

## 2.1 Definitions II - Geometric

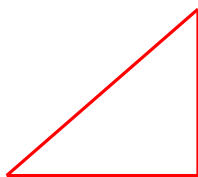
### Need To Know



- Alternate definitions of Trig Functions
- Property of cofunctions
- Special Triangles and exact values

## Trigonometry = triangle measure

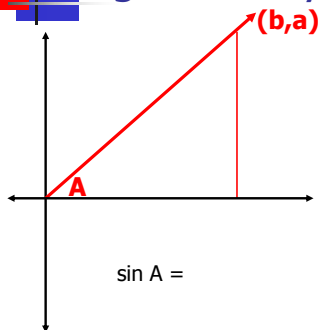
Generally capital letters for angles (A, B, C) and lower case letters for the sides (a, b, c)



Key words:

opposite, adjacent, hypotenuse

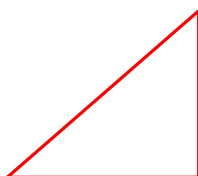
## Trigonometry = triangle measure



$$\sin A =$$

$$\cos A =$$

$$\tan A =$$



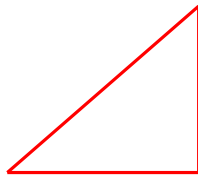
# Trigonometry = triangle measure

$$\sin B = \frac{\textit{opposite } B}{\textit{hypotenuse}} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

$$\cos B = \frac{\textit{adjacent } B}{\textit{hypotenuse}} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

$$\tan B = \frac{\textit{opposite } B}{\textit{adjacent } B} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

$$\sec B = \frac{\textit{hypotenuse}}{\textit{adjacent } B} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

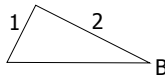


## Cofunctions Theorem:

A trig function of an angle is always equal to the cofunction of the \_\_\_\_\_ of the angle.

# Practice

Find sine, cosine and tangent of B.



Complete each:

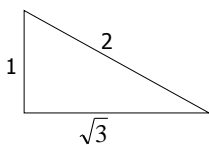
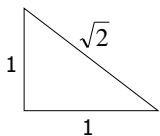
$$\cos 40^\circ = \sin \underline{\quad}$$

$$\cot 12^\circ = \tan \underline{\quad}$$

$$\sin y = \cos \underline{\quad}$$

# Exact values

Recall:  
special triangles



$\theta$	$0^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$90^\circ$
$\sin \theta$					
$\cos \theta$					
$\tan \theta$					



## Practice

Let  $x = 30^\circ$ ,  $y = 45^\circ$  and  $z = 60^\circ$ . Find each.

$$4\cos y$$

$$-2\sin(y + 45^\circ)$$

$$3\sin 2x$$

$$\sec z$$

end



## 2.2 Calculators and Trig

### Need To Know



- Convert
  - Decimal degrees to DMS
  - DMS to decimal degrees
- Use the calculator
  - to get approximates
  - to test identities
- Find  $\theta$  with the inverse Trig Function



## Conversion Ratios

$$1^\circ = \underline{\hspace{2cm}}$$

$$1' = \underline{\hspace{2cm}}$$

Convert decimal degrees into DMS

$$18.75^\circ$$

$$34.45^\circ$$

Convert DMS into decimal degrees

$$78^\circ 21'$$



## Conversions with the Calc

Find the Mode command in your calculator.

Note the setting between Degree and Radian

Calculate:

$$\sin 42^{\circ}15'$$

$$\cot 21^{\circ}$$

You try:

$$\sin 50^{\circ}30'$$

$$\sec 84^{\circ}48'$$



## Testing Identities

What do you know about

1)  $\sin 33^{\circ}$  and  $\cos 57^{\circ}$ ?

2)  $\tan 10.5^{\circ} = \cot$  \_\_\_\_\_

3)  $\cos^2 85^{\circ} + \sin^2 85^{\circ} =$  \_\_\_\_\_



## Find $\theta$ with the Calculator

Find the inverse trig functions on your calculator.

Find  $\theta$

$$\sin \theta = 0.3971$$

$$\sec \theta = 1.0801$$

You try find  $\theta$

$$\cot \theta = 0.4327$$

end

## 2.3 Solving Triangles

### Need To Know

- Significant digits
- Solving triangles



## Significant Digits

### Definition:

The number of *significant digits* in a number is found \_\_\_\_\_

Number	Significant Digits
43100	
97.3	
6.0	
6.000	
0.127	
0.000003	

$$43100 \cdot 0.127$$

$$5473.7 \approx 5.47 \times 10^3$$

### Note:

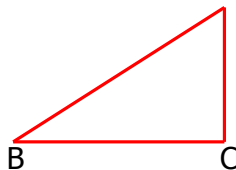
Angle results have one less sig. dig. than the sides.

## Practice Solving Right Triangles

$$A = \quad a = 5.555 \text{ mi}$$

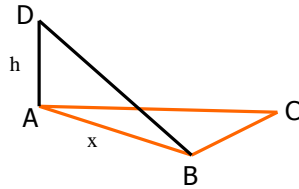
$$B = 44.44^\circ \quad b =$$

$$C = ? \quad c =$$



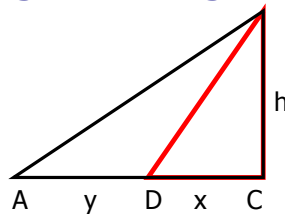
## Practice Solving Right Triangles

Given  $\angle ABD = 53^\circ$   
 $C = 48^\circ$ ,  $BC = 42$ ,  
 find  $x$  and  $h$ .



## Practice Solving Right Triangles

Given  $\angle BDC = 48^\circ$   
 $A = 32^\circ$ ,  $AB = 17$ ,  $DB = 12$   
 find  $x$  and  $y$ .



end

## 2.4 Application with Triangles

### Need To Know

- Angle of elevation and depression
- Bearing of a line
- Applications



## Definitions

### Definition:

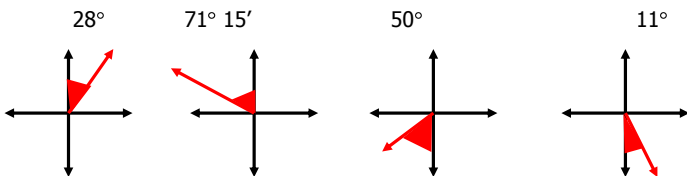
The angle measured \_\_\_\_\_ from the horizontal is the angle of \_\_\_\_\_.

The angle measured \_\_\_\_\_ from the horizontal is the angle of \_\_\_\_\_.

## Definitions

### Definition:

The bearing of a line is an angle measured off of the North-South axis to some degree East or West.



## Practice Solving Applications

#15 A boat goes 25 miles N42°E,  
turns 90°, then goes 18 miles S48°E.  
Find their distance from home  
and the bearing from home.

## Practice Solving Applications

[Click to remove picture](#)

#22 Building is 60 ft tall

Roof to roof depression is  $34.5^\circ$

Roof to ground depression is  $63.2^\circ$

How tall is the shorter building?

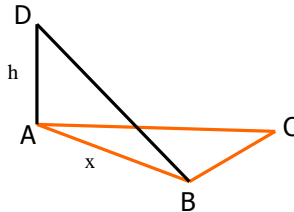
## Practice Solving Applications

A man is stuck on a mountain.

A rescuer measures a  $25^\circ$  angle of elevation to the man.

He walks at a right angle for 20.0 ft. His new path to the mountain forms an  $85^\circ$  angle to the mountain base.

Find the rope needed.



end

## 2.5 Vectors – A Geometric Look

### Need To Know



- Vector concept
- Vocabulary and notation
- Add and Subtract vectors
- Direction vectors
- Applications



## Vector Concept and Definition





Force, velocity, and acceleration are physical concepts that must be expressed with 2 parameters.

Definition

A **vector** is \_\_\_\_\_  
\_\_\_\_\_.

A **scalar** is \_\_\_\_\_  
\_\_\_\_\_.

## Notation and Graphs

<u>Notation:</u>	<u>Graphs:</u>	<u>Add &amp; Subt. Vectors:</u>
$V$		
$\vec{V}$		
$\overline{AB}$		
$x$		
$ V $		

## Navigation Direction

There are other ways to indicate bearing angles.

**Definition:**

The angle of direction is \_\_\_\_\_  
\_\_\_\_\_.

If  $\theta$  is  $185^\circ$ ,  
then in which quadrant will the terminal side lie?



## Component vectors

Any vector can be decomposed into two parts – the x-component and the y-component vectors.

$$V_x = \underline{\hspace{2cm}}$$

$$V_y = \underline{\hspace{2cm}}$$

$$V = \underline{\hspace{2cm}}$$

Given  $V$  in QI with  $|V_x| = 2.2$  and  $|V_y| = 5.8$

Find  $V$ .



## Practice and Application

A plane has an airspeed of 140 mph on  $S50^\circ E$ .

The wind is blowing 14 mph on  $40^\circ$ .

Find the ground speed and true course.



## Practice and Application

Static Equilibrium – a 25 lb weight is resting on an incline of  $10^\circ$ . Find the magnitude of the normal and friction forces.

end