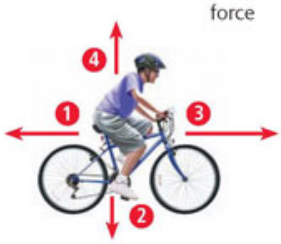
14. What information about the car can you find by using the dial and compass together?

F. its acceleration **H.** its speed
G. its motion **J.** its velocity

15. What force is shown by Arrow 2?

A. electric force **C.** gravity
B. friction **D.** magnetic force



16. CAUSE AND EFFECT If you increase the force on an object, what do you probably also increase?

F. acceleration **H.** inertia
G. gravity **J.** mass

Inquiry Skills

17. How do you **observe** friction when you erase a pencil mark?

18. A girl pulls a wagon by applying a force to it. What other force can you **infer** acts on the wagon in the opposite direction?

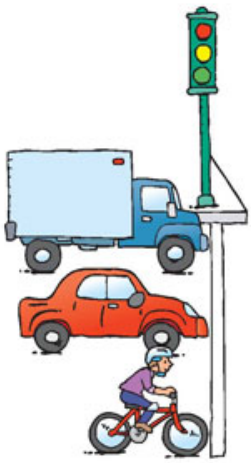


Critical Thinking

19. Can an object that moves at a constant speed be accelerating? Explain your answer.

The Big Idea

20. A truck, a car, and a bicycle are driving away from a stoplight. The truck uses a big engine for this acceleration. A car uses a smaller engine, and the bicycle rider uses the force of his own muscles. Why does each vehicle require a different amount of force to accelerate? Suppose each vehicle is pushed forward with a force of the same size. Which vehicle will be moving fastest after one minute? Why?



Inquiry Skills (5 pts. each)

17. as resistance to your motion, as heat

18. friction

Critical Thinking (5 pts. each)

19. Yes; if the object is moving in a circle at a constant speed, it is always changing direction, so it is always accelerating.

20. It takes more force to accelerate a larger mass, like the truck, than it does a smaller mass, like the bicycle. Greatest acceleration, the bicycle; least acceleration, the truck. The smallest mass will accelerate the most for a given force.

Chapter Test

See ***Assessment Guide*** pages AG116–121 for a Chapter Test and Performance Task, with Long Option rubric. Assessment options appear on page 654H.

Short Option Performance Assessment

Task

Forces and Motion

Place a strip of carpet on the floor. At one end of the carpet, prop one end of a ruler on several books. Roll a marble down the slot in the ruler so that it continues across the carpet. Write a paragraph explaining the changes in motion of the marble and the forces acting on it from beginning to end. Draw a diagram to illustrate your paragraph.

Rubric

Preparation Obtain several carpet scraps from a flooring store. Provide students with a marble, several books to make a ramp, and a ruler with a slot down the center.

Scoring Rubric—Performance Indicators

_____ Explains the motion of the marble in terms of speed or velocity and acceleration.

_____ Accurately describes the forces acting on the marble, including gravity and friction.

_____ Identifies gravity as the force that makes the marble move and identifies friction as the force that stops it.

_____ Recognizes that the force of gravity still acts on the marble after it has stopped.

Observations and Rubric Scores

3 2 1 0