Adv. Geometry 6.3 - Similar Polygons

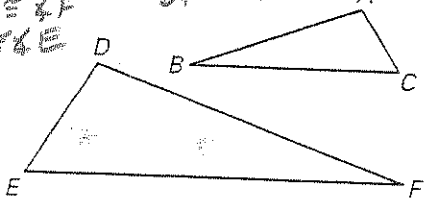
Key

List all pairs of congruent angles for the figures. Then write the ratios of the corresponding sides in a statement of proportionality.

1. $\triangle ABC \sim \triangle DFE$

$\angle A \cong \angle D$, $\angle B \cong \angle F$, $\angle C \cong \angle E$

$\frac{AB}{DF} = \frac{BC}{FE} = \frac{AC}{DE}$



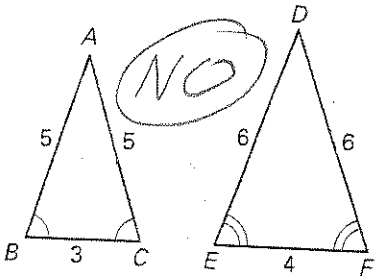
2. $\triangle LMN \sim \triangle GHI$

$\angle L \cong \angle G$, $\angle M \cong \angle H$, $\angle N \cong \angle I$

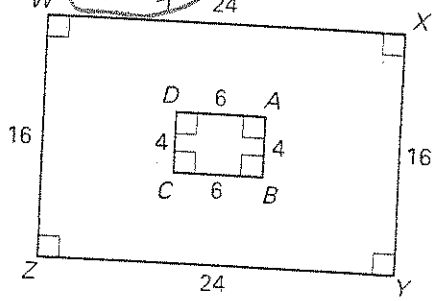
$\frac{LM}{GH} = \frac{MN}{HI} = \frac{LN}{GI}$

Determine whether the polygons are similar. If they are, write a similarity statement and find the scale factor.

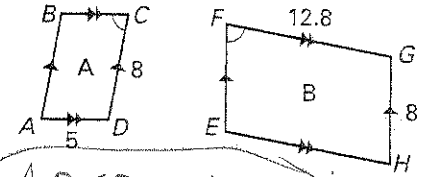
4.



5. Yes $WXYZ \sim DABC$ S.F $= \frac{1}{2}$ or $\frac{4}{24}$



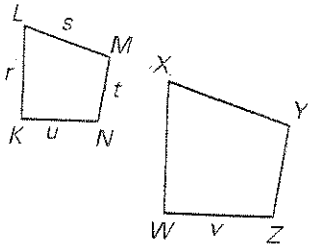
5. Yes



$ABCD \sim HEFG$

S.F $\frac{5}{8}$ or $\frac{8}{5}$

Quadrilateral *KLMN* ~ quadrilateral *WXYZ*. Find the indicated length in terms of *r*, *s*, *t*, *u*, and *v*.



13. WX $\frac{wx}{r} = \frac{v}{u} \Rightarrow wx = \frac{rv}{u}$

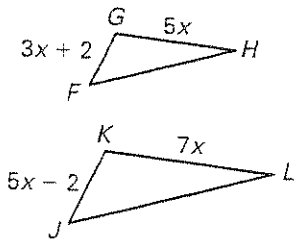
14. XY $\frac{xy}{s} = \frac{v}{u} \rightarrow xy = \frac{sv}{u}$

15. YZ $\frac{yz}{t} = \frac{v}{u} \Rightarrow yz = \frac{tv}{u}$

$\frac{s}{8} = \frac{6}{12.8}$

Find all possible values of *x* in the similar triangles.

16. $\triangle FGH \sim \triangle JKL$



$\frac{3x+2}{5x-2} = \frac{5x}{7x}$

$21x^2 + 14x - 25x^2 - 10x$

$0 = 4x^2 - 24x$

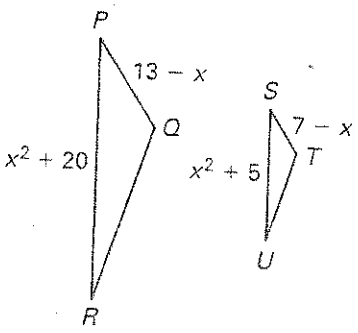
$0 = 4x(x-6)$

$4x = 0$ $x - 6 = 0$

$x = 0$ ← Doesn't work

$x = 6$

17. $\triangle PQR \sim \triangle STU$



$\frac{x^2+20}{x^2+5} = \frac{13-x}{7-x}$

$(x^2+20)(7-x) = (x^2+5)(13-x)$

$7x^2 - x^3 + 140 - 20x = 13x^2 - x^3 + 65 - 5x$

$-7x^2 + x^3 - 140 + 20x \quad -7x^2 + x^3 - 140 + 20x$

$0 = 6x^2 + 15x - 75$

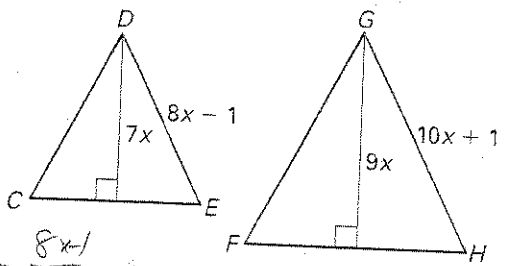
$0 = (3)(2x^2 + 5x - 25)$

$= 3(2x-5)(x+5)$

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

$x = \frac{5}{2}$ $x = -5$

18. $\triangle CDE \sim \triangle FGH$



$\frac{7x}{9x} = \frac{8x-1}{10x+1}$

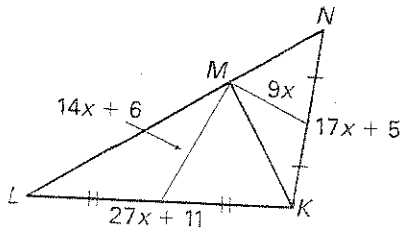
$70x^2 + 7x = 72x^2 - 9x$

$0 = 2x^2 - 16x$

$0 = 2x(x-8)$

$2x = 0$ $\quad x = 0$ $\quad x - 8 = 0$ $\quad x = 8$

19. $\triangle LMK \sim \triangle KMN$



$\frac{14x+6}{9x} = \frac{27x+11}{17x+5}$

$(14x+6)(17x+5) = (9x)(27x+11)$

$238x^2 + 102x + 70x + 30 = 243x^2 + 99x$

$0 = 5x^2 - 73x - 30$

$0 = (5x+2)(x-15)$

$5x+2=0$ $\quad x = -\frac{2}{5}$ does not work

$x - 15 = 0$ $\quad x = 15$

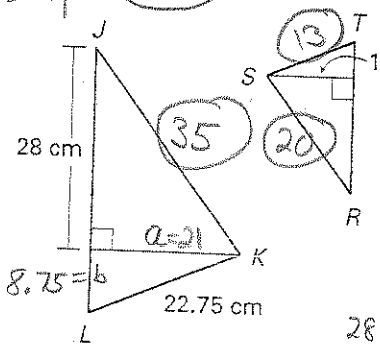
In the diagram, $\triangle JKL \sim \triangle RST$. The perimeter of $\triangle JKL$ is 94.5 centimeters and the perimeter of $\triangle RST$ is 54 centimeters.

1. Find the scale factor of $\triangle JKL$ to $\triangle RST$. $94.5 : 54 = \frac{7}{4}$ $\quad 7:4$

2. Find the length of the altitude shown in $\triangle JKL$. 21

3. Find the unknown side lengths in both triangles.

4. Find the areas of the two triangles. What is the scale factor of the area of $\triangle JKL$ to the area of $\triangle RST$? What is the relationship between the scale factor of the areas and the scale factor of the perimeters?



$12 \cdot \frac{7}{4} = \frac{a}{12} \cdot 12$

$21 = a$

$28^2 + 21^2 = (JK)^2$

$35 = JK$

$21^2 + b^2 = 22.75^2$

$\frac{22.75}{TS} = \frac{7}{4}$

$TS = 13$

$\frac{36.75}{TR} = \frac{7}{4}$

$TR = 21$

$SR = 54 - 13 - 21$

$= 20$

$A_{\triangle JKL} = \frac{1}{2}(36.75)(21)$

$= 385.875$

$A_{\triangle RST} = \frac{1}{2}(21)(12)$

$= 126$

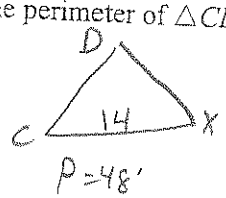
$\frac{A_{\triangle JKL}}{A_{\triangle RST}} = \frac{385.875}{126} = \frac{49}{16}$

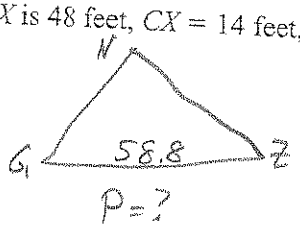
ratio of area is = (scale factor)^2

Use the given information to find the indicated value.

11. GIVEN: $\triangle CDX \sim \triangle GNZ$, the perimeter of $\triangle CDX$ is 48 feet, $CX = 14$ feet, and $GZ = 58.8$ feet.

Find the perimeter of $\triangle GNZ$.





$\frac{14}{58.8} = \frac{48}{x}$

$P_{\triangle GNZ} = 201.6$