

THE MIDWAY & GAMES

GRADE 8 STEM

A RIDE THROUGH NEWTON'S LAWS
ROLLER COASTER MOVEMENT ON THE MIDWAY



TEACHER







Although the Texas Star Ferris Wheel is an iconic part of the State Fair of Texas, the Midway is also home to many other more action-packed thrill rides. These rides use rapid acceleration, speed, dips, and quick direction changes to create an exciting experience for brave Fair patrons. Explore how all of these thrilling components are examples of Newton's law of motion! Are you brave enough?

A Ride Through Newton's Laws Roller Coaster Movement on the Midway

In this lesson students will:



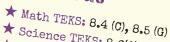
- * Apply Newton's laws of motion while examining Midway rides.
- * Note the difference between speed, velocity, and acceleration in the Midway rides.



- ★ Create their own unique fair ride that incorporates at least two laws of motion.
- ★ Use data from a graph to determine the rate of change or slope in a real-world situation.
- ★ Use integers to describe the direction of movement of a roller coaster.









★ Science TEKS: 8.6(A), 8.6(B), 8.6(C) *Art TEKS: 8.1(A), 8.2(B), 8.2(C), 8.4(B) Suggestion: The Social Studies lesson ("Games, Rides, and Fun!") asks students to complete a similar task, but with a slightly different spin; teaming up with a Social Studies teacher and co-teaching a larger project could be fun!)







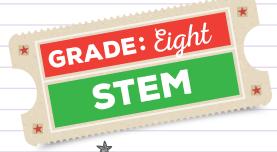
Before You Go

Class Discussion about Newton's Laws of Motion

- * Watch this video that covers speed, acceleration, force, inertia, velocity and motion.
- * Watch this video about action-reaction.
- * Take notes and discuss with a partner, and share your thoughts with the class.

TEACHER





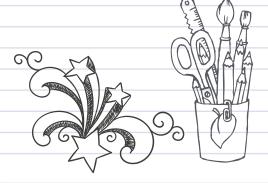


Plan Your Route.

★ Start at the Texas Star, and walk toward the Windstorm Roller Coaster.

Optional Materials to Bring

- * Smart Phone or Tablet
- Notes from Class (or photo of notes)
- ★ Pencil & Notepad or Sketchbook
- ★ Stopwatch (or you can use that function on your smartphone)



A Ride Through Newton's Laws Roller Coaster Movement on the Midway

Integers

Integers, such as negative numbers, can be used to describe a variety of situations.

- * Integers can be used to describe direction.
 - * If an object is moving forward, the distance may be described with a positive integer, and when moving in the opposite direction, the distance may be described with a negative integer.
- ★ At the Fair, several rides are using kinetic energy to move in many different directions.
 - * Watch this <u>video</u> of the Windstorm Roller Coaster in action, and sketch the movement of the roller coaster on a height vs. time graph.

: Roller Coaster Stats

Drop: 30 feet

Length: 1,430 feet

Trains: 2 - 12 passenger

Top Speed: 40 mph

Train Mfg: SDC

Height: 53 feet

Windstorm Roller Coaster statistics

Taken from http://www.ultimaterollercoaster.com/coasters/windstorm_oldtown

- * What unit of length is used to describe the distance traveled on the ride?
- * What other rides at the State Fair move in such a way that their movement could be described with positive and negative integers?

While You're There

The objective of your visit is to find examples of speed, acceleration, force, velocity, and action-reaction at the Midway roller coasters. Watch or ride the roller coasters to discover how Newton's laws of motion are in action today!

TEACHER





A Ride Through Newton's Laws Roller Coaster Movement on the Midway

ARE YOU SPEEDING?!

After riding or observing a roller coaster, take notes to answer the following questions:

- What are two examples of acceleration you observed on the ride?
- What force acts on the coaster to change its inertia?
- inertia:
 Can you give an example of the velocity of the roller
- Can you find an example of action/reaction?

HEIGHT VS. TIME

Observe the movement of the Windstorm Roller Coaster or another roller coaster on the Midway.

- Sketch a height vs. time graph in your notebook.
- Use positive and negative integers to identify changes in direction.
- You might want to observe the roller coaster more than one time, or use your smartphone to make a video.





After the Fair

When you return to class following your State Fair visit, you will:

- ★ Create an imaginary ride that includes two of the laws of motion to present to the class.
 - * It can be a picture with details or even a model you've built.
 - * Be creative! The sky's the limit...literally!
 - * Share your design with the class.
 - * Brainstorm how you can display the designs, for the rest of your school to view.
- ★ Use the data from your graph to determine the actual speed of the ride you observed at different intervals.
 - * Calculate the speed of the roller coaster between the time the ride starts and the time it reaches its first hill.
 - * How does this speed compare to the speeds reached at other points in time?
 - * When does the roller coaster travel the fastest?
 - * Does the roller coaster ever travel at a constant speed?
 - * How does understanding the concept of slope help you determine the speed of the roller
 - * How does this graph compare to the one you created before you went to the State Fair?