

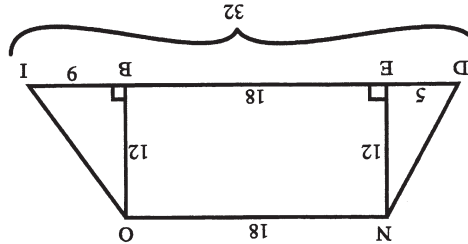
$$\begin{aligned}
 8. \quad 16^2 + 28^2 &= d^2 \\
 256 + 784 &= d^2 \\
 1040 &= d^2 \\
 4\sqrt{65} &= d
 \end{aligned}$$

7. Studying the patterns of the pythagorean triples, 3-4-5, 5-12-13, 7-24-25, 9-40-41, etc., by inductive reasoning we can conclude that the other sides are 144 and 145.

$$\begin{aligned}
 5. \quad 8^2 + 12^2 &= C^2 \\
 64 + 144 &= C^2 \\
 208 &= C^2 \\
 4\sqrt{13} &= C \\
 6. \quad 20^2 + b^2 &= 32^2 \\
 400 + b^2 &= 1024 \\
 b^2 &= 624 \\
 b &= 4\sqrt{39}
 \end{aligned}$$

$$\begin{aligned}
 1. \quad \Delta JOI \sim \Delta HOI \sim \Delta NOH &\sim \Delta JHI \quad (T19-1) \\
 2. \quad \frac{JO}{HO} = \frac{OH}{HO}, \frac{NO}{HO} = \frac{OH}{HO}, \frac{OH}{JO} &= 5\sqrt{2} \quad (T19-2) \\
 3. \quad \frac{JO}{IH} = \frac{HI}{IH}, \frac{NI}{IH} = \frac{HI}{IH}, \frac{HI}{IH} &= 5\sqrt{3} \quad (T19-3) \\
 4. \quad \frac{NH}{ON} = \frac{NI}{NH}, \frac{NH}{IO} = \frac{NI}{NH}, \frac{NH}{HN} &= 5\sqrt{6} \quad (T19-4)
 \end{aligned}$$

$$\begin{aligned}
 9 \ \& \ 10. \quad 9^2 + 12^2 &= (OI)^2 \\
 81 + 144 &= (OI)^2 \\
 225 &= (OI)^2 \\
 15 &= OI \\
 NO = EB &= 18 \\
 BO = EN &= 12 \\
 DE = 32 - 18 - 9 &= 5
 \end{aligned}$$



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# GEOMETRY

## The Complete Course

Lesson Nineteen

# Right Triangles And The Pythagorean Theorem

KA8479

## Worksheet

12. A (T19-7)

11. C (T19-6)

## I. VIDEOTAPE FOLLOW-UP QUESTIONS

### I. Introduction

### II. Similarity in right triangles.

#### A. Review of definitions

1. Proportion
2. Extremes
3. Means
4. Geometric mean

#### B. Resulting theorems when the altitude is drawn to the hypotenuse in a right triangle

1. The altitude to the hypotenuse of a right triangle forms two triangles that are similar to the original triangle and to each other. (T19-1)
2. The length of the altitude drawn to the hypotenuse of a right triangle is the geometric mean between the lengths of the segments of the hypotenuse. (T19-2)
3. The altitude to the hypotenuse of a right triangle intersects it so that the length of each leg is the geometric mean between the length of its adjacent segment of the hypotenuse and the length of the entire hypotenuse. (T19-3)
4. Examples
5. Applications

### III. The Pythagorean Theorem and its converse.

#### A. In a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the legs. (T19-4)

#### B. Proof

#### C. **Converse of 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. (T19-5)

#### D. Examples

#### E. Applications

#### F. Pythagorean Triples

1. List
2. Number patterns in the development

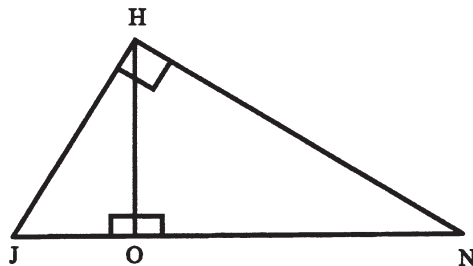
#### G. Pythagorean Theorem related to inequalities

1. 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 an acute triangle. (T19-6)
2. 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 an obtuse triangle. (T19-7)

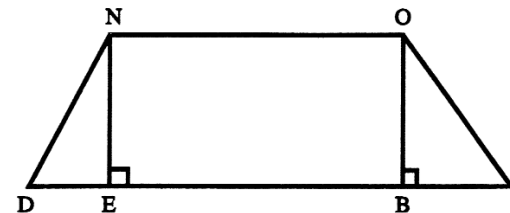
## II. SUPPLEMENTARY EXERCISES

1-4 Given right triangle JHN with altitude  $\overline{HO}$ ,  $JO = 5$ ,  $ON = 10$ .



1. Name the three similar triangles respectively from the figure.
2.  $HO = \underline{\hspace{2cm}}$
3.  $JH = \underline{\hspace{2cm}}$
4.  $HN = \underline{\hspace{2cm}}$
5. The measures of two legs of a right triangle are 8 and 12. What is the measure of the hypotenuse?
6. The measure of the hypotenuse of a right triangle is 32 and the measure of a leg is 20. What is the measure of the other leg?
7. The measures of the sides of a right triangle are those of a Pythagorean triple. If the measure of the shortest side is 17, what are the measures of the other two sides?
8. The sides of a rectangle measure 16 and 28. What is the length of the diagonal?

Given trapezoid DION with  $NO = 18$ ,  $BO = 12$ ,  $BI = 9$ ,  $DI = 32$ .



9.  $OI = \underline{\hspace{2cm}}$

10.  $DN = \underline{\hspace{2cm}}$

11-12 The measurements of the three sides of four different triangles are given:

- a) 12, 18, 24
- b) 16, 30, 34
- c) 15, 18, 22
- d) 13, 84, 85

11. Which measurements are those of an acute triangle?

12. Which measurements are those of an obtuse triangle?