

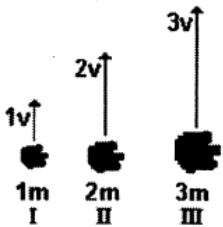
Name: _____

AP Physics: Kinematics
Vector and Relative Velocity Homework

Conceptual Questions

1. What kind of coordinates must vectors have in order to add by components? Why?
2. Can the magnitude of a vector ever
 - A. Be equal to one of its components? (Why or why not?)
 - B. Be less than one of its components? (Why or why not?)

3. Three stones of different masses (1 m , 2 m , and 3 m) are thrown vertically upward with different initial velocities (1 v , 2 v , and 3 v respectively). The diagram indicates the mass and velocity of each stone. Rank from high to low the maximum height achieved by each stone. Assume air resistance is negligible.

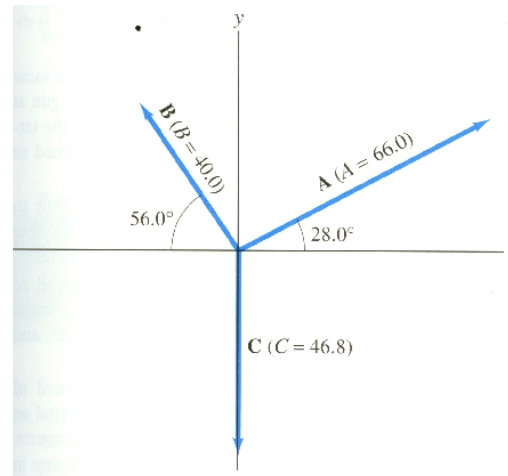


- A. I, II, III
- B. II, I, III
- C. III, II, I
- D. I, III, II

Mathematical Questions

4. You are given a vector in the xy plane that has a magnitude of 70.0 units and a y -component of -55.0 units. What are the two possibilities for its x -component?

5. Three vectors are shown in the figure to the right. Please do the following:
- Express each vector in the correct polar and rectangular form
 - Calculate the sum: $A - B + C$
 - Calculate the sum: $B - 2A$



6. A boat can travel 2.30 m/s in still water.
- If this boat points itself directly across the stream (whose current is 1.20 m/s, perpendicular to the prow of the boat) what will be the magnitude and direction of the boat relative to the shore?
 - What will be the position of the boat after 3.00 s? (Both how far across the stream and how far off-course?)

