Write

Given a basic function $y = f(x)$ and a function written in transformation form $g(x) = A \cdot f(x-C) + D$, describe how the transformations that are inside a function affect a graph differently than those on the outside of the function.

Remember

The basic absolute value function is $f(x) = |x|$.

The transformed function $y = f(x) + D$ shows a vertical translation of the function.

The transformed function $y = Af(x)$ shows a vertical dilation of the function when $A > 0$ and when $A < 0$ it shows a vertical dilation and reflection across the x-axis.

The transformed function $y = f(x - C)$ shows a horizontal translation of the function.

Practice

Given the basic function $f(x) = |x|$. Consider each transformation. Describe how the transformations affected $f(x)$. Then use coordinate notation to describe how each point (x, y) on the graph of $f(x)$ becomes a point on the graph the transformed function. Finally, sketch a graph of each new function.

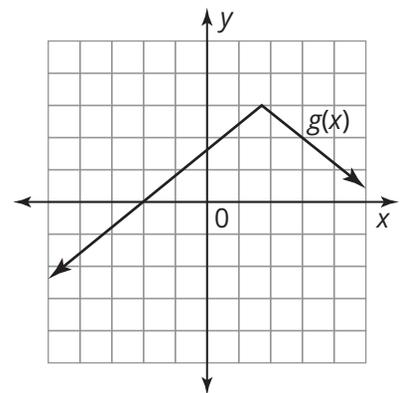1. $g(x) = \frac{1}{3}f(x) - 2$

2. $j(x) = 2f(x + 1) + 4$

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

4. $p(x) = -f(x + 4) + 3$

Stretch

The function $g(x)$ shown is a transformation of $f(x) = |x|$.
Write the function $g(x)$ in terms of $f(x)$.

Review

1. The TransAmerica Pyramid is the second highest building in San Francisco. It is shaped like a pyramid with a square base. The side length of the base is 175 feet, and the building is 853 feet tall. What is the volume of the TransAmerica Pyramid?

2. A perfume manufacturer is considering new bottles for one of their perfumes. The bottles are cylinder-shaped with a diameter of 9 centimeters and a height of 10 centimeters. How much perfume will the bottle hold? Use 3.14 for π and round your answer to the nearest tenth if necessary.

3. In circle M shown, the length of $\overarc{PW}$ is 18π centimeters and m$\angle PRW$ is 56°. Determine the length of the diameter of circle M. Round your answer to the nearest hundredth.

4. The measure of a central angle is 65°. The length of the radius is 25 cm. Determine the length of the arc intercepted by the central angle.

5. Write the equation of a line that passes through the point (−4, 3) and is parallel to the line $3x - 4y = 8$.

6. Write the equation of a line that passes through the point (–7, 11) and is perpendicular to the line $3x + 15y = -20$.