

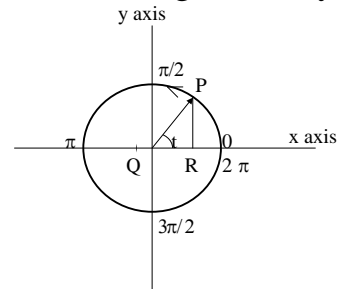
## Trigonometry Basics

Physics 109

Fall 2007

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## Basis of Trigonometry



## Outline

- Basis of Trigonometry
- Trigonometric Functions
- Relations Between Functions
- Application to Vectors

## Trigonometric Functions

QP is a vector of unit length

Sine of  $t$ ,  $\sin t = PR$

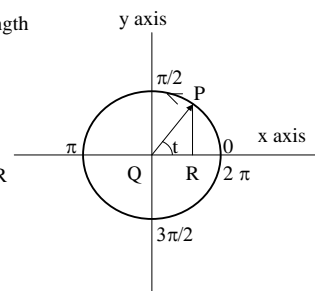
Cosine of  $t$ ,  $\cos t = QR$

Tangent of  $t$ ,  $\tan t = PR/QR$

Cotangent of  $t$ ,  $\cot t = QR/PR$

Secant of  $t$ ,  $\sec t = 1/QR$

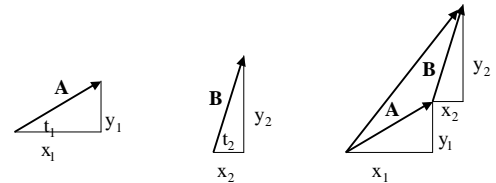
Cosecant of  $t$ ,  $\csc t = 1/PR$



## Relations Between Functions

$$\begin{aligned} \sin t &= 1/\csc t & \tan t &= \sin t / \cos t \\ \cos t &= 1/\sec t & \cot t &= \cos t / \sin t \\ \tan t &= 1/\cot t & \cos(-t) &= \cos t \\ & & \sin(-t) &= -\sin t \\ \sin^2 t + \cos^2 t &= 1 \end{aligned}$$

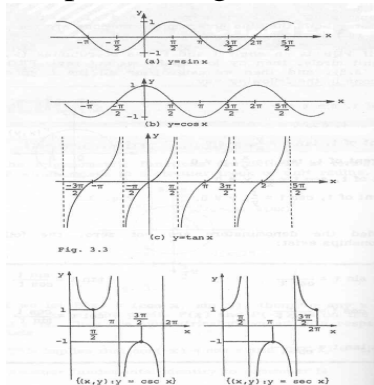
## Application to Vectors



$$\begin{aligned} \mathbf{A} + \mathbf{B} &= (x_1 + x_2) + (y_1 + y_2) \\ &= (A \cos t_1 + B \cos t_2) + (A \sin t_1 + B \sin t_2) \end{aligned}$$

$$\text{Angle} = \tan^{-1}((y_1 + y_2) / (x_1 + x_2))$$

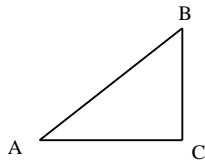
## Graphs of Trig Functions



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**Problem:**



Which of the following relations gives the **sin** of angle ABC?

- A.  $BC/AB$    B.  $AC/BC$    C.  $AB/AC$    D.  $AC/AB$   
E.  $AB/BC$

(Which relation gives the **cos** of the same angle?)