

**PHY 1350**  
**EXAM #1**

1. A hiker begins a trip from the camp's polelight by first walking 25.0 km in a direction 20.0 degrees North of East. On the second day, the hiker walks in a straight line and reaches a huge boulder. The boulder is known to be 20.0 km away from the polelight in a direction 20.0 degrees East of North. After drawing an appropriate diagram, use the method of components to determine the vector displacement of the hiker on the second day. Leave your answer in component form.

2. The water flow in a fast moving river is known to be 7.00 m/s directed to the South. A canoeist can paddle her canoe at a rate of 4.00 m/s in still water. If she paddles her canoe in this river with the same effort and has a heading of 30.0 degrees East of North,

(a.) What will be her velocity with respect to the earth?

(b.) How long will it take her to cross the river if it is 20.0 m wide?

3. A stone is dropped from rest from the top of a 500 meter tall building. At the same instant, a baseball is thrown straight up from ground level with a speed of 100 m/s. When and where do the stone and the baseball reach the same height?

4. A stone is thrown from the top of a building upward at an angle of 28.0 degrees to the horizontal and with an initial speed of 25.0 m/s. The height of the building is 46.0 m.  
(a.) Draw a diagram with an appropriate coordinate system to show the information that is given.

(b.) How long does it take the stone to reach the horizontal street below?

(c.) What is the speed of the stone just before making contact with the street?

5. The position of a particle is given by  $\vec{r} = (2 + 3t^2)\hat{i} + (5 - 2t^3)\hat{j}$ , where the units of  $r$  is meters and  $t$  has units of seconds.

(a.) Determine the instantaneous velocity of the particle at  $t = 2.0\text{s}$ . Report this result as the speed of the object at the appropriate angle with respect to the positive  $x$  axis.

(b.) Determine the acceleration of the particle at  $t = 2.0\text{s}$ .