

Level 3 Module 4: Forces and Motion

CONTENT OVERVIEW

ANCHOR PHENOMENON: Motion in Space

Essential Question: Why do objects move differently in space than they do on Earth?

By investigating how objects move differently in space and on Earth, we develop an understanding that forces can cause changes in the motion of objects and that we can observe, measure, describe, and predict an object's motion.

CONCEPT 1: Motion

Focus Question: How can we describe and predict an object's motion?

Observing and describing the motion of a soccer ball on Earth and in space helps us understand the patterns of an object's motion and make predictions about how an object will move.

CONCEPT 2: Forces

Focus Question: What can cause the motion of an object to change?

Observing pushes and pulls and investigating the many forces acting on an object, such as gravity and friction, help us recognize how forces can affect motion.

CONCEPT 3: Magnetic and Electric Forces

Focus Question: How can an object move without being touched?

By investigating magnetic and electric forces, we learn about non-touching forces and how magnets can be used to solve problems.

APPLICATION OF CONCEPTS: Designing an Astronaut's Toolbox

We apply our understanding of forces and motion in an engineering challenge in which we develop a solution to a problem experienced by astronauts outside the International Space Station.

SUPPORTING OUR CLASSROOM

If you have any of the items listed, please consider donating them to our class to use in our science investigations.

- Pennies
- Large metal paper clips

SUPPORTING YOUR YOUNG SCIENTIST AT HOME

ONGOING CONVERSATIONS

Support science learning at home by having conversations about forces and motion topics. Here are some suggestions to get you started:

- Have discussions about forces and motion in everyday life. Ask: Why is it easier to pull a wagon on a smooth sidewalk than on rough grass? Why does a bike speed up when it is going downhill?
- Talk about different sports that are played with balls and a striking force. Consider how forces affect the motion of the ball in sports such as baseball, tennis, ping pong, golf, basketball, and soccer.
- Draw attention to your daily activities and imagine how an activity such as taking a bath, brushing teeth, or making a bed might be different on the International Space Station.

ACTIVITIES

These activities support and extend the learning going on in the classroom:

- Go on a magnet hunt around the house to discover how magnets are used in everyday objects (e.g., refrigerator magnets, cabinet latches, toys, appliance doors).
- Watch a sporting event and encourage your student to use vocabulary such as *balanced*, *unbalanced*, *direction*, *speed*, *friction*, *push*, and *pull* to describe the forces and motion they observe.
- Invite your student to find examples of objects that move in ways similar to the objects in their Motion Station Investigation, such as those that swing, bounce, roll, spin, slide, and curve.

BOOKS

Local libraries are a great resource for fiction and nonfiction books related to space and forces and motion. Browse the library catalog or start with these suggestions:

- *Moonshot: The Flight of Apollo 11* by Brian Floca
- *Team Moon: How 400,000 People Landed Apollo 11 on the Moon* by Catherine Thimmesh
- *Footprints on the Moon* by Alexandra Siy

WEBSITES

Keep the learning going about forces and motion by exploring these internet resources:

- Visit the NASA website for students (<https://solc.gsfc.nasa.gov/modules/newkz3/index.html>) and select Living on ISS to see videos of some creative solutions for living and working in space.
- Find out how crew members on the International Space Station live. Visit this NASA website: https://www.nasa.gov/audience/forstudents/k-4/more_to_explore/Living-Working-In-Space.html.