

Similar Triangles

Ratios

The ratio of 3 to 4 can be written as 3:4 or $\frac{3}{4}$

Example of ratios

3 cups of milk to 5 cups of flour

8 ounces of 2-cycle oil: 2 gallons of gasoline

15 shots made to 20 shots attempted

8 passes completed to 11 passes attempted

Solving proportions

Find the missing value.

1)

$$\frac{8}{12} = \frac{x}{20}$$

$$12 \cdot x = 8 \cdot 20$$

$$12x = 160$$

$$\frac{12x}{12} = \frac{160}{12}$$

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

2)

$$\frac{y}{30} = \frac{3}{5}$$

$$5 \cdot y = 3 \cdot 30$$

$$5y = 90$$

$$\frac{5y}{5} = \frac{90}{5}$$

$$y = 18$$

3)

$$\frac{3}{10} = \frac{x+2}{45}$$

$$10(x+2) = 3 \cdot 45$$

$$10x + 20 = 135$$

$$10x = 135 - 20$$

$$\frac{10x}{10} = \frac{115}{10}$$

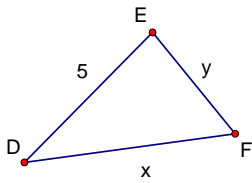
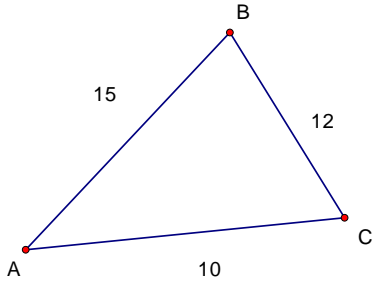
$$x = 11.5$$

Using ratios to find the missing side of a triangle

CSSTP

Corresponding sides of similar triangles are proportional

Given $\triangle ABC \sim \triangle DEF$, find x and y .



Find y

$$\frac{15}{5} = \frac{12}{y}$$

$$15y = 5(12)$$

$$15y = 60$$

$$y = 4$$

Find x

$$\frac{15}{5} = \frac{10}{x}$$

$$15x = 5(10)$$

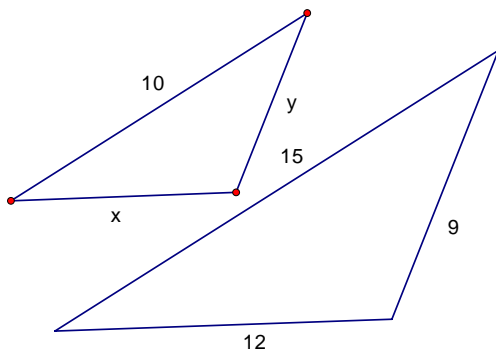
$$15x = 50$$

$$\frac{15x}{15} = \frac{50}{15}$$

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

More Examples

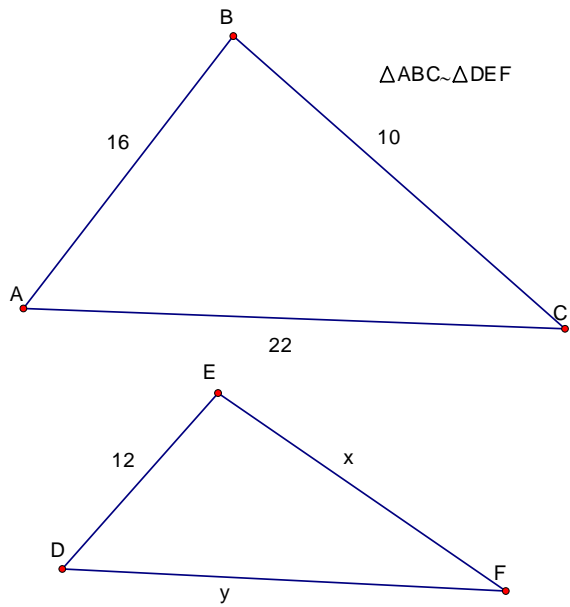
1)



$$\frac{y}{9} = \frac{10}{15}$$
$$15 \cdot y = 9 \cdot 10$$
$$15y = 90$$
$$\frac{15y}{15} = \frac{90}{15}$$
$$y = 6$$

$$\frac{x}{12} = \frac{10}{15}$$
$$15 \cdot x = 12 \cdot 10$$
$$15x = 120$$
$$\frac{15x}{15} = \frac{120}{15}$$
$$x = 8$$

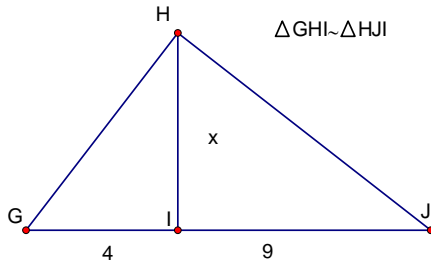
2)



$$\frac{16}{12} = \frac{10}{x}$$
$$16x = 12 \cdot 10$$
$$16x = 120$$
$$x = 7.5$$

$$\frac{16}{12} = \frac{22}{y}$$
$$16y = 12 \cdot 22$$
$$16y = 264$$
$$y = 16.5$$

3)



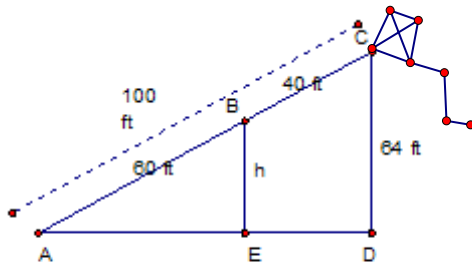
$$\frac{4}{x} = \frac{x}{9}$$

$$x^2 = 36$$

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

$$x = 6$$

4) With 100 ft of string out a kite is 64 ft above the ground. When a girl flying the kite pulls in 40 ft of the string, the angle formed by the string and the ground does not change. What is the height of the kite above the ground after she pulls in 40 feet of the string?



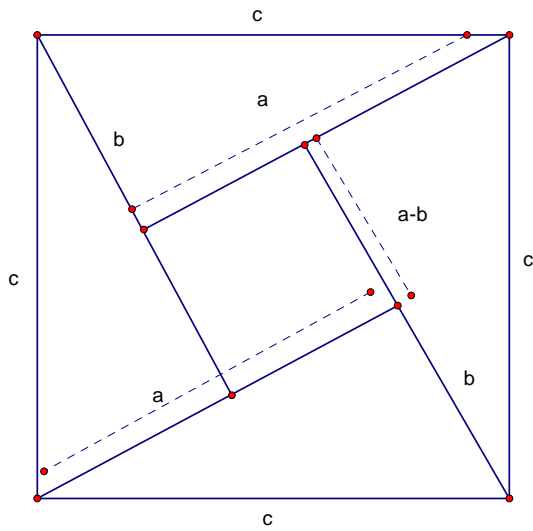
$$\frac{60}{100} = \frac{h}{64}$$

$$100h = 60 \cdot 64$$

$$100h = 3840$$

$$\frac{100h}{100} = \frac{3840}{100} \Rightarrow h = 38.4 \text{ ft}$$

Garfield Proof of Pythagorean Theorem



Area of Big Square = Area of Little Square + 4(Area of the Triangles)

$$c^2 = (a - b)^2 + 4\left(\frac{1}{2}ab\right)$$

$$c^2 = (a - b)(a - b) + 2ab$$

$$c^2 = a^2 - 2ab + b^2 + 2ab$$

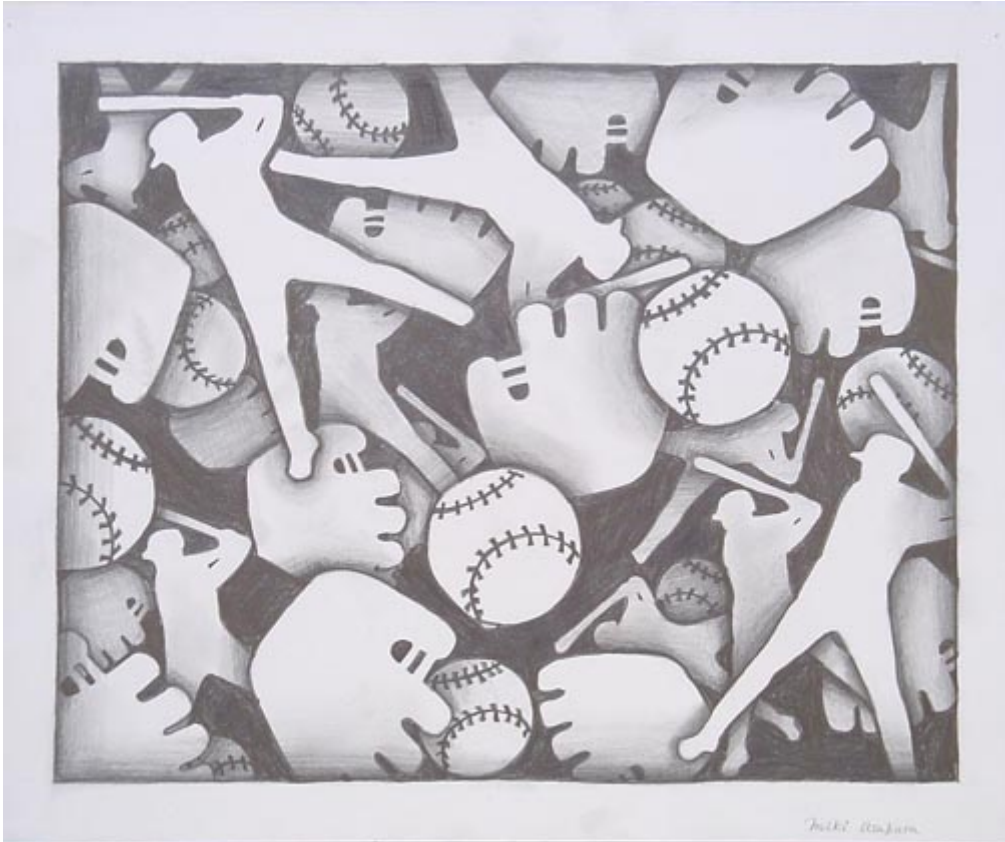
$$c^2 = a^2 + b^2$$

Perspective

Types of perspective

- 1) **Overlapping shapes:** In overlapping shapes depth perception is created by using overlapping shapes.



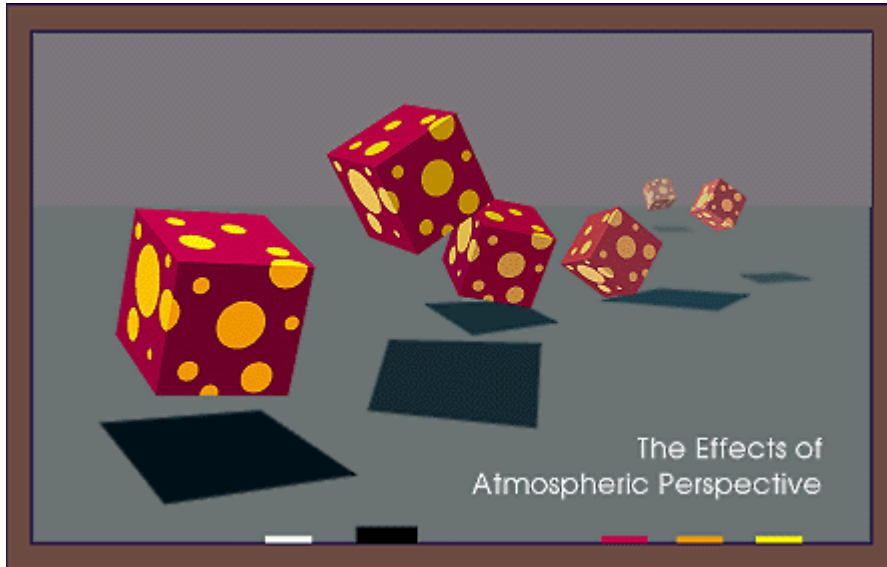


Photos courtesy: <http://fog.ccsf.cc.ca.us/~rholbert/dezin.html>

- 2) **Diminishing sizes:** In diminishing sizes depth is created by systematically making objects smaller.



- 3) **Atmospheric Perspective:** In atmospheric perspective depth is created by making objects that are farther away less clear by diminishing both color and shading.



- 4) **One-Point Perspective:** In one perspective depth is creating by using a vanishing point.

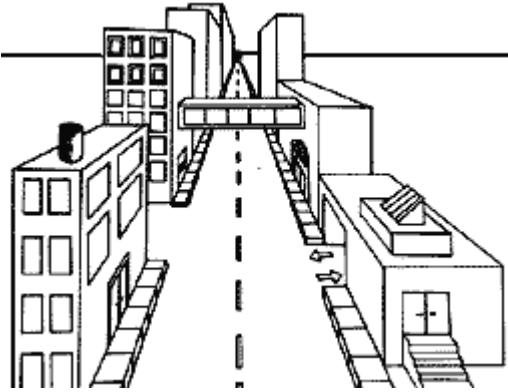
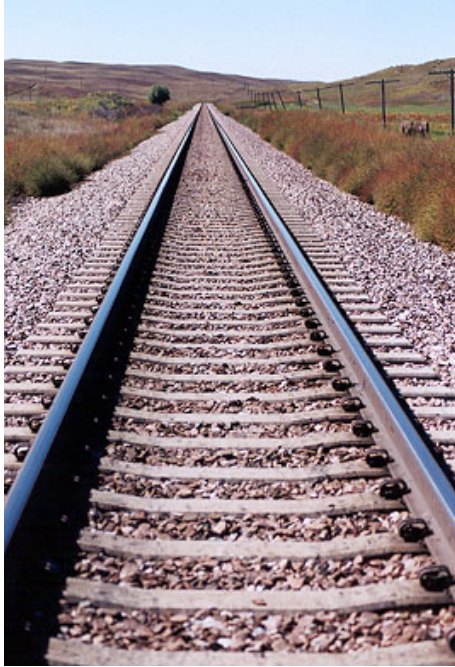


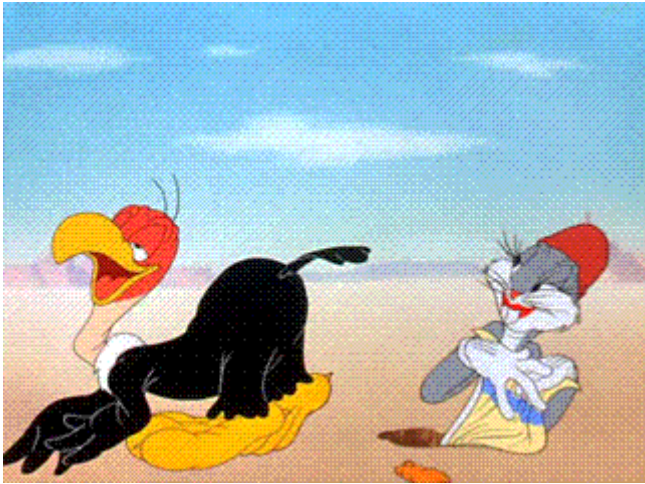
Photo courtesy of
<http://www.cartage.org.lb/en/themes/Arts/drawings/PerspectiveDrawing/OnePointPersp/OnePointPersp.htm>



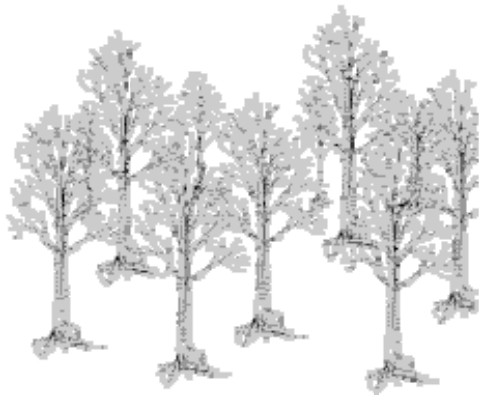
<http://facweb.cs.depaul.edu/sgrais/images/Lec2/france10.jpg>

Identify the perspective

1)



2)



3)

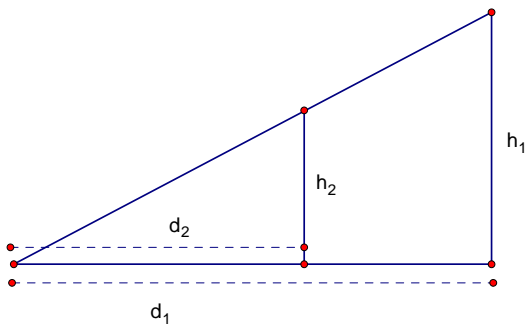


4)



<http://www.frick.org/html/pntg6df.htm>

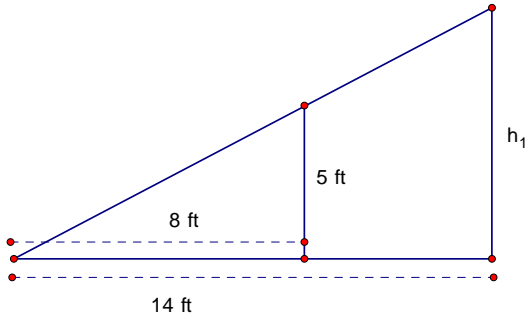
Perspective and Proportions



$$\frac{h_1}{d_1} = \frac{h_2}{d_2}$$

Examples

1) Find h_1



$$\frac{h_1}{d_1} = \frac{h_2}{d_2}$$

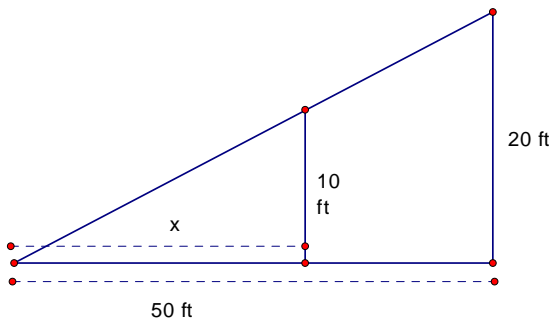
$$\frac{h_1}{14} = \frac{5}{8}$$

$$8h_1 = 5(14)$$

$$8h_1 = 70$$

$$h_1 = 8.75 \text{ ft}$$

2) Find x



$$\frac{h_1}{d_1} = \frac{h_2}{d_2}$$

$$\frac{10}{x} = \frac{20}{50}$$

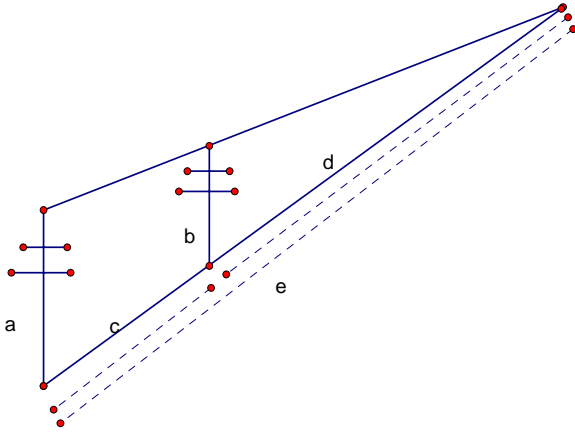
$$20x = 500$$

$$\frac{20x}{20} = \frac{500}{20}$$

$$x = 25 \text{ ft}$$

Exercises on page 286-297

22)



$$a = 3 \text{ in}$$

$$e = 12 \text{ in}$$

$$b = 2 \text{ in}$$

$$d = ?$$

$$\frac{3}{12} = \frac{2}{d}$$

$$3d = 12(2)$$

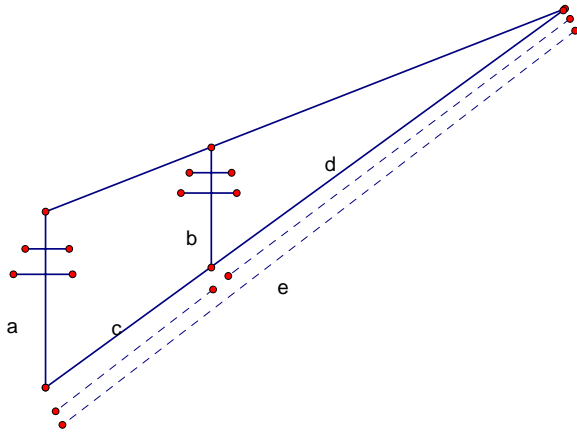
$$3d = 24$$

$$\frac{3d}{3} = \frac{24}{3}$$

$$d = 8 \text{ in}$$

$$c = 12 - 8 = 4 \text{ in}$$

20)



$$a = 4m, e = 10m, d = 2m$$

$$\frac{4}{10} = \frac{b}{2}$$

$$10b = 2(4)$$

$$10b = 8$$

$$b = .8 m$$

$$c = 10 - 2 = 8m$$