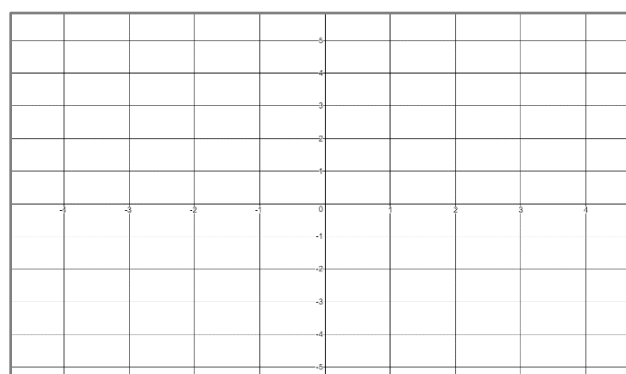
**Write each transformed function.**

9. $f(x) = 4^x$ is reflected across both axes and moved two units down.

10. $f(x) = \ln x$ is compressed horizontally by a factor of ½ and moved three units left.

11. $f(x) = 0.2^x$ is translated two units right, compressed vertically by a factor of ¾, and reflected across the x-axis.

**Applications**

12. The temperature in °F that milk must be kept at to last $n$ days can be modeled by $T(n) = 75 - 16\ln n$ Describe how the model is transformed from $f(n) = \ln n$. Use the model to predict how long milk will last if kept at 34°F.

13. A group of students retake the written portion of a driver's test after several months without reviewing the material. A model used by psychologists describes retention of the material by the function $a(t) = 85 - 15\log(t + 1)$, where $a$ is the average score at time $t$ (in months). Describe how the model is transformed from its parent function. When would the average score drop below 0. Is your answer reasonable?

14. Determine how long it will take for 650 mg of a sample of chromium-51 which has a half-life of about 28 days to decay to 200 mg.

15. The half-life of carbon-14 is 5730 years. What is the age of a fossil that only has 8% of its original carbon-14?

16. The management at a factory has determined that a worker can produce a maximum of 30 units per day.  The model $y = 30 - 30e^{-0.07t}$ indicates the number of units $y$ that a new employee can produce per day after $t$ days on the job.

a.  How many units can be produced per day by an employee who has been on the job 8 days?

b.  How many days of employment are required for a worker to produce 25 units per  day.

17. An amount of $2000 is deposited in a bank paying an annual interest rate of 2.85%, compounded continuously.

   a.  Find the balance after 3 years.

   b.  How long would it take for the money to double?

18. Baily has $10,000 to put into a bank account where the interest rate is 6.7% compounded continuously.  How long must she keep the money in the bank so that the principal doubles?

19. At what interest rate does Sam need for her money to double if she leaves her money in an account for 12 years which is compounded continuously?

20. The half-life for $^{14}C$ is 5715 years.

a.  If there are 2 grams after 1000 years, what was the initial quantity?

b.  If the initial quantity is 3 grams, how much is present after 1000 years?