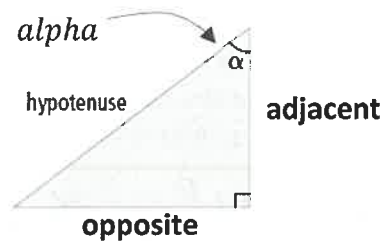
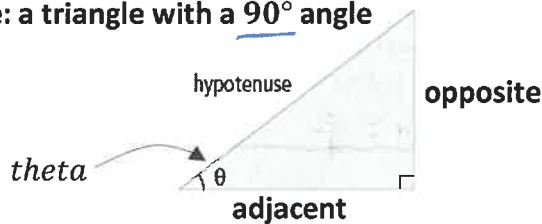


Date: _____

Unit 1: Right Angle Trigonometry**1.1 The Tangent Ratio****Right Triangle:** a triangle with a 90° angle

A trigonometric ratio is a ratio of the measures of two sides of a right triangle.

Tangent Ratio: for an acute angle in a right triangle, the ratio of the length of the opposite side to the length of the adjacent side.

$$\text{tangent } \theta = \frac{\text{length of side opposite } \angle \theta}{\text{length of side adjacent } \angle \theta}$$

$$\text{ie. } \tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{O}{A}$$

Ex. Write a Tangent Ratio

State each trigonometric ratio.

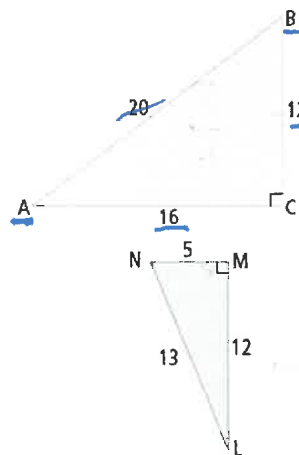
$$\begin{aligned} \text{a) } \tan A &= \frac{O}{A} = \frac{12}{16} \\ &= \frac{3}{4} = 0.75 \end{aligned}$$

$$\begin{aligned} \text{b) } \tan B &= \frac{16}{12} \\ &= \frac{4}{3} \\ \text{or } &= 1.\bar{3} \end{aligned}$$

Calculate each trigonometric ratio.

$$\text{a) } \tan L = \frac{5}{12}$$

$$\text{b) } \tan N = \frac{12}{5}$$

**Ex. Calculate a Tangent and an Angle**a) Calculate $\tan 25^\circ$ to four decimal places.

$$\tan 25^\circ = 0.4663$$

b) Draw a triangle to represent $\tan \theta = \frac{5}{4}$. Calculate the angle θ to the nearest tenth of a degree.

$$\tan \theta = \frac{O}{A}$$

$$\tan \theta = \frac{5}{4}$$

$$\theta = \tan^{-1}\left(\frac{5}{4}\right) = 51.3^\circ$$

$$\ast \tan^{-1}$$

$$\text{arc tan}$$

Use your calculator to calculate each tangent ratio (to four decimal places) and angle (to the nearest degree).

θ	Tan θ
27°	0.5095
45°	1
57°	1.5399

θ	Tan θ
27°	0.5095
29°	0.5543
56°	1.4653

Ex. Determine a Distance Using the Tangent Ratio

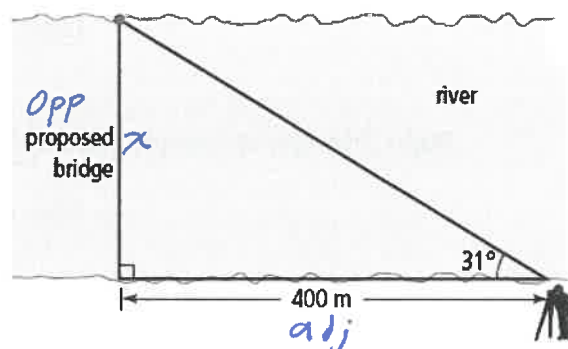
A surveyor wants to determine the width of a river for a proposed bridge. The distance from the surveyor to the proposed bridge site is 400 m. The surveyor uses a theodolite to measure angles. The surveyor measures a 31° angle to the bridge site across the river. What is the width of the river, to the nearest metre?

$$\tan = \frac{o}{a}$$

$$\frac{\tan 31^\circ}{1} = \frac{x}{400\text{m}}$$

$$x = 400 \times \tan 31^\circ$$

$$= 240\text{m}$$

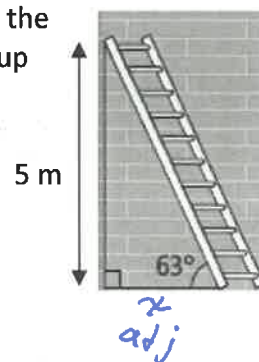


A ladder leaning against a wall forms an angle of 63° with the ground. How far is the foot of the ladder from the wall (to the nearest tenth) if the ladder reaches 5 m up the wall?

$$\frac{\tan 63^\circ}{1} = \frac{5}{x}$$

$$x = 5 \div \tan 63^\circ$$

$$x = 2.5\text{m}$$

**Ex. Determine an Angle Using the Tangent Ratio**

A small boat is 95 m from the base of a lighthouse that has a height of 36 m above sea level. Calculate the angle from the boat to the top of the lighthouse. Express your answer to the nearest degree.

$$\tan \theta = \frac{36}{95}$$

$$\theta = \tan^{-1} \left(\frac{36}{95} \right)$$

$$\theta = 21^\circ$$

