Lesson 6: Investigation: Downhill

Objective: Students will be able to show how potential energy changes with the height of an incline and illustrate how the potential energy changes into other forms of energy.

Learning Goal: Objects may also contain potential energy depending on relative positions. Potential energy increases as height of ramp increases. When two objects interact energy can be transferred from one object to another.

Vocabulary: Potential energy, incline/decline plane, transfer, kinetic energy, gravity

Engage:

1. Teacher asks whole class if to remember the last time they were on a road trip or traveling somewhere very far.
2. Students are asked to recall "What were they freeways and roads like? Were they busy? Were they flat and smooth?"
3. If we are designing a car to transport people a long distance, how can the road conditions impact the efficiency of travel?"
    - Possible student responses: The roughness of the road may add friction, the incline/decline may impact speed, the amount of traffic.
4. Students list possible road conditions and how they may impact the efficiency of our vehicles.
5. Teacher records the students suggestions on the white board and how it may impact the vehicle.

Explore:

1. Students will have 3 ramps that are set to various declines
2. Students will set their vehicles at the top of the ramp and measure the speed for three trials for each of the three ramps.
3. Students record and graph the data

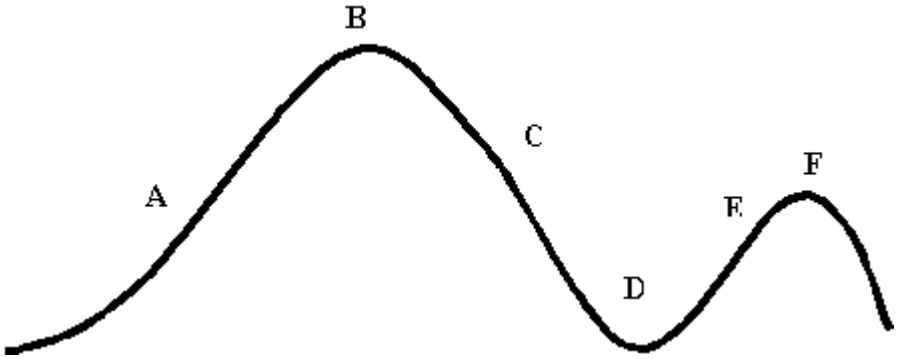
Explain:

1. Students are asked to share out their data and compare amongst the different inclines.
2. "Were there any patterns that you noticed?"
3. The teacher explains the concept of potential energy changing to kinetic energy.
4. The transition from potential energy to kinetic energy can be diagramed, which will be shown to the students.

- Example of kinetic v. potential energy diagram

Elaborate:

1. Students diagram the potential energy of each ramp at various positions.
    - Example of possible potential



    - Students point out at what points potential energy is the greatest and the least and explain why.

2. Students also describe how this may potentially impact the fuel economy of their proposed vehicle, "Can the potential energy be used to reduce the amount of fuel consumption? How so?"

Evaluate:

1. Students will be evaluated on the graphs they have created for potential energy, as well as the data and patterns they noticed from the increase of decline in ramps.
2. Students must support their claims by citing data that they have collected.