Section 9.1 The Pythagorean Theorem and its Converse

Complete the outline as you view Video Lecture 9.1. Pause the video as needed to fill in the blanks. Then press Play to continue. Also, circle your answer to each numbered exercise.

Objective 1 Use the Pythagorean Theorem

The ________ ________ can be applied to right triangles only.

Pythagorean Theorem

<table>
<thead>
<tr>
<th>Theorem</th>
<th>If...</th>
<th>Then...</th>
</tr>
</thead>
<tbody>
<tr>
<td>If a triangle is a right triangle, then the sum of the squares of the lengths of the legs is equal to the square of the length of the hypotenuse.</td>
<td>ΔABC is a right triangle</td>
<td>$(\text{leg}_1)^2 + (\text{leg}_2)^2 = (\text{hypotenuse})^2$ or $a^2 + b^2 = c^2$</td>
</tr>
</tbody>
</table>

Work Video Exercises 1 & 2 with me.

Find the value of $x$. If necessary, write the answer in simplest radical form.

1. 

2. 

A(n) ________ ________ is a set of positive integers $a$, $b$, and $c$ that satisfy the equation $a^2 + b^2 = c^2$. Notice from this equation that $c$ must be the greatest number.
Section 9.1 The Pythagorean Theorem and its Converse

Pause and work Video Exercise 3.

3. A wire is needed to support a vertical pole 15 feet tall. The cable will be anchored to a stake 8 feet from the base of the pole. How much cable is needed?

Play and check.

Objective 2 Use the Converse of the Pythagorean Theorem

Converse of the Pythagorean Theorem

If the sum of the squares of the lengths of two sides of a triangle is equal to the square of the length of the third side, then the triangle is a right triangle.

<table>
<thead>
<tr>
<th>If...</th>
<th>Then...</th>
</tr>
</thead>
<tbody>
<tr>
<td>$a^2 + b^2 = c^2$</td>
<td>$\triangle ABC$ is a right triangle</td>
</tr>
</tbody>
</table>

Work Video Exercise 4 with me.

4. Is the triangle a right triangle? Explain.
Theorem
If the square of the length of the longest side of a triangle is greater than the sum of the squares of the lengths of the other two sides, then the triangle is obtuse.

\[ c^2 > a^2 + b^2 \]

\( \triangle ABC \) is obtuse

Theorem
If the square of the length of the longest side of a triangle is less than the sum of the squares of the lengths of the other two sides, then the triangle is acute.

\[ c^2 < a^2 + b^2 \]

\( \triangle ABC \) is acute

Notice the patterns formed. Below, \( a, b, \) and \( c \) are the lengths of the sides of a \( \triangle \) and \( c \) is the greatest number.

If \( c^2 < a^2 + b^2 \), \( \triangle \) is acute.

If \( c^2 = a^2 + b^2 \), \( \triangle \) is right.

If \( c^2 > a^2 + b^2 \), \( \triangle \) is obtuse.

Work Video Exercise 5 with me.

5. The lengths of the sides of a triangle are given. Classify the triangle as “acute,” “right,” or “obtuse.”

0.3, 0.4, 0.6