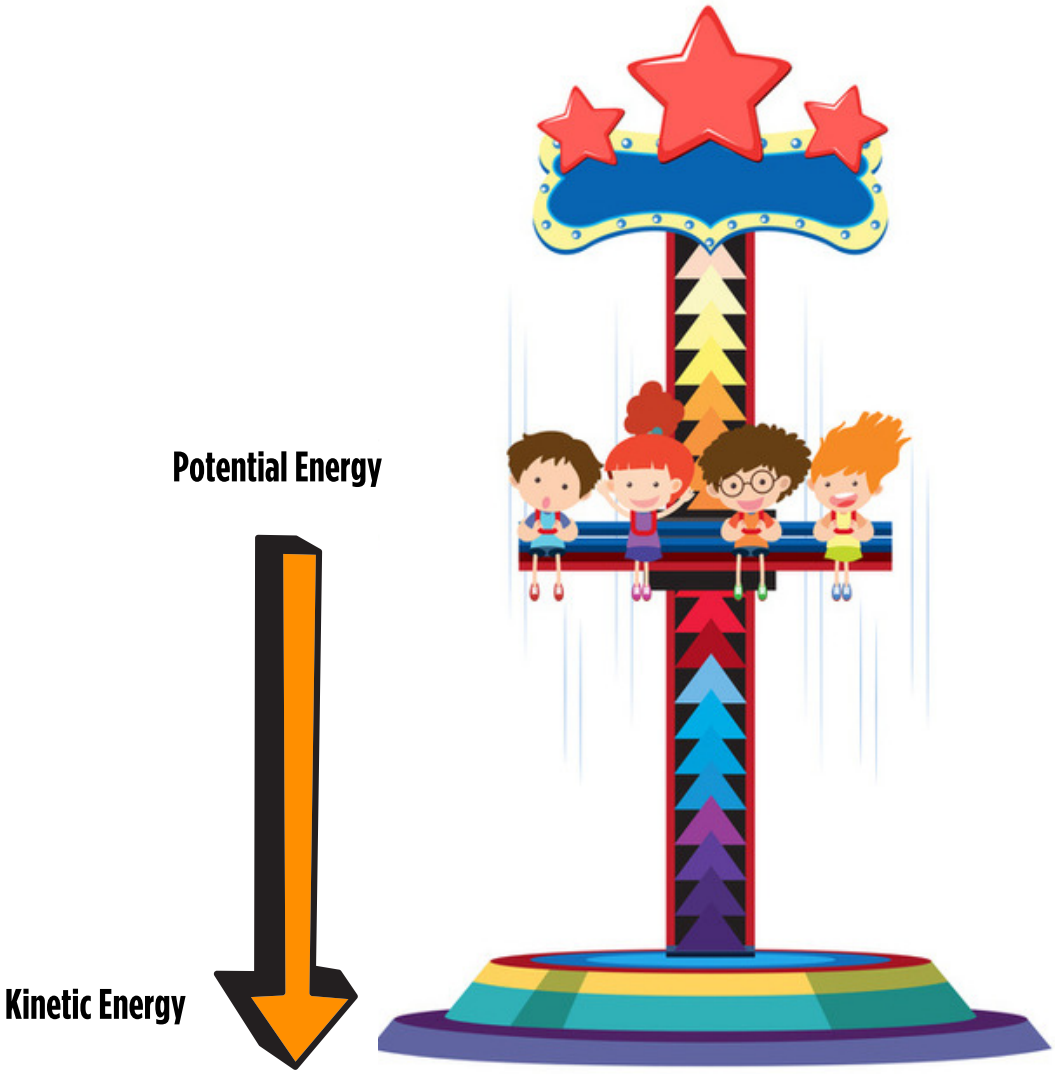
Teacher Prep

Follow the instructions:

Each group will need a plastic egg (or other small container) and some quarters. The egg is the car that and the quarters are the riders that sit in the car during a ride. Every group should start out with an egg or container with riders that is strong enough to be dropped from 6 inches but weak enough that it will break when dropped from 24 inches. That way the car is weak enough that it needs to be protected, but not so weak that it will easily break.

Before class, you must figure out how many quarters to put in each egg/container. Start by putting two quarters inside a plastic egg. Test to see that the egg/container with two quarters does not break open when it is dropped from a height of 6 inches but it does break open when dropped from a height of 2 feet. If this does not work, try adding more or less quarters . Once you have determined the right amount of coins to put in the egg/container, create identical containers for all groups. You can use objects other than coins, such as metal nuts or washers as long as you make each group's container identical.

Energy of Drop Rides



When a drop ride is stationary at the top of the ride, it has a lot of energy, called gravitational potential energy. iThe higher the car is, the more gravitational potential energy it will have.

When a car drops towards the ground, the potential energy changes into kinetic energy.

By the time the car has reached the ground, all of the potential energy has become kinetic energy. Engineers need to find a way to absorb all that energy or someone could get hurt!

Safety Features

Examples of safety features on theme park rides:

Braking Systems
Work by converting kinetic energy into heat energy through friction.

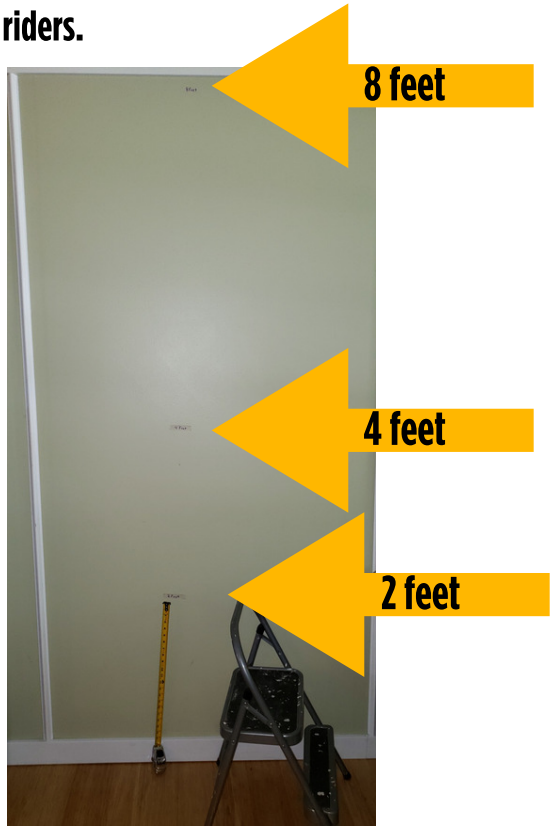
Tension Cables
Can convert kinetic energy into heat (those cables get hot!) or sound (you can hear the cables make “pinging” noises when they get stretched out).

Padding
Absorbs energy and converts it into heat or sound.

The Ground
Absorbs energy and coverts it into heat or sound. The ground can also allow kinetic energy to pass through it in the form of vibrations.

Steps to Create Ride

You will design a drop ride for an amusement park. Today, you will figure out how many feet the ride can be off the ground, without having the car break and hurt riders.



Step 1: Set Up

Use a tape measure to measure 2, 4, and 8 feet from the floor. Put a piece of tape to mark these heights. Each of these tape marks will represent a place where there will be a platform. The platform is the place where the car will drop from.

Step 2: Build Platforms

Use art supplies and building materials to create platforms. Your platforms must:

- Be attached onto the wall at 2, 4, and 8 feet.
- Allow the car to fall from this height without touching or hitting the wall. This means the platform must jut out enough that the car has a clear path to fall from.
- Support the weight of the car.

Step 3: Create the Safety Feature

You will use art supplies and building materials to design a safety feature that will go around your car. The safety feature will absorb energy when the car hits the bottom. Requirements for your safety feature:

- Must completely cover the car.
- Must absorb the energy at the bottom of the ride so the car doesn't break.
- Must be smaller than 6 inches x 6 inches x 6 inches.
- Must be as light as possible. Adding weight increases the potential energy of the car so the car will need to absorb even more energy.

Step 4: Testing

You will now drop your car, with riders and safety feature, from three different heights. The goal is to see how high your ride can be without having the car break.

- Start by placing your car (the egg), with riders inside and safety feature around it, at the lowest platform, 2 feet from the ground.
- Push your egg off the platform so that it does not touch the wall and falls directly on the hard floor.
- Observe your egg to see if it has cracked open. Fill out the chart on the next page.
- Repeat this same process using the middle platform (4 feet from ground) and then the highest platform (8 feet from ground).
- Record your observations after each drop.
- If you car does not survive a drop, build a modification and try again!

Step 5: Fine Tuning

If your egg broke, you will now make modifications to your padding design!

- Start by thinking about how your egg broke when it hit the floor.
- How can you change your design to make it safer?
- Test your new and improved design by dropping it from your platforms 2, 4, and 8 feet from the ground.

STEM CAREER ADVENTURES

Data Table

Drop Height	Draw a picture of what your car looks like	Write your observations
2 Feet		
4 Feet		
8 Feet		