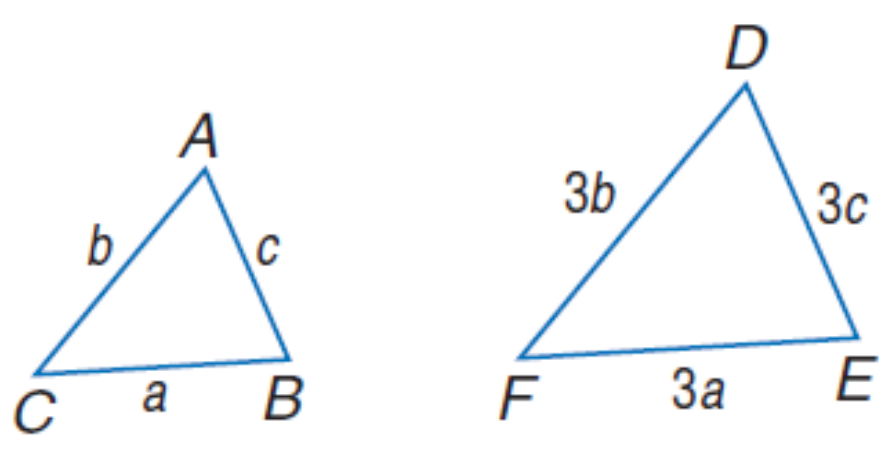
PARTS OF SIMILAR TRIANGLES

PROPORTIONAL PERIMETERS THEOREM

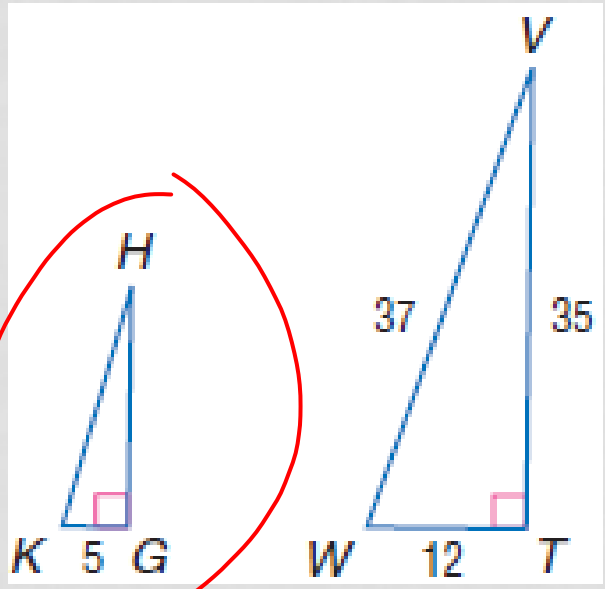
- If two triangles are similar, then the perimeters are proportional to the measure of corresponding sides.



$$\frac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle DEF} = \frac{a+b+c}{3a+3b+3c} = \frac{1(a+b+c)}{3(a+b+c)} \text{ or } \frac{1}{3}$$

EXAMPLES

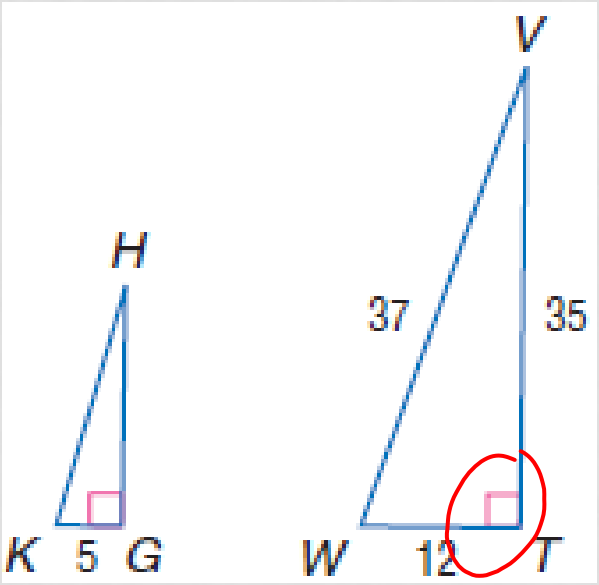
- If △GHK ~ △TVW, TV = 35, VW = 37, WT = 12, and KG = 5, find the perimeter of △GHK.



$\frac{5_{\times 7}}{12_{\times 7}} = \frac{x = 35}{84}$

EXAMPLES

- If △GHK ~ △TVW, TV = 35, VW = 37, WT = 12, and KG = 5, find the perimeter of △GHK.



The perimeter of △*TVW* = 35 + 37 + 12 or 84.

$$\frac{5}{12} = \frac{x}{84}$$

12x = 420

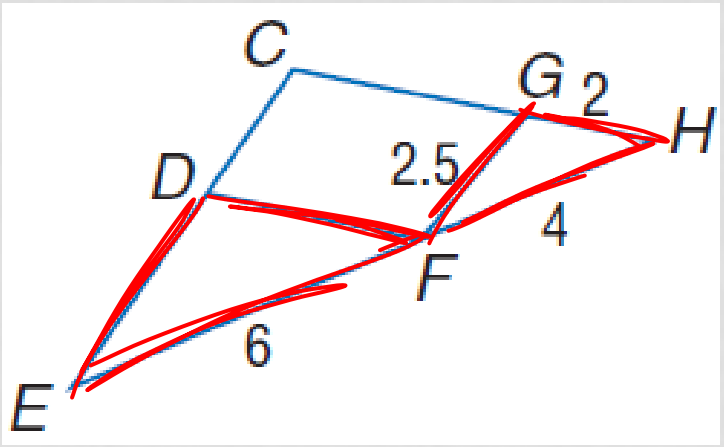
x = 35

The perimeter of △*GHK* is 35 units.

EXAMPLES

P =

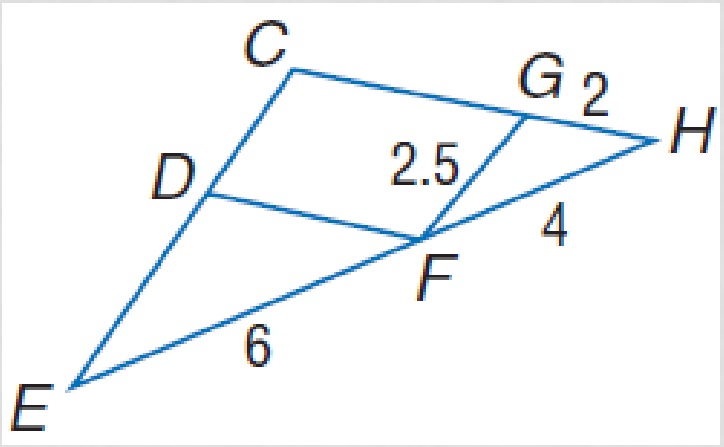
- If △DEF ~ △GFH, find the perimeter of △DEF.



$\frac{6}{4} = \frac{x}{8.5}$ $\quad x = 12.75$

EXAMPLES

- If △DEF ~ △GFH, find the perimeter of △DEF.



The perimeter of △GFH = 2 + 2.5 + 4 = 8.5.

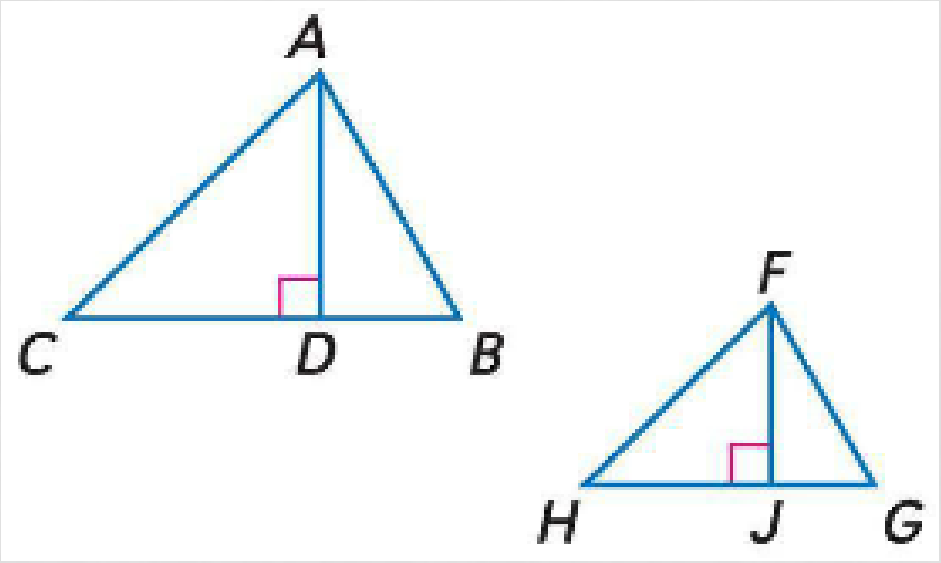
$$\frac{6}{4} = \frac{x}{8.5}$$

$4x = 51$

$x = 12.75$

ALTITUDES

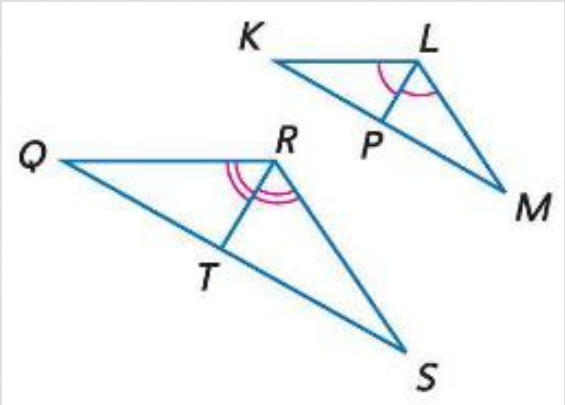
- If two triangles are similar, the lengths of corresponding altitudes are proportional to the lengths of the corresponding sides.



If $\triangle ABC \sim \triangle FGH$, then $\frac{AD}{FJ} = \frac{AB}{FG}$.

ANGLE BISECTORS

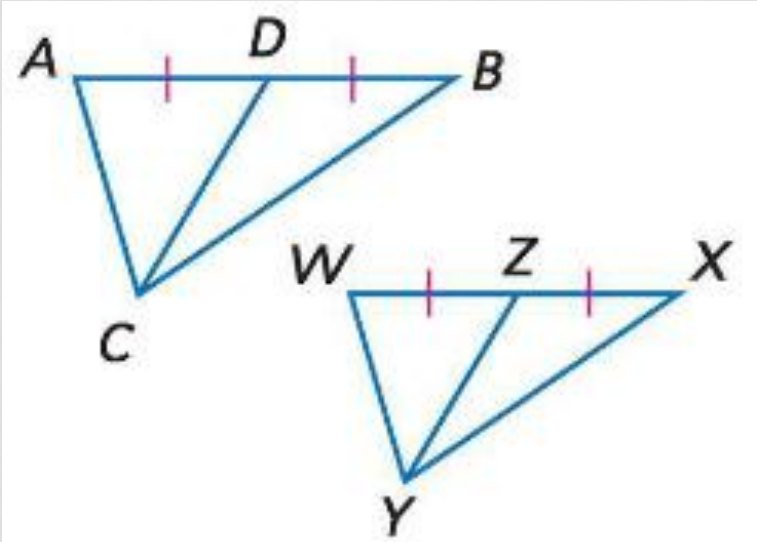
- If two triangles are similar, the lengths of corresponding angle bisectors are proportional to the lengths of the corresponding sides.



If $\triangle KLM \sim \triangle QRS$, then $\frac{LP}{RT} = \frac{LM}{RS}$.

MEDIANS

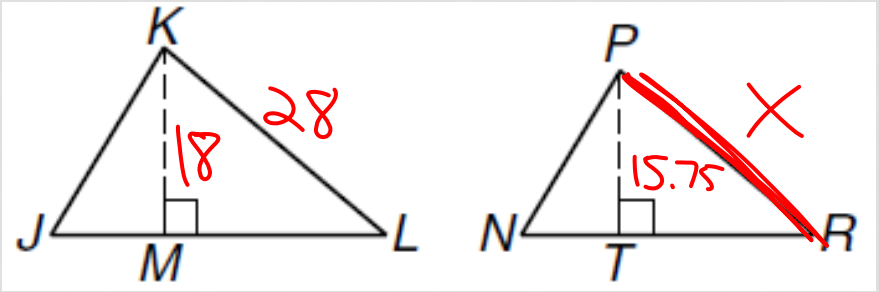
- If two triangles are similar, the lengths of corresponding medians are proportional to the lengths of the corresponding sides.



If $\triangle ABC \sim \triangle WXY$, then $\frac{CD}{YZ} = \frac{AB}{WX}$.

EXAMPLES

- **Use the given information to find each measure.**
- Find *PR* if $\triangle JKL \sim NPR$, $\overline{KM}$ is an altitude of $\triangle JKL$, $\overline{PT}$ is an altitude of *NPR*, *KL* = 28, *KM* = 18, and *PT* = 15.75.



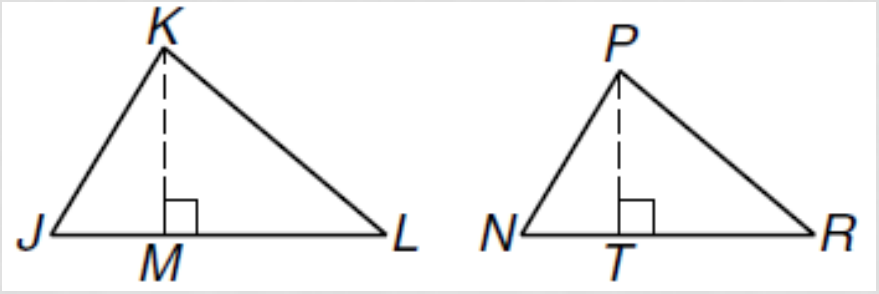
$$\frac{18}{28} = \frac{15.75}{x}$$

$$\frac{18x}{18} = \frac{441}{18}$$

$$x = 24.5$$

EXAMPLES

- **Use the given information to find each measure.**
- Find *PR* if $\triangle JKL \sim NPR$, $\overline{KM}$ is an altitude of $\triangle JKL$, $\overline{PT}$ is an altitude of *NPR*, *KL* = 28, *KM* = 18, and *PT* = 15.75.



$$\frac{KM}{KL} = \frac{PT}{PR}$$

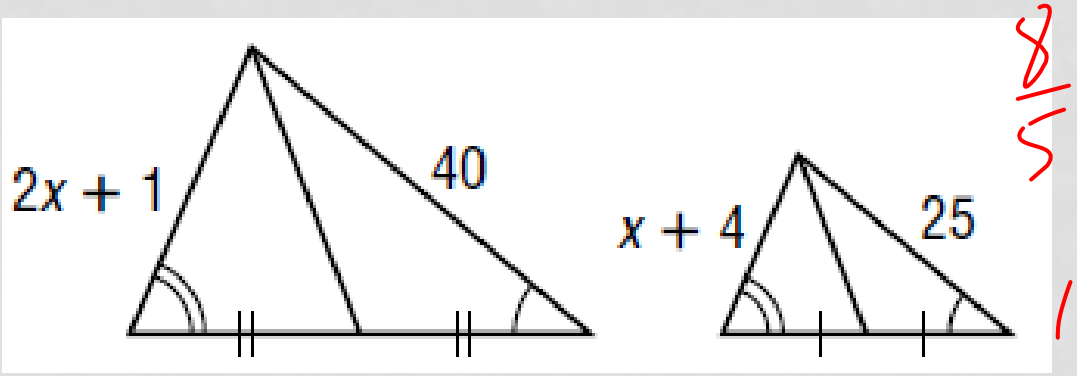
$$\frac{18}{28} = \frac{15.75}{x}$$

$$18x = 441$$

$$x = 24.5$$

EXAMPLES

- Find x.



$\frac{8}{5} = \frac{40}{25} = \frac{2x+1}{x+4}$

$10x + 5 = 8x + 32$

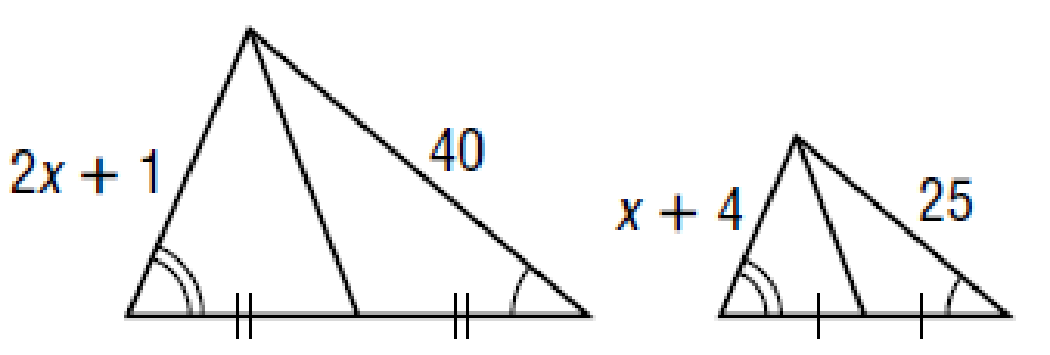
$-8x \quad -8x \quad -5$

$\frac{2x}{2} = \frac{27}{2}$

$x = 13.5$

EXAMPLES

- Find x.



$$\frac{2x+1}{40} = \frac{x+4}{25}$$

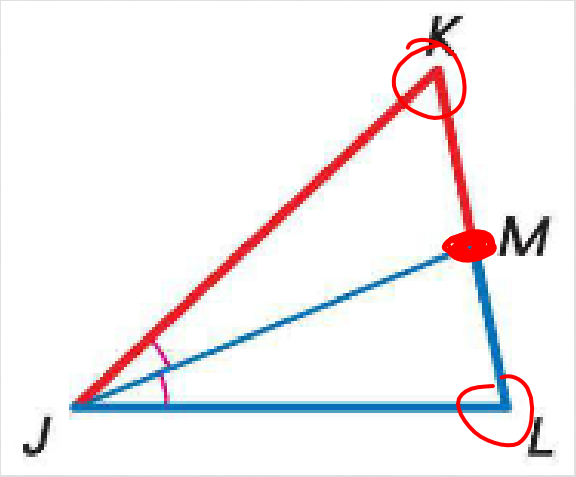
50x + 25 = 40x + 160

10x = 135

x = 13.5

TRIANGLE ANGLE BISECTOR

- An angle bisector in a triangle separates the opposite side into two segments that are proportional to the lengths of the other two sides.

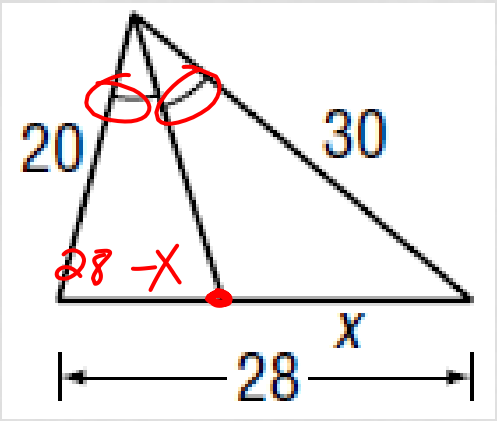


If $\overline{JM}$ is an angle bisector of $\triangle JKL$,

then $\frac{KM}{LM} = \frac{KJ}{LJ}$. ← segments with vertex K ← segments with vertex L

EXAMPLES

- Find x.



$\frac{20}{30} \neq \frac{28-x}{x}$

$20x = 840 - 30x$

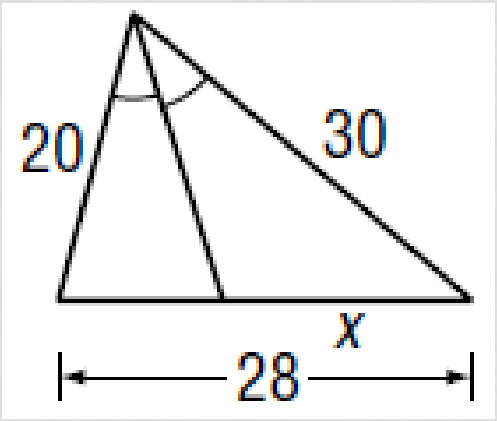
$+30x \quad +30x$

$\frac{50x}{50} = \frac{840}{50}$

$x = 16.8$

EXAMPLES

- Find x.



$$\frac{30}{x} = \frac{20}{28-x}$$

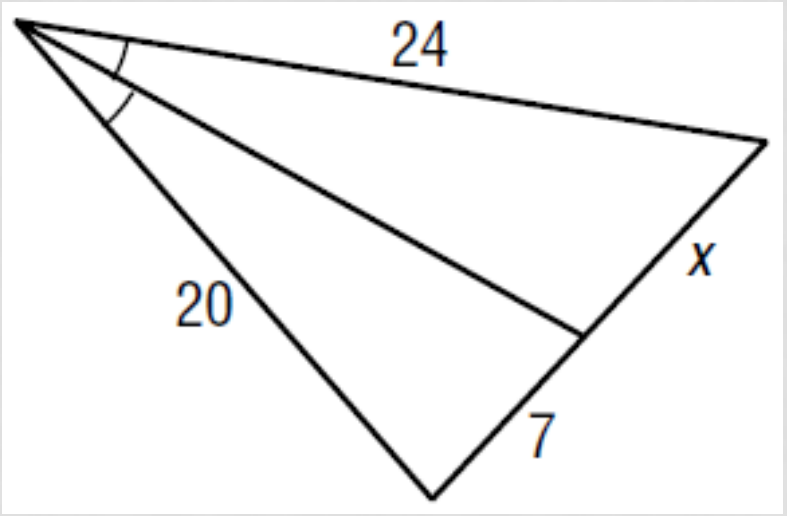
$20x = 840 - 30x$

$50x = 840$

$x = 16.8$

EXAMPLES

- Find x.



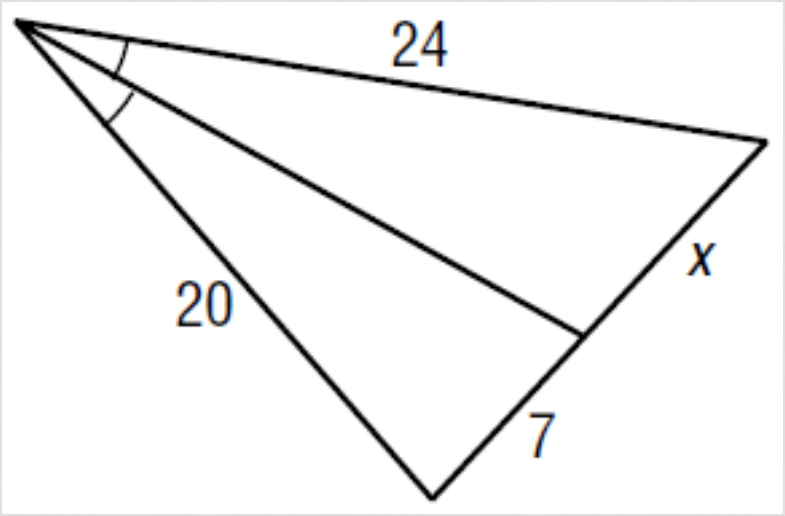
$\frac{x}{7} \neq \frac{24}{20}$

$\frac{20x}{20} = \frac{168}{20}$

$x = 8.4$

EXAMPLES

- Find x.



$\frac{24}{x} = \frac{20}{7}$

$20x = 168$

$x = 8.4$