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Warm-Up | Friction

Lesson Question

Lesson Goals

Describe _____ and explain what causes it to occur.

Identify and describe the _____ types of friction.

Explain how to _____ or increase friction.

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.

_____ static

_____ kinetic

_____ friction

_____ air resistance

_____ microscopic

_____ traction

A. a contact force that resists motion and that objects exert on each other when they rub together

B. relating to movement or motion

C. the state of remaining constant; not changing or moving

D. the grip of one object on another

E. a type of fluid friction caused by gas molecules pushing against objects moving through air

F. relating to objects or details so small that they can be seen only with a microscope

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Forces

- A force is a [ ] or a pull.
- The unit for force is the [ ] (N).
- Forces are [ ] with magnitude and direction.
  - [ ] is indicated by a positive or negative sign.
- Force diagrams show the type, [ ], and direction of the forces acting on an object.
  - [ ] are abbreviated as:
    - F_p: push or pull force exerted by a person or object on another object
    - F_f: force of friction
    - F_g: force of gravity
    - F_N: support from that comes from any surface with an object on top of it

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Forces

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

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The Nature of Friction

- _____ is a _____ force that objects exert on each other when they rub together.
  - Friction opposes _____.
- _____ bumps and ridges cause friction.
  - Rougher surfaces create _____ friction.

Factors that Affect Friction

The amount of friction an object experiences depends on:

- The type of _____
  - _____ surface = more friction
- The _____ of an object
  - _____ = more friction

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Friction and Motion

- Like any force, friction causes a change in _____.
  - Causes objects to _____ down
  - Causes objects to change _____

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Friction and Motion

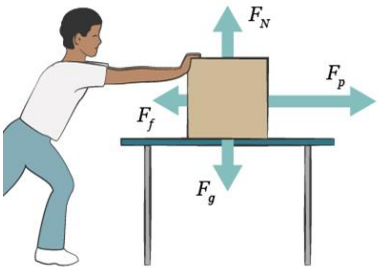
- Friction is often needed for [ ] to occur.
  - Allows tires, shoes, feet, etc., to have [ ], the grip of one object on another

Net Force and Friction

- Friction is always [ ] to the surfaces that rub together.
- Friction is always in the [ ] direction of the motion.
- The force of friction has the opposite sign from the force of the push or pull.

Circle the arrow that represents the force of friction. Then circle the (+) or (–) to indicate whether friction is a positive or a negative force.

+ –



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Static Friction

- [ ] friction acts on objects that are [ ] moving.
  - Prevents [ ] and keeps objects in place
  - Requires extra [ ] to be overcome

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Kinetic Friction

- [ ] friction acts on moving objects.
  - Acts against [ ]
  - [ ] objects
- Types of kinetic friction include:
  - [ ] friction (difficult to overcome)
  - [ ] friction (easy to overcome)

Fluid Friction

- [ ] friction acts on solid objects as they move through a fluid.
  - [ ] to overcome
- Fluid friction is affected by different factors than friction between solid surfaces.
  - [ ] of an object
  - Surface [ ] of an object
    - The [ ] the surface area, the more friction.
  - [ ] of an object
    - The greater the speed, the more fluid [ ].
- Air [ ] is a type of fluid friction that acts on objects moving through air.

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Ways to Reduce Friction

- Reducing friction can _____ an object's speed, make objects easier to move, and _____ wear and tear on objects.

Ways to reduce friction include:

- _____
- ball _____
- _____ designs
- _____ materials

Ways to Increase Friction

- Increasing friction can provide _____ on slippery surfaces, _____ objects down, and generate _____.

Ways to increase friction include:

- increase _____
- increase surface _____
- increase _____

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Summary | Friction

Lesson Question

How does friction affect the motion of an object?

Answer

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Review: Key Concepts

- Friction:
  - is a [ ] force.
  - is created when two objects [ ] against each other.
  - opposes [ ].
- Friction may be:
  - [ ].
  - [ ] (e.g., sliding or rolling).
  - [ ] (e.g., air resistance).

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Review: Key Concepts

- Friction can be reduced by using:
  - _____.
  - ball _____.
  - _____ designs.
  - _____ surfaces.
- Friction can be increased by increasing:
  - _____.
  - surface _____.
  - _____.

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Summary | Friction

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

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