Inertia in Collisions

Year 5 Sciences / AC Year 10

Unit Title:	Forces and Motion	**Date Released:**	31/05/2018
Checkpoint Dates:	7/06/2018	**Due Date:**	14/06/2018

Statement of Inquiry:

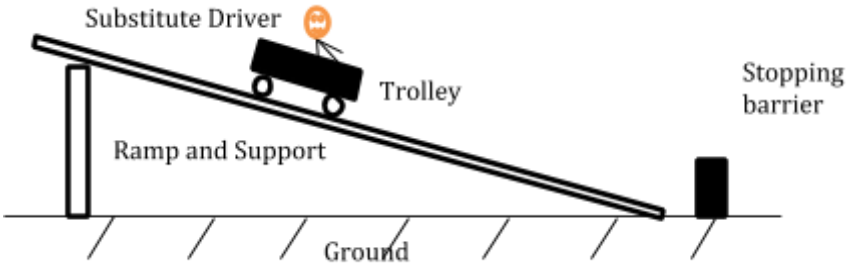
Through Scientific and Technical innovations, designers creatively apply energy changes in order to minimise the movement of occupants in collisions

Task Overview Inertia is an object's ability to resist a change in its state of motion. A passenger in a moving car has inertia, and if the car comes to a sudden stop (crashes) then the passenger will tend to continue his/her current state of motion and continue to move forward.

Your Task

You need to design, conduct and analyse an experiment to investigate how the speed of a vehicle affect the severity of the collision?

Useful Hint: In this case, we could let the distance the driver is thrown be the measure of accident "severity



Discuss the following:

1. *What form of energy did the driver and trolley have when they were stationary at the top of the ramp just before release?*
2. *If the ramp angle was increased what energy changes occurred?*
3. *As the trolley and the driver travelled down the ramp, what energy transformation occurred?*
4. *Explain which one of Newton's laws best explains the moment when the driver flings forward when the trolley hits the barrier.*

Requirements and Format:	
Word Count /Length	*750 Words maximum*
Format/Text Type	**Electronic Investigative Report**
Components	**See Scaffolding Document**

Assessment Criteria	**Maximum Level**
A Knowing and Understanding	**Not Assessed**
B Inquiring and Designing	**8**
C Processing and Evaluating	**8**
D Reflecting on the impacts of Science	**Not Assessed**

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Criterion B: *Inquiring and Designing*

Achievement Level	Level Descriptor	Task-specific clarification *To meet the level descriptors make sure you:*
7-8	The student is able to: i. explain a problem or question to be tested by a scientific investigation ii. formulate and explain a testable hypothesis using correct scientific reasoning iii. explain how to manipulate the variables, and explain how sufficient, relevant data will be collected iv. design a logical, complete and safe method in which he or she selects appropriate materials and equipment.	i. You were able to explain how you would test the severity of a crash ii. You have stated a clear hypothesis which is explained by clear scientific understanding iii. You have listed and explained all variables correctly and how you will collect data with little or no errors. iv. Your method is detailed and appropriate, includes all apparatus and has little or no errors
5-6	The student is able to: . describe a problem or question to be tested by a scientific investigation ii. formulate and explain a testable hypothesis using scientific reasoning iii. describe how to manipulate the variables, and describe how sufficient, relevant data will be collected iv. design a complete and safe method in which he or she selects appropriate materials and equipment.	i. You were able to describe how you would test the severity of a crash ii. You have stated a hypothesis which is described by some scientific understanding iii. You have listed and described most variables correctly and how you will collect data with some errors iv. Your method is detailed and appropriate, includes most apparatus or has some errors
3-4	The student is able to: i. outline a problem or question to be tested by a scientific investigation ii. formulate a testable hypothesis using scientific reasoning iii. outline how to manipulate the variables, and outline how relevant data will be collected iv. design a safe method in which he or she selects materials and equipment.	i. You were able to outline how you would test the severity of a crash ii. You have stated a testable hypothesis iii. You have outlined some variables and how you will collect data iv. Your method is complete but contains errors
1-2	The student is able to: i. state a problem or question to be tested by a scientific investigation ii. outline a testable hypothesis iii. outline the variables iv. design a method, with limited success.	i. You were able to state how you would test the severity of a crash ii. You have attempted to outline a hypothesis iii. You have outlined variables but there are many errors iv. Your method is stated but with limited success.
0	The student does not reach a standard described by any of the descriptors below.	Incomplete

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Criterion C: *Processing and Evaluating*

Achievement Level	Level Descriptor	Task-specific clarification *To meet the level descriptors make sure you:*
7-8	The student is able to: i. correctly collect, organize, transform and present data in numerical and/ or visual forms ii. accurately interpret data and explain results using correct scientific reasoning iii. evaluate the validity of a hypothesis based on the outcome of a scientific investigation iv. evaluate the validity of the method based on the outcome of a scientific investigation v. explain improvements or extensions to the method that would benefit the scientific investigation.	i. You have correctly collected, organized, transformed and presented data in numerical and/ or visual forms with little or no errors ii. You have accurately interpreted data and explained results using correct scientific reasoning forms with little or no errors iii. You have evaluated the validity of a hypothesis based on the outcome of a scientific investigation iv. You have evaluated the validity of the method based on the outcome of a scientific investigation v. You have explained improvements or extensions to the method that would benefit the scientific investigation.
5-6	The student is able to: i. correctly collect, organize and present data in numerical and/or visual forms ii. accurately interpret data and explain results using scientific reasoning iii. discuss the validity of a hypothesis based on the outcome of a scientific investigation iv. discuss the validity of the method based on the outcome of a scientific investigation v. describe improvements or extensions to the method that would benefit the scientific investigation.	i. You have correctly collected, organized and presented data in numerical and/ or visual forms with some errors ii. You have accurately interpreted data and explained results using correct scientific reasoning with some errors iii. You have discussed the validity of a hypothesis based on the outcome of a scientific investigation iv. You have discussed the validity of the method based on the outcome of a scientific investigation v. You have described improvements or extensions to the method that would benefit the scientific investigation.
3-4	The student is able to: i. correctly collect and present data in numerical and/or visual forms ii. accurately interpret data and explain results iii. outline the validity of a hypothesis based on the outcome of a scientific investigation iv. outline the validity of the method based on the outcome of a scientific investigation v. outline improvements or extensions to the method that would benefit the scientific investigation.	i. You have correctly collected and presented data in numerical and/ or visual forms with some errors ii. You have interpreted data and explained results with some errors iii. You have outlined the validity of a hypothesis based on the outcome of a scientific investigation iv. You have outlined the validity of the method based on the outcome of a scientific investigation v. You have outlined improvements or extensions to the method that would benefit the scientific investigation.
1-2	The student is able to: i. collect and present data in numerical and/or visual forms ii. interpret data iii. state the validity of a hypothesis based on the outcome of a scientific investigation iv. state the validity of the method based on the outcome of a scientific investigation v. state improvements or extensions to the method.	i. You have collected and presented data in numerical and/ or visual forms with many errors ii. You have attempted to interpret data iii. You have stated the validity of a hypothesis iv. You have stated the validity of the method based on the outcome of a scientific investigation v. You have stated improvements or extensions to the method
0	The student does not reach a standard described by any of the descriptors below.	Incomplete