Warm-Up | Introduction to Forces

Lesson Question

Lesson Goals

Describe the concept of _____.

Explain how to determine the net force on an _____.

Distinguish between balanced and unbalanced forces and their effects on _____.

Words to Know

Write the letter of the definition next to the matching word as you work through the lesson. You may use the glossary to help you.

_____ magnitude

_____ force

_____ friction

_____ gravity

_____ normal force

_____ vector

A. a resistance to motion caused by two surfaces rubbing against each other

B. the size or quantity of something

C. a push or pull

D. the support force a surface exerts on an object; always at a ninety-degree angle to the surfacea push or pull

E. a quantity that has both a size and a direction

F. the force that one massive object exerts to attract another object to it; expressed as the weight of an object

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Motion

- Motion is recognized when an object's _____ from a reference point changes.
- Motion can be described by:
  - a _____.
  - a _____.
  - an _____.

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Forces

- A [ ] is a push or a [ ].
- Forces are [ ].
  - A vector has both a magnitude and a [ ].
    [ ] is the size or quantity of something.
  - A vector is indicated with an [ ].
  - A vector can have a positive or [ ] value.
- Forces are measured in [ ] (N).

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Force Diagrams and Abbreviations

- A force diagram is a drawing with force [ ] whose sizes and directions represent the magnitudes and directions of the forces acting on an object. Abbreviations are used to identify which type of force each vector represents.
  - The [ ] of a force vector represents the magnitude, or size, of the force.
  - The [ ] of the force vector shows which direction the force is acting in and abbreviations to tell you what type of force each vector represents.

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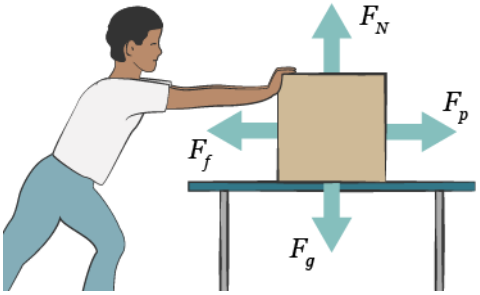
Force Diagrams and Abbreviations

- Some common forces are:
  - Push or pull, [ ]
  - [ ] force, F_N: always at a [ ]-degree right angle
  - Friction, [ ]: slows object down
  - [ ], F_g: weight



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Words to Know

counteract	to act against something, causing it to have [ ] of an effect
net force	the [ ] of all of the forces acting on an object

Multiple Forces

- Forces that act in the same direction [ ].
- Forces that act in opposite directions [ ] each other.

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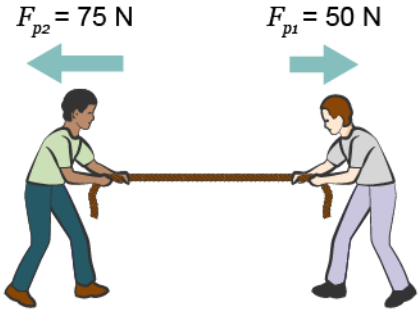
Net Force

- The net force is the sum of all of the [ ] that act on an object.
  - Positive and negatives have to be assigned for [ ] before adding forces together.
  - When assigning positives and negatives to forces, forces pointing to the [ ] are positive, and forces pointing to the [ ] are negative.

Label the forces shown as positive (+) or negative (–).

[ ] [ ]



- The net force in the illustration is [ ].

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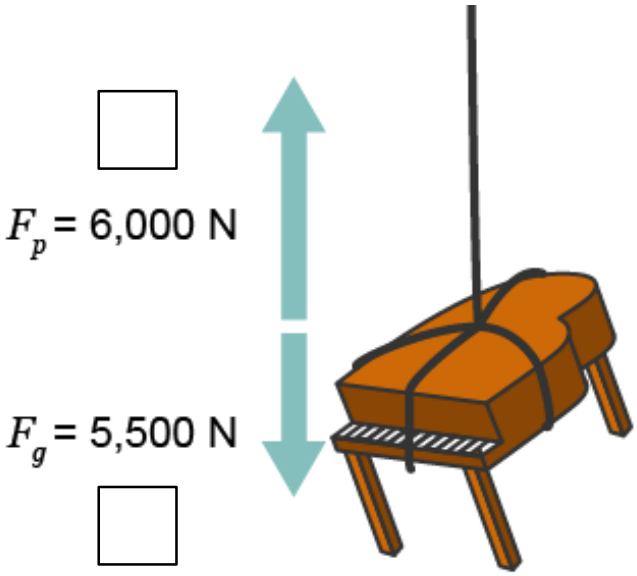
Parallel Forces

- Only [ ] forces can be added together.
  - Left and [ ] can be added together.
  - Up and [ ] can be added together.

Label the forces shown as positive (+) or negative (–).



- The sum of the forces acting on this piano is [ ].

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Balanced Forces

- When forces acting in [ ] directions are exactly equal:
  - The net force is [ ].
  - There is no change in [ ].
  - It's important to know that a zero net force does [ ] mean there is no motion. It simply means that there is no change from what is already happening.

Unbalanced Forces

- When forces acting in opposite directions are [ ]:
  - The net force is positive or negative in the direction of the [ ] force.
  - There is a change in [ ].
    - [ ]
    - [ ]
    - Both speed and direction
  - The motion of the object is in the same [ ] as the net force.
- Unbalanced forces can start an object moving or stop an object from moving.

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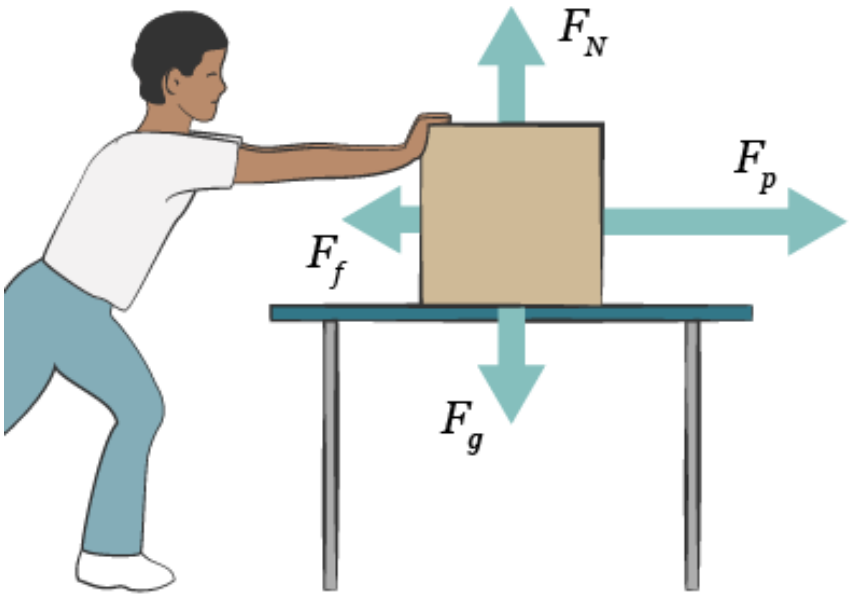
Force Diagrams and Unbalanced Forces

- Force diagrams show when forces are balanced or [ ].
  - The length of the vector represents the [ ] of the force.
  - The longer the vector is the [ ] force there is.
- The net force and the motion will be in the direction of the [ ] vector.

Circle the vector that represents the largest force.



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Summary | Introduction to Forces

Lesson Question

How do forces affect the motion of an object?

Answer

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Review: Key Concepts

FORCES

- A [ ] is a push or a pull.
- Forces are [ ] with magnitude and direction.
- Force diagrams show the type, magnitude, and [ ] of the forces acting on an object.
  - [ ] or pull, F_p
  - [ ], F_g
  - [ ], F_N
  - [ ], F_f

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Summary | Introduction to Forces

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Review: Key Concepts

NET FORCE

- The [ ] force is the sum of all forces acting on an object.
  - A net force of zero means that all forces are in [ ] and there is no change in motion.
  - A positive or negative net force causes a change in motion in the direction of the [ ] force.

Use this space to write any questions or thoughts about this lesson.

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