

Strand: 8.2	Standard: 8.2.1-3	Episode 3	Big Idea: Objects amount of kinetic energy is based on their mass and speed
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Title: Need for Speed Experiment	Time: 45-90 minutes	CCCs: <u>Quantity</u> <u>Cause and effect</u>	Practices: Use computational thinking to analyze data
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Episode Snapshot: Students will design and run an experiment exploring how the (quantity) of speed of an object affects its overall kinetic energy. They will use the **data** they collect to determine how the speed affects the amount of kinetic energy.

Gather:

Have students describe what speed is. Have a discussion about how to calculate speed (distance/time). Once students have this understanding explain that today you are going to be designing an experiment on how speed affects the amount of kinetic energy.

Ask the students to recall how they measured the amount of kinetic energy from the last experiment (they tested its effect on a stationary object at the bottom of the ramp. Give the students their research question for this experiment. **“How does the amount of speed affect total kinetic energy?”** Have students again design an experiment that will change the speed at which the marbles or cars are moving. Ask the students to come up with ideas in their groups about how they can do this. A common idea that comes up is to drop the marble or car down different heights on a ramp and the lower they put it the slower it goes the higher they put it the faster it goes. Other options are to change the surface so that some surfaces slow down the marble as it comes down the ramp. Again have students design their experiments. You can have each group running a slightly different version of the experiment based on how they planned it. Have students run the experiment and collect their data.

Reason:

After the students have collected the data remind them that we were trying to figure out how the speed affects the amount of kinetic energy. Have the students **analyze their data** and make a graph to show their data.

Communicate

Have students write their conclusions as groups and share their conclusions with the rest of the class based on their different experiments.

After students have completed this experiment have them go back to their phenomenon and change their explanation on what was happening based on the mass of the objects and the fact that they were being thrown at the beginning with the same speed. Have a discussion on what slowed the lighter ones down quicker (air resistance because there was less kinetic energy to counteract the air resistance)

Assessment: Students conclusions should identify the fact that more speed causes more kinetic energy in an object.

Materials, resources, handouts, etc:

- Ramps
- Marbles
- Stationary objects to move ie cups or tissue boxes etc.
- Anything else the students determine they need.
- Rulers
- Cars
- Stopwatches (phones can work for this)
- [Student planning guide](#)