1. For each of the six functions, describe how its graph is a transformation of the graph of $f(x)=log_2(x)$.

**a.** $g(x) = \log_2 x - 5$

**d.** $g(x) = -\frac{3}{4} \log_2 x$

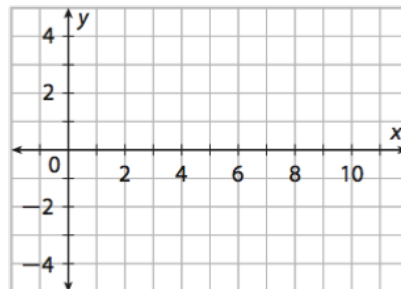**b.** $g(x) = 4 \log_2 x$

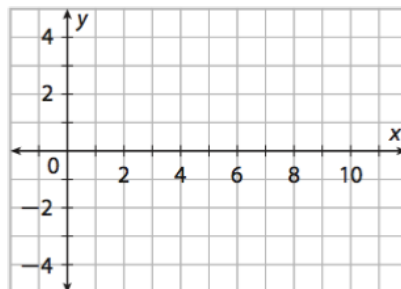**e.** $g(x) = \log_2 x + 7$

**c.** $g(x) = \log_2 (x + 6)$

**f.** $g(x) = \log_2 (x - 8)$

Identify transformations of the function. Find the vertical asymptote and name two reference points. Graph the function. State the domain and range of the function.
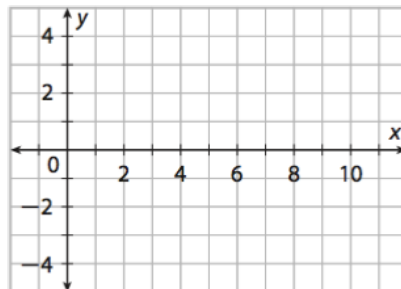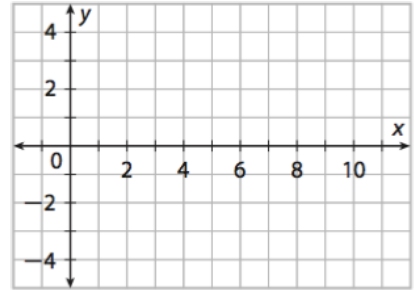
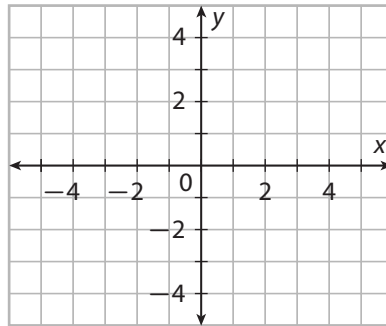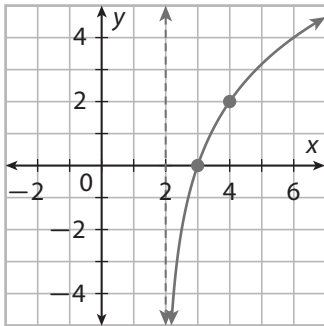2. $g(x) = 3 \log(x - 1) - 1$



3. $f(x) = \frac{1}{2} log_2(x - 1) - 2$



4. $g(x) = -4 \ln(x - 4) + 3$

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



**12. Explain the Error** A student drew the graph of $g(x) = 2\log_{\frac{1}{2}}(x - 2)$ as shown. Explain the error that the student made, and draw the correct graph.



## Review

1. If Jim invests \$3500 at 5% interest rate compounded quarterly, how much money will he have after 10 years?

2. Maria invests \$1250 at a 5.4% interest rate compounded continuously, how much money will she have after 6 years?

## Selected Answers:

3a. Translated down 5
New key features:
x=0
(1, -5)
(2, -4)
D: $(0, \infty)$
R: $(-\infty, \infty)$

3c. Translated left 6
New key features:
x=-6
(-5,0)
(-4,1)
D: $(-6, \infty)$
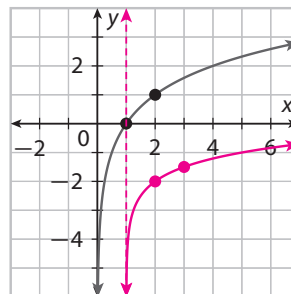R: $(-\infty, \infty)$

**6.** $f(x) = \frac{1}{2} \log_2 (x - 1) - 2$

**The transformations of the graph of $f(x) = \log_2 x$ that produce the graph of $g(x)$ are as follows:**

- **a vertical compression by a factor of $\frac{1}{2}$**
- **a translation of 1 unit to the right and 2 units down**

**Note that the translation of 1 unit to the right affects only the *x*-coordinates of points on the graph of $f(x)$, while the vertical compression by a factor of $\frac{1}{2}$ and the translation of 2 units down affect only the *y*-coordinates.**

**Domain:** $\{x \,|\, x > 1\}$ **Range:** $\{y \,|\, -\infty < y < +\infty\}$
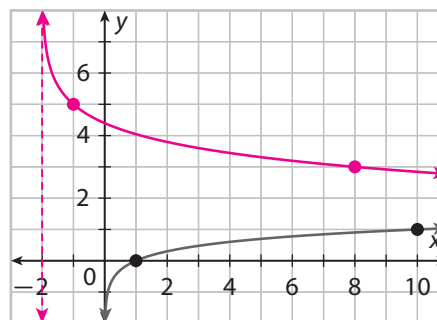
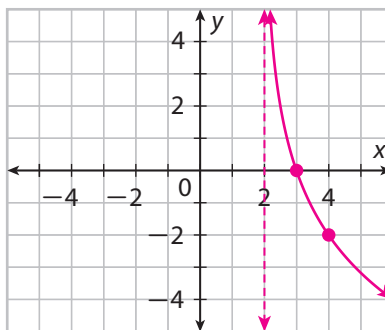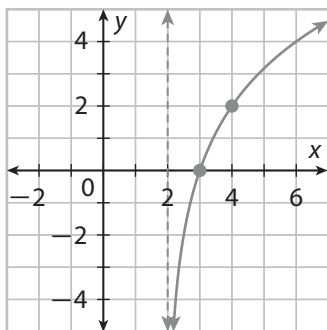**8.** $g(x) = -2 \log(x + 2) + 5$

**The transformations of the graph of $f(x) = \log x$ that produce the graph of $g(x)$ are as follows:**

- **a vertical stretch by a factor of 2**
- **a reflection across the *x*-axis**
- **a translation of 2 units to the left and 5 units up**

**Domain:** $\{x \,|\, x > -2\}$ **Range:** $\{y \,|\, -\infty < y < +\infty\}$

**12. Explain the Error** A student drew the graph of $g(x) = 2 \log_{\frac{1}{2}}(x - 2)$ as shown. Explain the error that the student made, and draw the correct graph.

log base ½, not log base 2