**Lesson 11-8**

Problem

FITNESS Several members of a cross-country team are training by running up and down the foothills of a mountain with a constant slope. At the base of the course, the elevation is 972 ft above sea level, and at the top of the course, the elevation is 1,412 ft above sea level. Thomas estimates the distance of one trip up the hill to be 440 ft. Suzie disagrees, saying that the actual distance is approximately 1,500 ft. Eduardo thinks that 2,200 ft is a more reasonable estimate of the distance. The slope of the hill is 17.5°. Use trigonometry to determine which runner has the most reasonable answer.

Solve the Problem

Draw a diagram of the situation.

First find a, the difference in elevation between the top of the course and the base of the course.
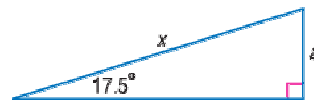
$1412 - 972 = 440$

Thomas' estimate of 440 ft can be eliminated because the length of the course is the hypotenuse of the diagram, not a.

Use a trigonometric ratio to find x, the length of one trip up the hill.

$$\sin 17.5° = \frac{440}{x}$$

$$0.3007 \quad \frac{440}{x}$$

$$0.3007 \cdot x \quad 440$$

$$\frac{0.3007x}{0.3007} \quad \frac{440}{0.3007}$$

$$x \quad 1463.3$$

The length of one trip up the hill is approximately 1463.3 ft, so Eduardo's estimate can also be eliminated. Suzie's estimate of 1500 ft is close to the actual answer, so her answer is the most reasonable.