

## 0.5 Tangent Notes

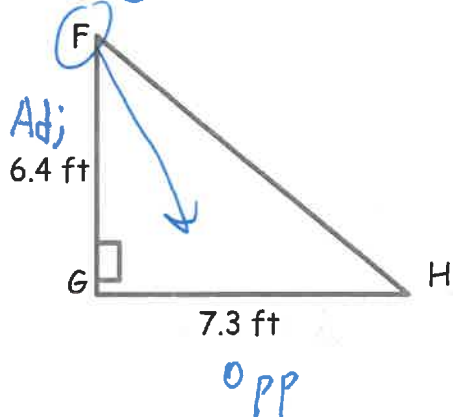
The relationship of tan ...

$$\tan = \frac{\text{opp}}{\text{adj}}$$

There are 3 types of tangent questions ...

Type 1 – Solving for the Angle

Solve for  $\angle F$ :

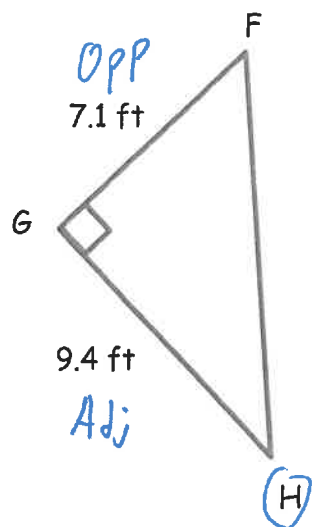


$$\tan = \frac{o}{a}$$

$$\tan F = \frac{7.3}{6.4}$$

$$F = 49^\circ$$

Solve for  $\angle H$ :



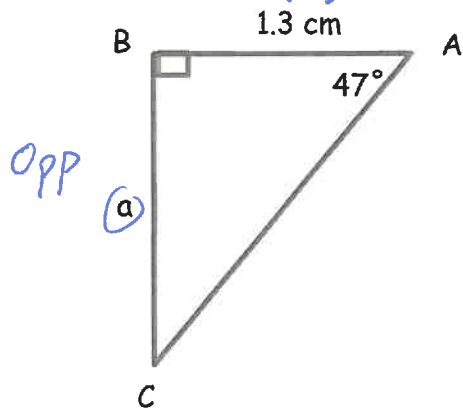
$$\tan = \frac{o}{a}$$

$$\tan H = \frac{7.1}{9.4}$$

$$H = 37^\circ$$

## Type 2 – Solving for opposite

Solve for a: Adj

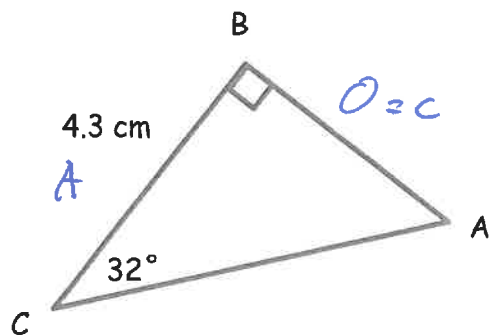


$$\tan = \frac{O}{A}$$

$$\tan 47^\circ = \frac{a}{1.3}$$

$$a = 1.39 \text{ cm}$$

Solve for c:



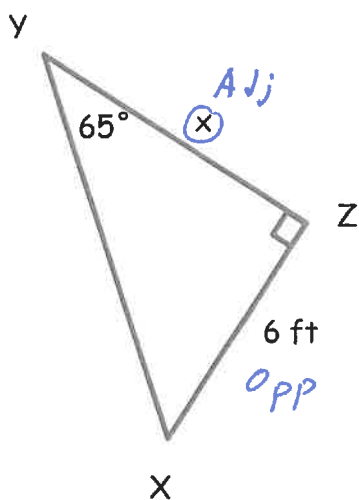
$$\tan = \frac{O}{A}$$

$$\frac{\tan 32^\circ}{1} = \frac{c}{4.3 \text{ cm}}$$

$$c = 2.69 \text{ cm}$$

## Type 3 – Solving for the adjacent

Solve for x:

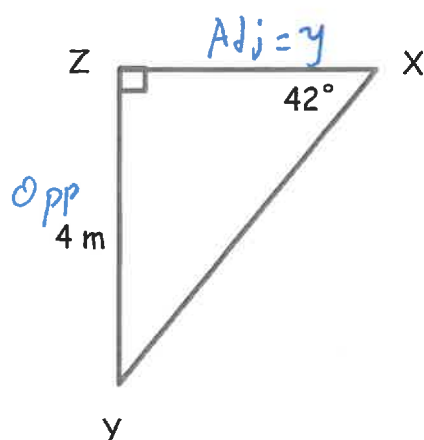


$$\tan = \frac{O}{A}$$

$$\frac{\tan 65^\circ}{1} = \frac{6 \text{ ft}}{x}$$

$$x = 2.81 \text{ ft}$$

Solve for y:



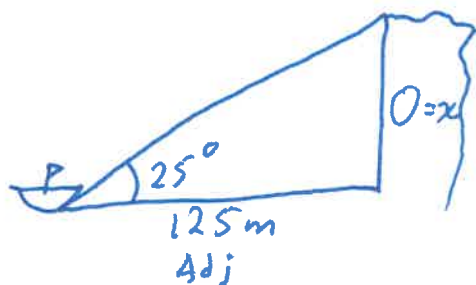
$$\tan = \frac{O}{A}$$

$$\frac{\tan 42^\circ}{1} = \frac{4m}{y}$$

$$y = 4.44m$$

Ex. 1:

Cody measures icebergs to help understand the effects of climate change. He used a sextant to measure the angle ( $25^\circ$ ) between the ocean and the top of an iceberg. The ship's radar was used to determine the distance from the ship to the iceberg (125 m). How tall is the iceberg?



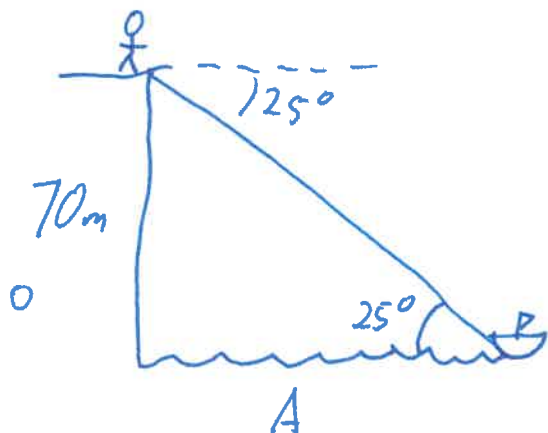
$$\tan = \frac{O}{A}$$

$$\frac{\tan 25^\circ}{1} = \frac{x}{125m}$$

$$x = 58.29m$$

Show you know

Una observed a boat from the top of a 70 m cliff near Atlin, BC. She noted that the angle of depression to the boat was  $25^\circ$ . How far is the boat from the base of the cliff?



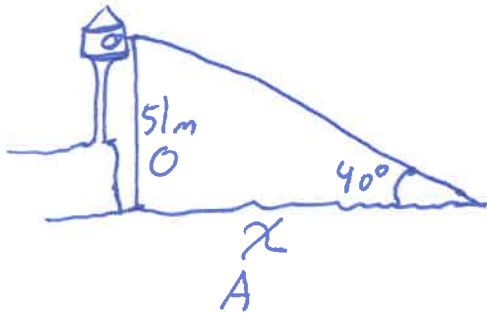
$$\tan = \frac{O}{A}$$

$$\frac{\tan 25^\circ}{1} = \frac{70m}{A}$$

$$A = 150.12m$$

Ex 2.

A lighthouse is located 51 m above sea level. The lighthouse warns boats of the danger of rocks close to shore. The safe distance for boats from shore is 75 m. The angle that a boat makes with the top of the lighthouse is  $40^\circ$ . Is the boat a safe distance from shore? Justify your answer.



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

$$\frac{\tan 40^\circ}{1} = \frac{51m}{x}$$

$$x = 60.78m$$

No, too close!