

Check Your Understanding

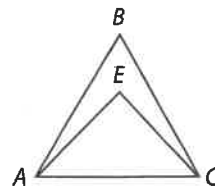
Step-by-Step Solutions begin on page R14.



Example 1

Refer to the figure at the right.

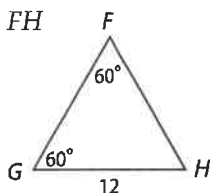
- If $\overline{AB} \cong \overline{CB}$, name two congruent angles.
- If $\angle EAC \cong \angle ECA$, name two congruent segments.



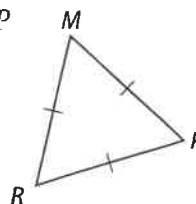
Example 2

Find each measure.

3. $\angle FHG$



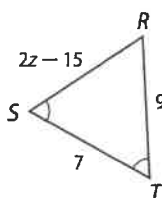
4. $m\angle MRP$



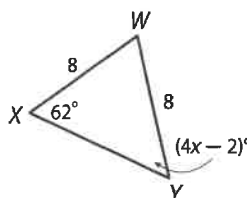
Example 3

CCSS SENSE-MAKING Find the value of each variable.

5.



6.

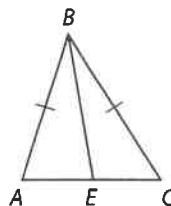


Example 4

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

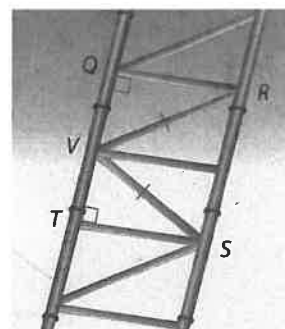
Given: $\triangle ABC$ is isosceles; \overline{EB} bisects $\angle ABC$.

Prove: $\triangle ABE \cong \triangle CBE$



8. **ROLLER COASTERS** The roller coaster track shown in the photo on page 285 appears to be composed of congruent triangles. A portion of the track is shown.

- If \overline{QR} and \overline{ST} are perpendicular to \overline{QT} , $\triangle VSR$ is isosceles with base \overline{SR} , and $\overline{QT} \parallel \overline{SR}$, prove that $\triangle RQV \cong \triangle STV$.
- If $VR = 2.5$ meters and $QR = 2$ meters, find the distance between \overline{QR} and \overline{ST} . Explain your reasoning.



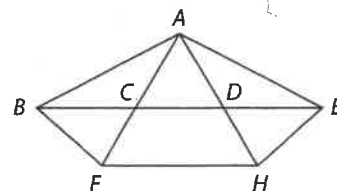
Practice and Problem Solving

Extra Practice is on page R4.

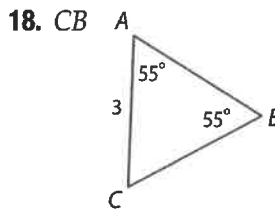
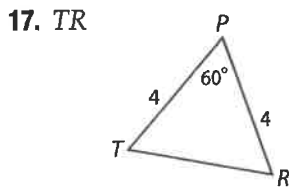
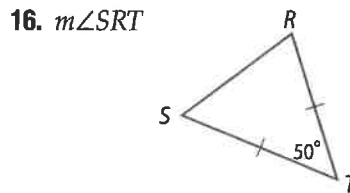
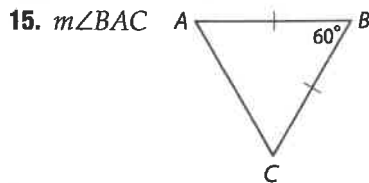
Example 1

Refer to the figure at the right.

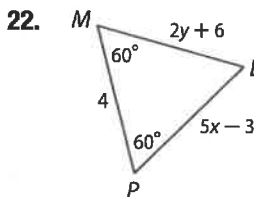
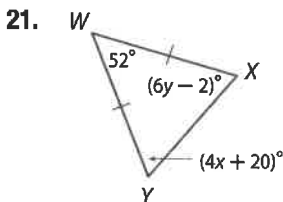
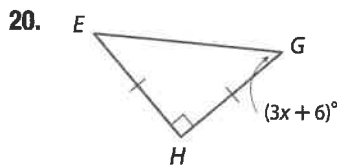
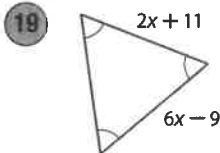
- If $\overline{AB} \cong \overline{AE}$, name two congruent angles.
- If $\angle ABF \cong \angle AFB$, name two congruent segments.
- If $\overline{CA} \cong \overline{DA}$, name two congruent angles.
- If $\angle DAE \cong \angle DEA$, name two congruent segments.
- If $\angle BCF \cong \angle BFC$, name two congruent segments.
- If $\overline{FA} \cong \overline{AH}$, name two congruent angles.



Example 2 Find each measure.



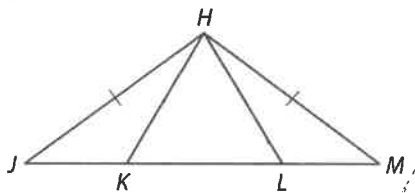
Example 3 **CCSS** REGULARITY Find the value of each variable.



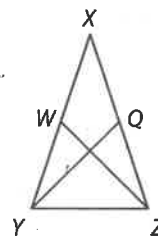
Example 4 **PROOF** Write a paragraph proof.

23. **Given:** $\triangle HJM$ is isosceles, and $\triangle HKL$ is equilateral. $\angle JKH$ and $\angle HKL$ are supplementary and $\angle HLK$ and $\angle MLH$ are supplementary.

Prove: $\angle JHK \cong \angle MHL$

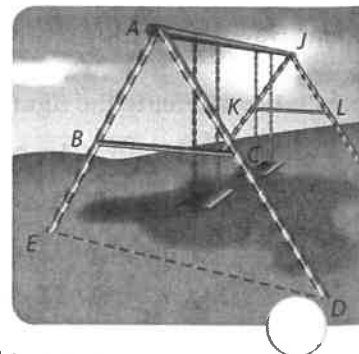


24. **Given:** $\overline{XY} \cong \overline{XZ}$
 W is the midpoint of \overline{XY} .
 Q is the midpoint of \overline{XZ} .
Prove: $\overline{WZ} \cong \overline{QY}$



25. **BABYSITTING** While babysitting her neighbor's children, Elisa observes that the supports on either side of a park swing set form two sets of triangles. Using a jump rope to measure, Elisa is able to determine that $\overline{AB} \cong \overline{AC}$, but $\overline{BC} \not\cong \overline{AB}$.

- Elisa estimates $m\angle BAC$ to be 50. Based on this estimate, what is $m\angle ABC$? Explain.
- If $\overline{BE} \cong \overline{CD}$, show that $\triangle AED$ is isosceles.
- If $\overline{BC} \parallel \overline{ED}$ and $\overline{ED} \cong \overline{AD}$, show that $\triangle AED$ is equilateral.
- If $\triangle JKL$ is isosceles, what is the minimum information needed to prove that $\triangle ABC \cong \triangle JLK$? Explain your reasoning.



26. **CHIMNEYS** In the picture, $\overline{BD} \perp \overline{AC}$ and $\triangle ABC$ is an isosceles triangle with base \overline{AC} . Show that the chimney of the house, represented by \overline{BD} , bisects the angle formed by the sloped sides of the roof, $\angle ABC$.



27. **CONSTRUCTION** Construct three different isosceles right triangles. Explain your method. Then verify your constructions using measurement and mathematics.

28. **PROOF** Based on your construction in Exercise 27, make and prove a conjecture about the relationship between the base angles of an isosceles right triangle.

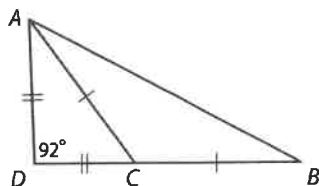
CCSS REGULARITY Find each measure.

29. $m\angle CAD$

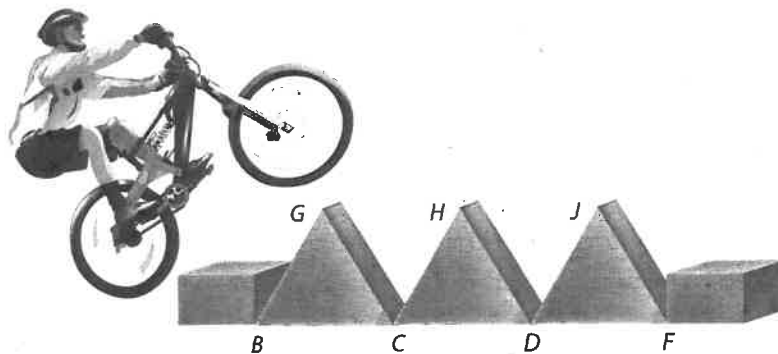
30. $m\angle ACD$

31. $m\angle ACB$

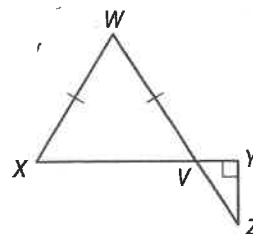
32. $m\angle ABC$



33. **FITNESS** In the diagram, the rider will use his bike to hop across the tops of each of the concrete solids shown. If each triangle is isosceles with vertex angles $G, H,$ and $J,$ and $\overline{BG} \cong \overline{HC}, \overline{HD} \cong \overline{JF}, \angle G \cong \angle H,$ and $\angle H \cong \angle J,$ show that the distance from B to F is three times the distance from D to F .



34. **Given:** $\triangle XWV$ is isosceles; $\overline{ZY} \perp \overline{YV}$.
Prove: $\angle X$ and $\angle YZV$ are complementary.



PROOF Write a two-column proof of each corollary or theorem.

35. Corollary 4.3

36. Corollary 4.4

37. Theorem 4.11

Find the value of each variable.

