

## 2020 Suggested E-Portfolio Research Documents

### *Amusement Park Physics*

Answer the following questions based on their relationship to the amusement park ride. Click on the blue hyperlinks to open the presentation. Mentors may have to assist students with some of the terms presented.

[Video: Axis Prototype](#)

#### **Roller Coasters**

- What does it feel like when you are experiencing high g on a roller coaster ride?
- How long does it take the space shuttle orbiter to travel from the ground to orbit?
- What is the KC-13S?
- How is the KC-13S's flight path similar to a roller coaster?
- Explain the difference between wooden coasters and steel coasters?

[Video: History of Roller Coasters](#)

#### **Loop Coasters**

- What sensation (high g, low g, or normal g) do you experience most when riding the inside loop of a roller coaster?
- How is the force you experience in a loop different than the sensation you have going over the top of a floater hill?
- When does a KC-13S fly in banked curves for extended periods of time?

[Video: How Do Bumper Cars Work](#)

#### **Bumper Cars**

- You collide head-on with another car. Describe how Newton's third law of motion applies.
- How does Newton's second law of motion apply to a rocket launch?
- How much microgravity experiment time does a sounding rocket provide?

[Pendulum Rides: How do they work?](#)

- When is high g experienced on the KC-13S?
- When is high g experienced on a pendulum ride (as the rider reaches the bottom of the arc or as the rider reaches the top of the arc)?

- When is low  $g$  experienced on the pendulum ride?
- What is the difference between the flight path of the KC-13S and the circular motion of the pendulum ride?

**Activity:**

**Trebuchet Challenge**

Now that you have a better understanding of physics try this fun game. Each time you try this challenge you will be able to incorporate new facts that you have learned.

Distance Challenge: The object being thrown must not exceed 650 feet.

- Which of the 6 variables did you change to maximize your score? Why?

Accuracy Challenge: The object being thrown must land in the target zone.

- Which of the 6 variables did you change to maximize your score? Why?