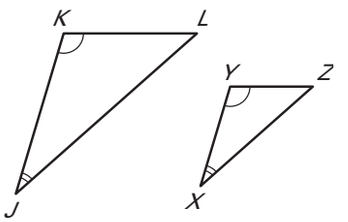
6.4 Prove Triangles Similar by AA

Goal • Use the AA Similarity Postulate.

Your Notes

POSTULATE 22: ANGLE-ANGLE (AA) SIMILARITY POSTULATE

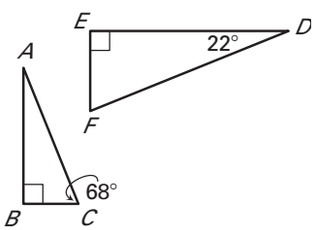
If two angles of one triangle are congruent to two angles of another triangle, then the two triangles are similar.



$\triangle JKL \sim \triangle XYZ$

Example 1 ***Use the AA Similarity Postulate***

Determine whether the triangles are similar. If they are, write a similarity statement. *Explain* your reasoning.



Solution

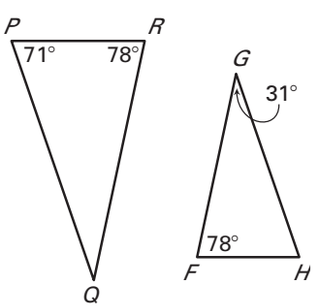
Because they are both right angles, $\angle$ *B* and $\angle$ *E* are congruent.

By the Triangle Sum Theorem, 68° + 90° + $m\angle A$ = 180°, so $m\angle A$ = 22°.
Therefore, $\angle A$ and $\angle$ *D* are congruent.

So, $\triangle ABC \sim \triangle DEF$ by the AA Similarity Postulate.

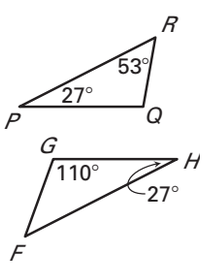
✔ ***Checkpoint*** **Determine whether the triangles are similar. If they are, write a similarity statement.**

1.



$\triangle FGH \sim \triangle RQP$

2.



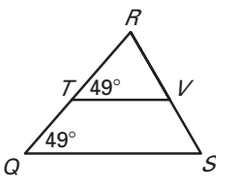
not similar

Your Notes

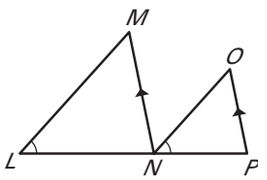
Example 2 ***Show that triangles are similar***

Show that the two triangles are similar.

a. $\triangle RTV$ and $\triangle RQS$



b. $\triangle LMN$ and $\triangle NOP$



Solution

a. You may find it helpful to redraw the triangles separately.

Because $m\angle$ *RTV* and $m\angle$ *Q* both equal 49°, $\angle$ *RTV* $\cong \angle$ *Q*. By the Reflexive Property, $\angle R \cong \angle$ *R*.

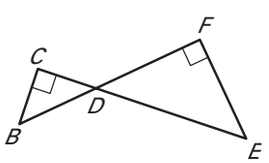
So, $\triangle RTV \sim \triangle RQS$ by the AA Similarity Postulate.

b. The diagram shows $\angle L \cong \angle$ *ONP*. It also shows that $\overline{MN} \parallel \overline{OP}$ so $\angle$ *LNM* $\cong \angle$ *P* by the Corresponding Angles Postulate.

So, $\triangle LMN \sim \triangle NOP$ by the AA Similarity Postulate.

✔ ***Checkpoint*** **Complete the following exercise.**

3. Show that $\triangle BCD \sim \triangle EFD$.



Because they are both right angles, $\angle C \cong \angle F$.

You know that $\angle CDB \cong \angle FDE$ by the Vertical Angles Congruence Theorem.

So, $\triangle BCD \sim \triangle EFD$ by the AA Similarity Postulate.

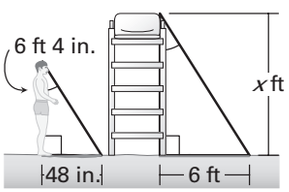
Your Notes

Example 3 ***Using similar triangles***

Height A lifeguard is standing beside the lifeguard chair on a beach. The lifeguard is 6 feet 4 inches tall and casts a shadow that is 48 inches long. The chair casts a shadow that is 6 feet long. How tall is the chair?

Solution

The lifeguard and the chair form sides of two right triangles with the ground, as shown below. The sun's rays hit the lifeguard and the chair at the same angle. You have two pairs of congruent angles, so the triangles are similar by the AA Similarity Postulate.



You can use a proportion to find the height x. Write 6 feet 4 inches as 76 inches so you can form two ratios of feet to inches.

$$\frac{x \text{ ft}}{76 \text{ in.}} = \frac{6 \text{ ft}}{48 \text{ in.}}$$ **Write proportion of side lengths.**

$48x = 456$ **Cross Products Property**

$x = 9.5$ **Solve for x.**

The chair is 9.5 feet tall.

✔ ***Checkpoint*** **Complete the following exercise.**

4. In Example 3, how long is the shadow of a person that is 4 feet 9 inches tall?

3 feet

Homework