

## Part V: The Legend of Sohcahtoa

There once was an ancient Indian chief. *Sohcahtoa, Sohcahtoa*. He had a lovely daughter. *Sohcahtoa, Sohcahtoa*. Her name was Sohcahtoa. *Sohcahtoa, Sohcahtoa*. Her name means “she who climbs trees.” *Sohcahtoa, Sohcahtoa*. Sohcahtoa was always climbing trees, trying to get as high as she could, and her father would worry, not knowing how high she was. Her father, “Measures Everything,” would pace below the tree his daughter--*Sohcahtoa, Sohcahtoa*--was climbing. “Oh Sohcahtoa,” said Measures, “You look so small in that tree. How am I to know how high ye be?” Said Sohcahtoa: “Dad, if you want to know how high I am, pace out  $a$  steps from the bottom of the tree and measure the angle  $\theta$  you see to me. You will then know that I am only  $o = a \tan \theta$  steps in the air because Tangent is Opposite over Adjacent.” “Wow!” said her father from the ground, “You’re 100 paces in the air!” *Sohcahtoa, Sohcahtoa*.

One day, Sohcahtoa and her father were fishing when they heard a scream from a neighboring village. Measures asked his daughter--*Sohcahtoa, Sohcahtoa*--how far it was to the village to find out if they could make it in time to help. Sohcahtoa measured the angle from the shore where they rowed from to the shore of the village. “It took us 17 minutes to row from our village, so it will take 20 minutes to get to theirs because

$h = \frac{a}{\sin \theta}$ .” *Sohcahtoa, Sohcahtoa*. “That’s too long said the chief, how long would it take our villagers to get there?”

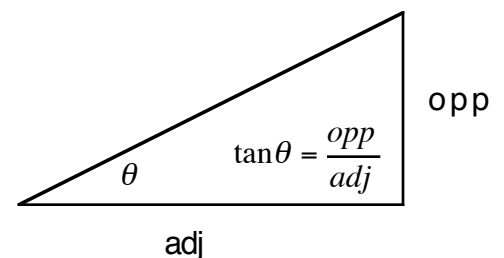
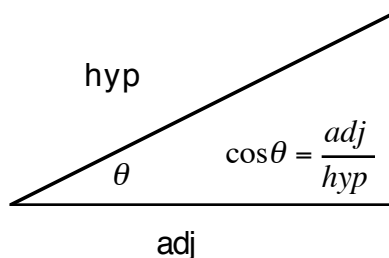
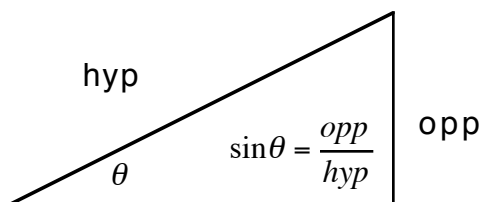
“That’s an easy one,” said Sohcahtoa, and she told him. *Sohcahtoa, Sohcahtoa*. Measures yelled to his fastest warriors and they got in a boat and saved the other tribe. “How did you do it,” asked Measures.

“Well,” said Sohcahtoa, “ $\cos \theta = \frac{a}{h}$ .”

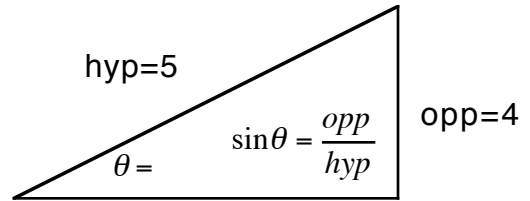
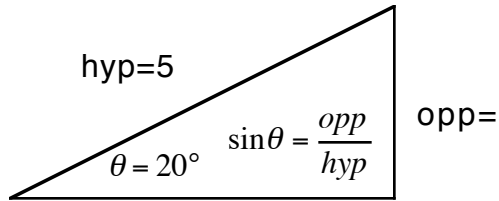
Soh-

cah-

toa

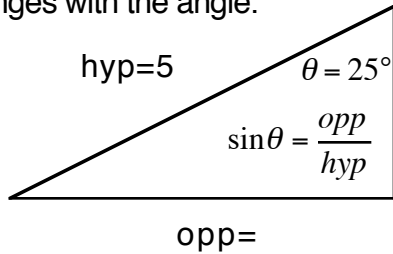


All of Trigonometry in Just One Sheet



Use the  $\sin^{-1}$  key on your calculator.

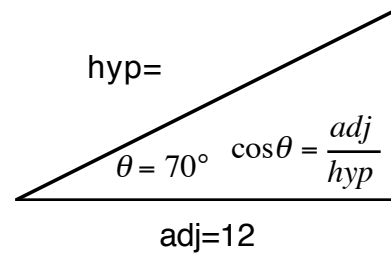
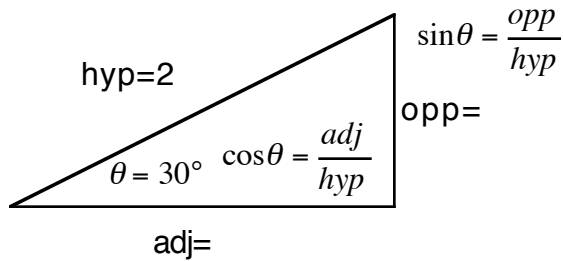
Notice that which side is opposite changes with the angle.



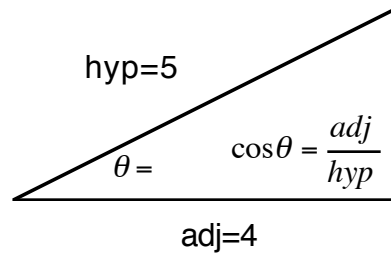
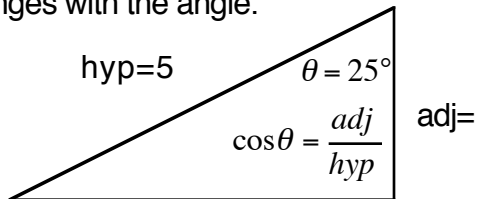
M & S rowed for 17 minutes.

$\theta =$   
 Sohcahtoa says the village is 20 minutes away.

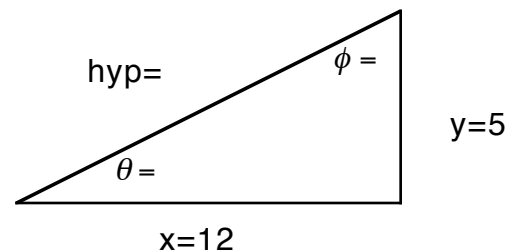
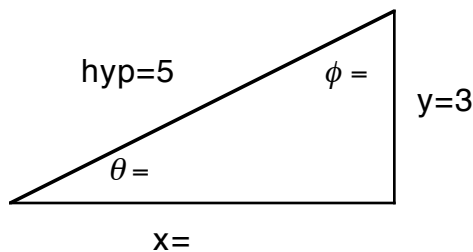
Use  $\cos^{-1}$  to find the angle, then use sin to find how long it took the warriors.



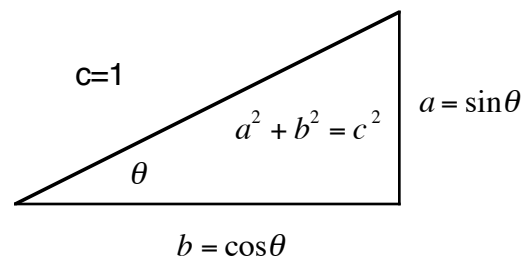
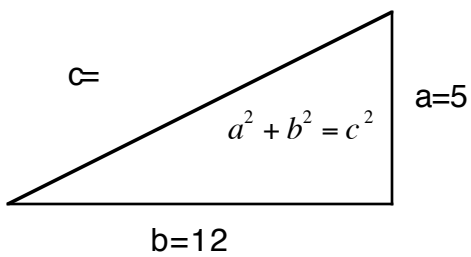
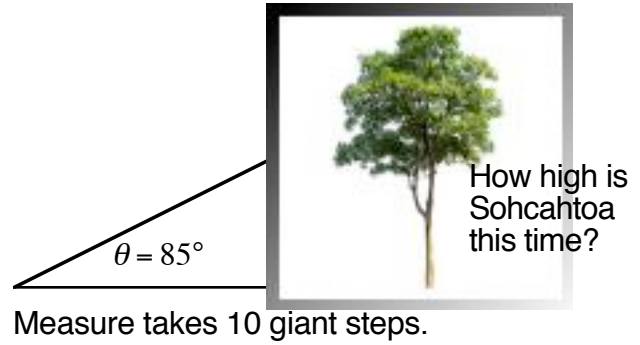
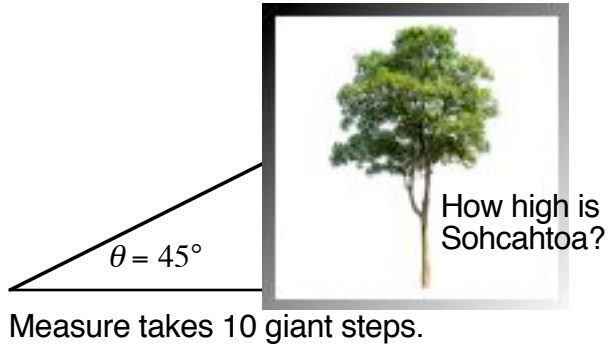
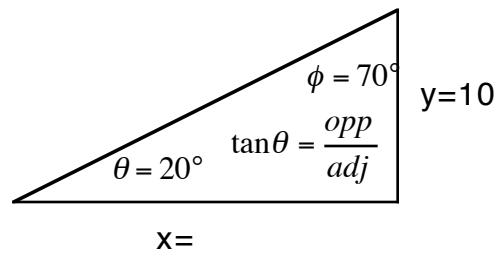
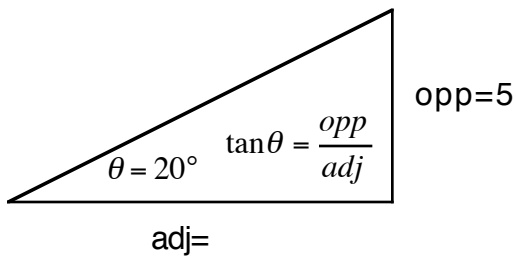
Notice that which side is opposite changes with the angle.



Find both angles!



Notice:  $\theta + \phi$  always equal what?



Notice:  $\sin^2 \theta + \cos^2 \theta = 1$  for all angles!  
Try it with  $\theta = 42^\circ$ .

