



## Chicken Collision (Digital Game)

### TEACHER DIRECTIONS & LESSON PLAN

### Focus on Inquiry

In the digital game *Chicken Collision*, students investigate the effects of unbalanced forces on the motion of chickens by making observations, analyzing and interpreting data, making and testing predictions, and drawing conclusions.

### Game Overview

Students take on the role of Alexa, a young science intern hired to perform chicken collision tests at a top secret lab called Newton Laboratory. The tests require Alexa to observe balanced and unbalanced forces acting on chickens, describe changes in their speed and/or direction, calculate net force, and analyze and interpret data to draw conclusions. When the chickens get tired of being tested, Alexa uses her new found knowledge to predict motion in order to save the lab from being destroyed.

### Implementation

*Chicken Collision* is a digital game designed to be a formative science assessment task that engages students in science practices in order to demonstrate their understanding of unbalanced forces. It can be used at any point during classroom instruction for engagement, reinforcement, review, and even homework,

<b>Duration</b> 20 minutes	<b>Setting</b> Classroom or computer lab	<b>Grouping</b> Individual or partners (2 students)	<b>Equipment</b> Desktop computer, laptop, tablet, mobile device, Internet connection (Google Chrome is recommended)	<b>PTI Inquiry Subskills</b> <b>4.1, 4.2, 4.4, 5.1, 5.2, 5.3</b>
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<p><b>Next Generation Science Standards – Motion and Stability: Forces and Interactions</b></p> <p>MS-PS2-2 Plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.</p>	<p><b>Florida Science Standards – Physical Science</b></p> <p>SC.6.P.13.3 Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.</p>
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### Game Levels

	<p><b>Sandbox Mode</b> – In this training level, students become familiar with the controls and navigation of the game. They experiment by shooting chickens out of an air cannon at various objects, observe the forces that act on the chicken, and describe how the chicken’s motion was effected by clicking on symbols. Conceptually students recognize balanced forces result in no motion; unbalanced forces result in a <i>change</i> in motion.</p>
	<p><b>Level 1</b> – In this level, students take a quantitative approach to unbalanced forces. They launch chickens at a stationary plane window shield, observe the forces that act, and describe the motion by dragging-and-dropping symbols to indicate beginning and ending direction, calculate net force, and type explanations about the observed motion. Students analyze data from their test trials to look for trends that will help them draw conclusions about the effect of unbalanced forces on an object’s motion.</p>
	<p><b>Level 2</b> – The scene of the game changes to an outdoor location where chickens are now launched at a moving plane’s windshield. Building on concepts from the first two levels, students test predictions about the types of motion that will result from interactions between the two moving objects. They offer explanations based on evidence to support their conclusions.</p>
	<p><b>Level 3</b> – The third level of the game serves as a more formal assessment of student learning on unbalanced forces and changes in object motion. The student is challenged to resolve five different scenarios that require conceptual understanding of unbalanced forces in order to keep angry chickens from breaking into the main control room of the lab! Drag-and-drop and numeric entry interactions are used.</p>

## LESSON PROCEDURE

### BEFORE THE GAME

*\*NOTE: Ensure that you have read the overview of the game so that you are familiar with learning objectives for each game level. It is a good idea to play the game yourself so you can identify points where students may have challenges.*

#### Engage

- You can introduce the *Chicken Collision* game to the class using several different methods:
  - Share some statistics about bird strikes with civil aircraft from the following website:  
[http://www.faa.gov/airports/airport\\_safety/wildlife/faq/](http://www.faa.gov/airports/airport_safety/wildlife/faq/)
  - Have students read a short article about how the U.S. Airforce conducts bird strike tests to try to solve the problem of birds colliding with plane windshields (read individually or whole class)  
<http://7gold.pbworks.com/f/Chicken+Article.pdf>
  - Show this short video of a Canadian goose crashing through a plane's windshield  
<https://www.youtube.com/watch?v=wVq3dfDDFKY>
- Ask students to discuss the types of forces they think are acting in the scenario between a bird and a plane.
- Explain to students they will have the opportunity to investigate unbalanced forces through their own bird impact tests by playing the *Chicken Collision* game.

### DURING THE GAME

#### Explore/Explain/Evaluate (happen concurrently in the game)

- As students begin gameplay, teacher walks around to ensure that students are able to access the game.
- During the various levels, ask students to talk aloud and explain their thinking about actions they are taking in the game.
- Encourage students in their gameplay to progress through all of the activities in each level. Monitor for those that spend lengthy amounts of time on any one part of the game.
- Ask students to predict the motion of the chickens and explain results using key vocabulary.
- Correct any misconceptions at the time of gameplay that students may have regarding balanced and unbalanced forces or the components of motion (change in speed, direction, and/or both).
- Help students make the connections between concepts in the game and previous material you may have taught in class.
- Direct students to pay attention to gauges and timers on the screen where appropriate.
- Congratulate students, celebrate with them, and ask about their performance in the game!

### AFTER THE GAME

- To ensure students will complete the game, it is best to give a 15-minute warning, a 10-minute warning, and a 5-minute warning before gameplay stops.
- Encourage students to complete the short questionnaire at the end of the game.
- Leave enough time for students to complete their Student Worksheets by collaborating with others or working in small groups.
- If time permits, you may have a short class discussion as a check for understanding, to check for misconceptions, or to expand on concepts.
- Have students turn in their Student Worksheets before leaving or you may collect them at the door as an Exit Ticket.