

Lesson 3: Investigation: Speed

Objective: Students will create and edit/revise their cars to calculate the speed of their cars and compare/contrast the speeds of different cars in order to evaluate best practices for speed. Students will be able to produce a D vs. T graph from their data.

Learning Goal: Motion energy is kinetic energy. Measuring motion: $\text{Speed} = \text{distance}/\text{time}$. Average speed = total D/total T, Graphing speed

Vocabulary:

Engage:

1. Students will brainstorm about some of the important aspects of the car that we should test, “What are 3 standard performance criteria you would want to know about a car before investing money in one? Come up with an investigation to measure one of your standards.”
 - Possible student answers: How fast the car will travel, how safe the car is, how many people can fit inside, how much the car cost,
2. Students will come up with the various criteria that they may want to measure; Teacher records the ideas on the board.
3. Teacher leads a discussion as to how you can test some of the criteria.

Explore:

1. Students will establish a baseline, or control, for how fast their car is able to travel with at least 3 trials on a flat surface.
2. Data will be recorded and graphed.
3. Students will share out the information they had learned about their cars’ performances and how they improved them.
4. Once the information has been shared amongst groups students will have a chance to modify their cars to try and help increase the average speed.
 - During this time students will have an opportunity to use their budget to purchase extra materials to change wheels, chassis types, axels etc.
 - All changes will be kept in the car change log and will also account for budget changes.
5. Students will finalize their changes and record the final three trials for their car.

Explain:

1. Once students have compiled their data the teacher will explain/review how to graph the data points correctly.
 - Depending on how the unit is taught, graphing motion may be a review for students.
2. Teacher explains how the slope defines the average speed of the vehicle and how they can be used to compare data.
3. Teacher also introduces motion energy as kinetic energy.

Elaborate:

1. Using the data students have gathered, students will explain how their changes to the car have improved or hindered the speed of their vehicles.
2. The students graph their data points.
3. Students share data between groups and graph to see how the different slopes relate to the different speeds of each other's cars

Evaluate:

1. Using the graphs and data students will be evaluated on how they cite and support their claims as to why the changes made to the car worked or did not work.