**5.2: Pythagorean Theorem**

**Learning Goal:** We are learning to use the Pythagorean theorem to solve problems involving right triangles. And we are learning how to use the *sin, cos, and tan* buttons on our calculators.

Pythagorean theorem is used on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ triangles. The Pythagorean theorem is: \_\_\_\_\_\_ + \_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_

Your hypotenuse is always \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**In words, it means that…**

-If you make a square on each side of the triangle

-The area of the two smaller squares

equals the area of the largest square

 b c

*\*It ONLY works on right triangles\**

Here is a visual proof: a

<https://www.youtube.com/watch?v=CAkMUdeB06o>

**Example #1: Solve for the unknown side length**

Solve for c Solve for e

 F

 A 16.9m

 E

10.2 cm

 6m

 D

 C 4.3 cm B

Remember the biggest \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ corresponds with the biggest \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and

the smallest \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ corresponds with the smallest \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Introduction to doing Trigonometry on a calculator**

Trigonometry is the branch of mathematics dealing with the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between the **sides** and **angles** of any triangle.

 It is common practice in trigonometry to label unknown angles with the Greek letter *theta*:

On your calculator are three important buttons: “*sin*” “*cos*” and “*tan*”. Each of these is a special trigonometric relationship.

It works like this: $\sin(50)=$

 Relationship Angle (*degrees*) Ratio (*remember ratios can be decimals OR fractions*)

So $\sin(50)$ means that there is a scale factor (relationship) of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between two sides.

Which two sides? That is a lesson for tomorrow! For today, we learn how to use our calculators.

**What is the ratio for:** Give answers to three decimal places.

$\tan(70)=$ $\cos(36)=$ $\sin(13)=$

But what if we need to go backwards? What if we want to find the angle that gives the ratio? Just like solving equations that you learnt in grade 9, we use “inverse operations”.

**What is the unknown angle?** Round to the nearest whole degree.

$\sin(θ)=$ 0.984 $\cos(θ)=0.970$ $\tan(θ)= $1

$\cos(θ)=$ 0.891 $\tan(θ)=1.600$ $\sin(θ)= $0.529

**Success Criteria**

* I can use the Pythagorean theorem to solve for an unknown side length in a right angled triangle.
* I can find the value of a trigonometric ratio by plugging it into my calculator
* I can calculate an unknown angle by using the inverse trigonometric ratio on my calculator.