FRICTION

Synopsis

Students in grades 5 through 8 join Walt Disney Imagineer Asa Kalama on an E-ticket ride into the world of imagination, inspiration, and science—the science of friction. Asa travels to Disney's theme parks to show students how Disney Imagineers put friction to work as they design and build amazing attractions, such as the Disney Wonder cruise ship, Big Thunder Mountain Railroad, and Lights, Motors, Action! Extreme Stunt Show. In this Educator's Guide, you'll find activity ideas that allow students to apply and extend what they've learned about friction.

Objectives

Students will be introduced to the following concepts in the DVD:

- Friction is the force that opposes the motion of an object that wants to rub or slide against another object.
- Friction is caused by the touching of atoms at contact points between surfaces that rub or slide against each other.
- The more surfaces press on each other, the more contact points you get, and the more friction.
- Friction is proportional—twice the force results in twice the friction.
- Friction also applies to fluids—whenever anything moves through water, it experiences drag, which is the resistant force due to an object's shape and surface properties.
- Skin friction is a type of drag.
- You can reduce drag by designing the shape of objects to be streamlined.
- Static friction is the resistive force that must be overcome to get an object moving.
- Kinetic friction is the resistive force that must be overcome to keep an object sliding over another object.
- Static friction is greater than kinetic friction.
- A lubricant reduces friction by reducing the number of contact points.
- The force of friction changes the energy of motion into heat.
- Rolling friction is the force that resists the rotation of a wheel because the wheel or ground deforms when the two come in contact with each other.
- Rolling friction is less than static and kinetic friction.

Activities in this Educator's Guide allow students to:

- Create and present a comic strip with a scenario that illustrates friction.
- Develop an idea for a theme park attraction that involves friction; explain the role of friction in the attraction.
- Identify and illustrate situations when friction is helpful and unhelpful.
- Create a music video for an original song about friction.
- Do a friction experiment.

Standards Addressed

DVD or Activity		Arts Education (Natl. Arts Education Assns.)	Language Arts (NCTE)	Science (NSTA)
DVD Content		None addressed.	None addressed.	**B.** Physical Science **G.** History and Nature of Science
Activity	Testing 1, 2, 3	None addressed.	**4.** Students adjust their use of spoken, written, and visual language…	**A.** Scientific Inquiry **B.** Physical Science
	A Friction Story	**Visual Arts 1.** Understanding and applying media, techniques, and processes **Visual Arts 3.** Choosing and evaluating a range of subject matter, symbols, and ideas	**4.** Students adjust their use of spoken, written, and visual language… **5.** Students employ a wide range of strategies as they write… **6.** Students apply knowledge of language structure… **11.** Students participate as knowledgeable, reflective, creative, and critical members…	**B.** Physical Science
	How Helpful	**Visual Arts 1.** Understanding and applying media, techniques, and processes **Visual Arts 3.** Choosing and evaluating a range of subject matter, symbols, and ideas	**4.** Students adjust their use of spoken, written, and visual language… **5.** Students employ a wide range of strategies as they write… **6.** Students apply knowledge of language structure…	**B.** Physical Science
	F-TV	**Theater 1:** Script writing by the creation of improvisations and scripted scenes based on personal experience and heritage, imagination, literature, and history **Theater 2:** Acting by developing basic acting skills to portray characters who interact in improvised and scripted scenes	**4.** Students adjust their use of spoken, written, and visual language… **5.** Students employ a wide range of strategies as they write… **6.** Students apply knowledge of language structure… **11.** Students participate as knowledgeable, reflective, creative, and critical members…	**B.** Physical Science
	How Comical	**Visual Arts 1.** Understanding and applying media, techniques, and processes **Visual Arts 3.** Choosing and evaluating a range of subject matter, symbols, and ideas	**4.** Students adjust their use of spoken, written, and visual language… **5.** Students employ a wide range of strategies as they write… **6.** Students apply knowledge of language structure…	**B.** Physical Science

Preview Questions

1. What is friction?
2. When is friction helpful?
3. When is friction unhelpful?

Postviewing Questions

1. What is the difference between static and kinetic friction?
2. What is rolling friction?
3. What is drag?
4. What can you do to reduce friction? What can you do to reduce drag?

Suggested Classroom Activities

Try It Yourself: Singing Glass and Cuica

This DVD contains two interactive activities that allows students to put what they've learned into practice. These activities can be located in the Bonus Materials section of the DVD. Below is a list of items needed to complete the activities.

Singing Glass

- One crystal beverage glass
- Water

Cuica (A Musical Friction Drum)

- One empty metal coffee can
- One piece of waxed dental tape – approximately three feet long
- One strong, thick nail
- One hammer
- One small piece of wet cloth

THE SCIENCE OF DISNEY IMAGINEERING

PREVIEW ONLY

This is a preview of the Educator's Guide on *The Science of Disney Imagineering: Friction* DVD. The complete Educator's Guide with all activities and resources can be downloaded directly from the DVD.