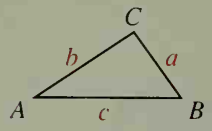
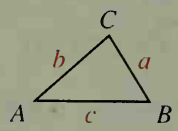
Theorem 8-3



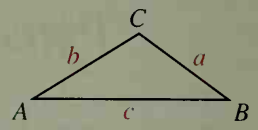
If $c^2 = a^2 + b^2$, then $m\angle C = 90$, and $\triangle ABC$ is right.

Theorem 8-4



If $c^2 < a^2 + b^2$, then $m\angle C < 90$, and $\triangle ABC$ is acute.

Theorem 8-5



If $c^2 > a^2 + b^2$, then $m\angle C > 90$, and $\triangle ABC$ is obtuse.

Example A triangle has sides of the given lengths. Is it acute, right, or obtuse?

a. 9, 40, 41 **b.** 6, 7, 8 **c.** 7, 8, 11

Solution

a. $41^2 \stackrel{?}{=} 9^2 + 40^2$
$1681 \stackrel{?}{=} 81 + 1600$
$1681 = 1681$
The triangle is right.

b. $8^2 \stackrel{?}{=} 6^2 + 7^2$
$64 \stackrel{?}{=} 36 + 49$
$64 < 85$
The triangle is acute.

c. $11^2 \stackrel{?}{=} 7^2 + 8^2$
$121 \stackrel{?}{=} 49 + 64$
$121 > 113$
The triangle is obtuse.

Classroom Exercises

If a triangle is formed with sides having the lengths given, is it acute, right, or obtuse? If a triangle can't be formed, say *not possible*.

1. 6, 8, 10 **2.** 4, 6, 8 **3.** 1, 4, 6

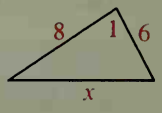
4. 8, 10, 12 **5.** $\sqrt{7}, \sqrt{7}, \sqrt{14}$ **6.** $4, 4\sqrt{3}, 8$

7. Specify all values of x that make the statement true.

a. $\angle 1$ is a right angle. **b.** $\angle 1$ is an acute angle.

c. $\angle 1$ is an obtuse angle. **d.** The triangle is isosceles.

e. No triangle is possible.

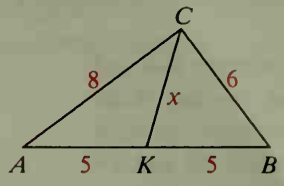


Exercises 8–10 refer to the figures below.

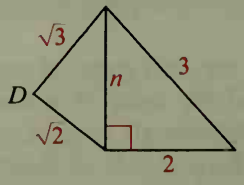
8. Explain why x must equal 5.

9. Explain why $\angle D$ must be a right angle.

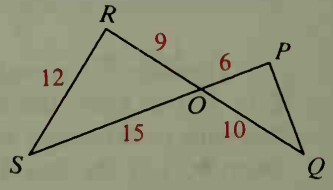
10. Explain why $\angle P$ must be a right angle.



Ex. 8



Ex. 9



Ex. 10