



FORTNITE



THE SCIENTIFIC METHOD WITH FORTNITE

LESSON PLAN

SCIENCE / PHYSICS

ANY CONTENT AREA
GRADES 8, 9, 10
4 TO 6 CLASS PERIODS



Scientists use a variety of means to develop and run experiments. Physics experiments, for example, can be carried out in both physical and virtual environments. Have you ever considered the physics in video games like Fortnite? In this lesson, students will do just that!

Fortnite Creative allows players to build and use a variety of elements to create immersive environments. Students will test Fortnite Creative objects and devices to determine whether they react to gravity and laws of physics like real objects. In the process, students will develop and test their own hypotheses to conduct authentic NGSS experiments in Fortnite.

Link to Introductory Video: <https://youtu.be/Yrlfifa3-tl>

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LESSON | AUTHOR | CLASS INFORMATION

LESSON INFORMATION

Lesson Title: The Scientific Method with Fortnite

Content/Grade: Science / Physics: Grades 8, 9, 10

Lesson Timeframe: 4 to 6 class periods

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DESCRIPTION OF CLASS/LEARNING ENVIRONMENT

This lesson works in a middle school science or STEM class, and is quite adaptable. It was created for a 6th grade science class in a small, rural K-12 public school, but also works for kids in high school or even lower elementary grades.

LESSON OVERVIEW

Students will use the scientific method to test different objects in Fortnite Creative and establish which objects work best for physics experiments.

With Fortnite Creative, students will use a virtual sandbox to design and carry out experiments and simulations. Once students determine which objects best follow the laws of physics, they will write a report using Claims, Evidence, and Reasoning (CER) to convince others.

As a class, students will use the information from the reports to determine which objects best follow the laws of physics. They will then design and conduct physics experiments using the selected objects in Fortnite Creative, collect data, and use that data to draw conclusions about real world physics.

Here is a one-minute video summary of this lesson: <https://youtu.be/Yrlfifa3-tl>

DESIRED RESULTS

ESSENTIAL QUESTIONS/BIG IDEAS

How do objects respond to gravity? How do objects fall? What do different objects do when they hit the ground?

How do objects roll down ramps? What do objects do when they reach the bottom of a ramp?

How do objects react when they hit each other?

How can you prove which objects in Fortnite Creative work best for physics simulations and experiments?

LEARNING OUTCOMES/OBJECTIVES

Students will be able to:

- Design experiments to show which objects in Fortnite Creative respond best to gravity, including falls and bounces, like objects in real life.
- Design experiments to show which objects roll best down ramps, including whether they continue to roll after they reach the bottom.
- Design experiments to show which objects react the most accurately to impact relative to their mass. For example, when bounced off each other, objects with greater mass should move less than those with lesser mass.
- Write a Claim, Evidence, Reasoning (CER) conclusion based on the results of the experiments to prove which objects in Fortnite Creative are best for physics simulations and experiments.
- Use the selected Fortnite Creative objects to conduct NGSS experiments and simulations.

LESSON PLAN

MATERIALS NEEDED:

Each student or small group should have:

- A device capable of running the Fortnite Game, such as a PC, tablet, or gaming console
- Fortnite installed on the device
- An Epic Games account created by the student or school
- CER Conclusion Graphic Organizer
- CER Conclusion Graphic Organizer with Sentence Starters
- Access to screencasting software

LESSON OBJECTIVE(S):

In Fortnite Creative, students will conduct experiments to determine which objects in the game world behave most like objects in the real world.

- Students will generate a list of Fortnite Creative objects with information about how they fall, how they roll, and how they react when running into each other.
- Students will write Claims, Evidence, Reasoning (CER) conclusions to share which Fortnite Creative objects work the best to conduct physics experiments and simulations in the game's virtual world.
- Using Fortnite Creative objects that most react like real-world objects, students will conduct experiments in the virtual game world 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" [NGSS MS-PS2-2]. Other Physical Science NGSS standards can also be applied, as necessary.

ANTICIPATORY SET:

- Ask students if they have played Fortnite or used Fortnite Creative. Students who have used it can help those who are unfamiliar with the program.
- Provide a brief demo of Fortnite Creative as follows:
 - Create an island in Fortnite Creative
 - Demonstrate navigation and motion
 - Show placement of items on the island
 - Explain prefabs, galleries, and devices
- Ask students which objects in Fortnite Creative fall like real objects, roll like real objects, and bounce off each other like real objects.
- Provide opportunities for students to explore and experiment with different objects in Fortnite Creative. This will allow students to determine how the objects function and which objects they want to use for their experiment.
- Teachers can share this video on [Fortnite ramps and rolling objects](#) for clarification.

LESSON WITH MULTIPLE MEANS OF ENGAGEMENT:

- Let students begin by answering the essential physics questions and big ideas. Students can use objects in the classroom to see how they fall, bounce, roll down ramps, and react when they hit each other. When they understand how real objects respond to gravity in the real world, students are ready to begin working in Fortnite Creative
- Show students how to access different objects in Fortnite Creative. If possible, place students in groups where at least one student is familiar with Fortnite.
- Once students have worked with different objects in Fortnite, have them compare how objects in the real world behave under similar circumstances using YouTube videos.

- Students should experiment with the following variables:
 - Which Fortnite Creative objects fall like real objects?
 - Which Fortnite Creative objects roll down a ramp like real objects?
 - Which Fortnite Creative objects react like real objects when running into each other?
- Students can work in teams in which everyone works on the same variable, or each team member works with a different variable.
- Once students decide which objects work better than others, they will plan and conduct more controlled investigations. Teachers may wish to approve investigation plans before students continue.
- Data they collect during the investigation will help students convince their classmates that they have the best objects for physics experiments.
- To plan their investigation, students will document data using one or more of the following tools:
 - Paper notebooks
 - Google Docs
 - Mind Mapping software such as LucidChart
 - Google Drawings
- Using the data they have collected, students will prepare their arguments and write a Claim, Evidence, Reasoning (CER) conclusion to present to the class. Evidence can include videos they record showing how objects behave in the virtual game world, qualitative data, and quantitative data.
- Once students have presented their findings, the class will make a collective list of the best objects for different physics experiments.

Note: NGSS performance expectation to design physics experiments with the selected object is 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.

To establish a controlled variable, teachers can make sure students only use the object selected by the class in their NGSS experiments and simulations.

This simple lesson plan can be augmented to support highly sophisticated and complex experimentation for Science and STEM classes.

EXTERNAL RESOURCES

[Wakelet collection](#) with PDF files referred to in this lesson plan.

<https://wke.lt/w/s/nxPDKi>

[Fortnite ramps and rolling objects](#) video

ASSESSMENT

ASSESSMENTS

Student assessments are based on the quality of their written CER conclusions.

RUBRIC

CLAIM, EVIDENCE, REASONING (CER) RUBRIC:

	1	2	3	4
CLAIM	Claim is stated incorrectly.	Claim does not make appropriate connections to the task.	Claim does not make appropriate connections to the task.	Domain-specific language is used to state the claim accurately.
EVIDENCE	Evidence is unclear or does not support the claim.	Evidence is provided to support the claim.	Evidence from text, videos, experiments, pictures, or lectures supports the claim.	Evidence from text, videos, experiments, pictures, and lectures contributes to overall understanding of the claim.
REASONING	Reasoning does not support the claim.	Reasoning partially supports the claim.	Reasoning fully supports the claim.	Reasoning supports and extends the claim.

SCIENTIFIC METHOD WITH FORTNITE PROJECT RUBRIC:

CHOOSING THE BEST FORTNITE CREATIVE OBJECTS				
	DEVELOPING	COMPETENT	PROFICIENT	DISTINGUISHED
PROJECT CONTENT/ LEARNING OBJECTIVES	No conclusion is apparent OR important details are overlooked. Evidence is lacking and overall the claims are not convincing.	Student provides a conclusion with evidence that does not prove their claim. The reasoning is not convincing; therefore, the claim cannot be proven.	Student provides a somewhat detailed conclusion clearly based on the data and related to the claim. The evidence is somewhat convincing.	Student provides a detailed conclusion clearly based on the data and related to previous research findings and the hypothesis statement(s). Claims are believable, based on the evidence, and very convincing.
PROJECT DEVELOPMENT	Student requires adult assistance to identify and define almost all variables to collect viable evidence.	With adult help, student identifies and clearly defines dependent and independent variables.	Student mostly identifies dependent and independent variables with some adult assistance.	Student independently identifies and clearly defines dependent and independent variables.
PROJECT AESTHETICS/ DESIGN	The display is incomplete or disorganized, with no clear plan. There is no multimedia presentation of evidence.	Each element of the display serves to illustrate some aspect of the experiment. More elements are needed to support the evidence.	Each element of the display clearly illustrates some aspect of the experiment. Evidence is demonstrated using video screencasts.	Each element in the display clearly illustrates some aspect of the experiment. Compelling quantitative and qualitative evidence is presented in video screencasts.

CHOOSING THE BEST FORTNITE CREATIVE OBJECTS				
	DEVELOPING	COMPETENT	PROFICIENT	DISTINGUISHED
REFLECTION	Student cannot identify the phenomena under investigation without adult support.	Student identifies some, but not all, of the phenomena under investigation without adult support.	Student identifies the phenomena under investigation, including the change in motion of an object.	Student identifies the purpose of the investigation. They provide evidence that the change in an object's motion is due to object mass and balance of force.

STANDARDS MAPPING

The first set of experiments will focus on the follow Science and Engineering Practices (SEP) of the NGSS:

1. Planning and carrying out investigations
2. Analyzing and interpreting data
3. Constructing explanations (for science) and designing solutions (for engineering)
4. Engaging in argument from evidence
5. Obtaining, evaluating, and communicating information

Once students in the class determine which objects will work the best for physics experiments, they will design and carry out investigations in the virtual game world to address the following NGSS performance expectation:

[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.](#)

Other NGSS Physical Standards can be used as well.

INTERDISCIPLINARY AND 21ST CENTURY CONNECTIONS

This lesson can work in a middle or high school setting because it integrates writing, math, science, and the scientific method. Students completing this project will use communication, collaboration, creativity, and critical thinking. This lesson is flexible enough to be carried out in multiple classrooms with different teachers working together.

MODIFICATIONS AND ACCOMMODATIONS

Teachers can establish modifications for students with special needs during the planning phase of this project and for CER writing.

If teachers must approve a plan before students use Fortnite Creative, they can provide support to students who don't know how to use the program.

If students struggle with Fortnite, teachers can encourage experienced students to provide game support. Once students figure out how to use Fortnite Creative to run their experiments, some may need help collecting data and/or recording screencasts of their results.

When students have data and video evidence, teachers can help students write their claim. The reasoning section of the conclusion will be challenging for most students, so teachers may wish to provide a model of the reasoning section.

ADDITIONAL TEACHING MATERIALS:

Please include other teaching materials as separate documents (handouts, and so on.)

<https://wke.lt/w/s/nxPDKi>



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WITH FORTNITE**