

NAME Student
 Adv Geo period 8

AMDG

Lines in the Plane - Chapter 4
4.2: The Case of the Missing Diagram

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Objective

After studying this section, you will be able to

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

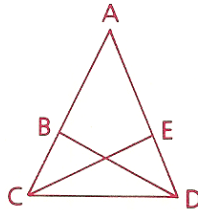
DIAG	
GIVEN	PROVE
IF	THEN
SUBJECT	PREDIC.

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.

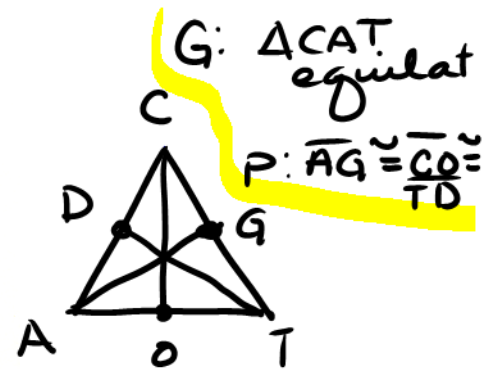
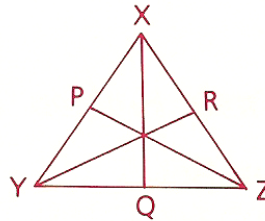


Example 2 Set up a proof of the statement, "The medians of a triangle are congruent if the triangle is equilateral."

Setup for Example 2:

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

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

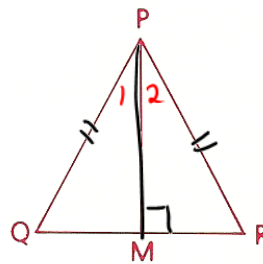


Example 3 Set up a proof of the statement, "The altitude to the base of an isosceles triangle bisects the vertex angle."

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

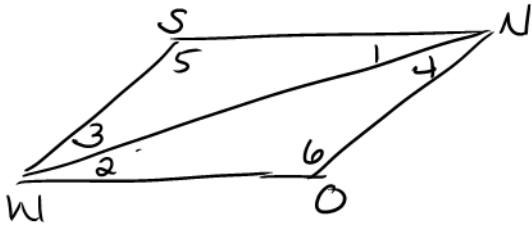
Problem Set up a proof of the statement, "If two angles of one triangle are congruent to two angles of another triangle, the remaining pair of angles are also congruent."

Solution

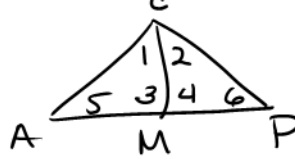
$$G: \angle 1 \cong \angle 2 \text{ \& \ } \angle 3 \cong \angle 4$$

$$P: \angle 5 \cong \angle 6$$

DIAG EX 1



DIAG EX 2



Homework

Problem Set A

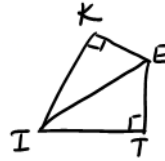
In problems 1–4, draw your own diagram and write “Given:” and “Prove:” statements in terms of your diagram. Do *not* write a proof.

- 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.

G: $\overline{EK} \perp \overline{KI}$, $\overline{ET} \perp \overline{IT}$, & \overline{IE} bis $\angle KIT$
 P: $\overline{EK} \cong \overline{ET}$



- 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.