

CH. I FORCE AND VELOCITY

2

1.2: Describing Changes in Motion

19 Lessons

Force and Motion





F&M: 1.2.1 WARM-UP

Students describe how the motion of an object can change. (5 min)

Work independently to answer the following questions. TURN IN!!!

1. How can the motion of an object that is already moving change?

An object that is already moving can ...

An object that is already moving can stop moving, speed up, slow down, or change direction.

2. How can the motion of an object that is NOT moving change?

An object that is not already moving can ...

An object that is not already moving can start moving.



F&M: 1.2.1 WARM-UP

Unit Question: How do forces affect motion?

Chapter 1 Question: *What caused the pod to change direction?*

VIDEO - A space pod was sent on a mission and in the few seconds that it lost contact with the ground, it moved in an unexpected way. This investigation will help you understand how forces affect the motion of objects.

Talk with a partner about the reflection question after the video.





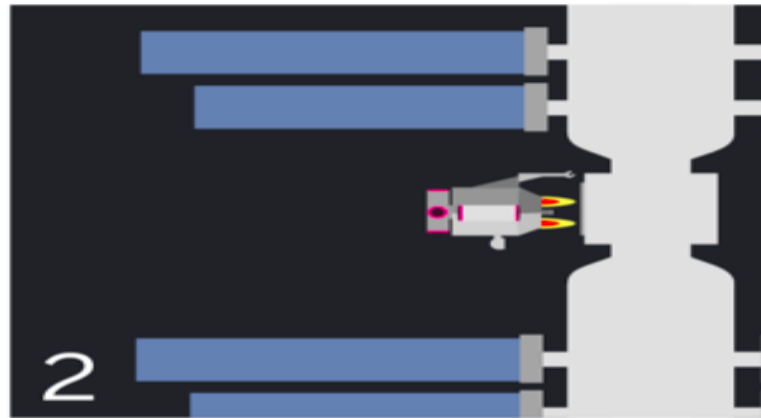
F&M: 1.2.2 WHAT HAPPENED TO THE POD?

Students discuss their initial thinking about two claims that might explain what happened to the pod in those missing seconds. (10 min)

Asteroid Collection Missions



1 Pod approaches space station at high speed.



2 Thrusters fire to stop the pod.



3 Docking: pod connects to space station.

The thrusters, or small engines, were supposed to fire and stop the pod just as it reached the space station so it could dock and deliver the samples. Instead, this pod moved in the opposite direction.



F&M: 1.2.2 WHAT HAPPENED TO THE POD?

Normally, when the thrusters fire, the pod will stop, but this mission was different.

Claim 1: The thrusters caused the pod to move in the opposite direction.

Claim 2: The thrusters only slowed the pod, it didn't stop; the pod hit the space station, which made it bounce and move in the opposite direction.



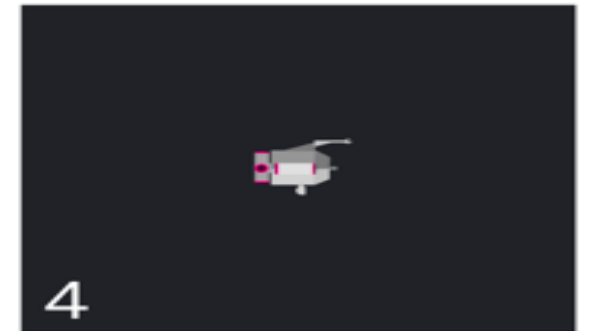
Pod approaches space station at high-speed.



Thrusters fire to stop the pod.



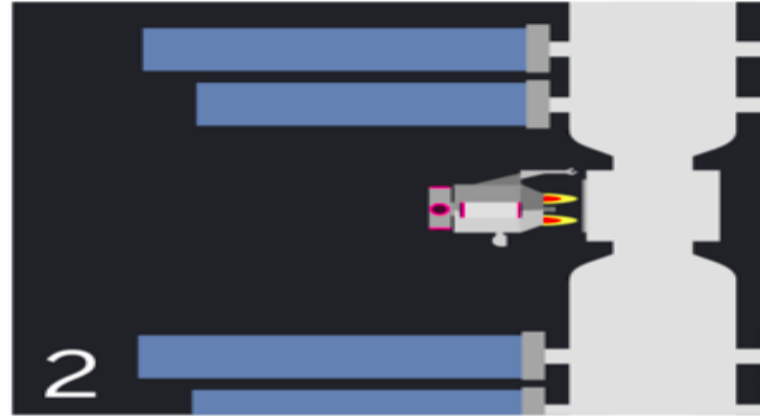
Thrusters cause pod to move in opposite direction OR pod hits space station and bounces off.



Pod travels far away from the space station.



Asteroid Collection Missions



When the space agency regained contact, why did they find this pod moving in the opposite direction? USA knows something was different—the thrusters did not have the effect they usually do—this pod did not stop at the space station and dock. These claims are different explanations for what happened. How are they different?

In Claim 1, the thrusters cause the pod to move in the opposite direction; in Claim 2, the thrusters slow the pod down, but it's not enough, so it collides with the space station.

DISCUSS



F&M: 1.2.2 WHAT HAPPENED TO THE POD?

Compare the claims storyboard with the storyboard showing the expected outcome.

Normally, when the thrusters fire, the pod will stop, but this mission was different.

Claim 1: The thrusters caused the pod to move in the opposite direction.

Claim 2: The thrusters only slowed the pod, it didn't stop; the pod hit the space station, which made it bounce and move in the opposite direction.

LETS VOTE!!!



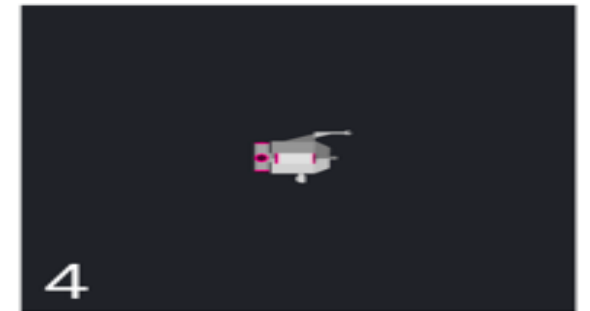
1 Pod approaches space station at high-speed.



2 Thrusters fire to stop the pod.



3 Thrusters cause pod to move in opposite direction OR pod hits space station and bounces off.



4 Pod travels far away from the space station.



EH – 1.2.3: EXPLORING CHANGES IN MOTION

Students use physical materials to investigate how the motion of stationary and moving objects can change and what might cause these changes. (15 min)

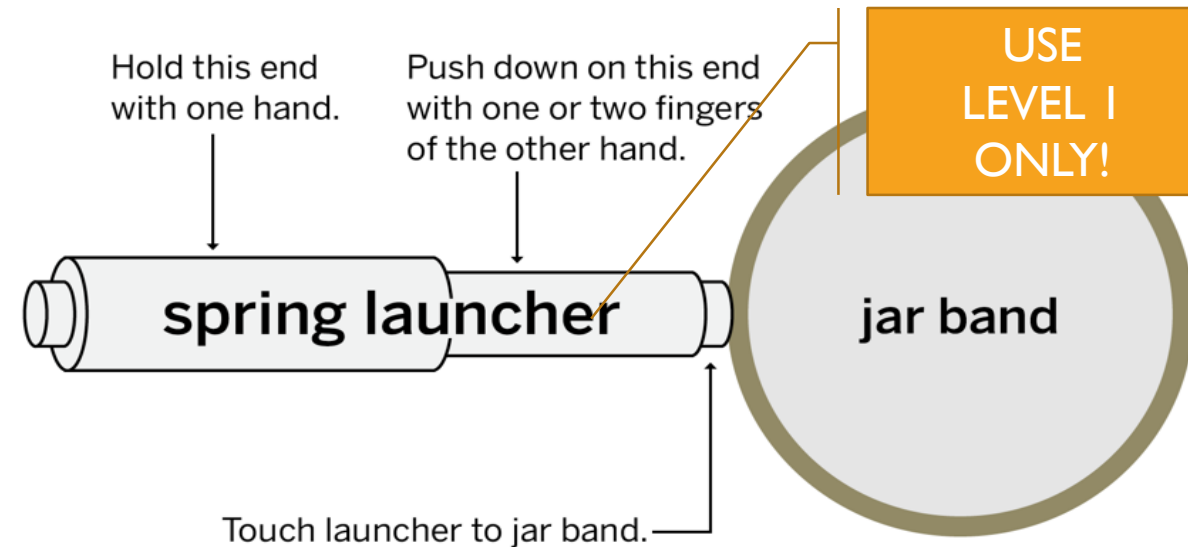
Chapter 1 Question: *What caused the pod to change direction?*

Activity - Exploring how the motion of an object can change and what causes these changes to happen.

First step in determining what happened to the pod is to come up with some possible reasons that it would change direction. —testing objects to see what makes them experience a change in motion can help answer this

How can the motion of an object sitting on a table change? How can the motion of an object sliding across a table change?

Top View of Launcher Setup





Exploring Changes in Motion

Use the materials on your tray to investigate the guiding question. Record your notes in the table below. One possible answer has been provided to help you get started.

Note: You are not required to use the spring launcher for every trial, but when you do, be sure it's only at level **1**.

Guiding Question: *In what ways can the motion of an object change?*

- An object that is already moving can ...
- An object that is not already moving can ...

Spring launcher is only to be used at the **1** setting!!!

**Conduct tests to discover answers to the guiding question.
You do not have to use the spring launcher the entire time.
Use all the objects and move them in different ways.**



8 MINUTES
TO TEST



EH – 1.2.3: EXPLORING CHANGES IN MOTION

After conducting tests, complete guiding question.

Guiding Question: *In what ways can the motion of an object change?*

In what ways can the motion of an object change?

Example: An object that is already moving can slow down.

DISCUSS WITH
OTHER GROUPS!

TURN IN!!!



Students summarize what they have learned about changes in motion. (10 min)

What are the FIVE ways an object's motion can change?

Discuss for 5 min

TURN IN!!!

START MOVING

STOP MOVING

SPEED UP

SLOW DOWN

CHANGE DIRECTION

All these changes in motion involve a change in speed or direction.

What is the word for this???????



VELOCITY

speed in a particular direction

A change in motion is the same thing as a change in velocity



1. **START MOVING**
2. **STOP MOVING**
3. **SPEED UP**
4. **SLOW DOWN**
5. **CHANGE DIRECTION**

You will continue to explore how objects can change velocity over the next few lessons. Next lesson will focus on **FORCE**