

INVESTIGATING KINETIC ENERGY WITH CARS

MS-PS3-1: Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

Essential Question:

Procedure:

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-
-

Materials:

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-
-
-
-

Hypothesis:

If...

Then...

Because...

Data Table A.

	Distance traveled on the track (d) <i>(centimeters)</i>	Time (t) <i>(seconds)</i>	Average Time (t) <i>(seconds)</i>	Average Velocity (v) $d/t = v$ <i>(meters/second)</i>
Car A 1 Marble				
Car A 1 Marble				
Car A 1 Marble				
Car B 3 Marbles				
Car B 3 Marbles				
Car B 3 Marbles				

VELOCITY is another word for **SPEED**.

Averages are calculated by adding the numbers together, then dividing by how many numbers you added.

Hint:

- Velocity is distance divided by time.
- Make sure you use the average time.

Measure the distance with a ruler

Measure time with your iPad.

Check-in
Which car traveled faster?

$$KE = (0.5) \cdot m \cdot v^2$$

Data Table B.

	Car Mass (m) (Kilograms)	Average Velocity (v) <i>You calculated this already in Data Table A</i>	Average Kinetic Energy $KE = (0.5) \cdot m \cdot v^2$ (Joules)
Car A: 1 Marble			
Car B: 3 Marbles			

Check-in

Which car has a greater mass?

Which car had a faster velocity (or speed)?

Which car had more kinetic energy?

Apply

Which vehicle has more kinetic energy? Why?



Which vehicle has more kinetic energy? Why?



Explain Everything Experiment Results

Instead of writing a lab report you are going to create an Explain Everything video to explain what you discovered during your investigation. Below is a list of questions you need to answer and everything that you need to include in your video. Before you get started please read through this list and the rubric. You will grade yourself **before** Ms. Johal grades you.

Topic	Questions to answer in the video.	Include...
Question	<ul style="list-style-type: none">• What question are we trying to answer?• What is the essential question that goes with this experiment?	<ul style="list-style-type: none">• Images of the TWO cars.
Hypothesis	<ul style="list-style-type: none">• What is your hypothesis?	<ul style="list-style-type: none">• Your written hypothesis
Procedure	<ul style="list-style-type: none">• What steps did I take during this experiment?	<ul style="list-style-type: none">• Explain each step of the investigation that you did. Add images that help explain each step.
Data	<ul style="list-style-type: none">• What data did you collect?• How did you calculate velocity?• How did you calculate kinetic energy?	<ul style="list-style-type: none">• Include pictures of data tables• Explain the data tables and how you filled them in.
Results	<ul style="list-style-type: none">• What did you find out?• Which car had more kinetic energy? Why?	<ul style="list-style-type: none">• Explain your results - Write them out!
Hypothesis	<ul style="list-style-type: none">• Was your hypothesis correct? Why or why not?	<ul style="list-style-type: none">• Use results to prove your hypothesis was correct or not.
Concepts	<ul style="list-style-type: none">• How does the mass of an object effect the amount of kinetic energy it has?• How does the velocity of an object effect the amount of kinetic energy it has?	<ul style="list-style-type: none">• Use the experiment to explain each question.• Give another example to explain how mass and speed effect kinetic energy.

Video Rubric

- Make sure you use this rubric. If you do not get Meets Expectations or Exceeds Expectations **you will need to go back and fix what you were missing or improve what you have done.**

	Exceeds Expectations (4)	Meets Expectations (3)	Needs Improvement (2)	Unsatisfactory (1)
Questions Hypothesis Procedure	Clearly and Concisely explains the answers to ALL the questions.	Clearly explains the answers to MOST of the questions with FEW mistakes.	Explains the answers to SOME of the questions, with SEVERAL mistakes.	Explains the answers to FEW of the questions, with SEVERAL mistakes.
Data tables and explanation of calculations	Clearly and Concisely explains the data tables and how the calculations were completed with NO mistakes.	Clearly explains the data tables and how the calculations were completed with FEW mistakes.	Explains the data tables and how the calculations were completed with SEVERAL mistakes.	Explains the data tables and how the calculations were completed UNCLEARLY with MANY mistakes.
Relationship between mass and kinetic energy	Clearly and Concisely explains the relationship between the mass of an object and its kinetic energy with NO mistakes. INCLUDES an example to help explain.	Clearly explains the relationship between the mass of an object and its kinetic energy with FEW mistakes. INCLUDES an example to help explain.	Explains the relationship between the mass of an object and its kinetic energy with SEVERAL mistakes. NO example to help explain.	Explains the relationship between the mass of an object and its kinetic energy UNCLEARLY with MANY mistakes. NO example to help explain.
Relationship between speed and kinetic energy	Clearly and Concisely explains the relationship between the speed of an object and its kinetic energy with NO mistakes. INCLUDES an example to help explain.	Clearly explains the relationship between the speed of an object and its kinetic energy with FEW mistakes. INCLUDES an example to help explain.	Explains the relationship between the speed of an object and its kinetic energy with SEVERAL mistakes. NO example to help explain.	Explains the relationship between the speed of an object and its kinetic energy UNCLEARLY with MANY mistakes. NO example to help explain.
Video Quality	Video shows A LOT of EFFORT and attention to detail. Video includes images and videos that help explain the experiment.	Video shows EFFORT and attention to detail. Video includes images that help explain the experiment.	Video shows SOME EFFORT and attention to detail. Video includes images .	Video shows LITTLE EFFORT . Images are missing.

Student Name: _____

I have put honest **time** and **effort** into my project. I used this rubric as a guide and have **graded** my own Explain Everything lab report.

Final Grade (Ms.Johal) : _____ / 20 points