

Read About Patterns of Motion and Friction

PATTERN OF MOTION DEFINITION

Motion is the process of an object moving or being moved. Motion that repeats is said to occur in a *pattern*. We can observe *patterns of motion* to make predictions about how things will move in the future. The force that slows down moving objects is called *friction*.

To better understand patterns of motion and friction...

LET'S BREAK IT DOWN!

Force and Motion: A pattern of motion is the repeated processes of an object moving.

Motion can be straight (like an arrow being shot at a target), circular (like a merry-go-round), up and down (like a pogo stick), zig-zag (like skiing), side-to-side (like dancing).

Some motion is a combination, like a swing. When you are swinging you are moving up and down, as well as forward and back. When the same motion repeats over and over, it creates a pattern.



A *pendulum* is a weight on a string that hangs from a single point. Pendulums swing to create a pattern of motion. The length of the string affects the pattern it creates. For example, short strings swing fast. Pendulums will continue to swing in the same pattern until a force, such as friction, stops them.

Predicting Motion: Patterns of motion can be used to make predictions.

If we know the pattern that a moving object is following, we can make predictions about where it will be in the future. For example, when you jump rope you are using the pattern to predict when to jump.

You can use information from patterns to make lots of predictions, like how many swings you can do at recess or when to swing your baseball bat to hit a ball.



Types of Friction: When one surface rubs against another we get friction.

When you rub your hands together on a cold day to warm them up, you are using friction.

Friction slows things down and creates heat. All types of matter can cause friction, even air! Air resistance is a form of friction that slows down cars, trains, and airplanes. Scientists design their shape to reduce friction from the air. This is called streamlining.



Effects: Friction slows things down.

Some surfaces cause more friction than others, like rough surfaces. The treads on the bottom of your sneakers keep you from slipping. In this case, friction is beneficial.

Sometimes you want less friction. Air resistance is a form of friction that slows down all moving objects. Cars, trains, and airplanes are designed to reduce air resistance. This is called streamlining.

Another way to reduce friction is to change the types of materials that contact each other. If you have a squeaky door hinge, the noise is created when parts of a door rub against each other. Adding a lubricant, such as oil or grease, will make the squeak go away.



MOTION & FRICTION EXAMPLES



Air hockey tables have very little friction. Air is pumped through tiny holes, preventing the puck from touching the table. Game on!



Bowling lanes are coated with an oil to reduce friction. This allows the ball to slide more smoothly.



Car tires are made out of rubber with patterned treads. This helps the car grip the road better so it does not slide when turning.

MOTION & FRICTION VOCABULARY

Pendulum

A weight on a string that hangs from a single point. It swings and creates a pattern of motion!

Motion

The process of an object moving or being moved.

Pattern

A series of repeating events.

Pattern of Motion

When a moving object makes the same pattern again and again.

Outcome

The results of tests after we make predictions.

Friction

The force resisting motion. It slows things down.

MOTION & FRICTION DISCUSSION QUESTIONS

Explain how the motion of a jump rope creates a predictable pattern.

When Izzy jumps rope, he knows when to jump because the rope moves up, over, down and around him in a repeating pattern.

If a ball is thrown straight up into the air, what do you predict its pattern of motion to be? Why?

We can predict that a ball thrown straight up will fall straight down again because we have likely done it before and noticed a pattern that happens every time.

Explain the relationship between string length and motion for pendulums.

The longer the string length, the slower a pendulum swings. The shorter the string length, the faster a pendulum swings.

If the length of the strings for all the pendulums in Zoe and Izzy's model were the same, would they still create the same kinds of patterns we see?

No. The difference we see in Izzy's and Zoe's pendulums is because the strings are different lengths. If the length of the pendulum strings were the same, it is predicted that they would all swing with the same pattern of motion.

What is friction?

Friction is the force that resists motion.

How does rubbing two sticks together cause a fire to start?

The force of friction between the sticks creates heat. When the flammable wood gets hot enough, a fire can start.
