

Evaluating Vehicle Design for Friction

Observation Card One

Design Feature: Wheels and Tan Hub Connectors

Observations

Ideas for observations: What is the job of the tan hub connector? Turn the vehicle on its side and hold the gray rod. Spin the large wheel. Time how long it spins. Do this several times. Now remove the large wheel and its tan hub connector. Turn the wheel over. Put it back on the axle so the small hole on the wheel faces out. Put the tan hub connector on the *outside* of the wheel. (Connect it to the small hole of the wheel.) Now spin the wheel again. Time its spin. What do you observe? How did the wheel spin differently each time? Why do you think this happened? (Remember to return the tan hub connector to the *inside* of the wheel when you are finished.)



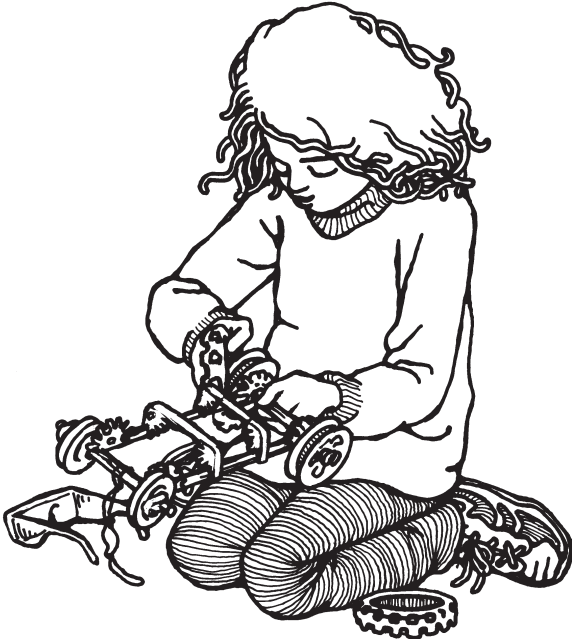
Evaluating Vehicle Design for Friction, *continued*

Observation Card Two

Design Feature: Tires

Observations

Ideas for observations: Remove the black tires from the large wheels. Use the rubber band to move the vehicle without its tires. What do you observe? What do you think is the job of the tires? (Remember to put the tires on again when you are finished.)



Evaluating Vehicle Design for Friction, *continued*

Observation Card Three

Design Feature: Frame and Crossbars

Observations

Ideas for observations: Remove the two blue crossbars. Squeeze the frame gently. Then pull the gray bars out gently. Now try to use the rubber band to move the vehicle. What changes do you observe when you remove the crossbars? What do you think is the job of the crossbars? How can the frame without the crossbars affect the spinning wheels? (Remember to put the crossbars on again when you are finished.)

