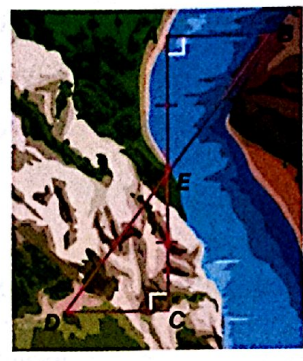


Example 3

**5 BRIDGE BUILDING** A surveyor needs to find the distance from point  $A$  to point  $B$  across a canyon. She places a stake at  $A$ , and a coworker places a stake at  $B$  on the other side of the canyon. The surveyor then locates  $C$  on the same side of the canyon as  $A$  such that  $\overline{CA} \perp \overline{AB}$ . A fourth stake is placed at  $E$ , the midpoint of  $\overline{CA}$ . Finally, a stake is placed at  $D$  such that  $\overline{CD} \perp \overline{CA}$  and  $D, E,$  and  $B$  are sited as lying along the same line.



- Explain how the surveyor can use the triangles formed to find  $AB$ .
- If  $AC = 1300$  meters,  $DC = 550$  meters, and  $DE = 851.5$  meters, what is  $AB$ ? Explain your reasoning.

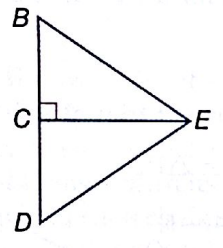
**Practice and Problem Solving** Extra Practice begins on page 969.

Example 1

**PROOF** Write a paragraph proof.

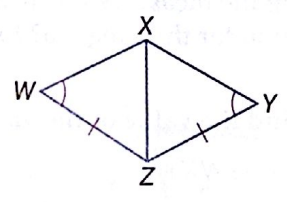
**6. Given:**  $\overline{CE}$  bisects  $\angle BED$ ;  $\angle BCE$  and  $\angle ECD$  are right angles.

**Prove:**  $\triangle ECB \cong \triangle ECD$

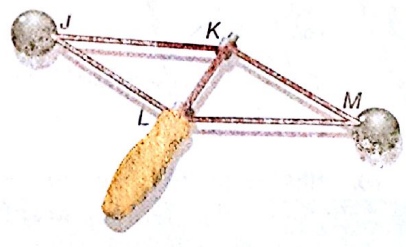


**7. Given:**  $\angle W \cong \angle Y$ ,  $\overline{WZ} \cong \overline{YZ}$ ,  $\overline{XZ}$  bisects  $\angle WZY$ .

**Prove:**  $\triangle XWZ \cong \triangle XYZ$



**8. TOYS** The object of the toy shown is to make the two spheres meet and strike each other repeatedly on one side of the wand and then again on the other side. If  $\angle JKL \cong \angle MLK$  and  $\angle JLK \cong \angle MKL$ , prove that  $\overline{JK} \cong \overline{ML}$ .

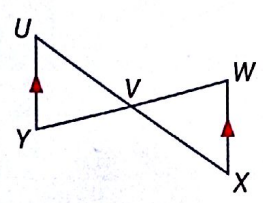


Example 2

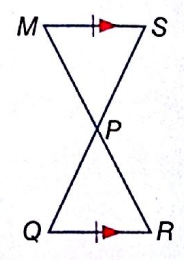
**PROOF** Write a two-column proof.

**9. Given:**  $V$  is the midpoint of  $\overline{YW}$ ;  $\overline{UY} \parallel \overline{XW}$ .

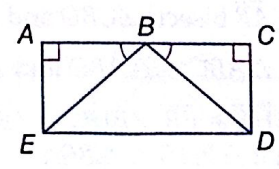
**Prove:**  $\triangle UVY \cong \triangle XVW$



**10. Given:**  $\overline{MS} \cong \overline{RQ}$ ,  $\overline{MS} \parallel \overline{RQ}$   
**Prove:**  $\triangle MSP \cong \triangle RQP$



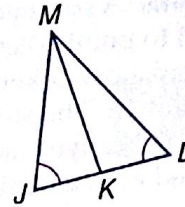
**11. PROOF** Write a flow proof.  
**Given:**  $\angle A$  and  $\angle C$  are right angles.  
 $\angle ABE \cong \angle CBD$ ,  $\overline{AE} \cong \overline{CD}$   
**Prove:**  $\overline{BE} \cong \overline{BD}$



12. **PROOF** Write a flow proof.

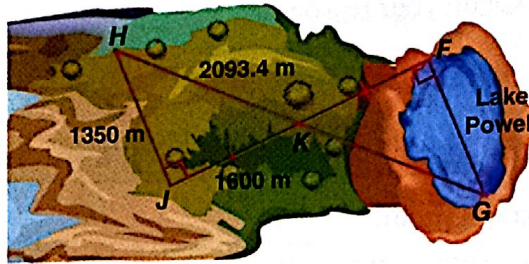
Given:  $\overline{KM}$  bisects  $\angle JML$ ;  $\angle J \cong \angle L$ .

Prove:  $\overline{JM} \cong \overline{LM}$



**Example 3**

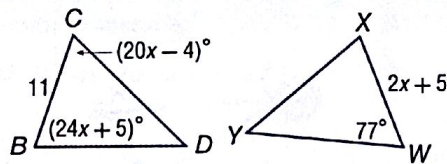
13. **FITNESS** A high school wants to hold a 1500-meter regatta on Lake Powell but is unsure if the lake is long enough. To measure the distance across the lake, the crew members locate the vertices of the triangles below and find the measures of the lengths of  $\triangle HJK$  as shown below.



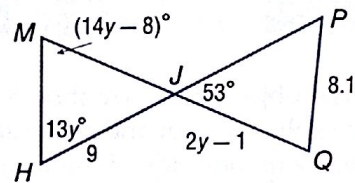
- Explain how the crew team can use the triangles formed to estimate the distance  $FG$  across the lake.
- Using the measures given, is the lake long enough for the team to use as the location for their regatta? Explain your reasoning.

**ALGEBRA** Find the value of the variable that yields congruent triangles.

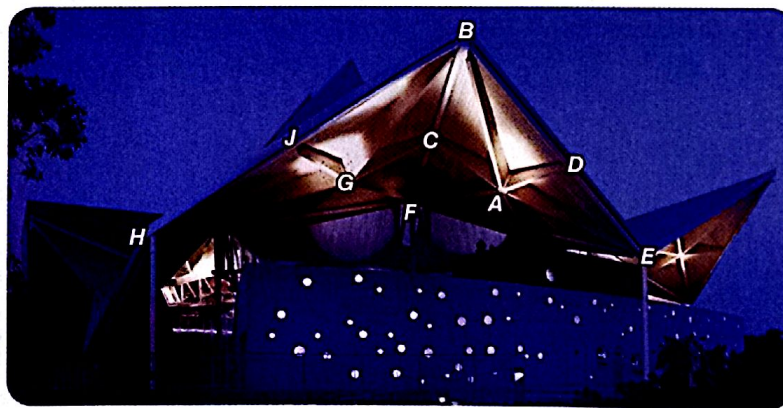
14.  $\triangle BCD \cong \triangle WXY$



15.  $\triangle MHJ \cong \triangle PQJ$



16. **THEATER DESIGN** The trusses of the roof of the outdoor theater shown below appear to be several different pairs of congruent triangles. Assume that trusses that appear to lie on the same line actually lie on the same line.



- If  $\overline{AB}$  bisects  $\angle CBD$  and  $\angle CAD$ , prove that  $\triangle ABC \cong \triangle ABD$ .
- If  $\triangle ABC \cong \triangle ABD$  and  $\angle FCA \cong \angle EDA$ , prove that  $\triangle CAF \cong \triangle DAE$ .
- If  $\overline{HB} \cong \overline{EB}$ ,  $\angle BHG \cong \angle BEA$ ,  $\angle HGF \cong \angle EAD$ , and  $\angle JGB \cong \angle DAB$ , prove that  $\triangle BHG \cong \triangle BEA$ .

