Forces and Motion

8-5 The student will demonstrate an understanding of the effects of forces on the motion of an object. (Physical Science)

8-5.6 Summarize and illustrate the concept of inertia.
Taxonomy level: 2.2 and 2.4-B Understand Conceptual Knowledge

Previous/Future knowledge: Students have not been introduced to the concept of inertia in previous grades. They will further develop the concept of inertia in high school Physical Science (PS-5.7) in relation to Newton's first law of motion.

It is essential for students to know that inertia is the tendency of objects to resist any change in motion. Inertia is a property of the object; it is not a force.

- It is the tendency for objects to stay in motion if they are moving or to stay at rest if they are not moving unless acted on by an outside force.
- The more mass an object has, the harder it is to start it in motion, to slow it down or speed it up, or to turn it.
- In other words, the more mass an object has, the more inertia it has.

Examples of the effects of inertia might include:

- Inertia causes a passenger in a car to continue to move forward even though the car stops. This is the reason that seat belts are so important for the safety of passengers in vehicles.
- Inertia is the reason that it is impossible for vehicles to stop instantaneously.
- Inertia is the reason that it is harder to start pushing a wheelbarrow full of bricks than to start pushing an empty wheelbarrow. The filled wheelbarrow has more mass and therefore, more inertia.
- Inertia is also the reason that it is harder to stop a loaded truck going 55 miles per hour than to stop a car going 55 miles per hour. The truck has more mass resisting the change of its motion and therefore, more inertia.

It is not essential for students to know that the concept of inertia as Newton's first law of motion. Students do not need to know how momentum relates to inertia or to calculate momentum.

Assessment Guidelines:
One objective of this indicator is to *summarize* the concept of inertia; therefore, the primary focus of assessment should be to generalize the major points concerning the concept of inertia. However, appropriate assessments should also require students to *recall* the meaning of inertia.

Another objective of this indicator is to *illustrate* the concept of inertia; therefore, the primary focus of assessment should be to give illustrations of this concept or use illustrations to show understanding of inertia using pictures, diagrams, or word descriptions. However, appropriate assessments should also require students to *exemplify* inertia with moving objects or with objects at rest resisting motion.