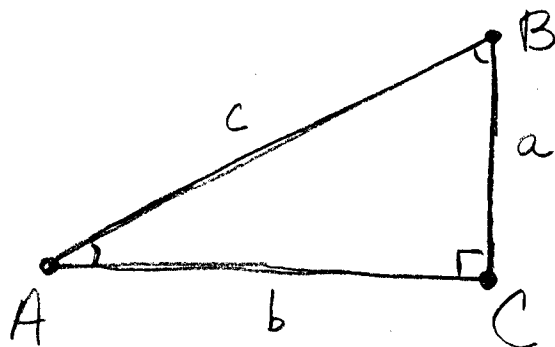


Alg I-BE

COPY FOR NOTES: [3-29-10]

MORE "Right triangle" vocabulary:



A, B, C = angles

a, b, c = sides

⇒ side b is adjacent to  $\angle A$   
(next to) (Angle A)

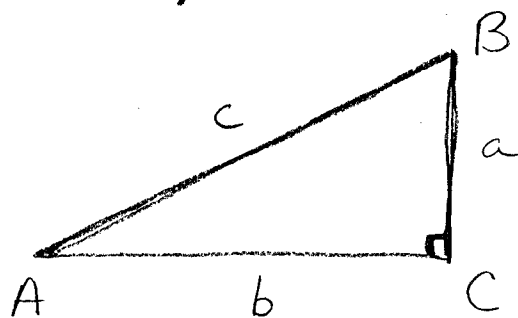
⇒ side a is opposite to  $\angle A$   
(Across from)

⇒ side a is adjacent to  $\angle B$

⇒ side b is opposite to  $\angle B$

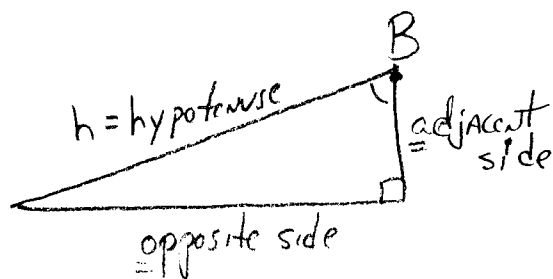
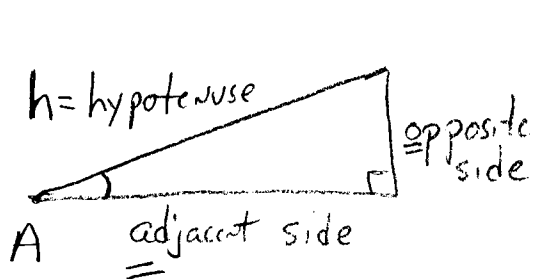
Only the angles A and B have sides that are referred to as adjacent. We never, for example, refer to side b as adjacent to  $\angle C$ . Also, we do not refer to side c as opposite  $\angle C$ , we refer to it by its name, the hypotenuse.

Another way to look at it:



$\Rightarrow \angle A$  has adjacent side  $b$  and opposite side  $a$

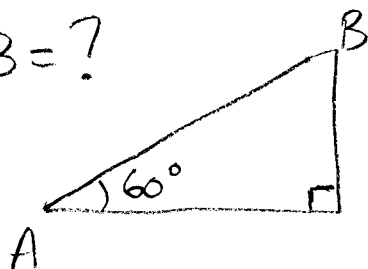
$\Rightarrow \angle B$  has adjacent side  $a$  and opposite side  $b$



$\angle A$  and  $\angle B$  are the two acute angles  
(less than  $90^\circ$ )  
in any right triangle.

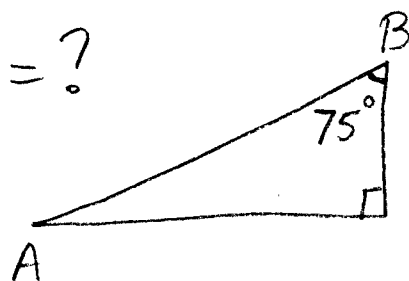
If you know  $\angle A$ , you know  $\angle B$  and vice versa

(EX)  $B = ?$



$$m\angle B = 30^\circ$$

(EX)  $A = ?$

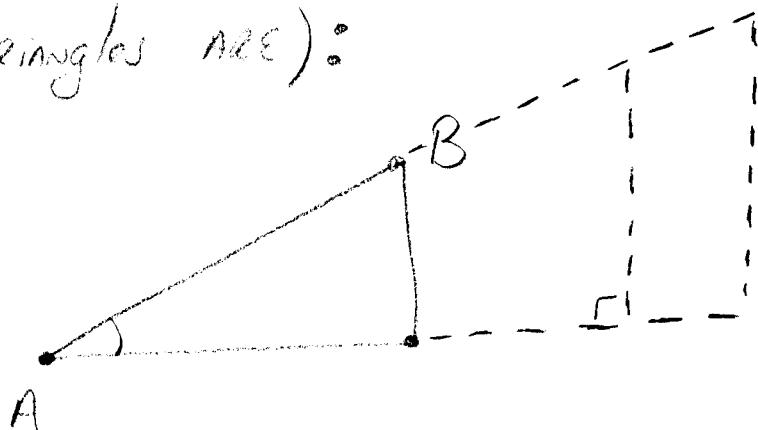


$$m\angle A = 15^\circ$$

A BASIC property of Right triangles:

For any right triangles that ARE SIMILAR (All Angles Equal)

The following RATIOS ARE ALWAYS THE SAME number (no matter how big or small the triangles are):



ALL RIGHT  $\Delta$  WITH  $\angle A, \angle B$  ARE SIMILAR, SO THEY ALL IN THE SAME RATIOS!

For  $\angle A$

$$\frac{\text{opposite}}{\text{hypotenuse}}$$

$$\frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\frac{\text{opposite}}{\text{adjacent}}$$

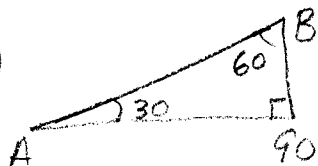
For  $\angle B$

$$\frac{\text{opposite}}{\text{hypotenuse}}$$

$$\frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\frac{\text{opposite}}{\text{adjacent}}$$

EX



For  $\angle A$

$$\frac{O}{H} = 0.5$$

$$\frac{a}{H} \approx 0.866$$

$$\frac{O}{a} \approx 0.577$$

For  $\angle B$

$$\frac{O}{H} \approx 0.866$$

$$\frac{a}{H} = 0.5$$

$$\frac{O}{a} \approx 1.732$$

Since these RATIOS ARE THE SAME FOR ANY  $\angle A$  or  $\angle B$  in a Right triangle, they can be used to find the length of any of the sides of a Right triangle if you know  $\angle A$  or  $\angle B$ .

---

These RATIOS used to be found in large tables in the back of every math book, now every scientific calculator has them "built in". These RATIOS have names.

---

$$\text{Sine of } \angle A \text{ or } \angle B = \frac{\text{opposite}}{\text{hypotenuse}}$$

ABBREVIATION

SIN

$$\text{Cosine of } \angle A \text{ or } \angle B = \frac{\text{adjacent}}{\text{hypotenuse}}$$

COS

$$\text{Tangent of } \angle A \text{ or } \angle B = \frac{\text{opposite}}{\text{adjacent}}$$

TAN

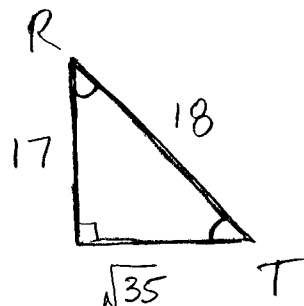
\*M SOHCAHTOA

---

## EX1 Pg 624

⊗ Find the SINE, COSINE, and tangent of LR and LT

$$\begin{aligned} \text{SINE} &= \sin = \frac{o}{h} \\ \text{COSINE} &= \cos = \frac{a}{h} \\ \text{TANGENT} &= \tan = \frac{o}{a} \end{aligned} \quad \text{SOHCAHTOA}$$



TO NEAREST  
THOUSANDTH

$$\sin R = \frac{o}{h} = \frac{\sqrt{35}}{18} \approx \frac{5.9161}{18} \approx .329$$

$$\cos R = \frac{a}{h} = \frac{17}{18} \approx .944$$

$$\tan R = \frac{o}{a} = \frac{\sqrt{35}}{17} = \frac{5.9161}{17} \approx .348$$

$$\sin T = \frac{o}{h} = \frac{17}{18} = .944$$

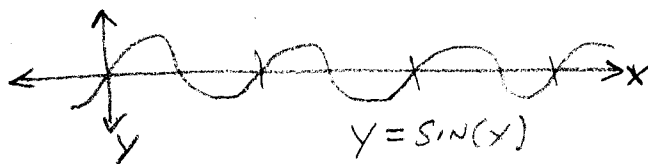
$$\cos T = \frac{a}{h} = \frac{\sqrt{35}}{18} \approx .329$$

$$\tan T = \frac{o}{a} = \frac{17}{\sqrt{35}} = \frac{17}{5.9161} \approx 2.874$$

THE SIN OF THE  
COMPLEMENTARY ANGLE  
OF R IS THE COSINE  
OF R, get it??

All scientific calculators HAVE THE  
sin, cos, and tan functions built-in!  
If you know an angle you can find the  
measure of a side, or use sides to find angles.

BTW:



LATIN  $\Rightarrow$  SINUOUS  
"CURVY" OR  
"WAVY"

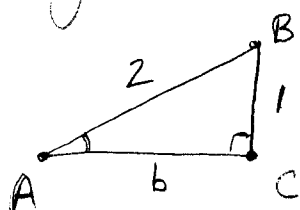
# Using sides of Right Triangles To Find Angles:

Which "trigonometric ratio" (sin, cos, tan) would

trigonometry

3 measures  
"study of  $\Delta$ 's"

you use to find the missing angle?



$$m\angle A = ?$$

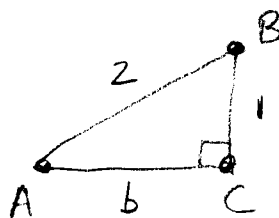
$$\sin A = \frac{1}{2} = \frac{O}{H}$$



$$\sin^{-1}.5 = 30^\circ$$

↑  
The angle with  
a sin of  $\frac{1}{2}$  is...

INVERSE  
SIN

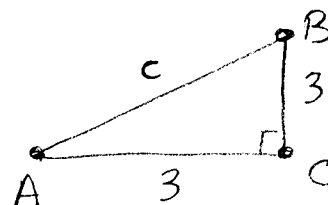


$$m\angle B = ?$$

$$\cos B = \frac{1}{2} = \frac{a}{H}$$

$$\cos^{-1}.5 = 60^\circ$$

↑  
INVERSE  
COS



$$m\angle A = ?$$

$$\tan A = \frac{3}{3} = \frac{O}{a}$$

$$\tan^{-1}1 = 45^\circ$$

↓ \* INVERSE TAN  
SLOPE =  $\frac{\text{rise}}{\text{run}}$   
of A

NOTE:

$$\sin 30 = \frac{1}{2} = .5$$

$$\cos 30 = \frac{\sqrt{2^2 - 1^2}}{2} = \frac{\sqrt{3}}{2} = .866$$

$$\tan 30 = \frac{1}{\sqrt{3}} = .577$$

$$\sin 60 = \frac{\sqrt{3}}{2} = .866$$

$$\cos 60 = \frac{1}{2} = .5$$

$$\tan 60 = \frac{\sqrt{3}}{1} = 1.732$$

Homework: ① Read Ch 11-7 ② Pg 627  
Page 623-624 #4-11  
STUDY EX 1-3

If you don't have a  
Scientific Calculator,  
use your Computer - Windows  
HAS ONE BUILT-IN OR USE WEB.