

Key

1. Use the right triangles to the right to determine each of the following;

a) Perimeter.

Lg: 54 Sm: 18

b) Area

Lg: 135 Sm: 15

c) Scale Factor

Sm to Lg : 3 Lg to Sm: $\frac{1}{3}$

d) Perimeter Ratio

$\frac{Sm}{Lg} = \frac{18}{54} = \frac{1}{3}$ or 1:3 or 1 to 3

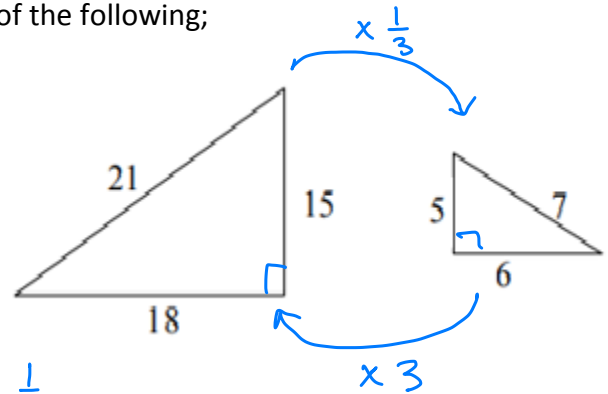
e) Area ratio

$\frac{Sm}{Lg} = \frac{15}{135} = \frac{1}{9}$ 1:9

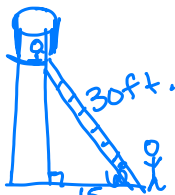
f) How does the scale factor compare to the perimeter ratio and the area ratio?

Perimeter ratio is the same

Area ratio is the scale squared

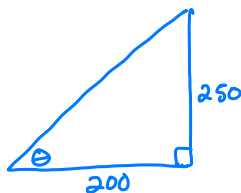


2. A damsel is in distress and is being held captive in a tower. Her knight in shining armor is on the ground below with a ladder. When the knight stands 15 feet from the base of the tower and looks up at his precious damsel, the angle of elevation to her window is 60 degrees. How long does the ladder have to be?



30ft.

3. The height of a building is 250 ft. What is the angle of elevation from a point on the level ground 200 ft. away from the base of the building?



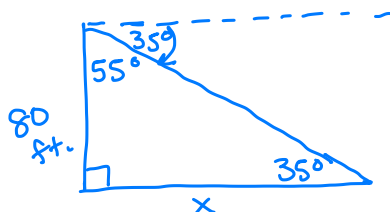
$\tan \theta = \frac{250}{200}$

$\theta = \tan^{-1} \left(\frac{250}{200} \right)$

$\theta \approx 51.3^\circ$

4. A cliff is 80 feet above the sea. From the cliff the angle of depression to a boat is 35°. How far is the boat from the base of the cliff?

$\tan 55^\circ = \frac{x}{80}$
 $80 \tan 55^\circ = x$

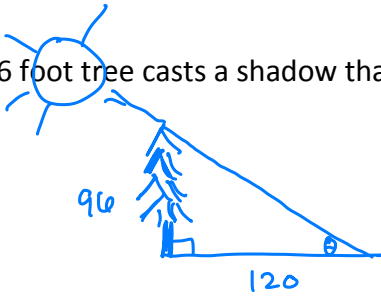


$\tan 35^\circ = \frac{80}{x}$

$x = \frac{80}{\tan 35^\circ}$

$x = 114.3 \text{ ft.}$

5. A 96 foot tree casts a shadow that is 120 feet long. What is the angle of elevation of the sun?

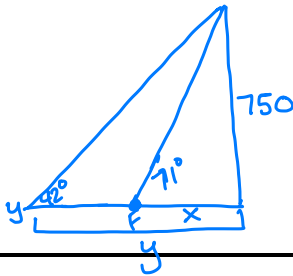


$$\tan \theta = \frac{96}{120}$$

$$\theta = \tan^{-1}\left(\frac{96}{120}\right)$$

$$\theta = 38.7^\circ$$

6. You are a block away from a skyscraper that is 750 ft. Tall. Your friend is between you and the skyscraper. The angle of elevation from your position to the top of the skyscraper is 42° and your friend's is 71° . How far are you from your friend?



$$\tan 42^\circ = \frac{750}{y}$$

$$y = \frac{750}{\tan 42^\circ}$$

$$y \approx 832.959$$

$$\tan 71^\circ = \frac{750}{x}$$

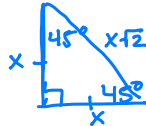
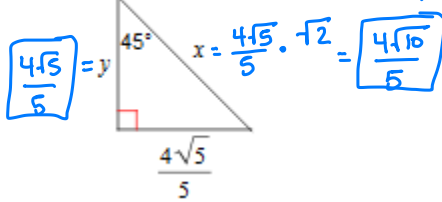
$$x = \frac{750}{\tan 71^\circ}$$

$$x \approx 258.24$$

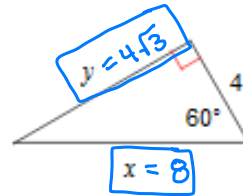
$$y - x \approx \boxed{574.7 \text{ ft.}}$$

Determine the missing side lengths. Leave your answer in simplest Radical for when necessary.

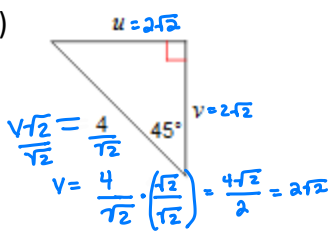
7)



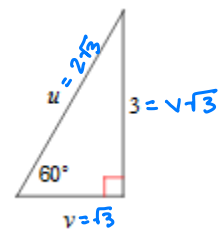
8)



9)



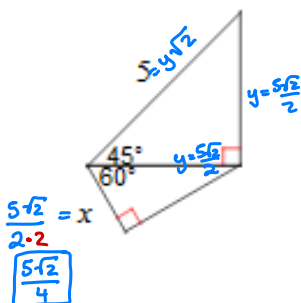
10)



$$\frac{v\sqrt{3}}{\sqrt{3}} = \frac{3}{\sqrt{3}}$$

$$v = \frac{3}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{3\sqrt{3}}{3} = \sqrt{3}$$

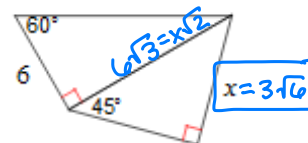
11)



$$y\sqrt{2} = 5$$

$$y = \frac{5}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{5\sqrt{2}}{2}$$

12)



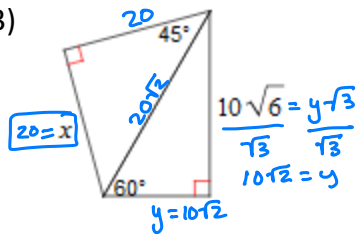
$$x\sqrt{2} = \frac{6\sqrt{3}}{\sqrt{2}}$$

$$x = \frac{6\sqrt{3}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

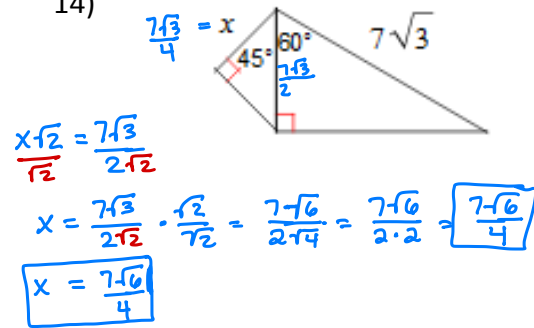
$$x = \frac{6\sqrt{6}}{2}$$

$$x = 3\sqrt{6}$$

13)

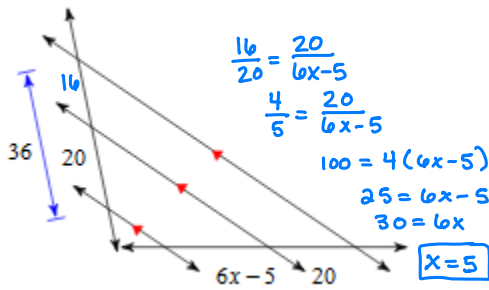


14)

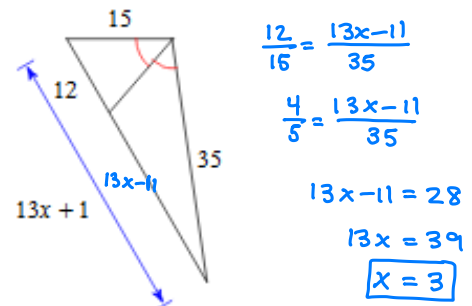


Determine the unknowns.

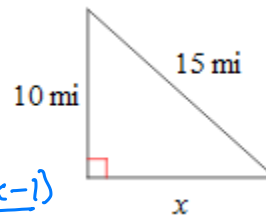
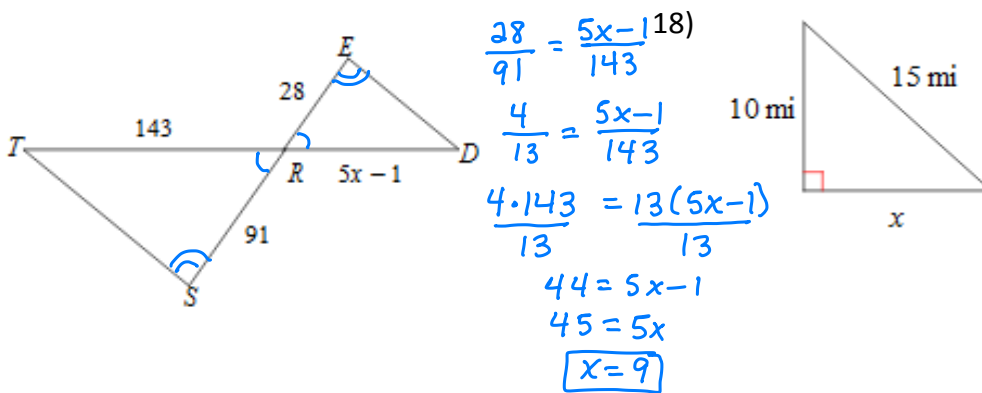
15)



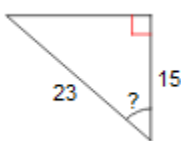
16)



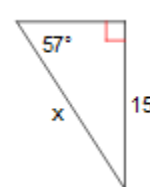
17)



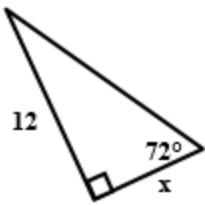
19)



20)



21)

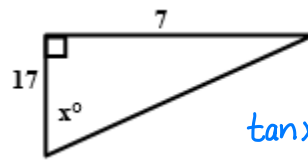


$$\tan 72^\circ = \frac{12}{x}$$

$$x = \frac{12}{\tan 72^\circ}$$

$x \approx 3.9$

22)

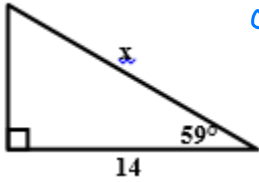


$$\tan x = \frac{7}{17}$$

$$x \approx \tan^{-1}\left(\frac{7}{17}\right)$$

$x \approx 22.4$

23)

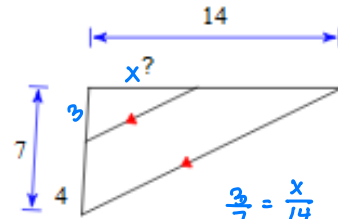


$$\cos 59^\circ = \frac{14}{x}$$

$$x = \frac{14}{\cos 59^\circ}$$

$x \approx 27.2$

24)



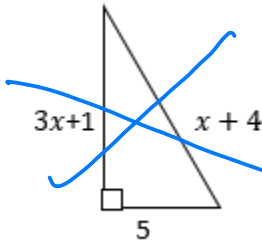
$$\frac{3}{7} = \frac{x}{14}$$

$$7x = 3(14)$$

$$x = \frac{42}{7}$$

$x = 6$

25)



not possible

$$5^2 + (3x+1)^2 = (x+4)^2$$

$$25 + 9x^2 + 6x + 1 = x^2 + 8x + 16$$

$$\frac{8x^2}{2} - \frac{2x}{2} + \frac{10}{2} = \frac{0}{2}$$

$$4x^2 - x + 5 = 0$$

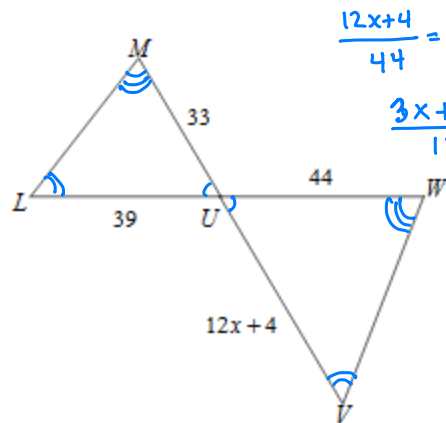
$$x = \frac{1 \pm \sqrt{1 - 4(4)(5)}}{8}$$

$$x = \frac{1 \pm \sqrt{-79}}{8} = \frac{1 \pm i\sqrt{79}}{8}$$

Does not factor

26)

$\triangle UVW \sim \triangle ULM$



$$\frac{12x+4}{44} = \frac{39}{33}$$

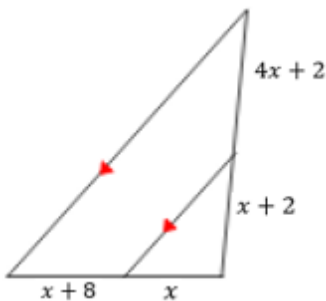
$$\frac{3x+1}{11} = \frac{13}{11}$$

$$3x+1 = 13$$

$$3x = 12$$

$x = 4$

27)



$$\frac{x+2}{4x+2} = \frac{x}{x+8}$$

$$x(4x+2) = (x+2)(x+8)$$

$$4x^2 + 2x = x^2 + 10x + 16$$

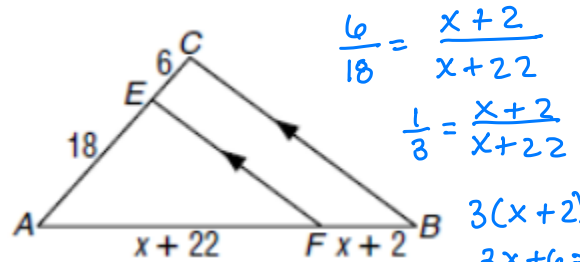
$$3x^2 - 8x - 16 = 0$$

$$(3x+4)(x-4) = 0$$

$$3x+4=0 \quad x-4=0$$

$$x = -\frac{4}{3} \quad x = 4$$

28)



$$\frac{6}{18} = \frac{x+2}{x+22}$$

$$\frac{1}{3} = \frac{x+2}{x+22}$$

$$3(x+2) = x+22$$

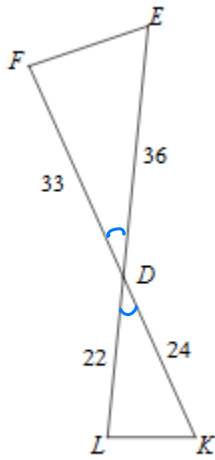
$$3x+6 = x+22$$

$$2x = 16$$

$x = 8$

State if the triangles in each pair are similar. If so, state how you know they are similar and complete the similarity statement.

29)

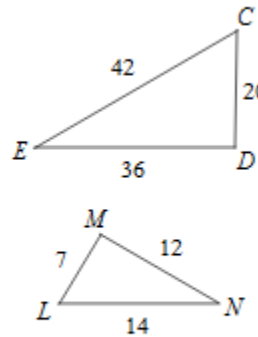


$\angle FDE \cong \angle KDL$ ✓
Vertical \angle s are \cong

$\frac{22}{33} = \frac{24}{36}$ ✓

$\triangle DEF \sim \triangle DKL$ by SAS

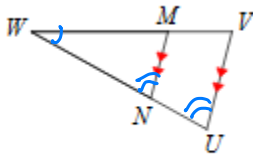
30)



$\frac{7}{20} \neq \frac{14}{36} = \frac{12}{42}$

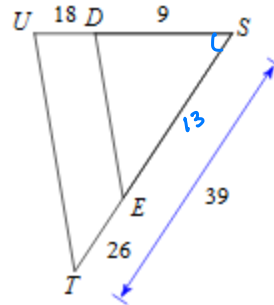
$\triangle CDE \sim$ not similar

31)



$\triangle WVU \sim \triangle WMN$ by AA

32)

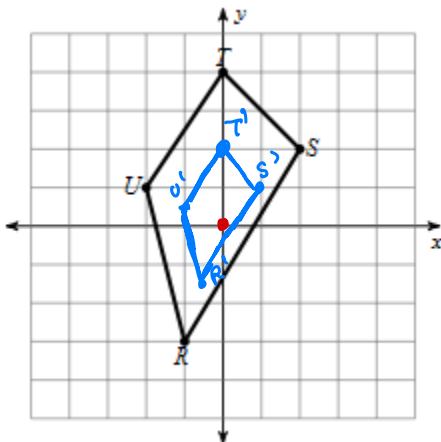


$\angle S \cong \angle S$
by reflexive Prop.
 $\frac{9}{27} = \frac{13}{39}$ ✓

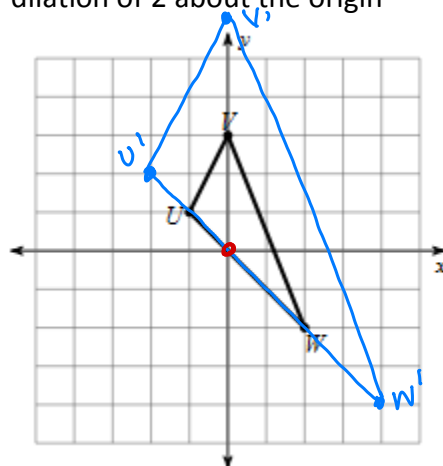
$\triangle STU \sim \triangle SED$ by SAS

Graph the image of the figure using the transformation given.

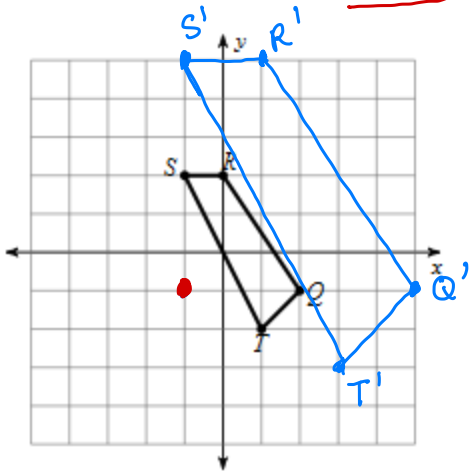
33) dilation of $\frac{1}{2}$ about the origin



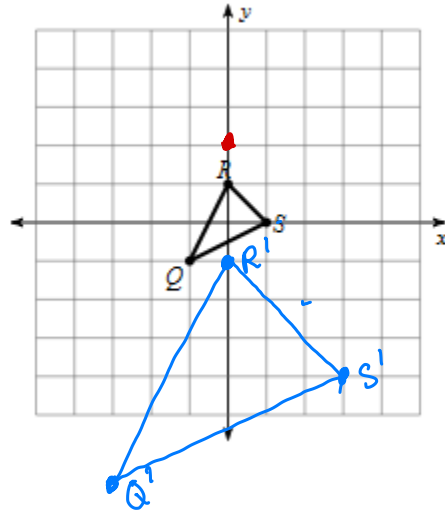
34) dilation of 2 about the origin



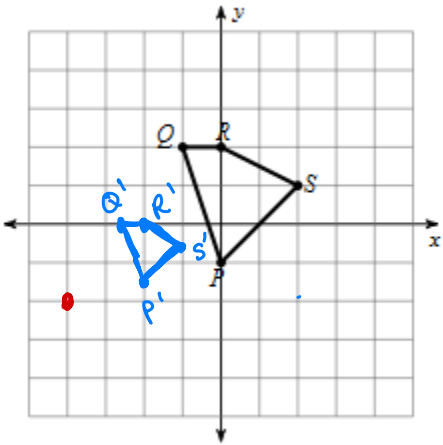
35) dilation of 2 about the $(-1, -1)$



36) dilation of 3 about the $(0, 2)$

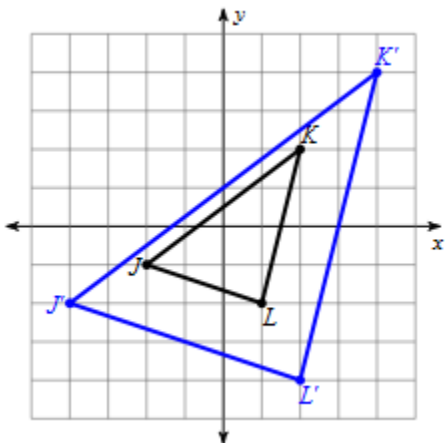


37) dilation of $\frac{1}{2}$ about the $(-4, -2)$



Write a rule to describe each dilation.

38) Dilation of 2 $f(x,y) \rightarrow f(2x, 2y)$



39) Dilation of $\frac{1}{2}$ $f(x,y) \rightarrow f(\frac{1}{2}x, \frac{1}{2}y)$

