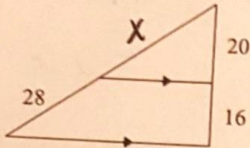


Warm Up-

Find the missing length indicated.

1)

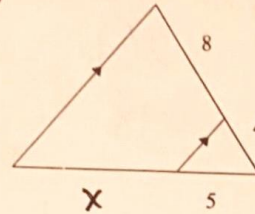


$$\frac{x}{28} = \frac{20}{16}$$

$$16x = 560$$

$$x = 35$$

2)

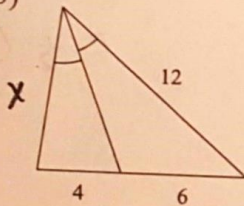


$$\frac{4}{8} = \frac{5}{x}$$

$$4x = 40$$

$$x = 10$$

3)

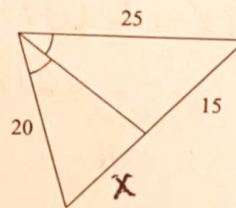


$$\frac{x}{6} = \frac{x}{12}$$

$$6x = 48$$

$$x = 8$$

4)



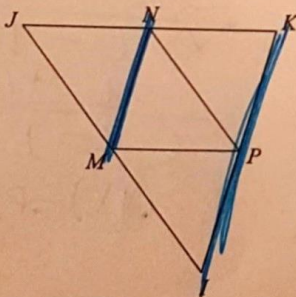
$$\frac{x}{15} = \frac{20}{25}$$

$$25x = 300$$

$$x = 12$$

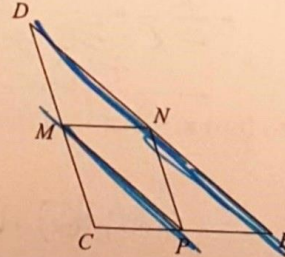
In each triangle, M, N, and P are the midpoints of the sides. Name a segment parallel to the one given.

5)



$$\overline{MN} \parallel \overline{KI}$$

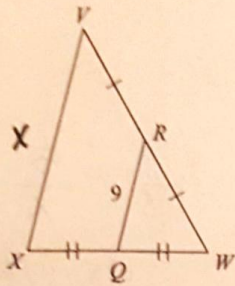
6)



$$\overline{DE} \parallel \overline{MP}$$

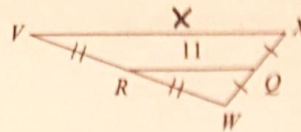
Find the missing length indicated.

7) Find VX



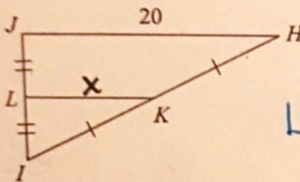
$$\begin{aligned} VX &= 2(RQ) \\ &= 2(9) \\ &= 18 \end{aligned}$$

8) Find XV



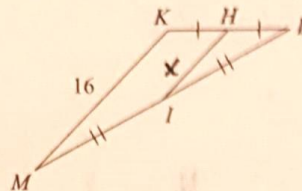
$$\begin{aligned} VX &= 2(RQ) \\ &= 2(11) \\ &= 22 \end{aligned}$$

9) Find KL



$$\begin{aligned} LK &= \frac{1}{2}(JH) \\ &= \frac{1}{2}(20) \\ &= 10 \end{aligned}$$

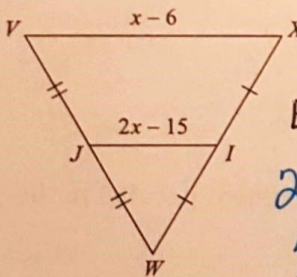
10) Find HI



$$\begin{aligned} HI &= \frac{1}{2}(MI) \\ &= \frac{1}{2}(16) = 8 \end{aligned}$$

Solve for x.

11)

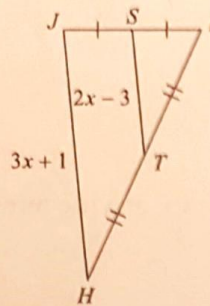


$$2(JI) = VX$$

Equation:

$$\begin{aligned} 2(2x-15) &= x-6 \\ 4x-30 &= x-6 \\ -x & \quad -x \\ \hline 3x-30 &= -6 \\ +30 & \quad +30 \\ \hline 3x &= 24 \end{aligned}$$

12)



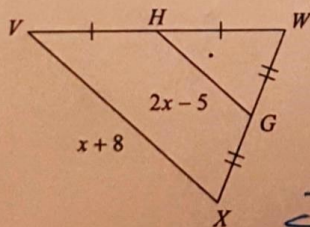
$$2(ST) = JH$$

Equation:

$$\begin{aligned} 2(2x-3) &= 3x+1 \\ 4x-6 &= 3x+1 \\ -3x & \quad -3x \\ \hline x-6 &= 1 \\ +6 & \quad +6 \\ \hline x &= 7 \end{aligned}$$

Write the equation to find x. Then find the missing length. $x=8$

13) Find VX



$$2(HG) = VX$$

$$2(2x-5) = x+8$$

$$4x-10 = x+8$$

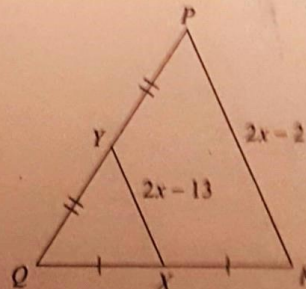
$$\begin{aligned} -x & \quad -x \\ \hline 3x-10 &= 8 \\ 3x &= 18 \\ x &= 6 \end{aligned}$$

Equation:

$$\begin{aligned} VX &= x+8 \\ &= 6+8 \end{aligned}$$

$$VX = 14$$

14) Find RP



$$2(YX) = PR$$

Equation:

$$2(2x-13) = 2x-2$$

$$4x-26 = 2x-2$$

$$-2x \quad -2x$$

$$2x-26 = -2$$

$$2x = 24$$

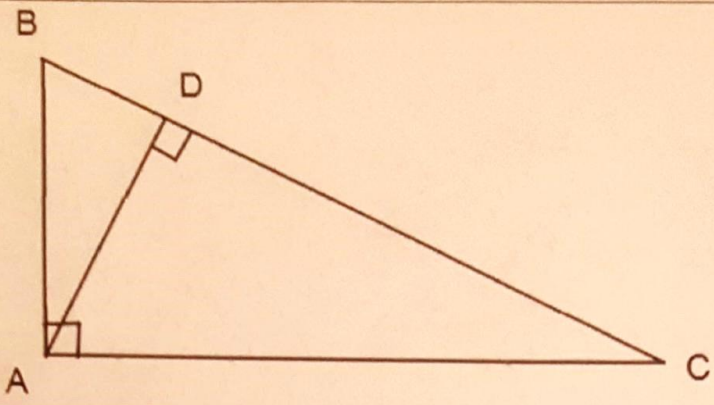
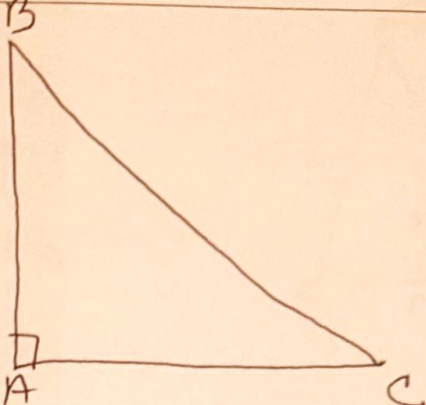
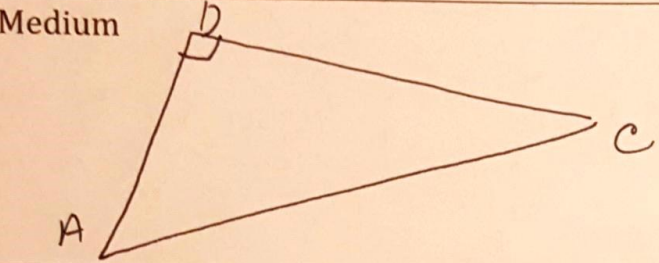
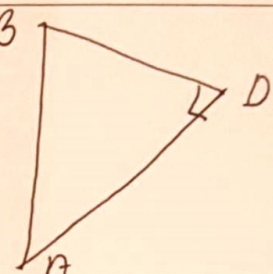
$$RP = 2(12) - 2$$

$$RP = 22 \quad x=12$$

$$PR = 2(12) - 2$$

Similar Right Triangles

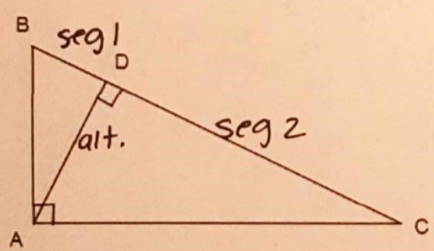
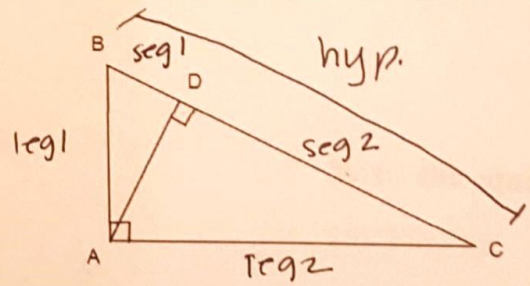
\overline{AD} is an altitude of $\triangle BAC$. Name the three similar triangles.

	Large 
Medium 	Small 

Name the similar triangles:

- L: $\overset{90^\circ}{A}$ $\overset{\text{same as } \triangle B}{B}$ $\overset{\text{same as Med.}}{C}$ 1. $\triangle ABC \sim \triangle DAC$
- M: D A C 2. $\triangle ABC \sim \triangle DBA$
- S: D B A 3. $\triangle DAC \sim \triangle DAB$

Solving Right Triangles

Altitude Rule	Leg Rule
	
<p>Proportion:</p> $\frac{\text{seg 1}}{\text{alt.}} = \frac{\text{alt.}}{\text{seg 2}}$ $\frac{BD}{AD} = \frac{AD}{DC}$	<p>Proportion:</p> <p style="text-align: center; margin-left: 20px;">Small leg</p> $\frac{\text{seg 1}}{\text{leg 2}} = \frac{\text{leg 1}}{\text{hyp}}$ $\frac{BD}{AB} = \frac{AB}{BC}$ <p style="text-align: center; margin-left: 20px;">large leg.</p> $\frac{\text{seg 2}}{\text{leg 2}} = \frac{\text{leg 2}}{\text{hyp}}$ $\frac{DC}{AC} = \frac{AC}{BC}$

Examples

1. alt?

$$\frac{s_1}{alt} = \frac{alt}{s_2} \quad \frac{36}{x} = \frac{x}{64}$$

$$\sqrt{x^2} = \sqrt{2304} \quad x = 48$$

2.

$$\frac{8}{x} = \frac{x}{18}$$

$$\sqrt{x^2} = \sqrt{144} \quad x = 12$$

3.

$$25 - 9 = 16$$

$$\frac{9}{x} = \frac{x}{16} \quad \sqrt{x^2} = \sqrt{144} \quad x = 12$$

4.

$$\frac{36}{x} = \frac{x}{64}$$

$$\sqrt{x^2} = \sqrt{2304} \quad x = 48$$

5. leg?

$$\frac{s_1}{L_1} = \frac{L_1}{hyp} \quad \frac{3}{x} = \frac{x}{12}$$

$$\sqrt{x^2} = \sqrt{36} \quad x = 6$$

6. leg?

$$\frac{9}{x} = \frac{x}{25}$$

$$\sqrt{x^2} = \sqrt{225} \quad x = 15$$

7. leg?

$$\frac{s_2}{L_2} = \frac{L_2}{hyp.} \quad \frac{18}{x} = \frac{x}{23}$$

8.

$$\frac{36}{48} = \frac{48}{x}$$

$$\frac{36x}{36} = \frac{2304}{36}$$

$$x = 64$$

9. leg?

$$\frac{36}{x} = \frac{x}{100}$$

$$\sqrt{x^2} = \sqrt{3600}$$

$$x = 60$$

10.

$$\frac{9}{x} = \frac{x}{25}$$

$$\sqrt{x^2} = \sqrt{225} \quad x = 15$$

11.

$$\frac{8}{x} = \frac{x}{24}$$

$$\sqrt{x^2} = \sqrt{192}$$

$$\sqrt{64 \cdot 3} = 8\sqrt{3}$$

12.

$$\frac{8}{x} = \frac{x}{20}$$

$$\sqrt{x^2} = \sqrt{160}$$

$$x = \pm \sqrt{160}$$

$$x = 4\sqrt{10}$$

13.

$$\frac{9}{12} = \frac{12}{x}$$

$$9x = 144$$

$$x = 16$$

14.

$$15^2 - 9^2 = \sqrt{144} = 12$$

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

$$9x = 225$$

$$x = 25$$

15.

$$60^2 - 36^2 = \sqrt{2304} = 48$$

$$\frac{x}{60} = \frac{60}{36}$$

$$36x = 3600$$

$$x = 100$$

SIMILAR TRIANGLE PROBLEM SOLVING

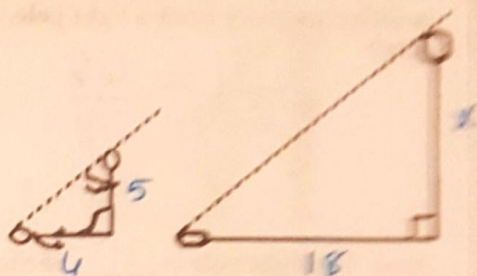
For #1-10, solve each involving similar triangles by labeling the given diagram and applying that *Corresponding Sides of Similar Triangles are in Proportion*. Show your process!

- ① A 5 foot tall person elicits a shadow of 6 feet at the same time that a lamppost casts an 18 foot shadow. What is the height of the lamppost?

$$\frac{x}{18} = \frac{5}{6} \quad 6x = 90$$

$$x = 15$$

Ans: The lamppost is 15 feet tall.



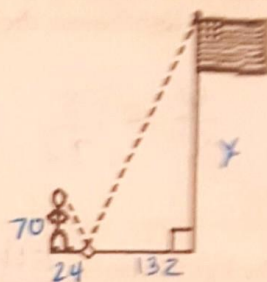
- ② A mirror is 132 inches from a flagpole. If your height is 70 inches and you are 24 inches from the mirror, then how tall is the flagpole?

$$\frac{x}{132} = \frac{70}{24}$$

$$24x = 9240$$

$$x = 385$$

Ans: The flagpole is 385 feet tall.

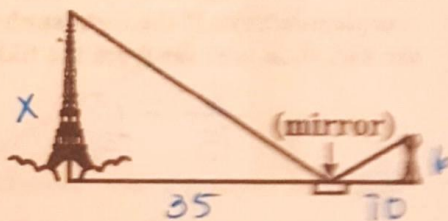


- ③ A mirror is 35 feet from a model iron tower. If your eye is 6 feet above the ground and you are 10 feet from the mirror, then how tall is the tower?

$$\frac{x}{35} = \frac{6}{10} \quad 10x = 210$$

$$x = 21$$

Ans: The model iron tower is 21 feet tall.

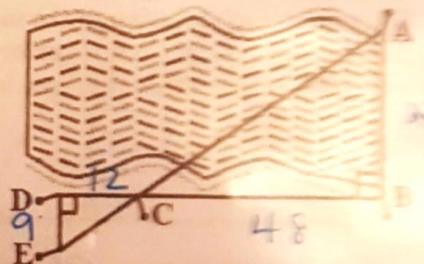


- ④ To estimate the width of a river, a surveyor places stakes on locations labeled A, B, C, D and E. If DE is 9 feet, DC is 12 feet and CB is 48 feet, then what is the width across the river?

$$\frac{x}{48} = \frac{9}{12} \quad 12x = 432$$

$$x = 36$$

Ans: The width of the river is 36 feet.



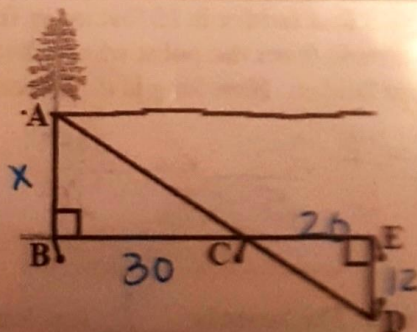
- ⑤ To estimate the width of a canyon, a park ranger places stakes on locations labeled A, B, C, D and E. If DE is 12 yards, CE is 20 yards and CB is 30 yards, then what is the width across the canyon?

$$\frac{x}{30} = \frac{12}{20}$$

$$20x = 360$$

$$x = 18$$

Ans: The width of the canyon is 18 yards wide.



SIMILAR TRIANGLE PROBLEM SOLVING

For #1-10, solve each involving similar triangles by labeling the given diagram and applying that *Corresponding Sides of Similar Triangles are in Proportion*. Show your process!

- ⑥ A lady who is 66 inches tall casts a shadow of 72 inches. If she is 48 inches away from a light pole, then how tall is the light pole?

$$\frac{x}{120} = \frac{66}{72}$$

$$72x = 7920$$

$$x = 110$$

Ans: The light pole is 110 inches tall.



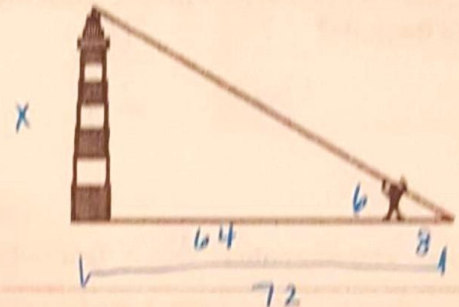
- ⑦ A 6 foot tall man elicits an 8 foot shadow. If the man is 64 feet away from the lighthouse, then how tall is the lighthouse?

$$\frac{6}{8} = \frac{x}{72}$$

$$8x = 432$$

$$x = 54$$

Ans: The lighthouse is 54 feet tall.



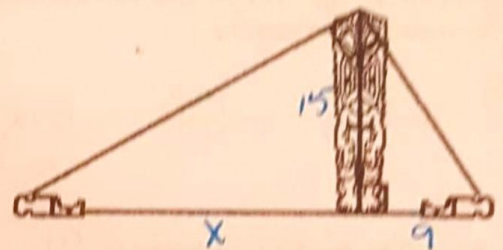
- ⑧ Two sunbathers lie on opposite ends of a 15 foot tall tiki statue. Their angles of elevation to the top of the tiki are complementary. If the right sunbather is 9 feet away from the tiki, then how far from the tiki is the left sunbather?

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

$$9x = 225$$

$$x = 25$$

Ans: The left sunbather is 25 feet away from the tiki.



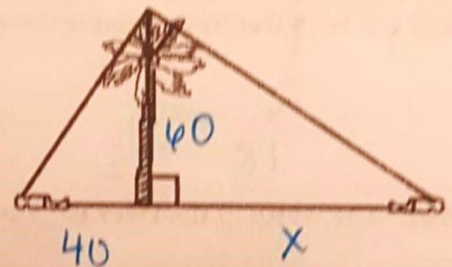
- ⑨ Two surfers lie on opposite ends of a 60 foot tall coconut tree. Their angles of elevation to the top of the tree are complementary. If the left surfer is 40 feet away from the tree, then how far from the tree is the right surfer?

$$\frac{40}{60} = \frac{60}{x}$$

$$40x = 3600$$

$$x = 90$$

Ans: The right surfer is 90 feet away from the tree.



- ⑩ A 25 foot ladder is 15 feet away from a building. A brace extends from the point where the building meets the ground to the ladder. How long is the brace?

$$\frac{25}{15} = \frac{15}{x}$$

$$25x = 225$$

$$x = 9$$

Ans: The brace is 9 feet long.

