

Describing Motion with Position-Time Graphs

Read from **Lesson 3** of the **1-D Kinematics** chapter at **The Physics Classroom**:

- <http://www.physicsclassroom.com/Class/1DKin/U1L3a.html>
- <http://www.physicsclassroom.com/Class/1DKin/U1L3b.html>
- <http://www.physicsclassroom.com/Class/1DKin/U1L3c.html>

MOP Connection: Kinematic Graphing: sublevels 1-4 (and some of sublevels 9-11)

Motion can be described using words, diagrams, numerical information, equations, and graphs. Describing motion with graphs involves representing how a quantity such as the object's position can change with respect to the time. The key to using position-time graphs is knowing that the slope of a position-time graph reveals information about the object's velocity. By *detecting* the slope, one can infer about an object's velocity. "As the slope goes, so goes the velocity."

Review:

1. Categorize the following motions as being either examples of + or - acceleration.
 - a. Moving in the + direction and speeding up (getting faster) _____
 - b. Moving in the + direction and slowing down (getting slower) _____
 - c. Moving in the - direction and speeding up (getting faster) _____
 - d. Moving in the - direction and slowing down (getting slower) _____

Interpreting Position-Graphs

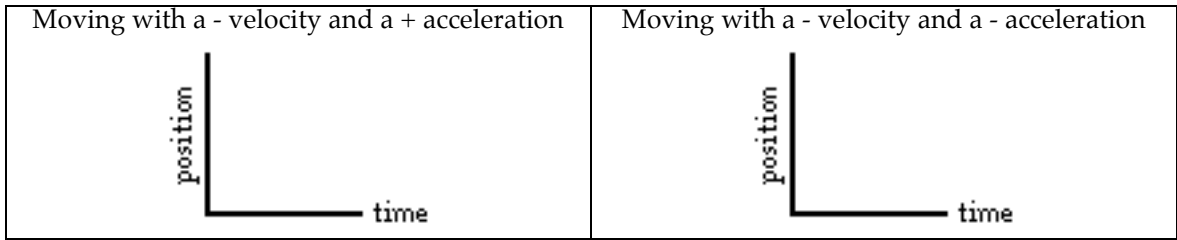
2. On the graphs below, draw two lines/curves to represent the given verbal descriptions; label the lines/curves as A or B.

| | | |
|-------------------------------------|------------------------------------|--|
| A Remaining at rest B Moving | A Moving slow B Moving fast | A Moving in + direction B Moving in - direction |
|-------------------------------------|------------------------------------|--|

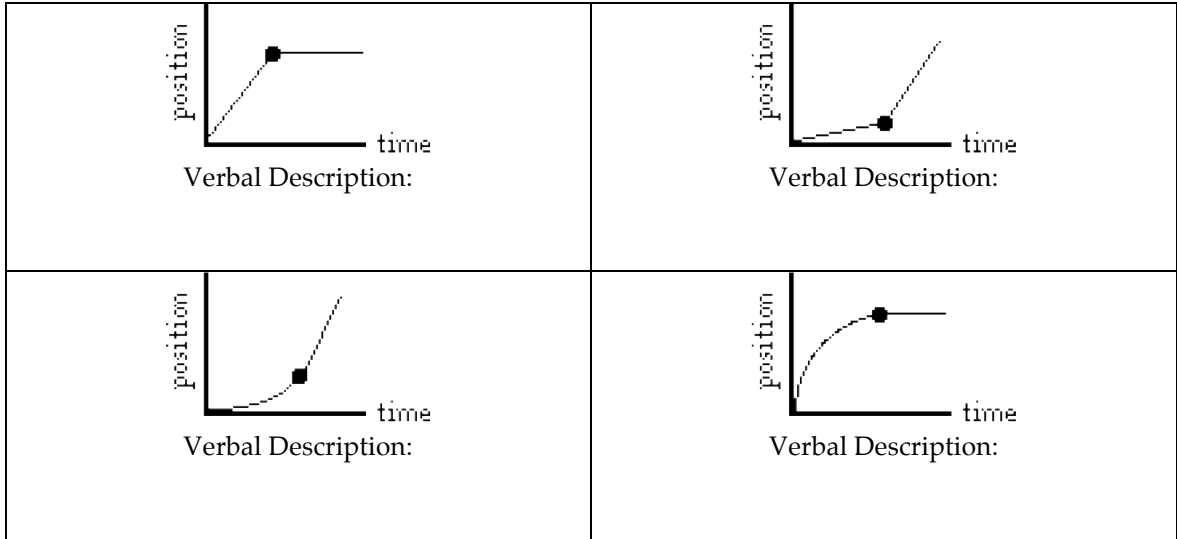
| | | |
|--|---|---|
| A Moving at constant speed B Accelerating | A Move in + dirn; speed up B Move in + dirn; slow dn | A Move in - dirn; speed up B Move in - dirn; slow dn |
|--|---|---|

3. For each type of accelerated motion, construct the appropriate shape of a position-time graph.

| | |
|---|---|
| Moving with a + velocity and a + acceleration | Moving with a + velocity and a - acceleration |
|---|---|



4. Use your understanding of the meaning of slope and shape of position-time graphs to describe the motion depicted by each of the following graphs.



5. Use the position-time graphs below to determine the velocity. **PSYW**

