$\tan 45^\circ = 1$. 
Measurement 2.8 – The Tangent Ratio

Today we will:
- Develop and apply a primary trigonometric ratio (tangent) to solve problems that involve right triangles.

*** Is your calculator in degree mode? ***

Trigonometric Ratios:

- The ratio of the measures of two sides of a right triangle.
- There are three primary trig ratios:

\[
\begin{align*}
\sin A &= \frac{\text{Opp}}{\text{Hyp}} & \cos A &= \frac{\text{Adj}}{\text{Hyp}} & \tan A &= \frac{\text{Opp}}{\text{Adj}} \\
\end{align*}
\]

- A common way to remember these ratios is by using the acronym:

\[
\text{SOH CAH TOA}
\]

What would the three trig ratios be for the triangle below?

\[
\begin{align*}
\sin A &= \frac{\text{Opp}}{\text{Hyp}} \Rightarrow \sin x &= \frac{BC}{AB} \\
\cos A &= \frac{\text{Adj}}{\text{Hyp}} \Rightarrow \cos x &= \frac{AC}{AB} \\
\tan A &= \frac{\text{Opp}}{\text{Adj}} \Rightarrow \tan x &= \frac{BC}{AC}
\end{align*}
\]
Lesson 2.9 - Tangent

October 22, 2014

Example:

a) Write the trig ratio for both Tan A and Tan B.

\[ \tan A = \frac{\text{Opp}}{\text{Adj}} \]

\[ \tan B = \frac{\text{Opp}}{\text{Adj}} \]

b) What is the degree of angle A and B?

We know: \[ \tan A = \frac{12}{16} \]

\[ A = \tan^{-1}\left(\frac{12}{16}\right) \]

\[ A = 36.9^\circ \]

\[ \tan B = \frac{16}{12} \]

\[ B = \tan^{-1}\left(\frac{16}{12}\right) \]

\[ B = 53.1^\circ \]

Practice: Evaluate the following tan ratios:

1) \[ \tan 50^\circ = 1.191 \]
2) \[ \tan 75^\circ = 3.732 \]
3) \[ \tan 15^\circ = 0.2679 \]
4) \[ \tan A = \frac{3}{4} = 36.87^\circ \]
5) \[ \tan A = \frac{10}{3} = 73.3^\circ \]
6) \[ \text{Tan A} = 0.700 \]
\[ A = 34.99^\circ \]
7) \[ \text{Tan A} = 0.933 \]
\[ A = 43.01^\circ \]

On your calculator press:

\[ \tan(50) = 1.191 \]

\[ 50^\circ \tan = 1.191 \]

\[ 2^{nd} \tan \frac{3}{4} \]

\[ 3 : 4 \square 2^{nd} \tan \]
**Lesson 2.9 - Tangent**

**Practice:** What is the side length of x to the nearest centimeter?

\[
\tan A = \frac{\text{Opp}}{\text{Adj}}
\]

\[
\tan 65^\circ = \frac{x}{13}
\]

\[
13 \times (\tan 65^\circ) = x(1)
\]

\[
x = \frac{27.9}{13}
\]

**Practice:** What is the height of a tree if you are standing 25 m away from it and it is 50° between you and the top of the tree?

\[
\tan A = \frac{\text{Opp}}{\text{Adj}}
\]

\[
25 \times (\tan 50^\circ) = x(1)
\]

\[
x = \frac{28}{25}(\tan 50^\circ)
\]

\[
x = 29.8 \text{ m}
\]
**Example:** The EPCOR Tower in Edmonton has a height of 194.4 m. If you are standing 300 m away from the building, what is the angle from you to the top of the building?

\[
\tan A = \frac{\text{Opp}}{\text{Adj}} \\
\tan x = \frac{194.4}{300} \\
x = \tan^{-1}\left(\frac{194.4}{300}\right) \\
x = 32.9^\circ
\]