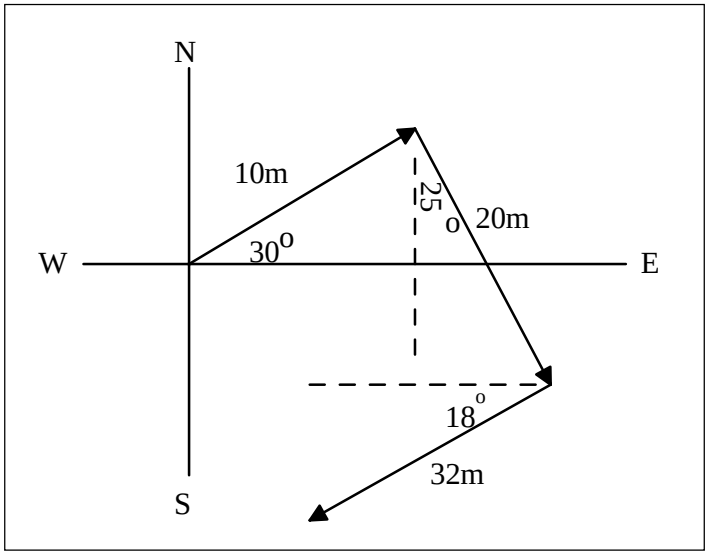
EXAM #1
PHY 1350 - 001
FALL 1993

Show your work for all problems. No work. No credit. Make sure answers have appropriate units.

1. Abigail starts walking from a flagpole. She first walks 10.0m at 30.0° North of East. From that point she walks 20.0m at 25.0° East of South. Finally, she walks 32.0m at 18.0° South of West. How far and in what direction is she from the flagpole? Use the method of components.

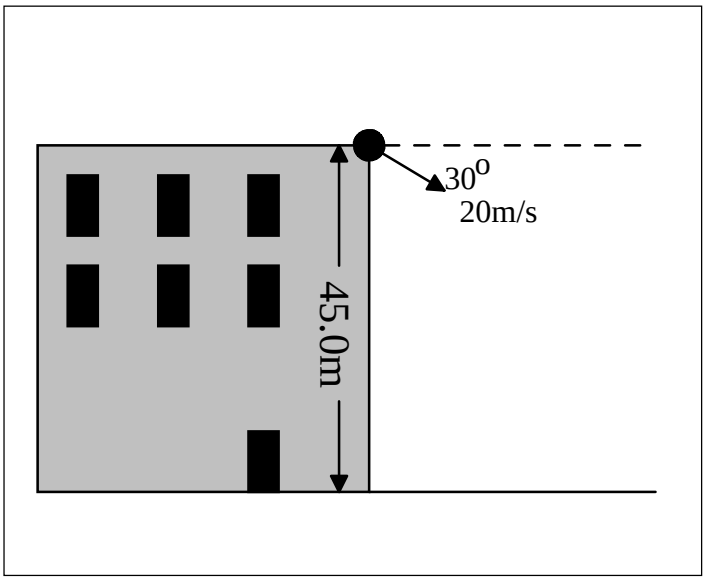


2. A stone is thrown straight up from the surface of the earth. When the stone is 50.0m up from the earth's surface, the velocity of the stone is 30.0m/s up. Let this be EVENT ONE.
Let EVENT TWO be: the stone reaches its highest position.
Let the vertical coordinate system be defined as follows. The origin is at the surface of the earth and the positive y direction is DOWNward.
Determine the value of each of the 8 quantities listed below. You must use the coordinate system indicated in the paragraph above. If a quantity is given or known, so state, otherwise show your calculation of the quantity.

event one acceleration	event two acceleration
event one velocity	event two velocity
event one time	event two time
event one position	event two position

3. A stone is thrown from the top of a building downward at an angle of 30° below the horizontal and with an initial speed of 20.0m/s.

(a.) If the height of the building is 45.0m, how long is the stone in flight before it hits the horizontal street below?



(b.) What is the speed of the stone just before it hits the ground?

4. Relative to a rock on the bank of a lake, speed boat LoriLee is moving with a velocity of 30.0 miles/hour at 30^{o} West of North. A second speed boat, PhasorPhyre, has a velocity of 40 miles/hour East relative to the rock. What is the velocity of PhasorPhyre relative to LoriLee?

5. A particle is speeding up as it moves clockwise around a circle of radius of 3.0m. At a given time, the total acceleration of the particle is $15.0 m/s^2$ at an angle of 37^o with respect to the radial. Find:

(a.) the centripetal acceleration.

(b.) the speed of the particle, and

(c.) its tangential acceleration.

$$\vec{V}_{AV} = \frac{\vec{r}_f - \vec{r}_i}{t_f - t_i} \qquad \vec{a}_{AV} = \frac{\vec{V}_f - \vec{V}_i}{t_f - t_i}$$

$$\vec{V}_{inst} = \frac{d\vec{r}}{dt} \qquad \vec{a}_{inst} = \frac{d\vec{V}}{dt}$$

$$x_1 = x_o + v_{ox}(t_1 - t_o) + \frac{1}{2}a_x(t_1 - t_o)^2$$

$$y_1 = y_o + v_{oy}(t_1 - t_o) + \frac{1}{2}a_y(t_1 - t_o)^2$$

$$z_1 = z_o + v_{oz}(t_1 - t_o) + \frac{1}{2}a_z(t_1 - t_o)^2$$

$$v_{1x} = v_{ox} + a_x(t_1 - t_o)$$

$$v_{1y} = v_{oy} + a_y(t_1 - t_o)$$

$$v_{1z} = v_{oz} + a_z(t_1 - t_o)$$

$$v_{1x}^2 = v_{ox}^2 + 2a_x(x_1 - x_o)$$

$$v_{1y}^2 = v_{oy}^2 + 2a_y(y_1 - y_o)$$

$$v_{1z}^2 = v_{oz}^2 + 2a_z(z_1 - z_o)$$

$$a_r = \frac{v^2}{r}$$

$$\vec{v}_{AC} = \vec{v}_{AB} + \vec{v}_{BC}$$