Real-Life Application: When Will I Ever Use This?

For use with the lesson "Solve Quadratic Equations by Completing the Square"

Caves

A cave, also known as a cavern, is a naturally hollow area in the Earth that is large enough for a person to enter. Some caves consist of a single chamber only a few yards deep. Other caves are vast networks of passages and chambers.

The longest cave ever explored is the Mammoth-Flint Ridge cave system in Kentucky. This cave has about 340 miles of explored and mapped passageways, but geologists think that it extends even farther.

The interior of a cave is a dark, damp place where sunlight never enters. Many caves have underground lakes, rivers, and waterfalls. Some of the most spectacular caves are popular tourist attractions. These caves have been equipped with pathways and electric lights. However, thousands of caves remain in their natural state, and many new caves and passages are being discovered each year.

In Exercises 1–3, use the following information.

You are exploring a new cave. You are asked to write down as much information about the cave as you can. You find yourself in a cavern that is large enough to stand in. The cross section showing the ceiling of the cavern can be modeled by the equation $y = -x^2 + 8x$ where y is the height of the cavern (in feet) and x is the distance from the left side of the cavern (in feet).

1. Use completing the square to solve the equation $-x^2 + 8x = 0$.

2. Sketch a graph of the equation $y = -x^2 + 8x$ to check the solution to Exercise 1.

3. Choose another method (finding square roots or factoring) for solving quadratic equations to check the solutions to Exercise 1. *Explain* your choice.

In Exercises 4 and 5, use the following information.

You enter a chamber with many stalactites. Stalactites are iciclelike formations that hang from the ceiling of a cave. The cross section showing the longest stalactite at its lowest point can be modeled by the equation $y = 12x^2 - 72x + 96$ where y is the length of the stalactite (in feet) and x is the horizontal distance from the left side of the stalactite (in feet).

4. Use completing the square to solve the equation $12x^2 - 72x = -96$.

5. Choose another method (finding square roots, graphing, or factoring) for solving quadratic equations to check the solutions to Exercise 4. *Explain* your choice.