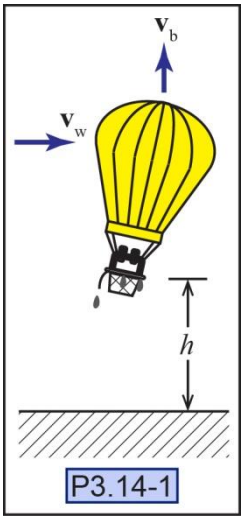
P3.14-1) A balloon is ascending at a constant rate of v_b = 30 ft/s when a ballast bag is dropped from the basket of the balloon. Five seconds later the balloon is still ascending at the same rate when a gust of wind with a velocity of v_w = 50 ft/s begins to blow the balloon horizontally (without appreciably affecting the ballast bag). At this instant, what is the velocity of the ballast bag as seen by an observer in the balloon?



Given:

Find:

Solution:

Coordinate system

Draw an x-y coordinate system on the balloon figure.

Velocity

Write down the known velocities at the instant the bag is dropped.

$\mathbf{v}_{balloon}$ = _____ **i** + _____ **j**

$\mathbf{v}_{bag}$ = _____ **i** + _____ **j**

Write down the known velocities 5 seconds after the bag is dropped.

$\mathbf{v}_{wind}$ = _____ **i** + _____ **j**

$\mathbf{v}_{balloon}$ = _____ **i** + _____ **j**

Calculate the velocity of the bag 5 seconds after it is dropped.

$\mathbf{v}_{bag}$ = _____ **i** + _____ **j**

Relative Velocity

Calculate the velocity of the bag relative to the balloon 5 seconds after the bag is dropped.

$\mathbf{v}_{bag/balloon}$ = _____ **i** + _____ **j**