

**Challenge: Skills and Applications**

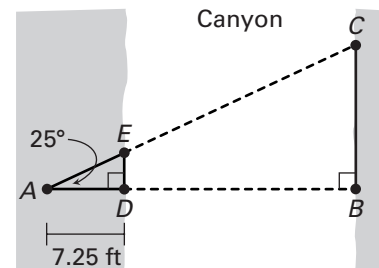
For use with pages 752–757

**In Exercises 1–4, you will explore an isosceles right triangle.**

- The sum of the measures of the angles of any triangle is  $180^\circ$ . The base angles of an isosceles triangle have the same measure. Use these facts to find the measure of a base angle of an isosceles right triangle.
- Let  $a$  be the length of one leg of an isosceles right triangle. Write an expression in terms of  $a$  for the length of the hypotenuse.
- Use the side lengths from Exercise 2 to find the following for a base angle of an isosceles right triangle. Express answers in simplest form.
  - sine
  - cosine
  - tangent
- Use a calculator to check that your results in Exercise 3 match the values for the sine, cosine, and tangent of the angle measure you found in Exercise 1.
- When necessary, round answers to 4 decimal places.
  - Find  $\sin 30^\circ$ .
  - Find  $\cos 30^\circ$ .
  - Find  $\tan 30^\circ$ .
  - Find  $\frac{\sin 30^\circ}{\cos 30^\circ}$ .
  - What do you notice?
  - Use the definitions of the trigonometric ratios to show your observation from part (e) is correct for any angle  $A$ .

**In Exercises 6–8, use the following information. Round answers to the nearest hundredth of a foot.**

As shown in the diagram, points  $D$  and  $E$  are along one edge of a canyon and points  $B$  and  $C$  are along the opposite, parallel edge of the canyon. The line containing points  $D$  and  $B$  is perpendicular to the edges of the canyon. Point  $A$  is 7.25 feet from point  $D$ . Point  $A$  is on line  $DB$  and on line  $EC$  and the measure of angle  $A$  is  $25^\circ$ .



- Find the distance from point  $A$  to point  $E$ .
- Find the distance from point  $D$  to point  $E$ .
- The distance between point  $B$  and point  $C$  is 13.5 feet. What is the distance across the canyon from point  $D$  to point  $B$ ?