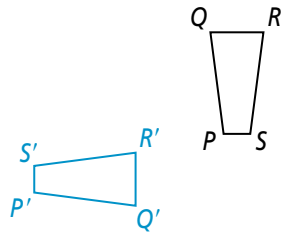


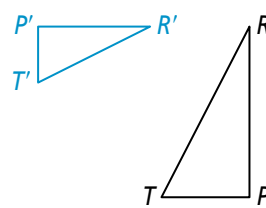
In each diagram, the blue figure is an image of the black figure.

- (a) Choose an angle or point from the preimage and name its image.
 (b) List all pairs of corresponding sides.

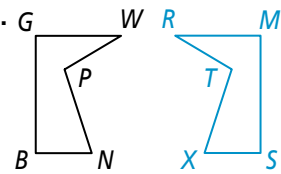
6.



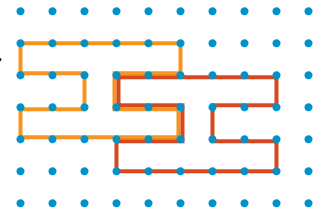
7.



8.



9. In the diagram at the right, the orange figure is a translation image of the red figure. Write a coordinate rule that describes the translation.

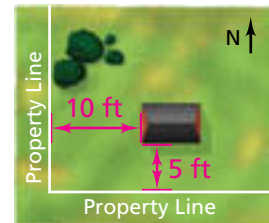


10. **Display Mathematical Ideas (1)(G)** $\triangle MUG$ has coordinates $M(2, -4)$, $U(6, 6)$, and $G(7, 2)$. A translation maps point M to $M'(-3, 6)$. What are the coordinates of U' and G' for this translation?

11. **Justify Mathematical Arguments (1)(G)** $PLAT$ has vertices $P(-2, 0)$, $L(-1, 1)$, $A(0, 1)$, and $T(-1, 0)$. The translation $T_{\langle -2, -3 \rangle}(PLAT) = P'L'A'T'$. Show that $\overline{PP'}$, $\overline{LL'}$, $\overline{AA'}$, and $\overline{TT'}$ are all parallel.

12. **Analyze Mathematical Relationships (1)(F)** If $T_{\langle 5, 7 \rangle}(\triangle MNO) = \triangle M'N'O'$, what coordinate rule maps $\triangle M'N'O'$ onto $\triangle MNO$?

13. **Apply Mathematics (1)(A)** The diagram at the right shows the site plan for a backyard storage shed. Local law, however, requires the shed to sit at least 15 ft from property lines. Describe how to move the shed to comply with the law.



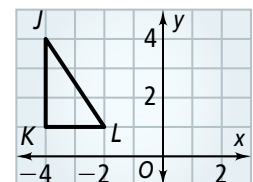
STEM

14. You write a computer animation program to help young children learn the alphabet. The program draws a letter, erases the letter, and makes it reappear in a new location two times. The program uses the following composition of translations to move the letter.

$$T_{\langle 5, 7 \rangle}(x, y) \text{ followed by } T_{\langle -9, -2 \rangle}(x, y)$$

Suppose the program makes the letter W by connecting the points $(1, 2)$, $(2, 0)$, $(3, 2)$, $(4, 0)$ and $(5, 2)$. What points does the program connect to make the last W?

15. **Connect Mathematical Ideas (1)(F)** $\triangle ABC$ has vertices $A(-2, 5)$, $B(-4, -1)$, and $C(2, -3)$. If $T_{\langle 4, 2 \rangle}(\triangle ABC) = \triangle A'B'C'$, show that the images of the midpoints of the sides of $\triangle ABC$ are the midpoints of the sides of $\triangle A'B'C'$.
16. **Explain Mathematical Ideas (1)(G)** Explain how to use translations to draw a parallelogram.
17. Use the graph at the right. Write three different rules for which the image of $\triangle JKL$ has a vertex at the origin.





Problem 4

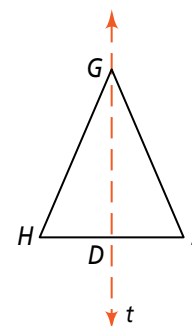
Plan

What do you have to know about $\triangle GHJ$ to show that it is an isosceles triangle? Isosceles triangles have at least two congruent sides.

Using Properties of Reflections

In the diagram, $R_t(G) = G$, $R_t(H) = J$, and $R_t(D) = D$. Use the properties of reflections to describe how you know that $\triangle GHJ$ is an isosceles triangle.

Since $R_t(G) = G$, $R_t(H) = J$, and reflections preserve distance, $R_t(\overline{GH}) = \overline{GJ}$. So $GH = GJ$ and, by definition, $\triangle GHJ$ is an isosceles triangle.



PRACTICE and APPLICATION EXERCISES

Scan page for a Virtual Nerd™ tutorial video.



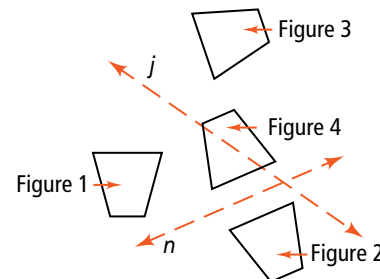
For additional support when completing your homework, go to PearsonTEXAS.com.

Create Representations to Communicate Mathematical Ideas (1)(E) Given points $J(1, 4)$, $A(3, 5)$, and $G(2, 1)$, graph $\triangle JAG$ and its reflection image as indicated.

1. $R_{x\text{-axis}}$
2. $R_{y\text{-axis}}$
3. $R_{y=2}$
4. $R_{y=5}$
5. $R_{x=-1}$
6. $R_{x=2}$

7. Each figure in the diagram at the right is a reflection of another figure across one of the reflection lines.

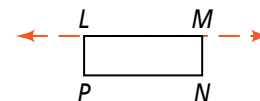
- a. Write a reflection rule to describe Figure 3. Justify your answer.
- b. Write a reflection rule to describe Figure 2. Justify your answer.
- c. Write a reflection rule to describe Figure 4. Justify your answer.



8. **Apply Mathematics (1)(A)** Give three examples from everyday life of objects or situations that show or use reflections.

9. In the diagram at the right, $LMNP$ is a rectangle with $LM = 2MN$.

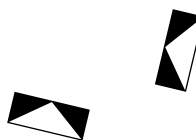
- a. Copy the diagram. Then sketch $R_{\overline{LM}}(LMNP)$.
- b. What figure results from the reflection? Use properties of reflections to justify your solution.



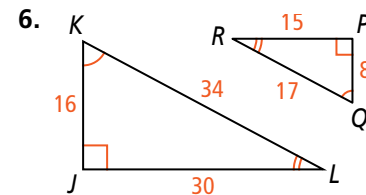
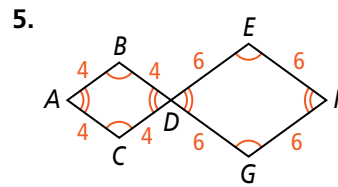
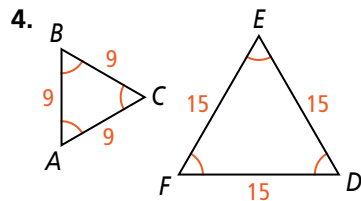
Copy each pair of figures. Then draw the line of reflection you can use to map one figure onto the other.



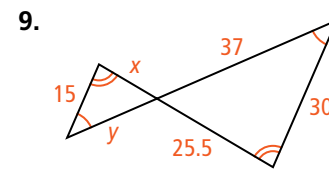
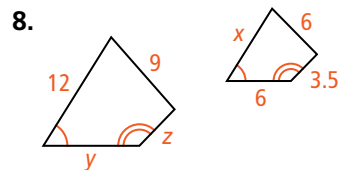
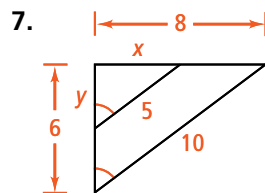
11.



Determine whether the polygons are similar. If so, write a similarity statement and give the scale factor. If not, explain.



The polygons are similar. Find the value of each variable.



- STEM** 10. The space allowed for the mascot on a school's Web page is 120 pixels wide by 90 pixels high. Its digital image is 500 pixels wide by 375 pixels high. What is the largest image of the mascot that will fit on the Web page?

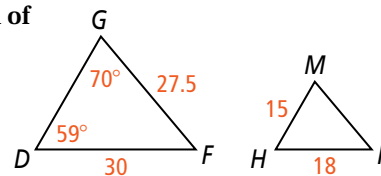
In the diagram at the right, $\triangle DFG \sim \triangle HKM$. Find each of the following.

11. $m\angle K$

12. $\frac{GD}{MH}$

13. MK

14. GD



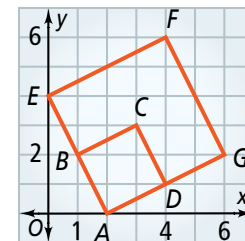
- STEM** 15. **Analyze Mathematical Relationships (1)(F)** You want to make a scale drawing of New York City's Empire State Building using the scale 1 in. = 250 ft. If the building is 1250 ft tall, how tall should you make the building in your scale drawing?

16. The Davis family is planning to drive from San Antonio to Houston. About how far will they have to drive?
17. **Justify Mathematical Arguments (1)(G)** Two polygons have corresponding side lengths that are proportional. Can you conclude that the polygons are similar? Justify your reasoning.
18. **Connect Mathematical Ideas (1)(F)** Explain why two congruent figures must also be similar. Include scale factor in your explanation.
19. $\triangle JLK$ and $\triangle RTS$ are similar. The scale factor of $\triangle JLK$ to $\triangle RTS$ is 3 : 1. What is the scale factor of $\triangle RTS$ to $\triangle JLK$?
20. In rectangle $BCEG$, $BC : CE = 2 : 3$. In rectangle $LJAW$, $LJ : JA = 2 : 3$. Show that $BCEG \sim LJAW$.



21. **Analyze Mathematical Relationships (1)(F)** A company produces a standard-sized U.S. flag that is 3 ft by 5 ft. The company also produces a giant-sized flag that is similar to the standard-sized flag. If the shorter side of the giant-sized flag is 36 ft, what is the length of its longer side?

22. a. **Explain Mathematical Ideas (1)(G)** What are the measures of $\angle A$, $\angle ABC$, $\angle BCD$, $\angle CDA$, $\angle E$, $\angle F$, and $\angle G$? Explain.
 b. What are the lengths of \overline{AB} , \overline{BC} , \overline{CD} , \overline{DA} , \overline{AE} , \overline{EF} , \overline{FG} , and \overline{AG} ?
 c. Is $ABCD$ similar to $AEFG$? Justify your answer.



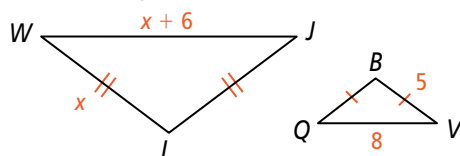
Create Representations to Communicate Mathematical Ideas (1)(E) Choose a scale and make a scale drawing of each rectangular playing surface.

23. A soccer field is 110 yd by 60 yd.

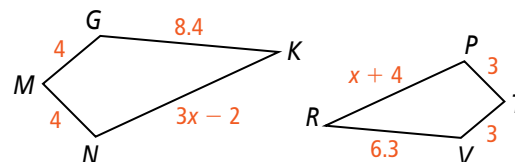
24. A football field is 360 ft by 160 ft.

Find the value of x . Give the scale factor of the polygons.

25. $\triangle WLJ \sim \triangle QBV$



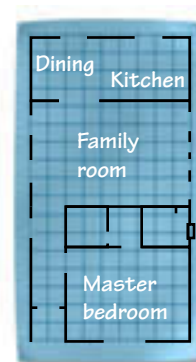
26. $GKNM \sim VRPT$



STEM 27. **Apply Mathematics (1)(A)** The scale drawing at the right is part of a floor plan for a home. The scale is 1 cm = 10 ft. What are the actual dimensions of the family room?

28. The lengths of the sides of a triangle are in the extended ratio 2 : 3 : 4. The perimeter of the triangle is 54 in.

- a. The length of the shortest side of a similar triangle is 16 in. What are the lengths of the other two sides of this triangle?
 b. Compare the ratio of the perimeters of the two triangles to their scale factor. What do you notice?



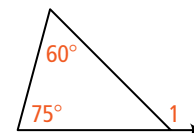
TEXAS Test Practice

29. $PQRS \sim JKLM$ with a scale factor of 4 : 3. $QR = 8$ cm. What is the value of KL ?

- A. 6 cm B. 8 cm C. $10\frac{2}{3}$ cm D. 24 cm

30. In the diagram at the right, what is $m\angle 1$?

- F. 45 G. 75 H. 125 J. 135

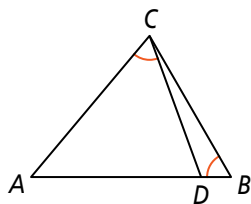


31. Which of the following is NOT a property of an isosceles trapezoid?

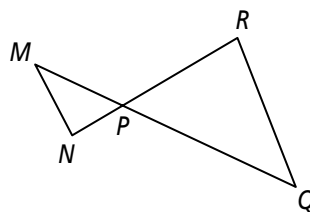
- A. The base angles are congruent. C. The diagonals are perpendicular.
 B. The legs are congruent. D. The diagonals are congruent.



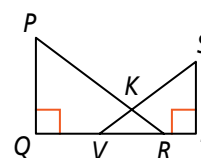
4. Given: $\angle ABC \cong \angle ACD$
Proof **Prove:** $\triangle ABC \sim \triangle ACD$



5. Given: $PR = 2NP$,
 $PQ = 2MP$
Proof **Prove:** $\triangle MNP \sim \triangle QRP$

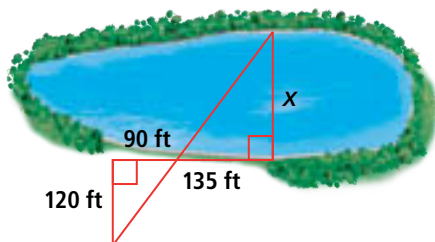


6. Given: $\overline{PQ} \perp \overline{QT}$, $\overline{ST} \perp \overline{TQ}$,
 $\frac{PQ}{ST} = \frac{QR}{TV}$
Proof **Prove:** $\triangle VKR$ is isosceles.

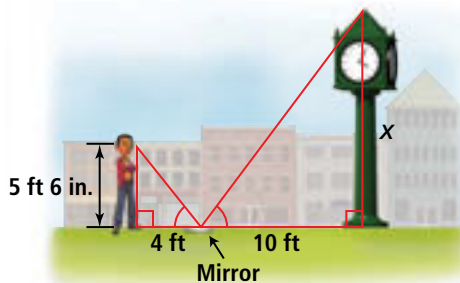


Explain why the triangles are similar. Then find the distance represented by x .

7.



8.



9. **Analyze Mathematical Relationships (1)(F)** At a certain time of day, a 1.8-m-tall person standing next to the Washington Monument casts a 0.7-m shadow. At the same time, the Washington Monument casts a 65.8-m shadow. How tall is the Washington Monument?

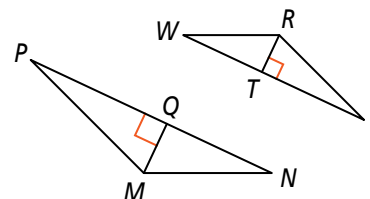
10. a. Are two isosceles triangles always similar? Explain.
 b. Are two right isosceles triangles always similar? Explain.

11. **Apply Mathematics (1)(A)** A 2-ft vertical post casts a 16-in. shadow at the same time that a nearby cell phone tower casts a 120-ft shadow. How tall is the cell phone tower?

12. **Justify Mathematical Arguments (1)(G)** Does any line that intersects two sides of a triangle and is parallel to the third side of the triangle form two similar triangles? Justify your reasoning.

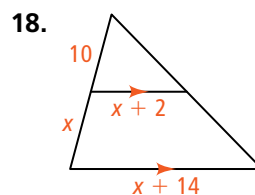
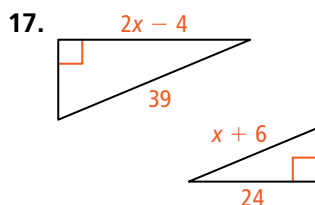
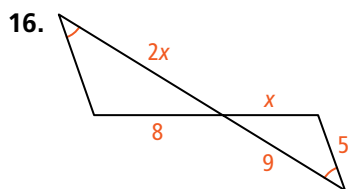
13. Draw any $\triangle ABC$ with $m\angle C = 30$. Use a straightedge and compass to construct $\triangle LKJ$ so that $\triangle LKJ \sim \triangle ABC$.

14. **Explain Mathematical Ideas (1)(G)** In the diagram at the right, $\triangle PMN \sim \triangle SRW$. \overline{MQ} and \overline{RT} are altitudes. The scale factor of $\triangle PMN$ to $\triangle SRW$ is 4 : 3. What is the ratio of \overline{MQ} to \overline{RT} ? Explain how you know.



15. Proof $\triangle ABC$ has vertices $A(0, 0)$, $B(2, 4)$, and $C(4, 2)$. $\triangle RST$ has vertices $R(0, 3)$, $S(-1, 5)$, and $T(-2, 4)$. Prove that $\triangle ABC \sim \triangle RST$.

For each pair of similar triangles, find the value of x .

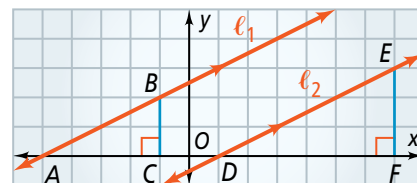


19. Write a proof of the following: Any two nonvertical parallel lines have equal slopes.

Proof

Given: Nonvertical lines ℓ_1 and ℓ_2 , $\ell_1 \parallel \ell_2$,
 \overline{EF} and \overline{BC} are \perp to the x -axis

Prove: $\frac{BC}{AC} = \frac{EF}{DF}$



20. Use the diagram in Exercise 19. Prove: Any two nonvertical lines with equal slopes are parallel.

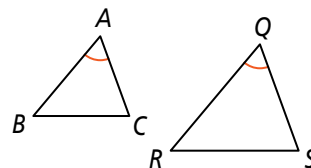
Proof

21. Write a paragraph proof to prove the Side-Angle-Side Similarity Theorem (Theorem 9-1).

Proof

Given: $\frac{AB}{QR} = \frac{AC}{QS}$, $\angle A \cong \angle Q$

Prove: $\triangle ABC \sim \triangle QRS$

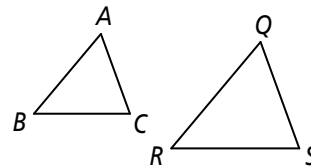


22. Write a paragraph proof to prove the Side-Side-Side Similarity Theorem (Theorem 9-2).

Proof

Given: $\frac{AB}{QR} = \frac{AC}{QS} = \frac{BC}{RS}$

Prove: $\triangle ABC \sim \triangle QRS$



TEXAS Test Practice

23. Complete the statement $\triangle ABC \sim \underline{\quad? \quad}$. By which postulate or theorem are the triangles similar?

A. $\triangle AKN$; SSS \sim

C. $\triangle ANK$; SAS \sim

B. $\triangle AKN$; SAS \sim

D. $\triangle ANK$; AA \sim

24. $\angle 1$ and $\angle 2$ are alternate interior angles formed by two parallel lines and a transversal. If $m\angle 2 = 68$, what is $m\angle 1$?

F. 22

G. 68

H. 112

J. 122

25. The length of a rectangle is twice its width. If the perimeter of the rectangle is 72 in., what is the length of the rectangle?

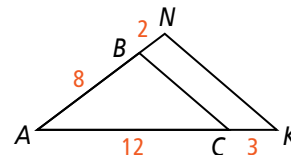
A. 12 in.

B. 18 in.

C. 24 in.

D. 36 in.

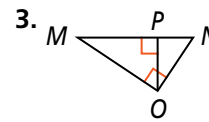
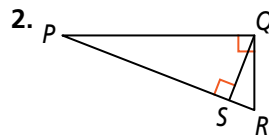
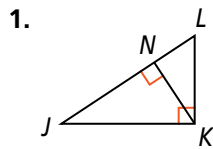
26. Graph $A(2, 4)$, $B(4, 6)$, $C(6, 4)$, and $D(4, 2)$. What type of polygon is $ABCD$? Justify your answer.





For additional support when completing your homework, go to PearsonTEXAS.com.

Write a similarity statement relating the three triangles in each diagram.



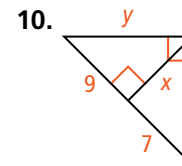
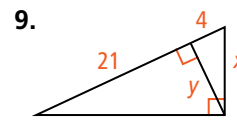
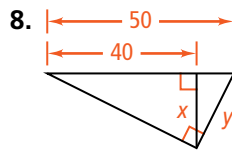
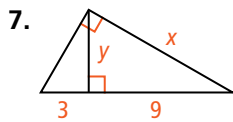
Find the geometric mean of each pair of numbers.

4. 4 and 10

5. 3 and 48

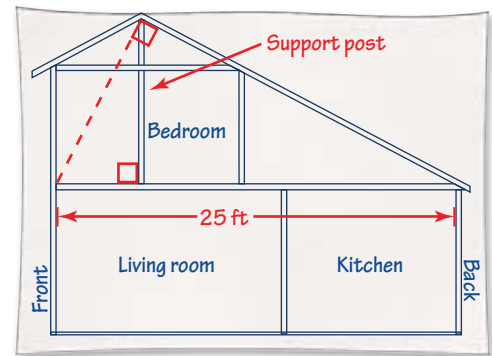
6. 5 and 125

Select Techniques to Solve Problems (1)(C) Solve for x and y .



STEM

11. **Analyze Mathematical Relationships (1)(F)** The architect's side view drawing of a saltbox-style house shows a post that supports the roof ridge. The support post is 10 ft tall. How far from the front of the house is the support post positioned?



12. a. The altitude to the hypotenuse of a right triangle divides the hypotenuse into segments 2 cm and 8 cm long. Find the length of the altitude to the hypotenuse.
 b. Use a ruler to make an accurate drawing of the right triangle in part (a).
 c. Describe how you drew the triangle in part (b).

Find the geometric mean of each pair of numbers.

13. 1 and 1000

14. 5 and 1.25

15. $\sqrt{8}$ and $\sqrt{2}$

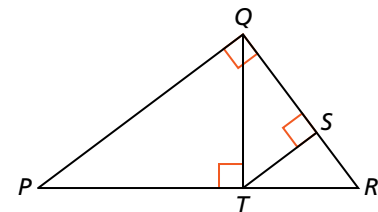
16. $\frac{1}{2}$ and 2

17. $\sqrt{28}$ and $\sqrt{7}$

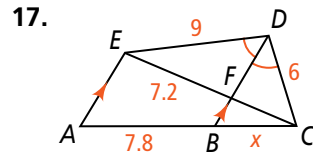
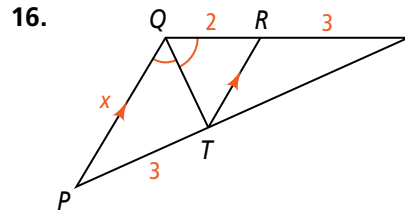
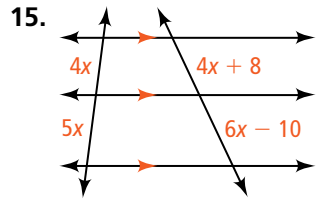
18. **Evaluate Reasonableness (1)(B)** A classmate says the following statement is true: The geometric mean of positive numbers a and b is \sqrt{ab} . Do you agree? Explain.

19. Write all possible similarity statements relating pairs of triangles in the diagram at the right.

20. **Use a Problem-Solving Model (1)(B)** The altitude to the hypotenuse of a right triangle divides the hypotenuse into segments with lengths in the ratio 1 : 2. The length of the altitude is 8. How long is the hypotenuse?



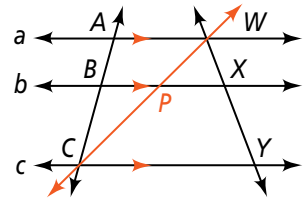
Solve for x .



18. **Proof** Prove the Corollary to the Triangle Proportionality Theorem. In the diagram from page 408, draw the auxiliary line \overleftrightarrow{CW} and label its intersection with line b as point P .

Given: $a \parallel b \parallel c$

Prove: $\frac{AB}{BC} = \frac{WX}{XY}$



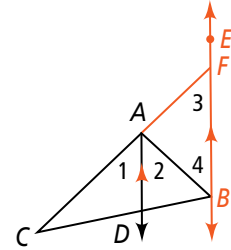
19. **Proof** **Justify Mathematical Arguments (1)(G)** Use the definition in part (a) to prove the statements in parts (b) and (c).

- Write a definition for a midsegment of a parallelogram.
- A parallelogram midsegment is parallel to two sides of the parallelogram.
- A parallelogram midsegment bisects the diagonals of a parallelogram.

20. **Proof** Prove the Triangle-Angle-Bisector Theorem. In the diagram at the top of page 409, draw the auxiliary line \overleftrightarrow{BE} so that $\overleftrightarrow{BE} \parallel \overleftrightarrow{DA}$. Extend \overleftrightarrow{CA} to meet \overleftrightarrow{BE} at point F .

Given: \overleftrightarrow{AD} bisects $\angle CAB$.

Prove: $\frac{CD}{DB} = \frac{CA}{BA}$



STEM **Apply Mathematics (1)(A)** In Washington, D.C., E. Capitol Street, Independence Avenue, C Street, and D Street are parallel streets that intersect Kentucky Avenue and 12th Street.

- How long (to the nearest foot) is Kentucky Avenue between C Street and D Street?
- How long (to the nearest foot) is Kentucky Avenue between E. Capitol Street and Independence Avenue?
- An angle bisector of a triangle divides the opposite side of the triangle into segments 5 cm and 3 cm long. A second side of the triangle is 7.5 cm long. Find all possible lengths for the third side of the triangle.

