

Trigonometry: Introduction

Trigonometry: Means triangle measurement. It is used to calculate lengths of sides and measures of angles in triangles.

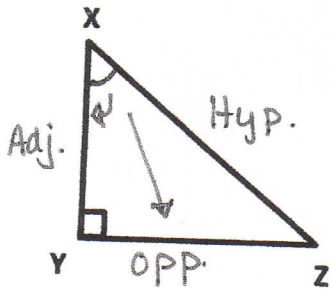
This whole unit deals with RIGHT ANGLE TRIANGLES only!!!

Right Triangle Terminology

Three sides to a right-angle triangle are:

1. Hypotenuse (hyp) – it is the side across from the right angle (longest side)
2. Adjacent (Adj) – it is the side closest to the angle of interest (touches the angle)
3. Opposite (Opp) – it is the side across from the angle of interest

Example 1: In $\triangle XYZ$, identify the hypotenuse, adjacent side, and opposite side for $\angle X$.

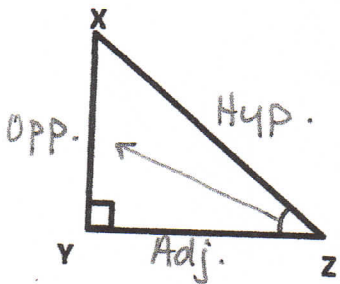


Hypotenuse: XZ

Adjacent: XY

Opposite: YZ

Example 2: In $\triangle XYZ$, identify the hypotenuse, adjacent side, and opposite side for $\angle Z$.

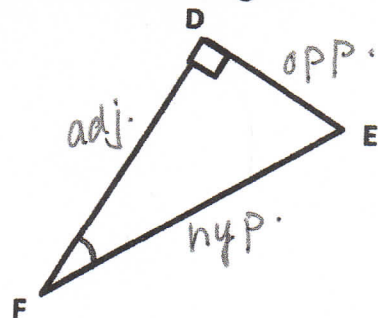
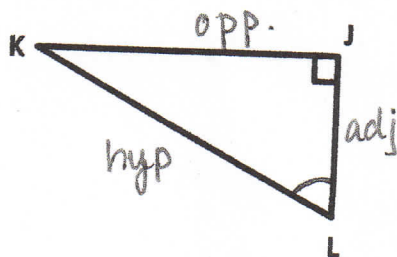
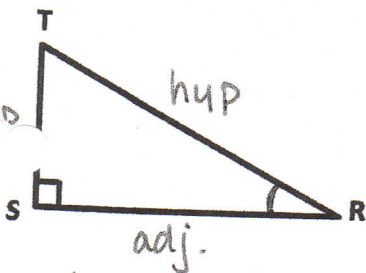


Hypotenuse: XZ

Adjacent: YZ

Opposite: XY

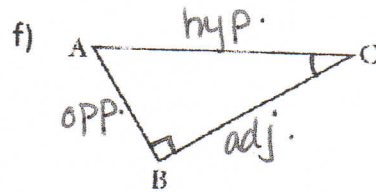
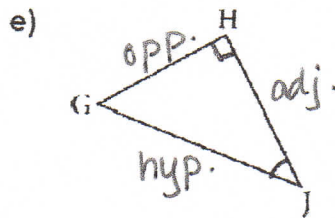
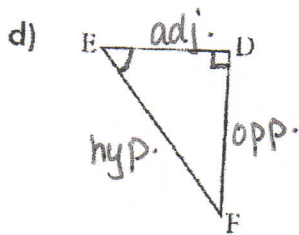
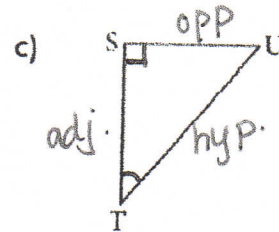
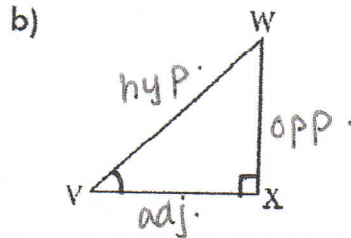
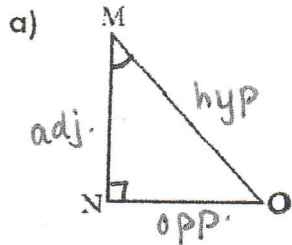
Label the hypotenuse (hyp), opposite (opp) and adjacent (adj) sides for marked angles.



Trigonometry: Introduction

PRACTICE:

For each triangle, label the **hypotenuse**, the **opposite**, and the **adjacent** sides relative to the marked angle.



These three ratios are called the **Primary Trigonometric Ratios**:

Sine Ratio

$$\frac{\text{Opposite}}{\text{Hypotenuse}}$$

$\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{o}{h}$

angle

Cosine Ratio

$$\frac{\text{Adjacent}}{\text{Hypotenuse}}$$

$$\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{a}{h}$$

Tangent Ratio

$$\frac{\text{Opposite}}{\text{Adjacent}}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{o}{a}$$

REMEMBER

SOH - CAH - TOA.

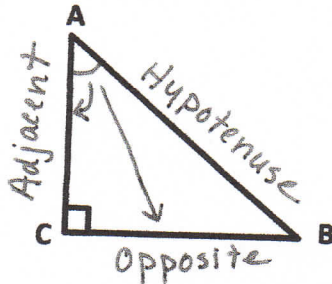
Trigonometry: Tangent Ratio

Date: Notes

The tangent ratio can be used to find side lengths and angle measures in right triangles.

In a right triangle, the tangent ratio of each non-right angle is given by (Remember **TOAI**):

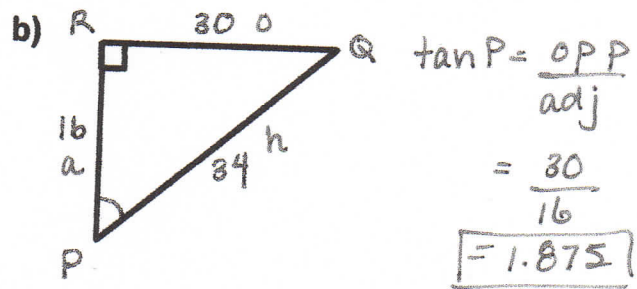
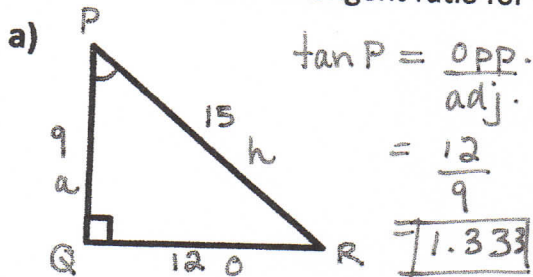
$$\tan A = \frac{\text{Opposite}}{\text{Adjacent}}$$



Tangent Ratio

Example #1

Find the value of the tangent ratio for $\angle P$. **① Label triangle** **② state ratio** **③ sub values.**



Example #2

Use your calculator to find the following ratios. Round to 3 decimal places.

a) $\tan 10^\circ = 0.176$
Calculator $10 \tan$

b) $\tan 74^\circ = 3.487$

Finding Unknown Sides

Example #3:

Find the length of side h using the tangent ratio.

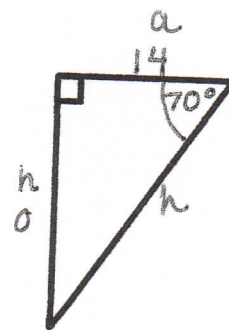
$$\tan 70^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\text{cross } \times \frac{\tan 70^\circ = h}{1 \times 14}$$

$$14 \tan 70^\circ = h$$

$$\boxed{38.46 = h}$$

(Calculator $70 \tan =$
 $\times 14$)



Trigonometry: Tangent Ratio

Date: Notes

Finding Unknown Sides cont'd.....

Example #4:

Find the length of side d using the tangent ratio.

$$\tan 6^\circ = \frac{\text{opp}}{\text{adj}}$$

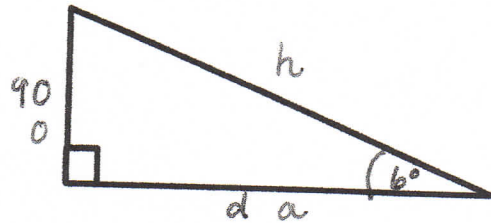
cross
x

$$\frac{\tan 6^\circ}{1} = \frac{90}{d}$$

$$d \tan 6^\circ = \frac{90}{\tan 6^\circ}$$

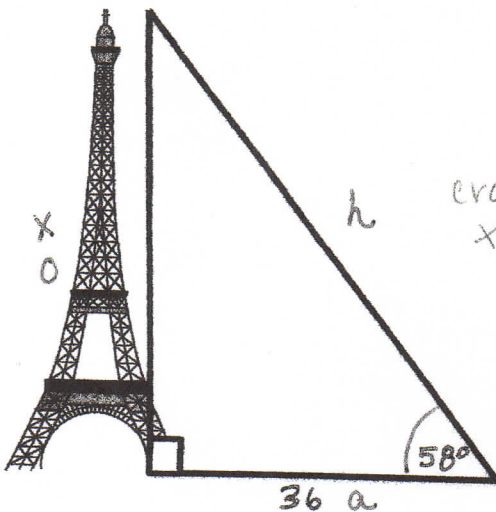
$$d = \frac{90}{\tan 6^\circ} = \frac{90}{0.1051}$$

$$d = 856.29$$



Example #5:

Find the height of the tower to the nearest tenth of a metre.



$$\tan 58^\circ = \frac{\text{opp}}{\text{adj}}$$

cross
x

$$\frac{\tan 58^\circ}{1} = \frac{x}{36}$$

$$36 \tan 58^\circ = x$$

$$57.612 = x$$

\therefore tower is 57.612 m tall.