

October 17, 2011

Physics 131

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■ **Theme Music: Human League**  
*Together in Electric Dreams*  
 ■ **Cartoon: Bill Watterson**  
*Calvin & Hobbes*



10/17/11

Physics 131

1

## Review of Vectors (2-dimensional coordinates)

- We have 2 directions to specify. We must
  - Choose a reference point (origin)
  - Pick 2 perpendicular axes (x and y)
  - Choose a scale
- We specify our x and y directions by drawing little arrows of unit length in their positive direction.  $\hat{i}$ ,  $\hat{j}$
- A force vector is written
 
$$\vec{F} = F_x \hat{i} + F_y \hat{j} = (F_x, F_y)$$

10/17/11

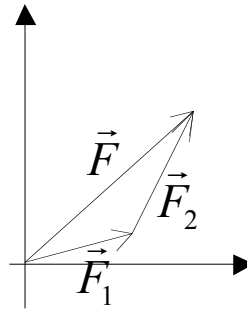
Physics 131

2

## Adding Forces

- We define the sum of two vectors as if they were successive displacements.

$$\vec{F} = \vec{F}_1 + \vec{F}_2$$



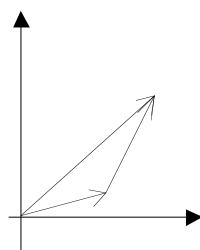
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Physics 131

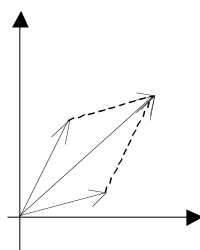
3

## Adding Vectors: Methods

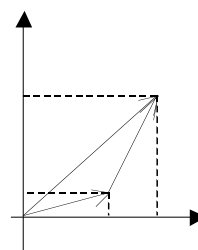
- There are 3 mathematical ways to add vectors



head  
to tail



parallelogram  
rule



coordinates

10/17/11

Physics 131

4

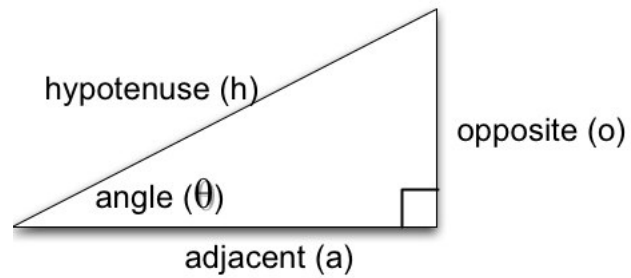
## Trig recap

SOH-CAH-TOA

$\sin(\theta) = \text{opposite/hypotenuse}$

$\cos(\theta) = \text{adjacent/hypotenuse}$

$\tan(\theta) = \text{opposite/adjacent}$



10/17/11

Physics 131

5