PRACTICE & PROBLEM SOLVING

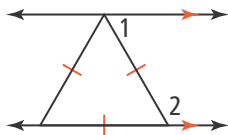**UNDERSTAND**

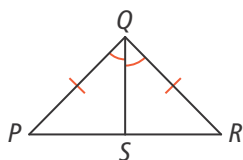**12. Mathematical Connections** What are the measures of ∠1 and ∠2? Explain.
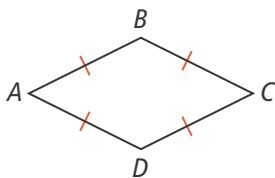
13. Construct Arguments Use the properties of rigid motions to write a proof of Theorem 4-2.

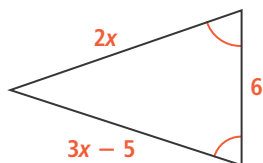**Given:** $\overline{PQ} \cong \overline{QR}$ and
$m\angle PQS = m\angle RQS$

Prove: $\overline{QS} \perp \overline{PR}$ and
$PS = SR$

14. Look for Relationships Prove that
∠BAD ≅ ∠BCD and ∠ABC ≅ ∠CDA.

15. Error Analysis Amaya is asked to find the side lengths of the triangle shown. What is her error?

> From the top leg and the base, 2x = 6, so x = 3. Substitute x into the expression for the bottom leg's length to get 3(3) − 5 = 4. ✗

16. Higher Order Thinking Deondra draws points at (1, 5) and (1, −1) on a coordinate plane. Each point will be a vertex of an isosceles right triangle. What are two possible points in the second quadrant that she can specify as a vertex of her triangle? Explain.
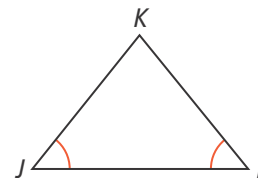
PRACTICE

17. Use rigid motions to write a proof of the Converse of the Isosceles Triangle Theorem.
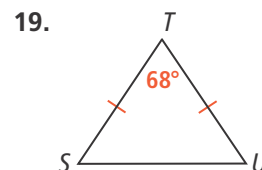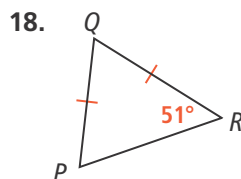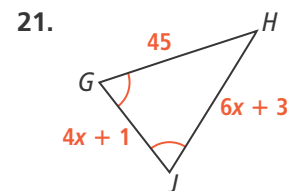SEE EXAMPLE 1

Given: ∠J ≅ ∠L
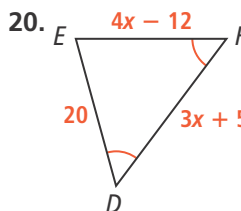
Prove: JK ≅ KL

Find the unknown angle measures in each triangle.
SEE EXAMPLE 2
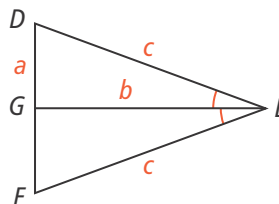
18.

19.

Find the lengths of all three sides of each triangle.
SEE EXAMPLE 3

20.

21.

Use the figure shown for Exercises 22 and 23.
SEE EXAMPLE 4

22. What is m∠DEG if m∠DFE = 70?

23. What is the value of b if a = 8 and c = 24?

24. Prove that ∠ABC is a right angle.
SEE EXAMPLE 5

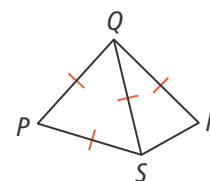**Given:** $\overline{AD} \cong \overline{BD} \cong \overline{CD}$

Prove: m∠ABC = 90
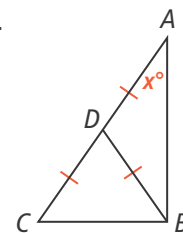
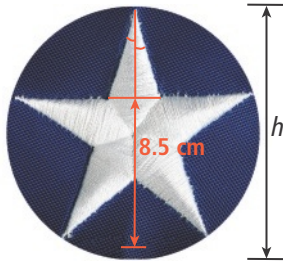**25.** Given m∠PSR = 134, what is the measure of ∠SQR?
SEE EXAMPLE 6

APPLY

26. Make Sense and Persevere Each of the five points on a star produced for a flag is an isosceles triangle with leg length 6 cm and base length 4.2 cm. What is the total height h of each star? Round to the nearest tenth of a centimeter.

8.5 cm

h

27. Use Structure The front of the tent below has the shape of an equilateral triangle.

a. What is the side length of the triangle? Round to the nearest tenth of a foot.

b. Explain the method you use to calculate the length.

5 ft

28. Look for Relationships For a crane to lift the beam shown below, the beam and the two support cables must form an isosceles triangle with height h. If the distance between the cables along the beam is 18 ft and the height h is 8 ft, what is the total length of the two cables? Round to the nearest tenth of a foot.
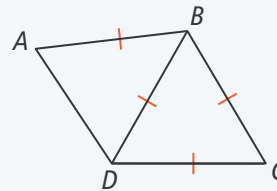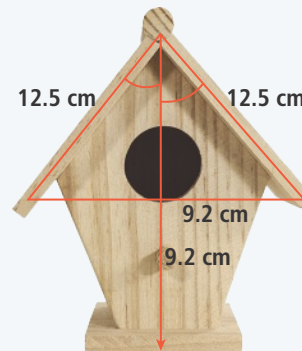
h
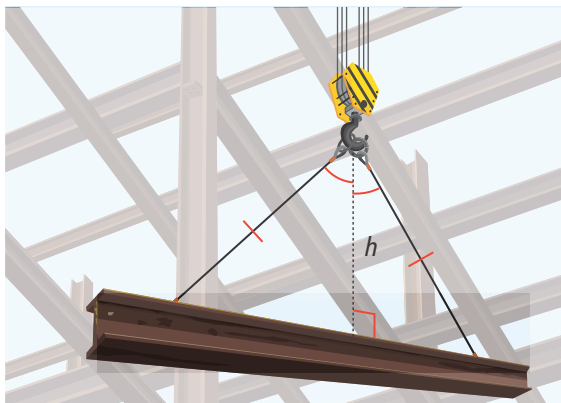
ASSESSMENT PRACTICE

29. Consider the following triangle.

L

$(5y - 19)°$

K 56°

M
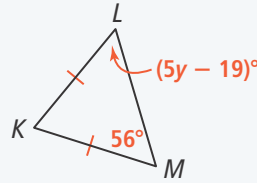
a. Write an equation you can solve to find the value of y.

b. What is $m\angle K$?

30. SAT/ACT Given $m\angle ABC = 114$, what is $m\angle BAD$?

A B

D C

Ⓐ 54   Ⓒ 60
Ⓑ 63   Ⓓ 72

31. Performance Task Emaan designs the birdhouse shown below.

12.5 cm   12.5 cm

9.2 cm

9.2 cm

Part A What is the total height of the birdhouse? Show your work.

Part B If Emaan decides to change the design by increasing each side of the roof from 12.5 cm to 15.2 cm, what will be the new height of the birdhouse? All other labeled dimensions on the birdhouse will remain unchanged.