Motion Graphing

Connect ticker tape position velocity and acceleration

Name _____ Period _____ Date _____

Compare constant velocity and constant acceleration using motion patterns, graph slope, and graph area.

About 25 to 30 minutes | buildphysics.com/?experiment=motion-graphing

Predict the patterns

Set Car initial velocity to 0 m/s, Car acceleration to +2.0 m/s², and Sled velocity to +2.0 m/s. Turn on Ticker tape. The dots mark equal time intervals.

1. Sketch the expected dot patterns for the car and sled over the same time. Label which pattern has equal spacing.

Use Auto-pause after beside Run to stop at 2.0 s. Open graph. Select each vehicle and compare Position x, Horizontal velocity, and Horizontal acceleration. Use Inspect to complete the table.

2. Sketch the three graph shapes for each vehicle on the next page. Label axes and identify the car and sled. Use each object's own starting position when comparing displacement.

Object	Initial x (m)	x at 2 s (m)	v_x at 2 s (m/s)	a_x (m/s²)
Car				
Sled				

3. Use the slope of the car's velocity graph to find its acceleration. Use the area under each velocity graph from 0 to 2 s to find displacement. Show your work.

Show the graphs

Sketch x versus time, v_x versus time, and a_x versus time. Put both objects on each set of axes. Label important values at 0 and 2.0 s.

4. At 1.0 s the two velocities are equal. Does that mean their accelerations are equal? Explain using both graph shapes.

Give the car zero acceleration

Reset. Set Car initial velocity to +2.0 m/s and Car acceleration to 0 m/s². Keep Sled velocity at +2.0 m/s.

5. Predict how the car's ticker tape and three graphs will change. Run to 2.0 s and check. Which graph can have a different vertical offset even when the motions match?