**"Speed bus jump:"** A bus moving at 70 mi/hr jumps over a gap of 50 feet between two level stretches of freeway. In real life...



The bus makes the jump



The bus misses the jump



It depends on how heavy the bus is



# Class participation

0. Your name

1. Order from *largest* to *smallest* magnitude:

Arrange in a row: largest on left; for ties, stack vertically



#### Vector components

$$y$$

$$C_{x} = C \cos \theta$$

$$C_{y} = C \sin \theta$$

$$C = \sqrt{C_{x}^{2} + C_{y}^{2}}$$

$$\theta = \tan^{-1} (C_{y}/C_{x})$$

$$\vec{C}_{x}$$

$$\vec{C$$

**Question 3.2a** Vector Components I

If each component of a vector is doubled, what happens to the angle of that vector?



it doubles

it increases, but by less than double

it does not change

it is reduced by half

it decreases, but not as much as half

#### Add vectors by components



#### Vector addition: example



**Question 3.1a** Vectors I



**Question 3.1b** Vectors II

Given that A + B = C, and that  $|A|^2 + |B|^2 = |C|^2$ ,

how are vectors **A** and **B** oriented with respect to each other?

A they are perpendicular to each other
B they are parallel and in the same direction
C they are parallel but in the opposite

direction

**D** they are at 45° to each other

they can be at any angle to each other

#### **Question 3.3 Vector Addition**

You are adding vectors of length 20 and 40 units. What is the only possible resultant magnitude that you can obtain out of the following choices?



"Monkey shoot" The monkey starts falling when the gun fires. What angle  $\theta$  should you aim to hit the monkey?



Below the monkey



Straight at the monkey



Above the monkey



It depends on the dart speed

