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Right Triangle Trigonometry

Unit 4 Lesson 1

RIGHT TRIANGLE TRIGONOMETRY

Students will be able to:

Use the right triangle trigonometry for finding the unknowns in a right angled triangle

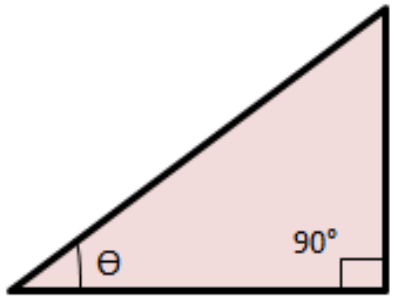
Key Vocabulary:

- Right Triangle Trigonometry
- Trigonometric Ratios
- Pythagorean Theorem

Right Triangle Trigonometry

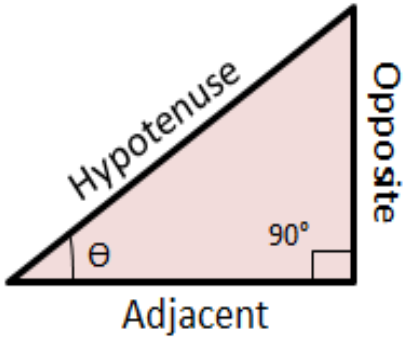
Right angle trigonometry is the trigonometry of a right-angled triangle.

A right-angled triangle is a triangle in which one angle is 90 degrees.



Properties of a Right Angled Triangle

- A **hypotenuse** is the line segment opposite to the right-angle.
- An **opposite** is the line segment opposite to the angle Θ.
- An **adjacent** is the line segment next to the angle Θ.

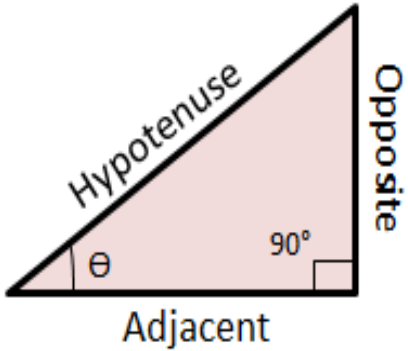


Trigonometric Ratios

There are total 6 trigonometric ratios for a right angled triangle.

1. Sine

$$sin(\theta) = \frac{opposite}{hypotenuse}$$

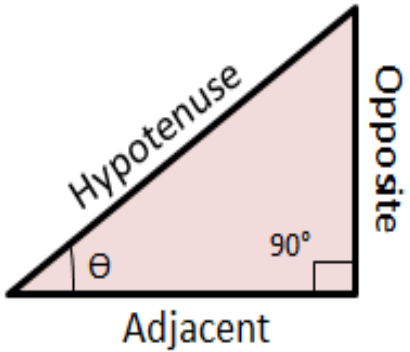


2. Cosine

$$cos(\theta) = \frac{adjacent}{hypotenuse}$$

3. Tangent

$$tan(\theta) = \frac{opposite}{adjacent}$$

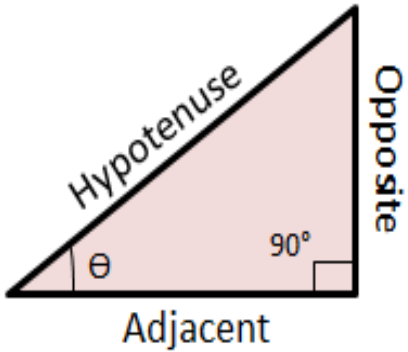


4. Cosecant

$$cosec(\theta) = \frac{hypotenuse}{opposite} = \frac{1}{sin(\theta)}$$

5. Secant

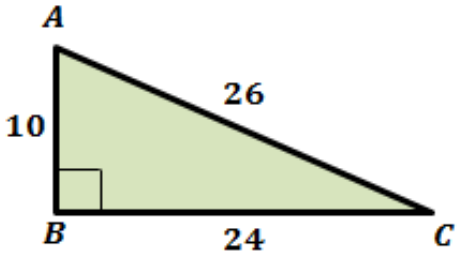
$$sec(\theta) = \frac{hypotenuse}{adjacent} = \frac{1}{cos(\theta)}$$



6. Cotangent

$$cot(\theta) = \frac{adjacent}{opposite} = \frac{1}{cot(\theta)}$$

Problem 1: Write the trigonometric ratios for the angle C in the triangle shown.



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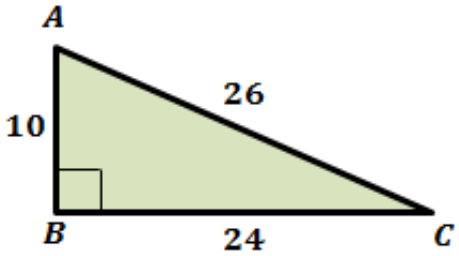
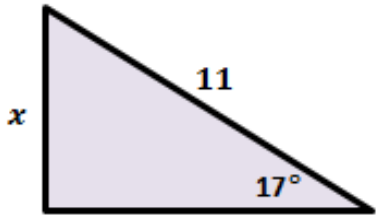


$$sin(C) = \frac{10}{26} = \frac{5}{13} \qquad cosec(C) = \frac{26}{10} = \frac{13}{5}$$

$$cos(C) = \frac{24}{26} = \frac{12}{13} \qquad sec(C) = \frac{26}{24} = \frac{13}{12}$$

$$tan(C) = \frac{10}{24} = \frac{5}{12} \qquad cot(C) = \frac{24}{10} = \frac{12}{5}$$

Problem 2: Find the value of x. Round to the nearest tenth.



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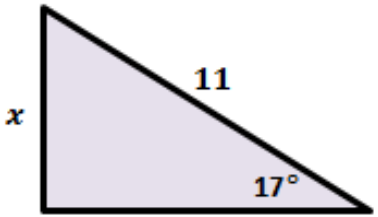


$$\sin\theta = \frac{opp}{hyp}$$

$$\sin 17° = \frac{x}{11}$$

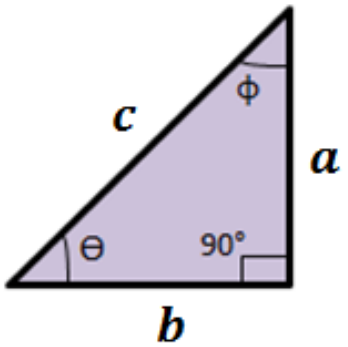
$$x = 11 \times \sin 17°$$

$$x = 3.2$$

Pythagorean Theorem

In a right-triangle, the sum of the squares of the lengths of adjacent and opposite is equal to the square of the length of hypotenuse.

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



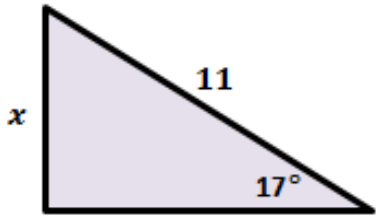
Where,

$c = Hypotenuse$

$a = Opposite$

$b = Adjacent$

Problem 3: Find the unknown length x in the right triangle shown.



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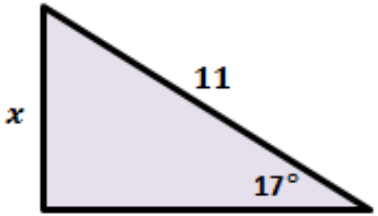

By Pythagorean theorem,

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

$$13^2 = x^2 + 12^2$$

$$x^2 = 169 - 144$$

$$x^2 = 25$$

$$x = 5$$