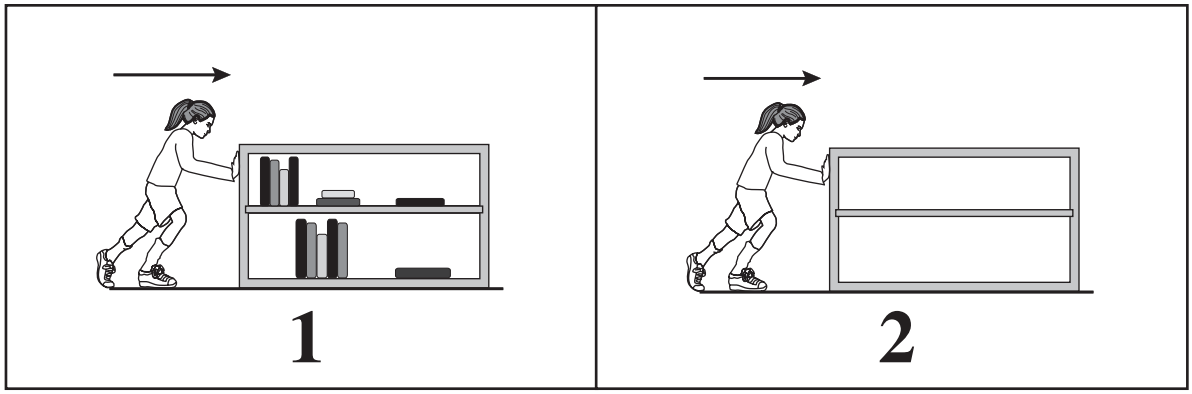
Benchmark SC.5.P.13.2

Reporting Category	Physical Science
Standard	**Big Idea 13** Forces and Changes in Motion
Benchmark	**SC.5.P.13.2 Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object. (Also assesses SC.4.P.12.1, SC.4.P.12.2, SC.5.P.13.3, and SC.5.P.13.4.)**
Also Assesses	**SC.4.P.12.1** Recognize that an object in motion always changes its position and may change its direction. **SC.4.P.12.2** Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds. **SC.5.P.13.3** Investigate and describe that the more mass an object has, the less effect a given force will have on the object's motion. **SC.5.P.13.4** Investigate and explain that when a force is applied to an object but it does not move, it is because another opposing force is being applied by something in the environment so that the forces are balanced.
Benchmark Clarifications	Students will describe the relationship among mass, force, and motion. Students will identify and/or describe that an object in motion always changes its position and may change its direction. Students will describe that the speed of an object is determined by the distance an object travels and the time it takes the object to travel that distance. Students will describe that objects can move at different speeds.
Content Limits	Items assessing relationship between mass, force, and motion are limited to a conceptual understanding. Items will not involve mathematical calculations or formulas. Items will address a conceptual understanding of speed and not require mathematical computations. Items may require the identification of the direction of motion but not the magnitude of motion. Items may refer to balanced forces and/or unbalanced forces but not net force. Items assessing forces applied to objects of different masses are limited to pushes, pulls, and friction.

Stimulus Attribute	Scenarios should use newtons (N) as the unit of measure for forces.
Response Attributes	None specified
Prior Knowledge	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.K.P.13.1, SC.1.P.13.1, SC.2.P.13.1, and SC.2.P.13.4.

Sample Item 19 **SC.5.P.13.3**

Stephanie started pushing a bookcase across the room, as shown in picture 1. Then, she removed the books and continued pushing with the same force and direction, as shown in picture 2.



How does removing the books affect the motion of the bookcase?

★ **A.** The mass is decreased, making the bookcase move faster.
B. The gravity is increased, making the bookcase move slower.
C. The friction is increased, making the bookcase move slower.
D. The mechanical energy is decreased, making the bookcase move faster.