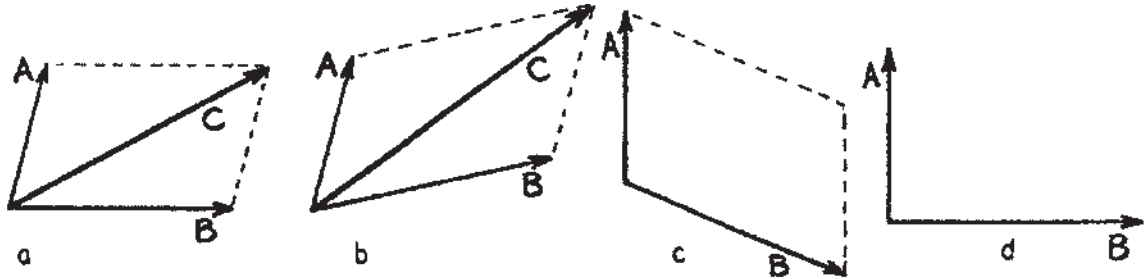


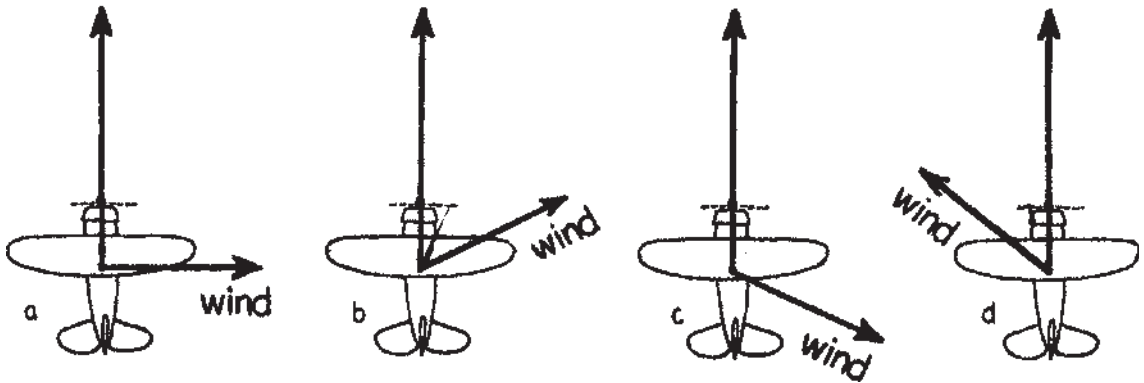
**Concept-Development
Practice Page** 5-3

Vectors and the Parallelogram Rule

1. When two vectors **A** and **B** are at an angle to each other, they add to produce the resultant **C** by the *parallelogram rule*. Note that **C** is the diagonal of a parallelogram where **A** and **B** are adjacent sides. Resultant **C** is shown in the first two diagrams, (a) and (b). Construct resultant **C** in diagrams (c) and (d). Note that in diagram (d) you form a rectangle (a special case of a parallelogram).



2. Below we see a top view of an airplane being blown off course by wind in various directions. Use the parallelogram rule to show the resulting speed and direction of travel for each case. In which case does the airplane travel fastest across the ground? _____ Slowest? _____



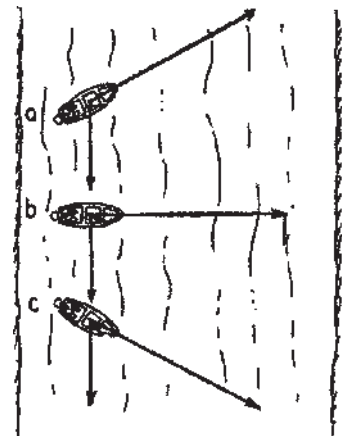
3. To the right we see the top views of 3 motorboats crossing a river. All have the same speed relative to the water, and all experience the same water flow.

Construct resultant vectors showing the speed and direction of the boats.

- a. Which boat takes the shortest path to the opposite shore?

- b. Which boat reaches the opposite shore first?

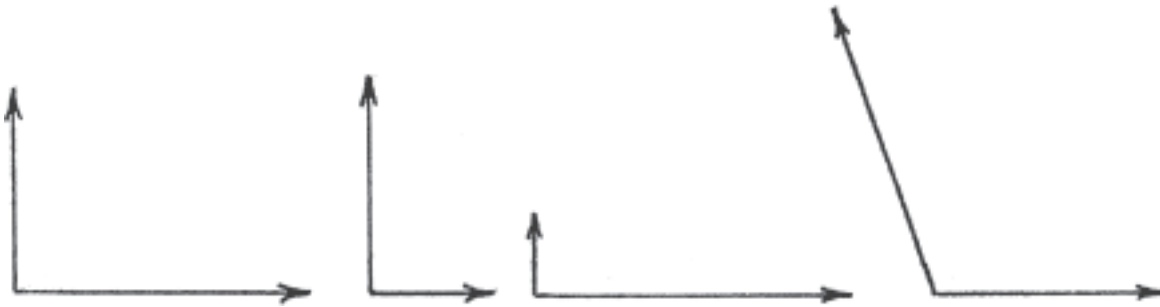
- c. Which boat provides the fastest ride?



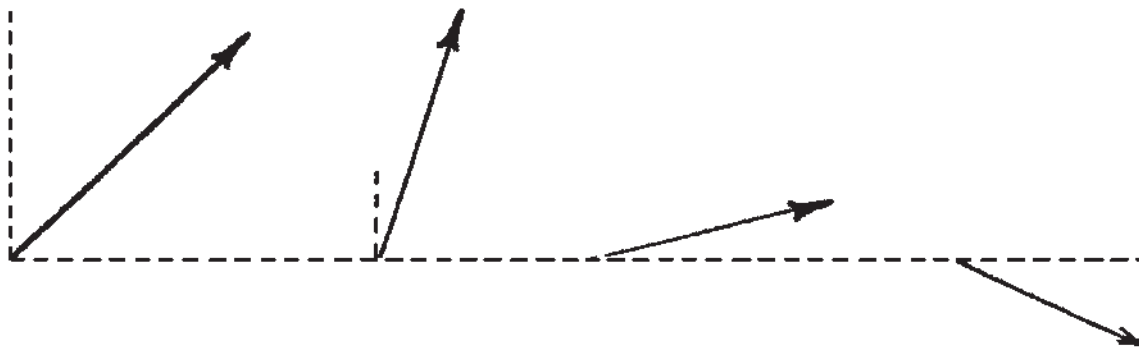
CONCEPTUAL PHYSICS

Velocity Vectors and Components

1. Draw the resultants of the four sets of vectors below.

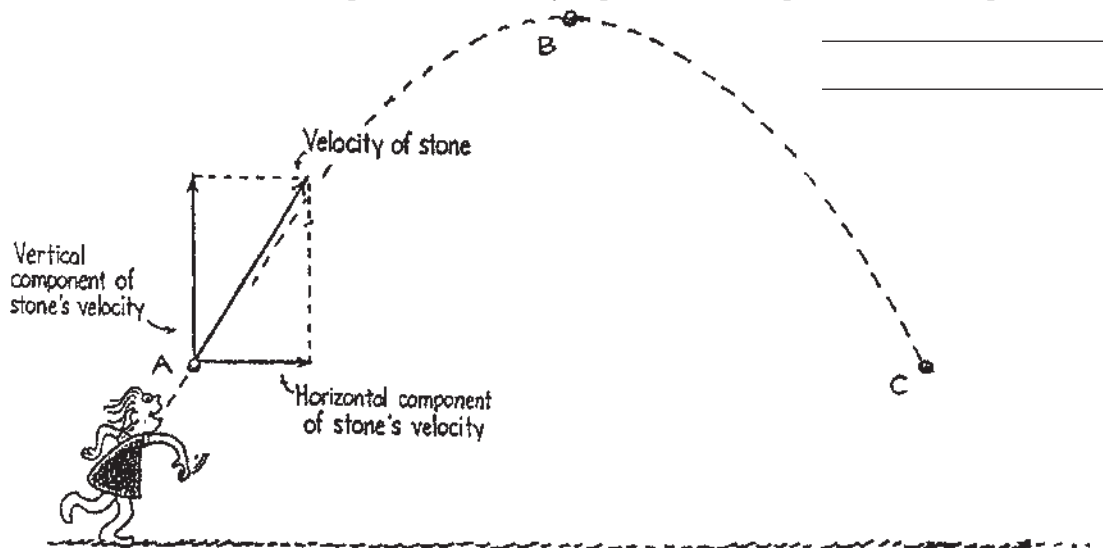


2. Draw the horizontal and vertical components of the four vectors below.



3. Nellie Newton tosses the ball along the dashed path. The velocity vector, complete with its horizontal and vertical components, is shown at position A. Carefully sketch the appropriate components for positions B and C.

- Since there is no acceleration in the horizontal direction, how does the horizontal component of velocity compare for positions A, B, and C? _____
- What is the value of the vertical component of velocity at position B? _____
- How does the vertical component of velocity at position C compare with that of position A? _____



CONCEPTUAL PHYSICS