NAME StuDent
Adv Geo period 8

4.2: The Case of the Missing Diagram

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Date 11/2/15

Objective

After studying this section, you will be able to

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

DIAG

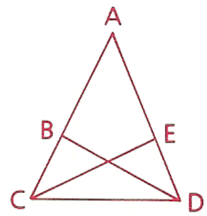
GIVEN	PROVE
IF	THEN
SUBJECT	PREDIC.

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.

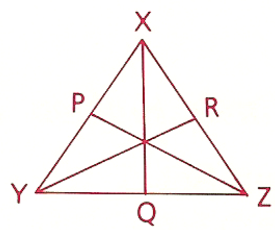


Example 2 *Set up a proof of the statement, "The medians of a triangle are congruent if the triangle is equilateral."*

Setup for Example 2:

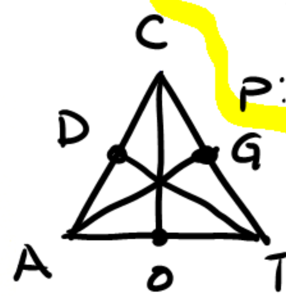
Given: $\triangle XYZ$ is equilateral.
$\overline{PZ}$, $\overline{RY}$, and $\overline{QX}$ are medians.

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



G: $\triangle CAT$ equilat

P: $\overline{AG} \cong \overline{CO} \cong \overline{TD}$

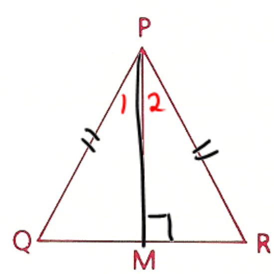


Example 3 *Set up a proof of the statement, "The altitude to the base of an isosceles triangle bisects the vertex angle."*

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

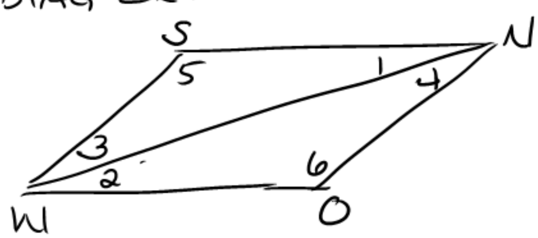
Problem Set up a proof of the statement, "If two angles of one triangle are congruent to two angles of another triangle, the remaining pair of angles are also congruent."

Solution

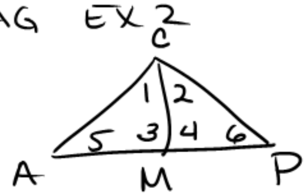
G: $\angle 1 \cong \angle 2$ & $\angle 3 \cong \angle 4$

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

DIAG EX 1



DIAG EX 2



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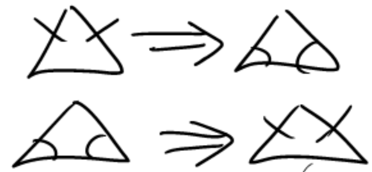
Homework

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.

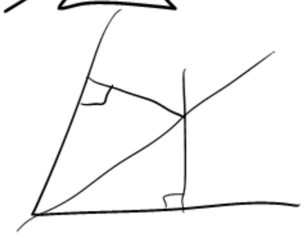
1 Given: An isosceles triangle and the median to the base

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.

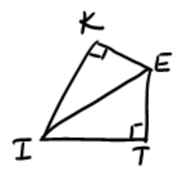


3 Given: Segments drawn perpendicular to each side of an angle from a point on the bisector of the angle

Conclusion: These two segments are congruent.

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

P: $\overline{EK} \cong \overline{ET}$



G: IF or SUBJ >VERB

P: then or pred

4 The bisector of the vertex angle of an isosceles triangle is perpendicular to the base.

G: $\overrightarrow{AD}$ bis $\angle BAC$, $\overline{AB} \cong \overline{AC}$

P: $\overline{AD} \perp \overline{BC}$

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.

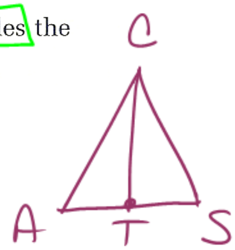
G: $\overline{DG}$ alt $\overline{EF}$

P: $\angle EGD \cong \angle FGD$

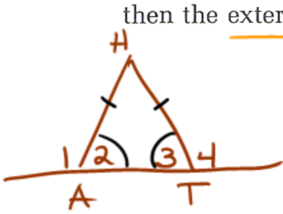
6 The median to the base of an isosceles triangle $\boxed{\text{divides}}$ the triangle into two congruent triangles.

G: $\overline{CT}$ med, $\overline{CA} \cong \overline{CS}$

P: $\triangle CAT \cong \triangle CST$



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



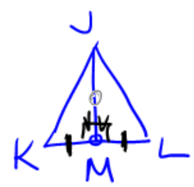
G: $\triangle HAT$ isos base $\overline{AT}$

P: $\angle 1 \cong \angle 4$

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.



G: $\overline{JM}$ med $\overline{KL}$
$\overline{JM}$ alt $\overline{KL}$

P: $\triangle JKL$ isos

	S	R
	1. $\overline{JM}$ med	1. Given
S	2. $\overline{KM} \cong \overline{ML}$	2. med $\Rightarrow \cong$ segs
	3. $\overline{JM}$ alt	3. Given
	4. $\angle JMK$ & $\angle JML$ rt$\angle$s	4. alt $\Rightarrow$ rt$\angle$s
A	5. $\angle JMK \cong \angle JML$	5. rt$\angle$s $\Rightarrow \cong \angle$s
S	6. $\overline{JM} \cong \overline{JM}$	6. Ref
	7. $\triangle JKM \cong \triangle JLM$	7. SAS (2 5 6)
	8. $\overline{JK} \cong \overline{JL}$	8. CPCTC
	9. $\triangle JKL$ isos	9. 2 $\cong$ sds $\Rightarrow$ isos $\triangle$