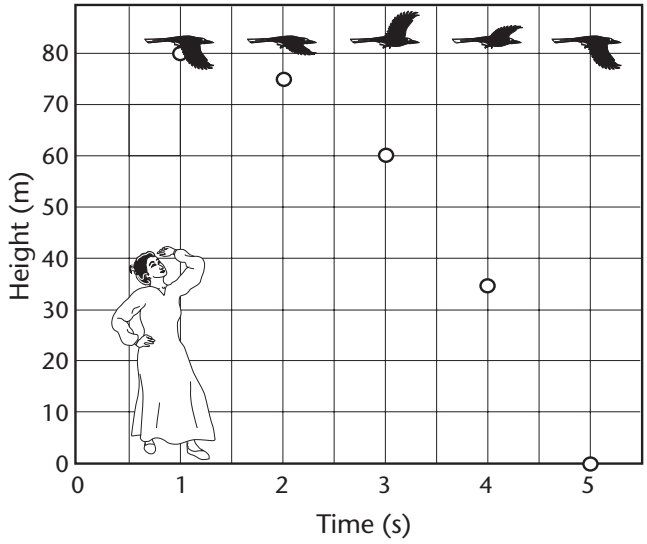
Exploring Reference Points

Depending on the reference point you choose, the same object can seem to be moving or standing still. Furthermore, even if an object seems to be moving from two different reference points, observers at those points might disagree about its speed and direction.

Here is a simple example: In the diagram below, a crow is flying along at a constant speed, carrying a ball. Suddenly, the crow accidentally drops the ball and watches it fall. The diagram shows the position of the crow and the ball at five points in time, one second apart. A person standing still on the ground also watches the ball fall.



Answer the following questions on a separate sheet of paper.

1. From the reference point of the crow, in what direction is the ball falling? Does it appear to follow a curved or straight path? Explain.
2. How many seconds does it take the ball to fall to the ground?
3. From the reference point of the person on the ground, does the ball appear to fall in a straight or curved path?
4. From the reference point of a person on the ground running in the same direction and at the same speed as the crow is flying, does the ball appear to fall in a straight or curved path?