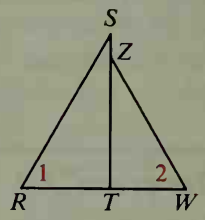
To prove two polygons similar, you might need to compare the corresponding sides. As shown in the example below, a useful technique is to compare the longest sides, the shortest sides, and so on.

Example Can the information given in each part be used to prove $\triangle RST \sim \triangle WZT$? If so, how?



a. $RS = 18$, $ST = 15$, $RT = 10$, $WT = 6$, $ZT = 9$, $WZ = 10.8$

b. $\angle 1 \cong \angle 2$, $\dfrac{WZ}{RS} = \dfrac{TZ}{TS}$

c. $\overline{ST} \perp \overline{RW}$, $ST = 32$, $SZ = 8$, $RT = 20$, $WT = 15$

Solution

a. Comparing the longest sides, $\dfrac{RS}{WZ} = \dfrac{18}{10.8} = \dfrac{5}{3}$.

Comparing the shortest sides, $\dfrac{RT}{WT} = \dfrac{10}{6} = \dfrac{5}{3}$.

Comparing the remaining sides, $\dfrac{ST}{ZT} = \dfrac{15}{9} = \dfrac{5}{3}$.

Thus, $\dfrac{RS}{WZ} = \dfrac{RT}{WT} = \dfrac{ST}{ZT}$.

$\triangle RST \sim \triangle WZT$ by the SSS Similarity Theorem.

b. Notice that $\angle 1$ and $\angle 2$ are not the angles included by the sides that are in proportion. Therefore, the triangles cannot be proved similar.

c. Comparing the shorter legs, $\dfrac{RT}{WT} = \dfrac{20}{15} = \dfrac{4}{3}$.

Comparing the other legs, $\dfrac{ST}{ZT} = \dfrac{32}{32 - 8} = \dfrac{32}{24} = \dfrac{4}{3}$.

$\dfrac{RT}{WT} = \dfrac{ST}{ZT}$ and $\angle RTS \cong \angle WTS$.

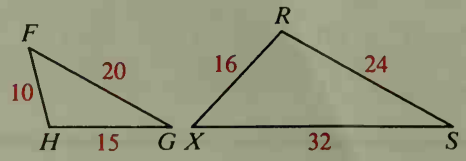
$\triangle RST \sim \triangle WZT$ by the SAS Similarity Theorem.

The perimeters of similar polygons are in the same ratio as the corresponding sides. By using similar triangles, you can prove that corresponding segments such as diagonals of similar polygons also have this ratio. (See Exercises 25 and 26, page 259 and Exercises 17 and 18, page 267.)

Classroom Exercises

Can the two triangles shown be proved similar? If so, state the similarity and tell which similarity postulate or theorem you would use.

1.



2.