

Mid-Chapter Quiz: Lessons 7-1 through 7-4

Solve each proportion.

1. $\frac{2}{5} = \frac{x}{25}$

SOLUTION:

$$\frac{2}{5} = \frac{x}{25}$$

Cross multiply.

$$2(25) = x(5)$$

Solve for x .

$$50 = 5x$$

$$x = 10$$

ANSWER:

10

2. $\frac{10}{3} = \frac{7}{x}$

SOLUTION:

$$\frac{10}{3} = \frac{7}{x}$$

Cross multiply.

$$10(x) = 7(3)$$

Solve for x .

$$10x = 21$$

$$x = 2.1$$

ANSWER:

2.1

Mid-Chapter Quiz: Lessons 7-1 through 7-4

3. $\frac{y+4}{11} = \frac{y-2}{9}$

SOLUTION:

$$\frac{y+4}{11} = \frac{y-2}{9}$$

Cross multiply.

$$9(y+4) = 11(y-2)$$

Solve for y .

$$9y + 36 = 11y - 22$$

$$2y = 58$$

$$y = 29$$

ANSWER:

29

4. $\frac{z-1}{3} = \frac{8}{z+1}$

SOLUTION:

$$\frac{z-1}{3} = \frac{8}{z+1}$$

Cross multiply.

$$(z+1)(z-1) = 24$$

Solve for z .

$$z^2 - 1 = 24$$

$$z^2 = 25$$

$$z = \pm 5$$

ANSWER:

5 or -5

Mid-Chapter Quiz: Lessons 7-1 through 7-4

5. **BASEBALL** A pitcher's earned run average or ERA is the product of 9 and the ratio of earned runs the pitcher has allowed to the number of innings pitched. During the 2007 season, Johan Santana of the Minnesota Twins allowed 81 earned runs in 219 innings pitched. Find his ERA to the nearest hundredth.

SOLUTION:

Let the unknown number be x .

Form a proportion for the given information.

$$\frac{8 \text{ earned runs}}{219 \text{ innings}} = \frac{x \text{ earned runs}}{9 \text{ innings}}$$

$$\frac{81}{219} = \frac{x}{9}$$

Cross multiply.

$$9(81) = x(219)$$

Solve for x .

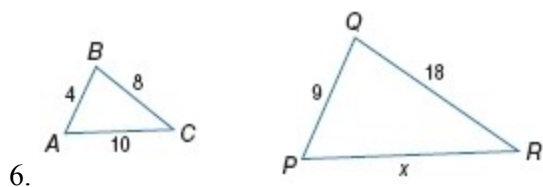
$$729 = 219x$$

$$x \approx 3.33$$

ANSWER:

3.33

Each pair of polygons is similar. Find the value of x .



SOLUTION:

Use the corresponding side lengths to write a proportion.

$$\frac{x}{10} = \frac{9}{4}$$

Solve for x .

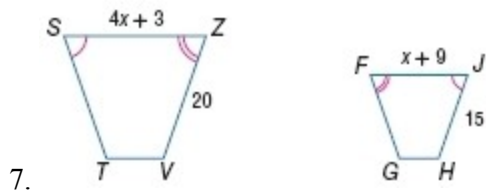
$$4x = 90$$

$$x = 22.5$$

ANSWER:

22.5

Mid-Chapter Quiz: Lessons 7-1 through 7-4



SOLUTION:

Use the corresponding side lengths to write a proportion.

$$\frac{4x+3}{x+9} = \frac{20}{15}$$

Solve for x .

$$\begin{aligned} 15(4x+3) &= 20(x+9) \\ 60x+45 &= 20x+180 \\ 40x &= 135 \\ x &\approx 3.4 \end{aligned}$$

ANSWER:

3.4

8. **MULTIPLE CHOICE** Two similar polygons have a scale factor of 3: 5. The perimeter of the large polygon is 120 feet. Find the perimeter of the small polygon.
- A** 68 ft
B 72 ft
C 192 ft
D 200 ft

SOLUTION:

The scale factor of the small polygon to the large polygon is 3: 5.

Use the perimeter of the large polygon and the scale factor to write a proportion.

$$\begin{aligned} \frac{3}{5} &= \frac{\text{perimeter of small polygon}}{\text{perimeter of large polygon}} \\ \frac{3}{5} &= \frac{x}{120} \\ 5x &= 360 \\ x &= 72 \text{ ft} \end{aligned}$$

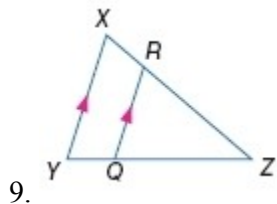
Therefore, the correct choice is **B**.

ANSWER:

B

Mid-Chapter Quiz: Lessons 7-1 through 7-4

Determine whether the triangles are similar. If so, write a similarity statement. If not, what would be sufficient to prove the triangles similar? Explain your reasoning.



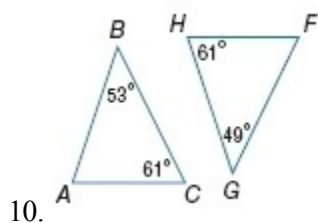
SOLUTION:

Since $\overline{XY} \parallel \overline{RQ}$, then $\angle YXZ \cong \angle QRZ$ and $\angle XYZ \cong \angle RQZ$ because they are corresponding angles formed by parallel lines.

Yes; $\triangle YXZ \sim \triangle QRZ$ by AA Similarity.

ANSWER:

Yes; $\triangle YXZ \sim \triangle QRZ$ by AA Similarity.



SOLUTION:

Since the angles of a triangle add up to 180, we can find the missing angles of the two triangles.

In $\triangle ABC$, we have:

$$\begin{aligned} 53 + 61 + m\angle A &= 180 \\ m\angle A &= 180 - (53 + 61) \\ m\angle A &= 66 \end{aligned}$$

In $\triangle HFG$, we have:

$$\begin{aligned} 49 + 61 + m\angle F &= 180 \\ m\angle F &= 180 - (49 + 61) \\ m\angle F &= 70 \end{aligned}$$

No; The angles of the triangle can never be congruent, so the triangles can never be similar.

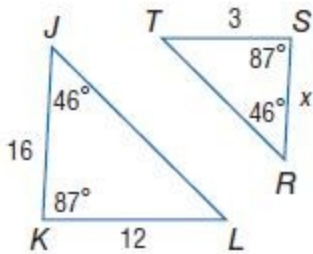
ANSWER:

No; The angles of the triangle can never be congruent, so the triangles can never be similar.

Mid-Chapter Quiz: Lessons 7-1 through 7-4

ALGEBRA Identify the similar triangles. Find each measure.

11. SR



SOLUTION:

We can prove that $\triangle JKL \sim \triangle RST$ by AA Similarity. Therefore, we can set up a proportion and solve for x :

$$\frac{RS}{ST} = \frac{JK}{KL}$$

$$\frac{x}{3} = \frac{16}{12}$$

$$12x = 48$$

$$x = 4$$

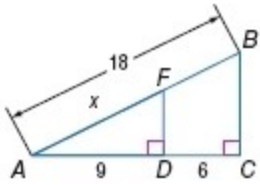
Therefore, $SR = 4$.

ANSWER:

$$\triangle JKL \sim \triangle RST; 4$$

Mid-Chapter Quiz: Lessons 7-1 through 7-4

12. AF



SOLUTION:

By AA Similarity, $\triangle ABC \sim \triangle AFD$.

Use the corresponding side lengths to write a proportion and solve for x :

$$\frac{AF}{AB} = \frac{AD}{AC}$$

$$\frac{x}{18} = \frac{9}{15}$$

$$15x = 162$$

$$x = 10.8$$

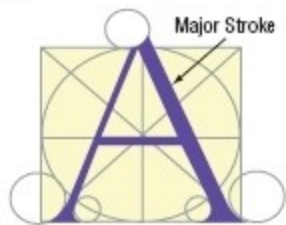
Therefore, $AF = 10.8$.

ANSWER:

$\triangle ABC \sim \triangle AFD$; 10.8

Mid-Chapter Quiz: Lessons 7-1 through 7-4

13. **HISTORY** In the fifteenth century, mathematicians and artists tried to construct the perfect letter. A square was used as a frame to design the letter “A,” as shown below. The thickness of the major stroke of the letter was $\frac{1}{12}$ the height of the letter.



- a. Explain why the bar through the middle of the A is half the length of the space between the outside bottom corners of the sides of the letter.
- b. If the letter were 3 centimeters tall, how wide would the major stroke be?

SOLUTION:

- a. The bar connects the midpoints of each leg of the letter and it is parallel to the base. This is true because the bar is along the diameter of the inscribed circle. Therefore, the length of the bar is one-half the length of the base because a midsegment of a triangle is parallel to one side of the triangle, and its length is one-half the length of that side.
- b. Let the unknown be x . Form a proportion for the given information.

$$\frac{1}{12} = \frac{x}{3}$$

$$12x = 3$$

$$x = 0.25$$

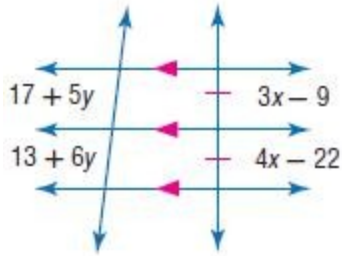
So, the major stroke would be 0.25 cm wide.

ANSWER:

- a. The bar connects the midpoints of each leg of the letter and it is parallel to the base. Therefore, the length of the bar is one-half the length of the base because a midsegment of a triangle is parallel to one side of the triangle, and its length is one-half the length of that side.
- b. 0.25 cm

Mid-Chapter Quiz: Lessons 7-1 through 7-4

ALGEBRA Find x and y .



14.

SOLUTION:

We see that $4x - 22 = 3x - 9$.

Solve for x .

$$\begin{aligned}4x - 3x &= 22 - 9 \\x &= 13\end{aligned}$$

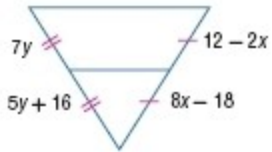
By Corollary 7.2, set up an equation and solve for y .

$$\begin{aligned}13 + 6y &= 17 + 5y \\13 + 6y &= 17 + 5y \\y &= 17 - 13 \\y &= 4\end{aligned}$$

ANSWER:

$$x = 13, y = 4$$

Mid-Chapter Quiz: Lessons 7-1 through 7-4



15.

SOLUTION:

We see that $8x - 18 = 12 - 2x$ and $7y = 5y + 16$.

Solve for x .

$$8x - 18 = 12 - 2x$$

$$10x = 18 + 12$$

$$10x = 30$$

$$x = 3$$

Solve for y .

$$7y = 5y + 16$$

$$2y = 16$$

$$y = 8$$

ANSWER:

$$x = 3, y = 8$$