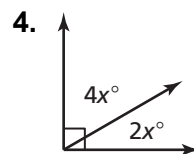
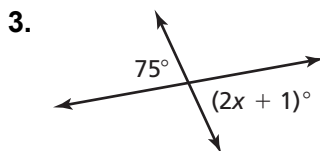
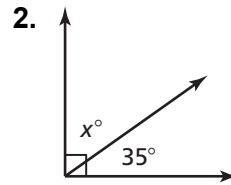
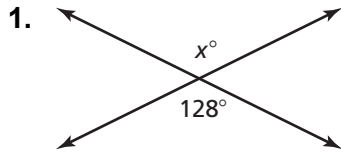
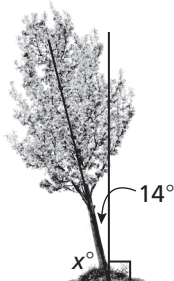


**Chapter
12****Fair Game Review**

Tell whether the angles are *adjacent* or *vertical*. Then find the value of x .



5. The tree is tilted 14° . Find the value of x .

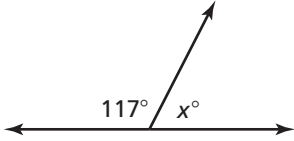


**Chapter
12**

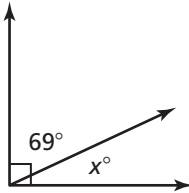
Fair Game Review (continued)

Tell whether the angles are *complementary* or *supplementary*. Then find the value of x .

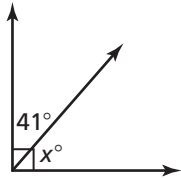
6.



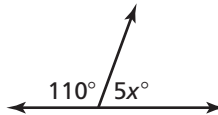
7.



8.



9.



10. A tributary joins a river at an angle. Find the value of x .



12.1**Parallel Lines and Transversals**

For use with Activity 12.1

Essential Question How can you describe angles formed by parallel lines and transversals?

1 ACTIVITY: A Property of Parallel Lines

Work with a partner.

- **Discuss what it means for two lines to be parallel. Decide on a strategy for drawing two parallel lines. Then draw the two parallel lines.**

- **Draw a third line that intersects the two parallel lines. This line is called a *transversal*.**

a. How many angles are formed by the parallel lines and the transversal? Label the angles.

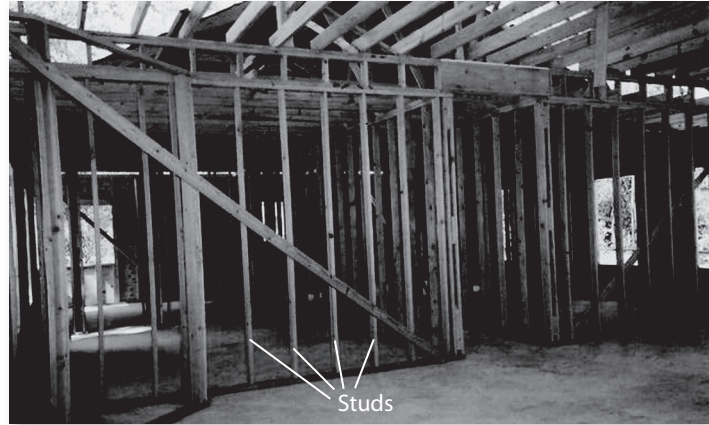
b. Which of these angles have equal measures? Explain your reasoning.

12.1 Parallel Lines and Transversals (continued)

2 ACTIVITY: Creating Parallel Lines

Work with a partner.

- a. If you were building the house in the photograph, how could you make sure that the studs are parallel to each other?

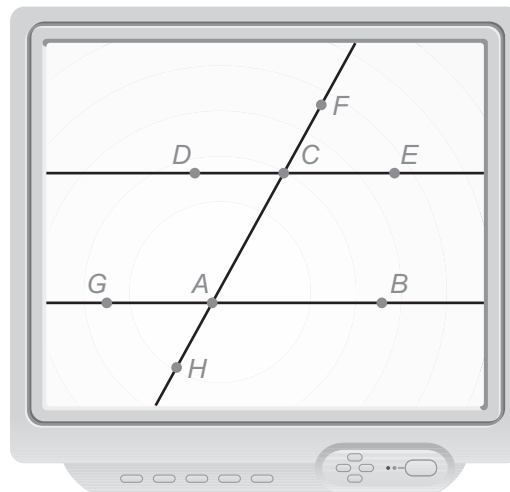


- b. Identify sets of parallel lines and transversals in the photograph.

3 ACTIVITY: Using Technology to Draw Parallel Lines and a Transversal

Work with a partner. Use geometry software to draw two parallel lines intersected by a transversal.

- a. Find all of the angle measures.



12.1 Parallel Lines and Transversals (continued)

- b. Adjust the figure by moving the parallel lines or the transversal to a different position. Describe how the angle measures and relationships change.

What Is Your Answer?

4. **IN YOUR OWN WORDS** How can you describe angles formed by parallel lines and transversals? Give an example.
5. Use geometry software to draw a transversal that is perpendicular to two parallel lines. What do you notice about the angles formed by the parallel lines and the transversal?

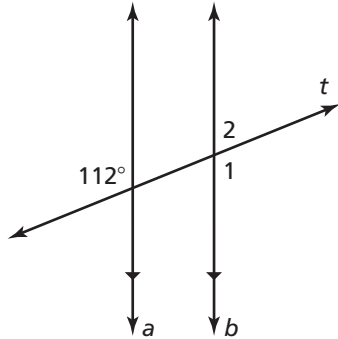
12.1

Practice

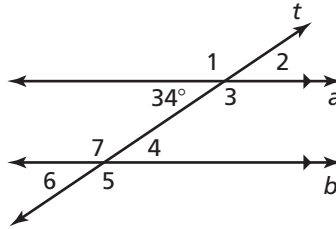
For use after Lesson 12.1

Use the figure to find the measures of the numbered angles.

1.



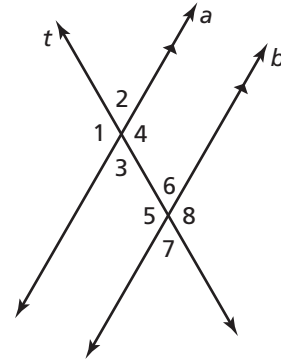
2.



Complete the statement. Explain your reasoning.

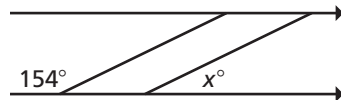
3. If the measure of $\angle 1 = 150^\circ$, then the measure of $\angle 6 =$ _____.

4. If the measure of $\angle 3 = 42^\circ$, then the measure of $\angle 5 =$ _____.



5. If the measure of $\angle 6 = 28^\circ$, then the measure of $\angle 3 =$ _____.

6. You paint a border around the top of the walls in your room. What angle does x need to be to repeat the pattern?



12.2**Angles of Triangles**

For use with Activity 12.2

Essential Question How can you describe the relationships among the angles of a triangle?

1 ACTIVITY: Exploring the Interior Angles of a Triangle

Work with a partner.

- a. Draw a triangle. Label the interior angles A , B , and C .

- b. Carefully cut out the triangle. Tear off the three corners of the triangle.

- c. Arrange angles A and B so that they share a vertex and are adjacent.

- d. How can you place the third angle to determine the sum of the measures of the interior angles? What is the sum?

- e. Compare your results with others in your class.

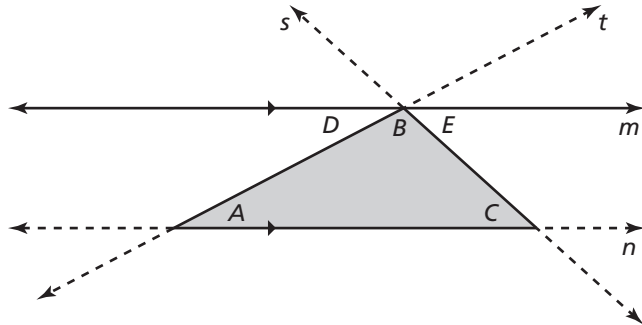
- f. **STRUCTURE** How does your result in part (d) compare to your conclusion in Lesson 7.3, Activity Question 7?

12.2 Angles of Triangles (continued)

2 ACTIVITY: Exploring the Interior Angles of a Triangle

Work with a partner.

- a. Describe the figure.



- b. **LOGIC** Use what you know about parallel lines and transversals to justify your result in part (d) of Activity 1.

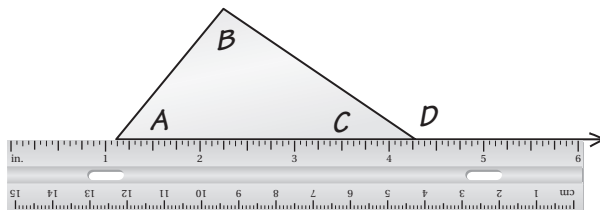
3 ACTIVITY: Exploring an Exterior Angle of a Triangle

Work with a partner.

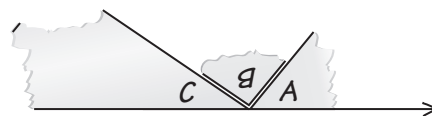
- a. Draw a triangle. Label the interior angles A , B , and C .

- b. Carefully cut out the triangle.

- c. Place the triangle on a piece of paper and extend one side to form exterior angle D , as shown.



- d. Tear off the corners that are not adjacent to the exterior angle. Arrange them to fill the exterior angle, as shown. What does this tell you about the measure of exterior angle D ?

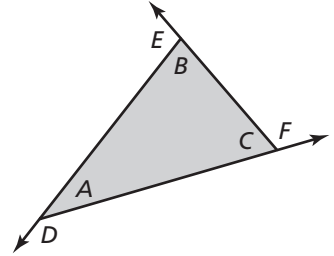


12.2 Angles of Triangles (continued)

4 ACTIVITY: Measuring the Exterior Angles of a Triangle

Work with a partner.

- a. Draw a triangle and label the interior and exterior angles as shown.
- b. Use a protractor to measure all six angles of your triangle. Complete the table to organize your results. What does the table tell you about the measure of an exterior angle of a triangle?



Exterior Angle	$D = \underline{\hspace{2cm}}^\circ$	$E = \underline{\hspace{2cm}}^\circ$	$F = \underline{\hspace{2cm}}^\circ$
Interior Angle	$B = \underline{\hspace{2cm}}^\circ$	$A = \underline{\hspace{2cm}}^\circ$	$A = \underline{\hspace{2cm}}^\circ$
Interior Angle	$C = \underline{\hspace{2cm}}^\circ$	$C = \underline{\hspace{2cm}}^\circ$	$B = \underline{\hspace{2cm}}^\circ$

What Is Your Answer?

5. **REPEATED REASONING** Draw three triangles that have different shapes. Repeat parts (b)–(d) from Activity 1 for each triangle. Do you get the same results? Explain.

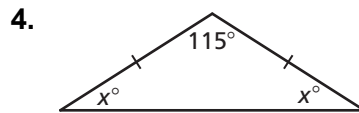
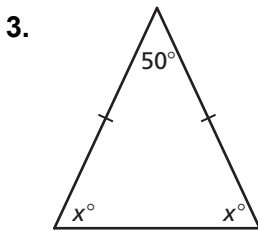
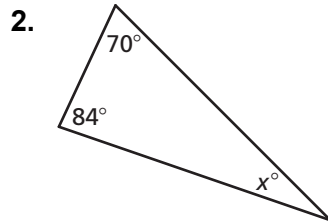
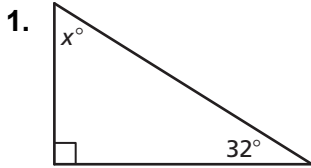
6. **IN YOUR OWN WORDS** How can you describe the relationships among angles of a triangle?

12.2

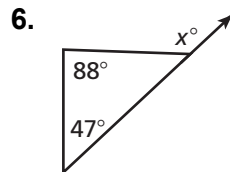
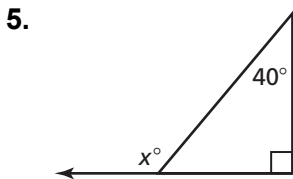
Practice

For use after Lesson 12.2

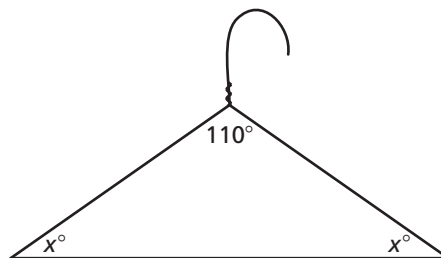
Find the measures of the interior angles.



Find the measure of the exterior angle.



7. Find the value of x on the clothes hanger.



12.3

Angles of Polygons

For use with Activity 12.3

Essential Question How can you find the sum of the interior angle measures and the sum of the exterior angle measures of a polygon?

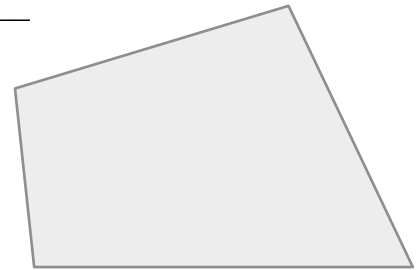
1 ACTIVITY: Exploring the Interior Angles of a Polygon

Work with a partner. In parts (a)–(e), identify each polygon and the number of sides n . Then find the sum of the interior angle measures of the polygon.

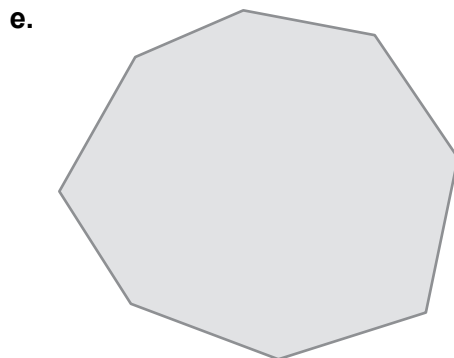
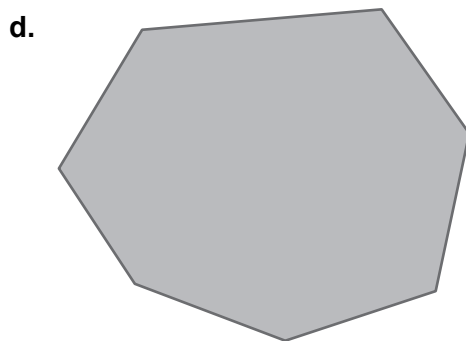
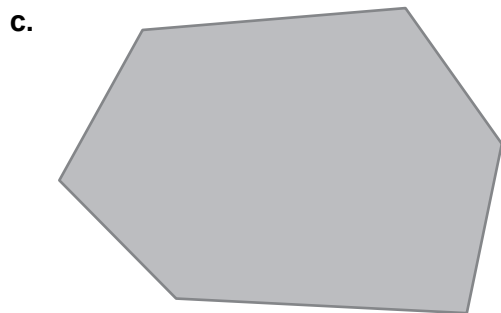
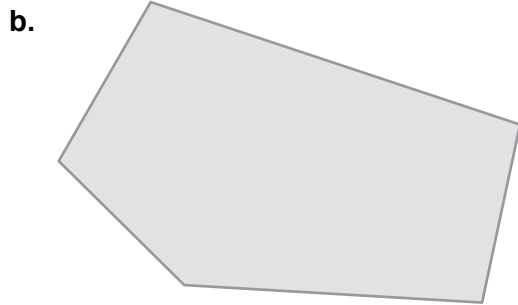
a. Polygon: _____ Number of sides: $n =$ _____

Draw a line segment on the figure that divides it into two triangles. Is there more than one way to do this? Explain.

What is the sum of the interior angle measures of each triangle?



What is the sum of the interior angle measures of the figure?



12.3 Angles of Polygons (continued)

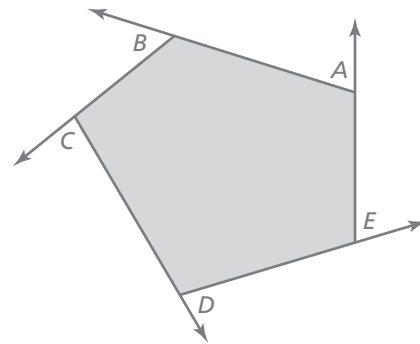
- f. **REPEATED REASONING** Use your results to complete the table. Then find the sum of the interior angle measures of a polygon with 12 sides.

Number of Sides, n	3	4	5	6	7	8
Number of Triangles						
Angle Sum, S						

2 ACTIVITY: Exploring the Exterior Angles of a Polygon

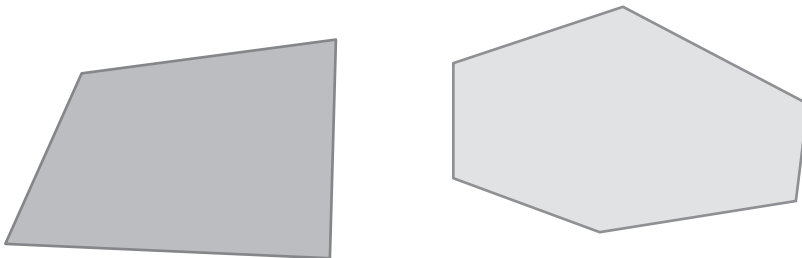
Work with a partner.

- a. Draw a convex pentagon. Extend the sides to form the exterior angles. Label one exterior angle at each vertex A , B , C , D , and E , as shown.



- b. Cut out the exterior angles. How can you join the vertices to determine the sum of the angle measures? What do you notice?

- c. **REPEATED REASONING** Repeat the procedure in parts (a) and (b) for each figure below.



What can you conclude about the sum of the measures of the exterior angles of a convex polygon? Explain.

12.3 Angles of Polygons (continued)

What Is Your Answer?

3. **STRUCTURE** Use your results from Activity 1 to write an expression that represents the sum of the interior angle measures of a polygon.

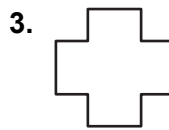
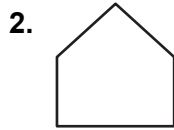
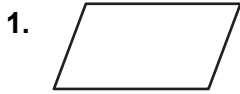
4. **IN YOUR OWN WORDS** How can you find the sum of the interior angle measures and the sum of the exterior angle measures of a polygon?

12.3

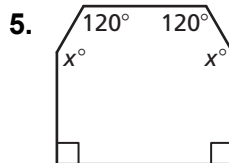
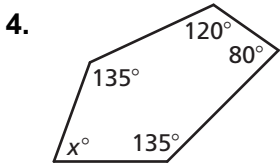
Practice

For use after Lesson 12.3

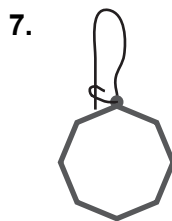
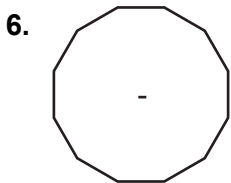
Find the sum of the interior angle measures of the polygon.



Find the measures of the interior angles.



Find the measure of each interior angle of the regular polygon.



8. In pottery class, you are making a pot that is shaped as a regular hexagon. What is the measure of each angle in the regular hexagon?

12.4**Using Similar Triangles**

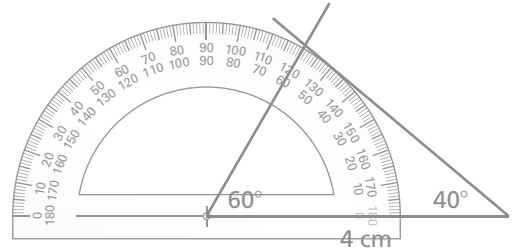
For use with Activity 12.4

Essential Question How can you use angles to tell whether triangles are similar?

1 ACTIVITY: Constructing Similar Triangles

Work with a partner.

- Use a straightedge to draw a line segment that is 4 centimeters long.
- Then use the line segment and a protractor to draw a triangle that has a 60° and a 40° angle as shown. Label the triangle ABC .

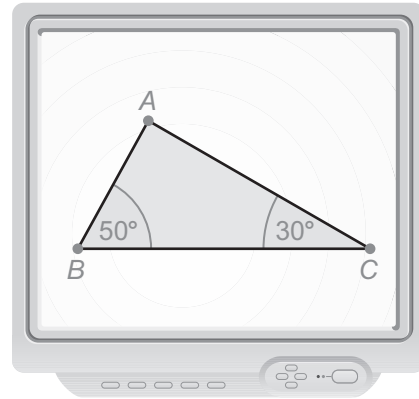


- Explain how to draw a larger triangle that has the same two angle measures. Label the triangle JKL .
- Explain how to draw a smaller triangle that has the same two angle measures. Label the triangle PQR .
- Are all of the triangles similar? Explain.

12.4 Using Similar Triangles (continued)

2 ACTIVITY: Using Technology to Explore Triangles

Work with a partner. Use geometry software to draw the triangle shown.



a. Dilate the triangle by the following scale factors.

- 2 $\frac{1}{2}$ $\frac{1}{4}$ 2.5

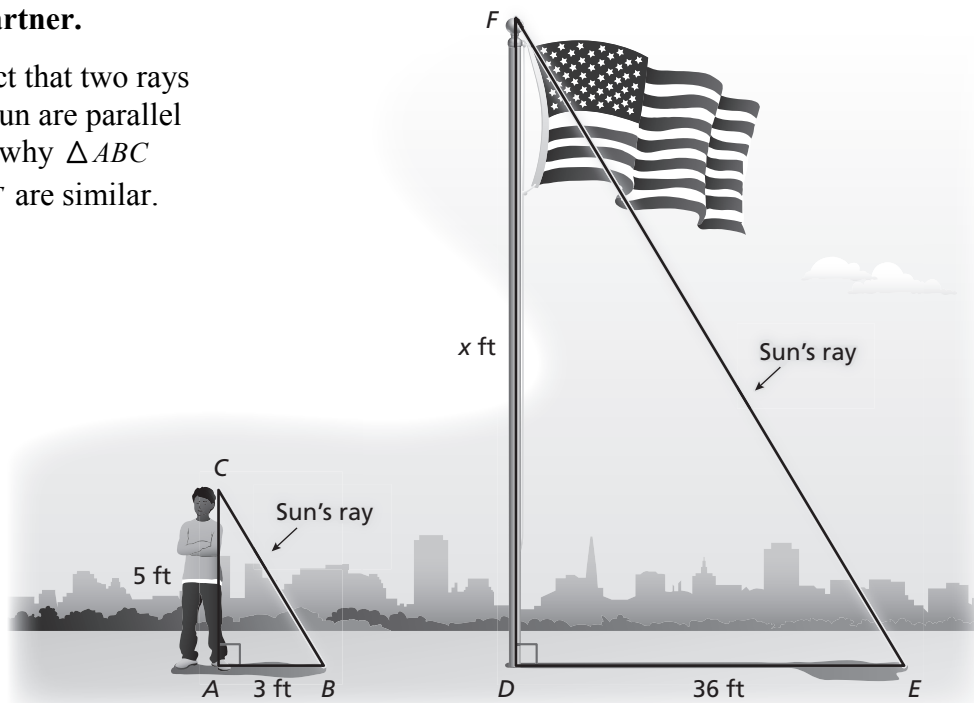
b. Measure the third angle in each triangle. What do you notice?

c. **REASONING** When two angles in one triangle are congruent to two angles in another triangle, can you conclude that the triangles are similar? Explain.

3 ACTIVITY: Indirect Measurement

Work with a partner.

a. Use the fact that two rays from the Sun are parallel to explain why $\triangle ABC$ and $\triangle DEF$ are similar.



12.4 Using Similar Triangles (continued)

- b. Explain how to use similar triangles to find the height of the flagpole.

What Is Your Answer?

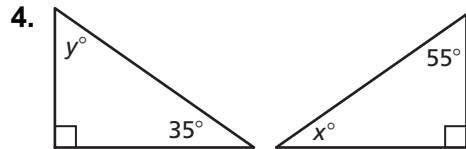
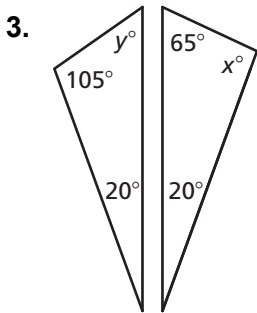
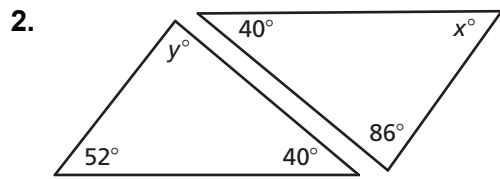
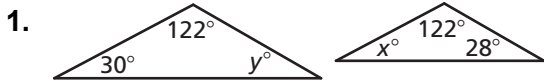
4. **IN YOUR OWN WORDS** How can you use angles to tell whether triangles are similar?
5. **PROJECT** Work with a partner or in a small group.
- a. Explain why the process in Activity 3 is called “indirect” measurement.
- b. **CHOOSE TOOLS** Use indirect measurement to measure the height of something outside your school (a tree, a building, a flagpole). Before going outside, decide what materials you need to take with you.
- c. **MODELING** Draw a diagram of the indirect measurement process you used. In the diagram, label the lengths that you actually measured and also the lengths that you calculated.
6. **PRECISION** Look back at Exercise 17 in Section 11.5. Explain how you can show that the two triangles are similar.

12.4

Practice

For use after Lesson 12.4

Tell whether the triangles are similar. Explain.



5. You can use similar triangles to find the height of a tree. Triangle ABC is similar to triangle DEC . What is the height of the tree?

