Name: _____

Unit 5 – Trigonometry
5.1 – The Pythagoras Theorem

Review of Squares and Square Roots

Find the **SQUARES** of the following values given in the table:

Original Value	3	7	12	2.6	11.8	46.53
Squared						

Find the **SQUARE ROOTS** of the following values in the table:

Original Value	9	25	144	12	40	348.56
Square Root						

For each of the following pairs of values find the **SUM OF THE SQUARES**:

a. 3, 4   b. 9, 16   c. 29.44, 65.2

For each of the following pairs of values find the **DIFFERENCE OF THE SQUARES**:

d. 5, 3   e. 12, 8   f. 35.2, 12.33

Find the **SQUARE ROOT** of the **SUM** of the **SQUARES** of:

a. 3 and 4   b. 9 and 16   c. 2.4 and 11.6

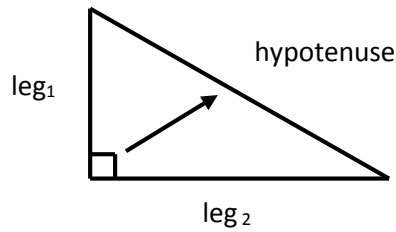Find the **SQUARE ROOT** of the **DIFFERENCE** of the **SQUARES** of:

a. 13 and 12   b. 5 and 3   c. 16 and 8

The Pythagoras Theorem

- A *right triangle* is any triangle that contains a right angle **i.e.** 90^0
- The side opposite the right angle is called the ***hypotenuse.***
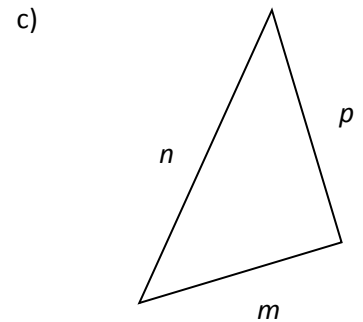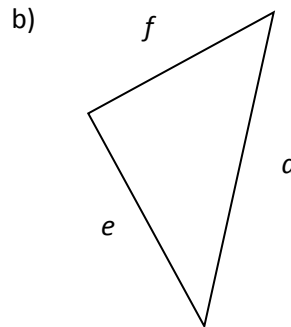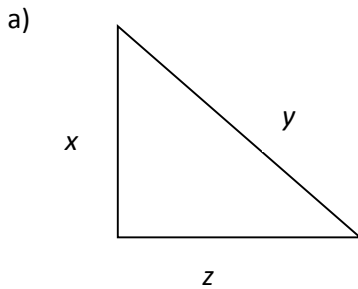- The other two sides are called ***legs.***

The hypotenuse is always the **LONGEST** leg in a triangle.

- the ***Pythagoras Theorem*** states that the sum of the squares of the lengths of the two legs is equal to the square of the length of the hypotenuse:

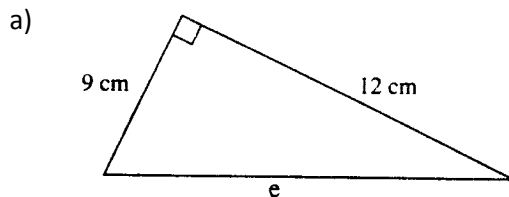$$\left(\text{hypotenuse}\right)^2 = \left(\text{leg}_1\right)^2 + \left(\text{leg}_2\right)^2 \qquad\qquad \left(\text{leg}_2\right)^2 = \left(\text{hypotenuse}\right)^2 - \left(\text{leg}_1\right)^2$$

Examples: Write the Pythagoras Theorem for the following triangles.
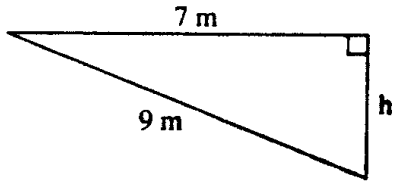
a)

b)

c)

We can use the Pythagoras Theorem to find the lengths of unknown sides of any right triangle.
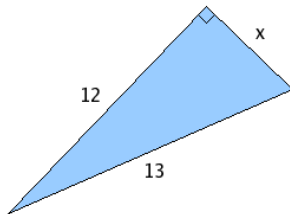
Examples: Find the lengths of the unknown sides.

a)

b)

c)

Pythagorean Triples

Pythagorean triples are whole number groups of numbers that **satisfy the Pythagoras Theorem**

        e.g. 3,4,5   5,12,13   8,15,17   7,24,25   9,40,41   20,21,29

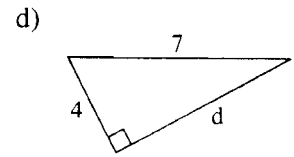**Examples:**   Determine if it is possible to have a right triangle with the following side lengths.
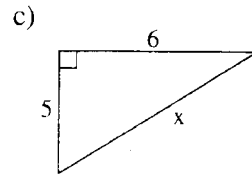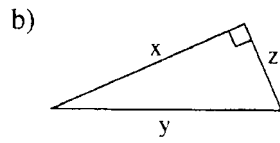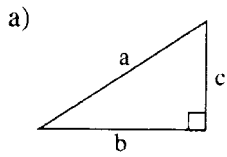
                (*__HINT__: Check if the side lengths __satisfy__ the Pythagoras Theorem.*)

a) 24, 45, 51

b) 18, 24, 28

Assignment

1. Write the Pythagoras Theorem for each right triangle.

a)

b)

c)

d)

_____   _____   _____   _____

2. Will the following lengths form a right triangle? (**_HINT_:** *Use the Pythagoras Theorem and check to see if the left side of the equation equals the right side of the equation.*)
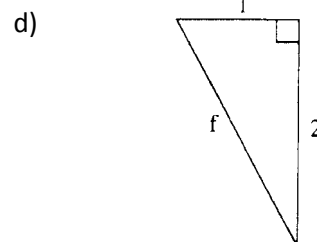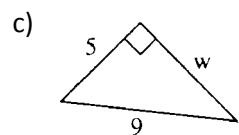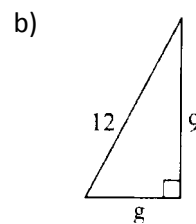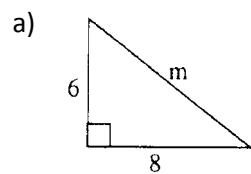
a) 1, 2, 3

b) 12, 15, 9

c) 12, 13, 5

d) 14, 7, 9

3. Find the length of the unknown side. Leave your answers to the nearest tenth if necessary.

a)

b)

c)

d)

4. A ladder that is 8 metres long is leaning against a wall. The base of the ladder is 2.1 metres from the wall. How high on the wall does the ladder reach? *(**HINT:** Draw a sketch first.)*

5. Ray hikes 7 km north and 4 km east. How far is he from his starting point? *(**HINT:** Draw a sketch first.)*

6. A 15 metre flag pole is supported by a 20 metre guy wire as shown below. How far from the pole is the wire attached to the ground? *(**HINT:** Label the diagram below with the information given.)*