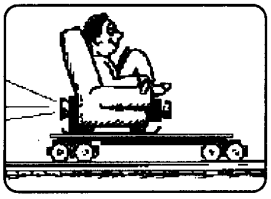
Name _____ Class _____ Date _____

4 Rocket Chair I

The concept investigated in this simulation is Newton's first law—inertia.



Situation A

Malcolm, an aspiring inventor, has developed a rocket-powered chair that is mounted on railroad wheels. Malcolm fires the rocket for short periods to move himself along. Assume no frictional forces act on the rocket-chair and that the ground is level with no hills.

Make a Prediction

1. Malcolm fires the rocket for 1.00 s. Describe the rocket-chair's motion after the rocket stops firing. Place a check next to your prediction.
   - **a.** ___ The rocket-chair will continue to speed up.
   - **b.** ___ The rocket-chair will maintain a constant speed.
   - **c.** ___ The rocket-chair will immediately begin to slow down.

Run Simulation Set *Duration of rocket thrust* to 1.00 s. Click the *Run* button and observe the simulation.

2. Was your prediction correct? Describe what happened to the speed of the rocket-chair after the rocket stopped firing.

_____

_____

_____

3. Using Newton's first law, explain the motion of the rocket-chair after the rocket stops firing.

_____

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_____

For Questions 4 through 8, place a check next to the correct answer.

4. Describe the plotted line on the speed-versus-time graph during the period when the rocket is being fired.
   - **a.** ___ The line slopes upward toward the right.
   - **b.** ___ The line slopes downward toward the right.
   - **c.** ___ The line is horizontal.
   - **d.** ___ The line is vertical.

5. Describe the plotted line on the speed versus time graph after the rocket stops firing.
   - **a.** ___ The line slopes upward toward the right.
   - **b.** ___ The line slopes downward toward the right.
   - **c.** ___ The line is horizontal.
   - **d.** ___ The line is vertical.

6. What does a line sloping upward toward the right on the graph mean?
   a. ___ The rocket-chair is accelerating.
   b. ___ The rocket-chair is traveling at a constant speed.
   c. ___ The rocket-chair is decelerating.
   d. ___ The rocket-chair's speed is zero.

7. What does a horizontal line on the graph mean?
   a. ___ The rocket-chair is accelerating.
   b. ___ The rocket-chair is traveling at a constant speed.
   c. ___ The rocket-chair is decelerating.
   d. ___ The rocket-chair's speed is zero.

8. What does a line sloping downward toward the right on the graph mean?
   a. ___ The rocket-chair is accelerating.
   b. ___ The rocket-chair is traveling at a constant speed.
   c. ___ The rocket-chair is decelerating.
   d. ___ The rocket-chair's speed is zero.

9. What was the top speed obtained by the rocket-chair when the rocket was fired for a period of 1.00 s? Record the value below.

   Top speed obtained = _____ m/s (for a rocket duration of 1.00 s).

Situation B

Malcolm investigates the effect of varying the duration of rocket thrust on the top speed obtained by the rocket-chair.

Run Simulation Click the *Reset* button. Set *Duration of rocket thrust* to 2.00 s. Click the *Run* button and observe the simulation. Note top speed obtained and record it below.

10. Record below the top speed obtained by the rocket-chair for a rocket thrust duration of 1.00 s and 2.00 s. See Question 9 for the top speed obtained after 1.00 s.

	Duration of rocket thrust (1.00 s)	Duration of rocket thrust (2.00 s)
Top speed obtained	_____ m/s	_____ m/s

11. Explain how varying the *Duration of rocket thrust* affects the top speed obtained by the rocket-chair.

_____

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