# Name \_

Period \_\_ Date

Newton’s Laws WebQuest

Introduction

Explain each of Newton’s three laws in your own words:

1. Law of Inertia <http://www.physicsclassroom.com/class/newtlaws/u2l1a.cfm>
2. Law of Force and Acceleration <http://www.physicsclassroom.com/class/newtlaws/u2l3a.cfm>
3. Law of Action/Reaction <http://www.physicsclassroom.com/class/newtlaws/u2l4a.cfm>
	1. Part 1 - (<http://www.physicsclassroom.com/mmedia/newtlaws/il.cfm>)
	2. Watch the truck and ladder animation. What is another name for Newton’s First Law?
	3. What do people wear in cars to protect themselves against this law?
4. Investigate and apply Newton’s Laws to vehicle restraints.
	1. Go to <https://www.youtube.com/>
	2. Choose several short videos involving Newton’s Laws in relation to car crashes.
	3. Describe 3 ways that Newton’s Laws can apply in a car crash.
	4. Compare and contrast the results of a crash while a passenger is **not** wearing seat belts and while they are wearing a seat belt.

Review what you have learned about Newton’s First Law by working through the questions in the chart below.

|  |  |
| --- | --- |
| Question | Answer True or False |
| If a hockey puck slides on a perfectly frictionless surface, it will eventually slow down because of its inertia. |  |
| Inertia is the property that every material object has that causes objects to resist changes in its state of motion. |  |
| The law of inertia applies to both moving and nonmoving objects. |  |
| The reason a penny thrown straight up inside a bus will come back to your hand is that you, the bus, the air inside the bus, and the penny are all moving at the same velocity. |  |
| An object wants to maintain its state of motion because it has mass. |  |

Part 2

Watch the presentation and learn about Newton’s Second Law <http://www.wisc-online.com/objects/ViewObject.aspx?ID=TP1302>

1. In what direction does an object move when affected by an unbalanced force?
2. Large force= ............Small force=
3. Large Mass= \_.............Small Mass=

Watch the elephant and feather (<http://www.physicsclassroom.com/mmedia/newtlaws/efff.cfm>)

Tell how Newton’s second law explains why objects of different masses fall at the same rate. (hint: look for information about the ratios discussed in the second law)

**Bumper Cars**

[**http://www.learner.org/interactives/parkphysics/bumpcars.html**](http://www.learner.org/interactives/parkphysics/bumpcars.html)

*Directions:*

When you make your prediction, write down the sentence under the box that you choose. If your prediction is correct, write “same” on the correct answer line. If your prediction is not correct, click the back button on your browser to find the correct answer. Write the sentence on the correct answer line.

**Collision 1: One Car at Rest**

Your Prediction: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Correct Answer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Collision 2: Glancing Collision**

 Your Prediction: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Correct Answer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Collision 3: Equal Masses**

 Your Prediction: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 Correct Answer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Challenge:**

On the back create your own scenario for colliding cars. Be sure to include the speed of each car, the mass each car, the mass of each driver, and the angle of impact (straight on, glancing). Create a right and wrong answer and circle the correct answer. Draw your answers.

How many of the scenarios did you get right?

Review what you have learned by working through these questions:

|  |  |
| --- | --- |
| Question | True or False |
| Bubba approaches Billie and gives him a swift shove. Timid little Billie keeps his hands in his pocket during this interaction. Subsequently, while Bubba places a force upon Billie, Billie does not place a force upon Bubba. |  |
| Forces always cause objects to move. |  |
| A sled slides down the hill and reaches the bottom where it gradually slows to a stop. Once on the level ground the force of the hill persists upon the sled to allow it to continue its forward motion. |  |

Part 3

Read about Newton’s [Third Law](http://www-istp.gsfc.nasa.gov/stargaze/Snewton3.htm). Use the info here to help answer the questions below.

1. Describe what happens when you fire a gun from the perspective of the 3rd Law.
2. Describe what happens when you jump from a small boat onto a dock from the perspective of the 3rd Law.

<http://teachertech.rice.edu/Participants/louviere/Newton/law3.html>

1. For every force there is one that is in size but

in direction.

1. In a rocket what creates the initial action?
2. In the rocket what is the equal and opposite reaction?
3. Draw and label the rocket picture

## Investigate Newton’s Laws in the Real World

I can investigate and apply Newton’s Laws to sports activities.

Go to <http://www.exploratorium.edu/baseball/scientificslugger.html>The Scientific Slugger.

* 1. Read all of the text and fill in the blanks:

The distance a baseball travels depends on primary factors: the at which the ball leaves the bat, and how the ball is hit. The of the ball depends on both the speed of the and the speed of the

 \_.

Gravity is always pulling on the ball. If you hit the ball straight up, it spends quite a bit of time in the air, but doesn't travel far from home plate. If you hit the ball horizontally, as in a line drive, the ball moves away from home plate at maximum velocity, but

quickly hits the ground because of

-- still not very far from home plate. To

maximize your hitting \_, you need to have both a high horizontal

 AND you need to keep the ball in the air for a \_ time. You can do this by hitting the ball at an angle.