

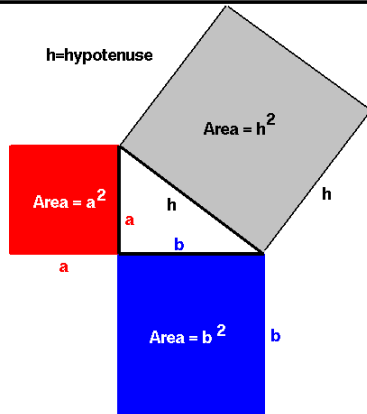
7-1: Pythagorus Theorem



Pythagorean Theorem



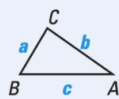
For any right triangle with sides a and b and hypotenuse h , the square of the hypotenuse is equal to the sum of the squares of the other two sides.



$$h^2 = a^2 + b^2$$

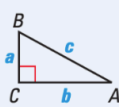
In $\triangle ABC$ with longest side c :

If $c^2 < a^2 + b^2$,



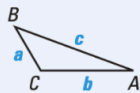
then $\triangle ABC$ is *acute*.

• If $c^2 = a^2 + b^2$,



then $\triangle ABC$ is *right*.

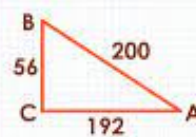
If $c^2 > a^2 + b^2$,



then $\triangle ABC$ is *obtuse*.

Pythagorean Theorem Converse

"If the square of one side of a triangle is equal to the sum of the squares of the other two sides, then the triangle is a right triangle."



$$a^2 + b^2 = c^2$$

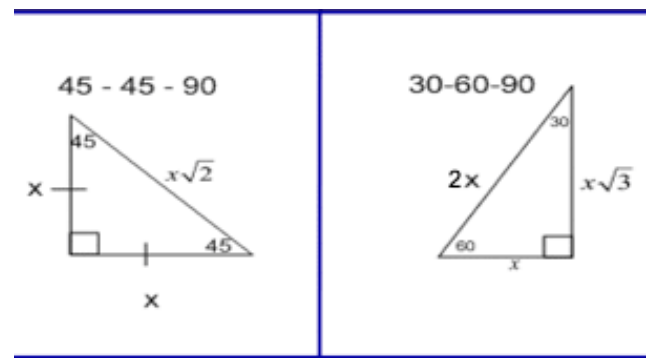
$$56^2 + 192^2 = 200^2$$

$$3136 + 36864 = 40000$$

$$40000 = 40000$$

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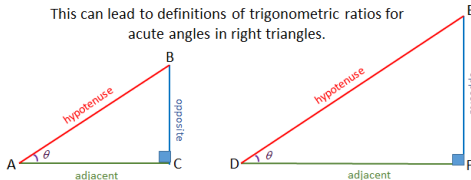
7-2: Special Right Triangles



7-(3...5) Trigonometric ratios and inverse

Trigonometry and Similar Triangles

If two triangles are similar, then their corresponding sides are proportional and their corresponding angles are congruent. This can lead to definitions of trigonometric ratios for acute angles in right triangles.



$$\frac{BC}{BA} = \frac{EF}{ED}$$

$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

SOH

$$\frac{AC}{AB} = \frac{DF}{DE}$$

$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

CAH

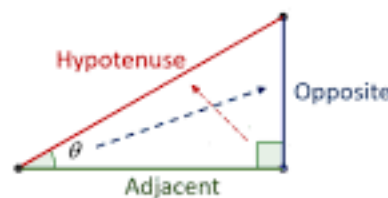
$$\frac{BC}{CA} = \frac{EF}{DF}$$

$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$

TOA

Inverse Trig Ratio

Inverse trig ratio can be used to find the angle of a right triangle when given two sides of the triangle.



SOH $\theta = \sin^{-1} \frac{\text{opposite}}{\text{hypotenuse}}$

CAH $\theta = \cos^{-1} \frac{\text{adjacent}}{\text{hypotenuse}}$

TOA $\theta = \tan^{-1} \frac{\text{opposite}}{\text{adjacent}}$

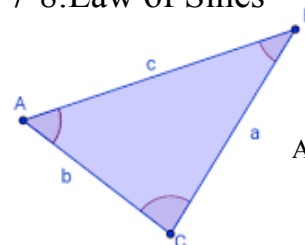
7-6: Cofunctions

$$\sin(90^\circ - x) = \cos(x), \quad \cos(90^\circ - x) = \sin(x),$$

$$\tan(90^\circ - x) = \cot(x), \quad \cot(90^\circ - x) = \tan(x),$$

$$\sec(90^\circ - x) = \csc(x), \quad \csc(90^\circ - x) = \sec(x).$$

7-8: Law of Sines



Law of sines

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

Applicable to all triangle