

NAME \_\_\_\_\_  
 Adv Geo period \_\_\_\_

Date \_\_\_\_\_

**Objective**

After studying this section, you will be able to

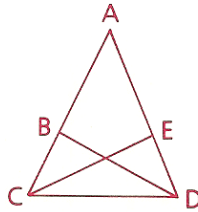
- Organize the information in, and draw diagrams for, problems presented in words

**Example 1** Set up a proof of the statement, “If two altitudes of a triangle are congruent, then the triangle is isosceles.”

Setup for Example 1:

Given:  $\overline{BD}$  and  $\overline{CE}$  are altitudes to  $\overline{AC}$  and  $\overline{AD}$  of  $\triangle ACD$ .  
 $\overline{BD} \cong \overline{CE}$

Prove:  $\triangle ACD$  is isosceles.

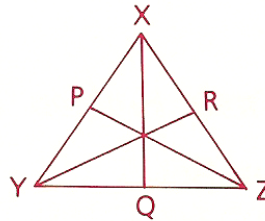


**Example 2** Set up a proof of the statement, “The medians of a triangle are congruent if the triangle is equilateral.”

Setup for Example 2:

Given:  $\triangle XYZ$  is equilateral.  
 $\overline{PZ}$ ,  $\overline{RY}$ , and  $\overline{QX}$  are medians.

Prove:  $\overline{PZ} \cong \overline{RY} \cong \overline{QX}$

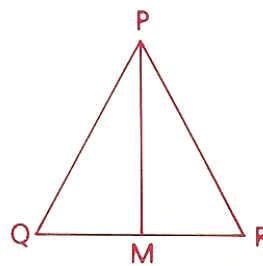


**Example 3** Set up a proof of the statement, “The altitude to the base of an isosceles triangle bisects the vertex angle.”

Setup for Example 3:

Given:  $\triangle PQR$  is isosceles, with base  $\overline{QR}$ .  
 $\overline{PM}$  is an altitude.

Prove:  $\overline{PM}$  bisects  $\angle QPR$ .





### ***Part Two: Sample Problem***

**Problem**      *Set up a proof of the statement, “If two angles of one triangle are congruent to two angles of another triangle, the remaining pair of angles are also congruent.”*

**Solution**

## Homework

### Problem Set A

In problems 1–4, draw your own diagram and write “Given:” and “Prove:” statements in terms of your diagram. Do *not* write a proof.

- 1 Given: An isosceles triangle and the median to the base  
Prove: The median is the *perpendicular bisector* of the base. (This sentence contains two conclusions—“the median is perpendicular to the base” and “the median bisects the base.”)
  
- 2 Given: A four-sided polygon with all four sides congruent (This figure is called a *rhombus*.)  
Conclusion: The lines joining opposite vertices are perpendicular.
  
- 3 Given: Segments drawn perpendicular to each side of an angle from a point on the bisector of the angle  
Conclusion: These two segments are congruent.
  
- 4 The bisector of the vertex angle of an isosceles triangle is perpendicular to the base.

In problems 5–7, set up each problem and supply a proof of the statement.

- 5 The altitude to a side of a scalene triangle forms two congruent angles with that side of the triangle.

**6** The median to the base of an isosceles triangle divides the triangle into two congruent triangles.

**7** If the base of an isosceles triangle is extended in both directions, then the exterior angles formed are congruent.

### **Problem Set B**

**In problems 8 set up and complete a proof of each statement.**

**8** If the median to a side of a triangle is also an altitude to that side, then the triangle is isosceles.