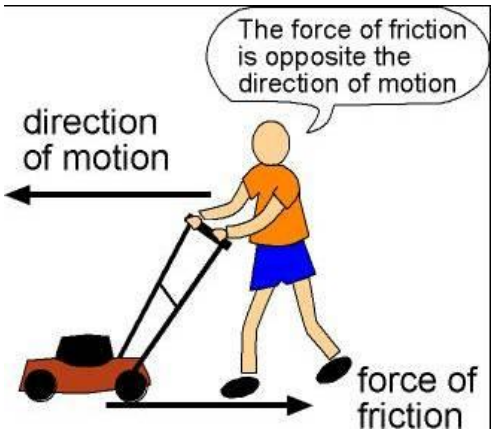
Opposing Friction
Physical Science

Name: _____ Period: _____ Date: _____

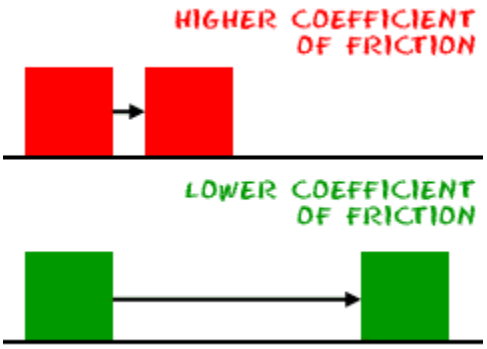
Essential Question: How do I oppose friction?



Friction, the force or resistance that opposes the movement of one body or substance against another. Friction between solids is usually caused by irregularities in sliding surfaces, but sometimes by adhesion (sticking) or electrical attraction. Friction between fluids is usually caused by their viscosity (resistance to flowing).

If there were no friction, walking would be impossible and cars would spin their wheels without moving. Friction holds nails and screws in wood, and the operation of all brakes depends on friction. Friction between belts and pulleys is important in the operation of many machines. Friction between moving parts of machines, however, is undesirable. It wastes energy that could otherwise be used to perform work, produces **heat**, and can cause considerable wear. Friction can never be entirely eliminated, but it can be reduced by smoothing sliding surfaces or applying a lubricant such as oil.

Measures of friction are based on the type of materials that are in contact. Concrete on concrete has a very high **coefficient of friction**. That coefficient is a measure of how easily one object moves in relationship to another. When you have a high coefficient of friction, you have a lot of friction between the materials. Concrete on concrete has a very high coefficient, and Teflon on most things has a very low coefficient. **Teflon** is used on surfaces where we don't want things to stick; such as pots and pans.



Scientists have discovered that there is even less friction in your joints than in Teflon! It is one more example at how efficient living organisms can be.

There are four types of friction.

Type of Friction	Definitions
Static Friction	when a force is applied to an object but it does not cause it to move example: pushing on a wall, the wall does not move.
Fluid Friction	occurs when a object moves through a fluid (liquid or gas), meaning either a liquid or gas examples: skydiving, swimming
Sliding Friction	occurs when solid surfaces slide over each other example: falling/sliding on the pavement
Rolling Friction	occurs when an object rolls over another (something with wheels or that is circular like a ball) example: riding a motorcycle, the wheels roll.

In general, more force is required in overcoming friction to start an object moving across a surface than to keep it moving. Once the object is moving, the friction acting on the object (that is, the force opposing its motion) is directly proportional to the force with which the object presses against the surface. For example, doubling the weight of an object sliding across a surface will double the force with which the object presses against the surface and therefore double the friction that must be overcome to keep the object moving.

The ratio of the friction acting on an object to the force with which the object presses against a surface is called the coefficient of friction. Its value depends on the materials in contact. The greater the friction between two materials, the higher is the coefficient. Knowledge of the coefficient of friction between materials is useful to engineers in designing the moving parts of machines and in calculating the amount of power necessary to operate them.

http://quizlet.com/6866081/the-four-types-of-friction-flash-cards/
http://www.physics4kids.com/files/motion_friction.html
http://science.howstuffworks.com/friction-info.htm
http://share.ehs.uen.org/node/7853

Clarifying Questions:

1. What is the **force that opposes the movement of an object**?

_____

2. What causes **friction** between solids?

_____

_____

3. What cause **friction between fluids** (liquid and gas)?

_____

_____

4. What would happen if there is no **friction**?

_____

_____

5. How is friction considered **undesirable** for machines?

_____

_____

6. How can **friction be lessened**?

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_____

7. How is the **coefficient of friction** measured?

_____

_____

8. Where is **Teflon** used? Why is it better than the alternative? Think!

_____

_____

9. Why are living thing considered so **efficient**?

_____

_____

10. What are **the four types of friction**?

_____

_____

11. Give at least **two examples** on each type of friction. Think!

Static Friction
Fluid Friction
Sliding Friction
Rolling Friction

12. What is required to **overcome friction**?

_____

_____

13. What is the relationship **between the weight of the object and its friction**? Think!

_____

_____

14. Why is the value of the **coefficient friction** important to engineers?

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