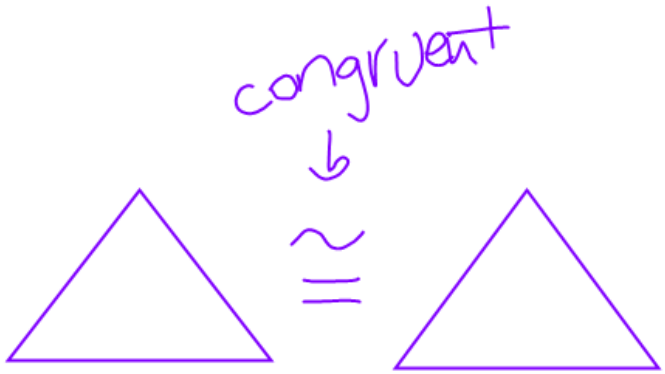
3.5 - Proportions and Similar Figures

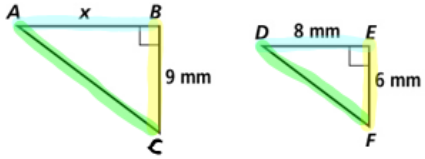
Vocabulary:

- Similar Figures - same shape but not the same size
- Dilation - transforming the shape to look bigger or smaller
- Scale drawing - reducing the drawing by a factor



OBJECTIVE 1

1 EXAMPLE In the figure below, $\triangle ABC \sim \triangle DEF$. Find $\overline{AB}$.



$$\frac{AB}{BC} = \frac{DE}{EF}$$

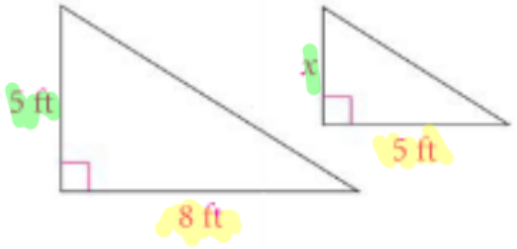
$$\frac{x}{9} = \frac{8}{6}$$

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

$x = 12\text{mm}$

The figures in each pair are similar. Find the missing length.

3.

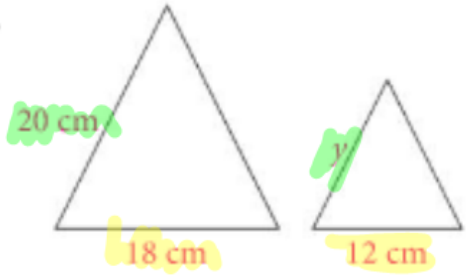


$$\frac{x}{5} = \frac{5}{8}$$

$$8x = \frac{25}{8}$$

$$x = 3\frac{1}{8}\text{ ft}$$

4.



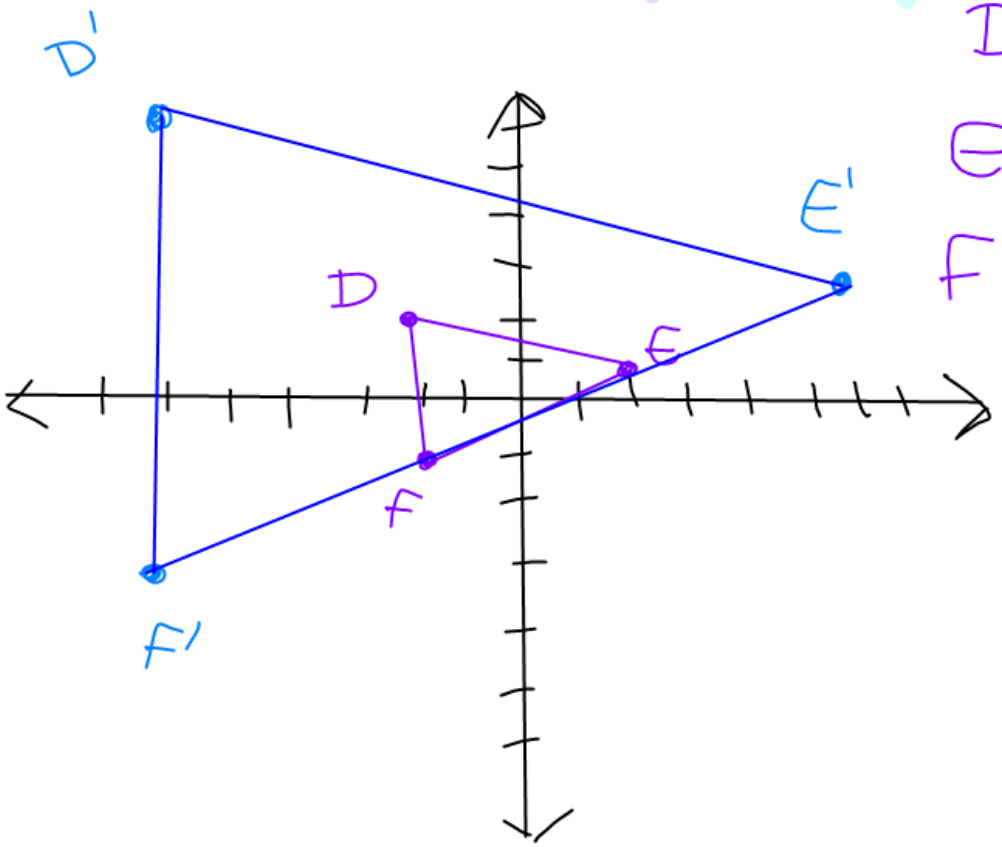
$$\frac{20\text{cm}}{18\text{cm}} = \frac{y}{12}$$

$$\frac{18y}{18} = \frac{240}{18}$$

$$y = 13.\overline{3}\text{ cm}$$

OBJECTIVE 1

2 EXAMPLE ΔDEF has vertices $D(-2, 2)$, $E(2, 1)$, and $F(-2, -1)$. It is dilated by a scale factor of 3, and the origin is at the center of the dilation. Graph the figure and its dilation.



$D(-2,2) \xrightarrow{\times 3} D'(-6,6)$

$E(2,1) \xrightarrow{\times 3} E'(6,3)$

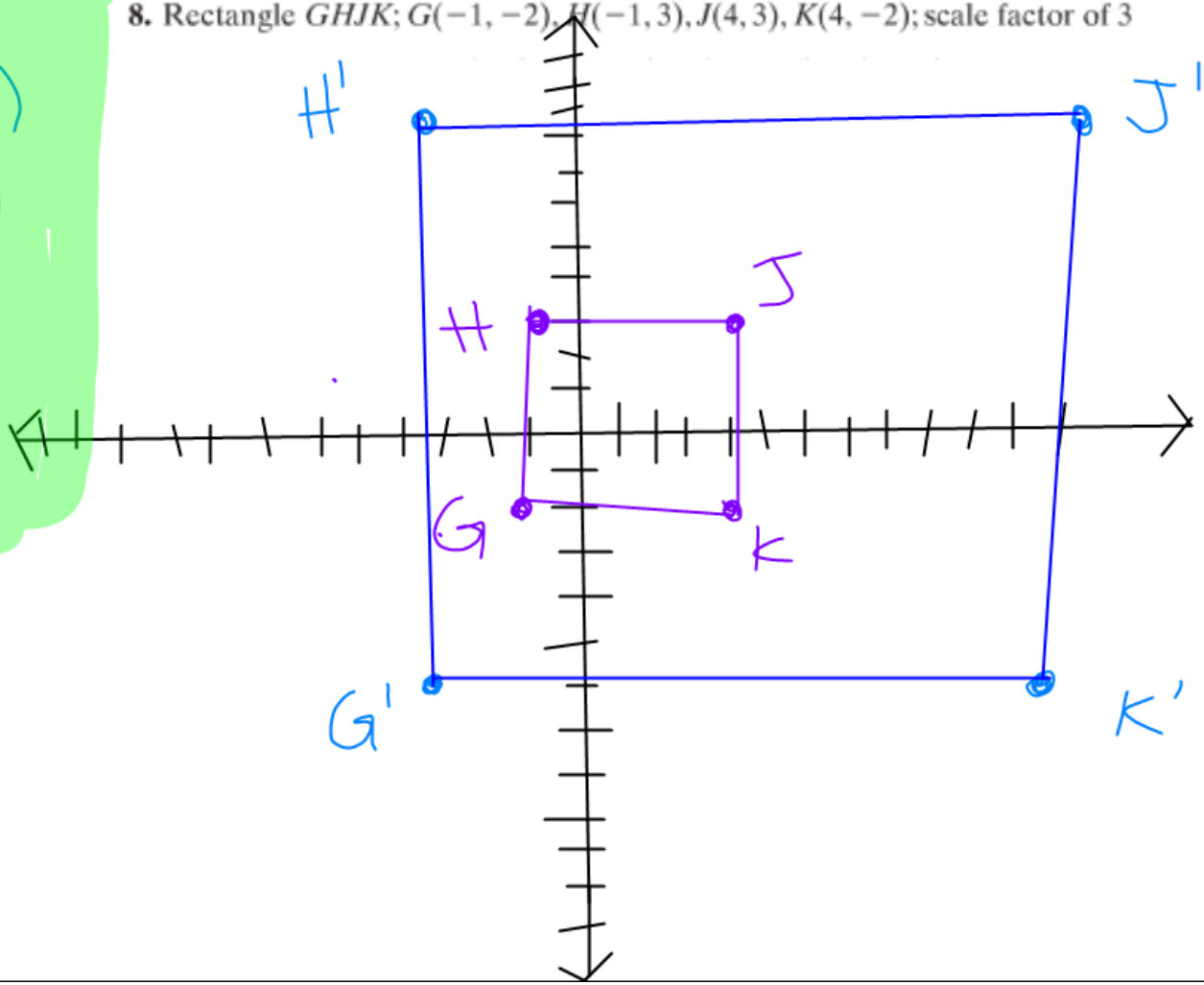
$F(-2,-1) \xrightarrow{\times 3} F'(-6,-3)$

Graph the coordinates of each figure. Find the coordinates of its image after a dilation centered at the origin with the given scale factor. Graph the image.

~~7. $\triangle ABC$; $A(3, 3)$, $B(1, -2)$, $C(-6, 3)$; scale factor of $\frac{1}{3}$~~

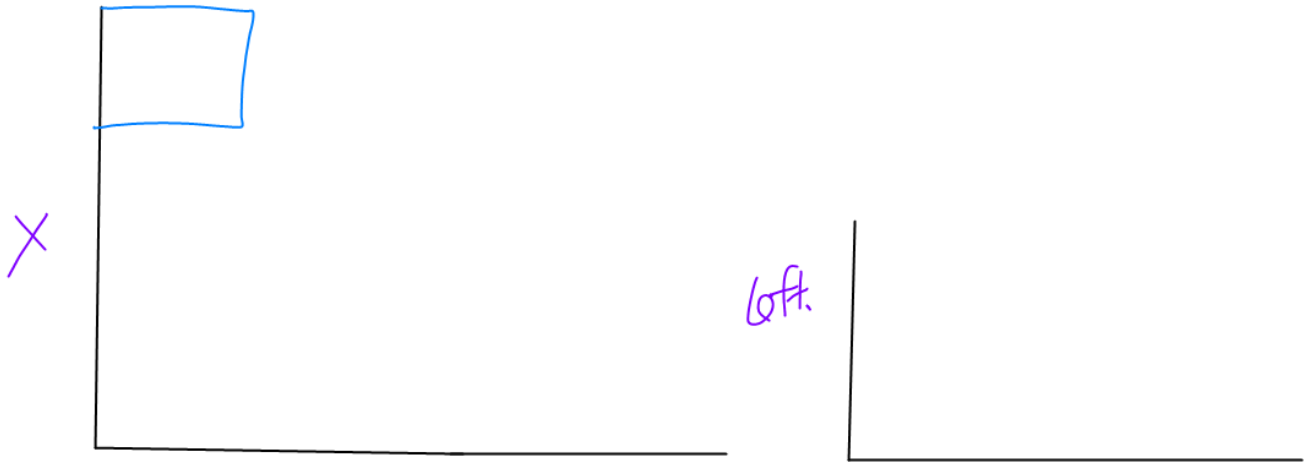
8. Rectangle $GHJK$; $G(-1, -2)$, $H(-1, 3)$, $J(4, 3)$, $K(4, -2)$; scale factor of 3

G' (-3, -6)
H' (-3, 9)
J' (12, 9)
K' (12, -6)



OBJECTIVE 2

3 EXAMPLE A flagpole casts a shadow 102 feet long. A 6 ft tall man casts a shadow 17 feet long. How tall is the flagpole?



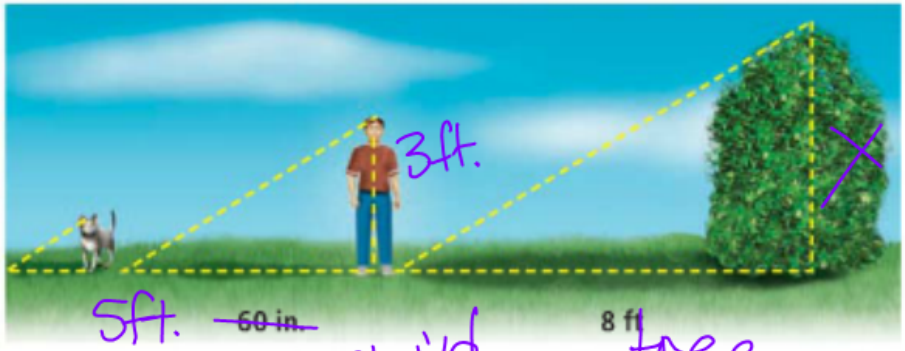
height: $\frac{x}{102} = \frac{6}{17}$

shadow:

$\frac{17x}{17} = \frac{612}{17}$

$x = 36$ ft.

The child in the figure is 3 ft tall.



child tree

10. How tall is the tree?

height / shadow

$$\frac{3\text{ ft.}}{5\text{ ft.}} = \frac{x}{8\text{ ft.}}$$

$$24 = 5x$$

$$\frac{24}{5} = \frac{5x}{5}$$

$$4\frac{4}{5}\text{ ft.} = x$$

OBJECTIVE 2

4 EXAMPLE The scale of a map is 1 inch : 10 miles. The map distance from Valkaria to Gifford is 2.25 inches. Approximately how far is the actual distance?

$$\frac{1 \text{ in.}}{10 \text{ miles}} = \frac{2.25 \text{ in.}}{x}$$

$x = 22.5$ miles

The scale of a map is 1 in.: 17.5 mi. Find the actual distance corresponding to each map distance.

12. 5 in.

13. 8.3 in.

$\frac{1\text{in.}}{17.5\text{mi}} = \frac{5\text{in.}}{x\text{ miles}}$

$x = 87.5\text{miles}$

$\frac{1\text{in.}}{17.5\text{miles}} = \frac{8.3\text{in.}}{x}$

$x = 145.25\text{ miles}$

Homework: pg. 152 #4, 6, 9, 11, 14-16, 18, 24, 26