BENCHMARK SC.C.1.2.1

Strand C	Force and Motion
Standard 1	The student understands that types of motion may be described, measured, and predicted.
Benchmark SC.C.1.2.1	The student understands that the motion of an object can be described and measured.
Item Type(s)	MC
Benchmark Clarification	The student identifies and quantifies the movement of an object and makes predictions based on its movement.
Content Limits	Items will NOT require the use of formulas (e.g., rate of speed) to obtain the correct answer. Items may address tools used to measure different aspects of movement.
Stimulus Attributes	Items may provide the student with data on speed in chart, diagram, or picture form.
Response Attributes	Items will describe units in which the answer is to be given.

Sample MC Item

Susan designed an experiment to determine the speed of a toy car. She released the car from the top of a ramp.

Susan's Ramp

She already has a meterstick. Which other tool should she use to measure the car's speed?

A. balance
B. inclined plane
C. spring scale
* D. stopwatch

BENCHMARK SC.C.1.2.2

Strand	**C**	Force and Motion
Standard	**1**	The student understands that types of motion may be described, measured, and predicted.
Benchmark	**SC.C.1.2.2**	The student knows that waves travel at different speeds through different materials.
Item Type(s)		MC
Benchmark Clarification		The student identifies that waves may increase or decrease in velocity as they move through different materials.
Content Limits		Items will include information related to how sound waves travel through different materials at different speeds (i.e., speed of sound through gas, liquids, and solids).
Stimulus Attributes		Items may provide the student with data on wave speeds in chart, diagram, or graph form.
Response Attributes		None specified.
Sample MC Item		Scientists use sound waves to map the ocean floor. They send out sound waves, and the time the signal takes to return is used to determine the distance of the object. Sound waves travel much quicker in water than in air. Why is there a difference in the time it takes sound to travel in air and water? A. Water is colder than air and conducts sound waves at faster rate. B. Sound waves travel in different directions through different materials. C. Air molecules cannot change sound waves as well as water molecules. * D. Sound waves travel at different speeds because of the density of different materials.

BENCHMARK SC.C.2.2.1

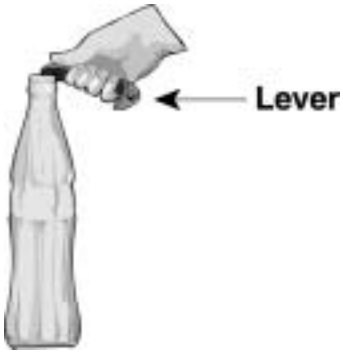
Strand	**C**	Force and Motion
Standard	**2**	The student understands that the types of force that act on an object and the effect of that force can be described, measured, and predicted.
Benchmark	**SC.C.2.2.1**	The student recognizes that forces of gravity, magnetism, and electricity operate simple machines.
Item Type(s)		MC
Benchmark Clarification		The student identifies ways in which simple machines use forces other than human input to operate.
Content Limits		Items will assess the student's ability to analyze the type of forces and how they are operating within one system.
Stimulus Attributes		Items may provide the student with data in graphics of real-world machines that are clearly labeled, simple, common, and familiar.
Response Attributes		Items may have responses in the form of real-world machines that are clearly labeled, simple, common, and familiar.

Sample MC Item

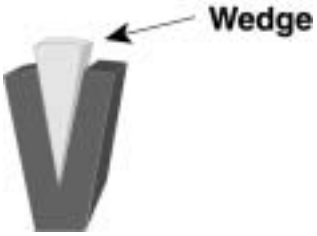
The force due to gravity is sometimes used to assist simple machines. Which simple machine relies on the force due to gravity?

* A.

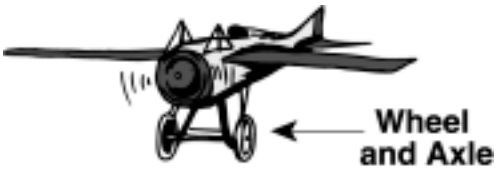
C.



B.



D.

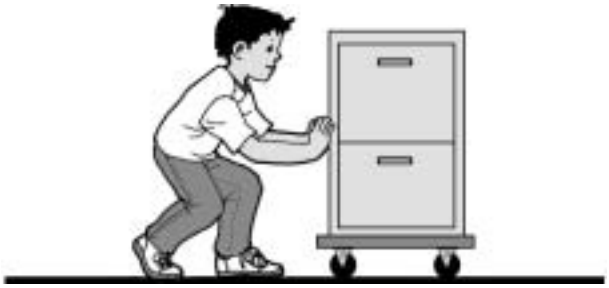


BENCHMARK SC.C.2.2.3

Strand	**C**	Force and Motion
Standard	**2**	The student understands that the types of force that act on an object and the effect of that force can be described, measured, and predicted.
Benchmark	**SC.C.2.2.3**	The student knows that the more massive an object is, the less effect a given force has.
Item Type(s)		MC
Benchmark Clarification		The student recognizes the greater the mass of an object, the greater the force needed to act on the object.
Content Limits		Items will describe the mass of objects in whole numbers. Items will NOT require unit conversions to compare data.
Stimulus Attributes		Items may provide the student with data in diagram or picture form.
Response Attributes		Items may require the student to select a diagram or picture based on its mass.

Sample MC Item

Tim needs to move four file cabinets. The file cabinets have different masses. Tim pushes each cabinet for three meters.



Which cabinet requires the **most** force to move?

A.

Cabinet A
50 kilograms

C.

Cabinet C
150 kilograms

B.

Cabinet B
100 kilograms

* D.

Cabinet D
200 kilograms

BENCHMARK SC.C.2.2.4

Strand	**C**	Force and Motion
Standard	**2**	The student understands that the types of force that act on an object and the effect of that force can be described, measured, and predicted.
Benchmark	**SC.C.2.2.4**	The student knows that the motion of an object is determined by the overall effect of all of the forces acting on the object. This benchmark also assesses SC.C.2.2.2.[3]
Item Type(s)		MC, SR
Benchmark Clarification		The student identifies the net force acting on an object and describes the motion of that object.
Content Limits		Items will require the student to interpret only two forces at a time.
Stimulus Attributes		Items may provide the student with data in diagram or picture form.
Response Attributes		None specified.

[3] The complete text for SC.C.2.2.2 is "The student knows that an object may move in a straight line at a constant speed, speed up, slow down, or change direction dependent on net force acting on the object."

Sample MC Item

Mr. Gates mops the gymnasium floor every day. When he finishes mopping, he puts up the sign shown below.

The effect of which force is weakened when the floor is wet?

* A. friction
B. gravitation
C. inertia
D. magnetism

Sample SR Item

Juan and Kathleen bought model rocket kits. They built identical rockets with identical engines. Juan, however, glued small pieces of a broken bicycle reflector to his rocket to make it more visible in the sky.

Part A If everything is the same on both rockets except for the reflector pieces, which rocket will travel higher when they are launched at the exact same time?

Part B Explain why the rocket selected in Part A would travel higher.

Correct and Complete Response

Part A Kathleen's rocket should go higher than Juan's.

Part B Kathleen's rocket has less mass and less air resistance. The reflectors give Juan's rocket more mass than Kathleen's.