

STUDY GUIDE

ELEMENTARY • 4th & 5th GRADE



Dr. Kaboom and the Wheel of Science



Performance Summary

So much science, so little time. . .

Doktor Kaboom is having trouble picking his favorite science demonstrations, so he's bringing them all! Unfortunately, there are way too many to do them all in one show.

The solution: The Wheel of Science!

Doktor Kaboom has built a great big spinning wheel and labeled it with everything from optical illusions to chemical reactions to a homemade hovercraft, and more! At least a dozen fantastic demonstrations ready to go. Wherever the wheel stops, that's what's next!

Will we turn a water bottle into a rocket or catapult bananas across the stage? Electrocute a pickle or create artificial gravity? Who knows? No two shows will be the same.

So, step right up, and let's spin that wheel!

About Doktor Kaboom

Doktor Kaboom is the creation of actor/comedian David Epley. David has been fortunate enough to discover two passions in his life. Science, his first, took him to study at the North Carolina School of Science and Mathematics. His second passion, performing, became his career, and for 20 years David has made his living writing, performing and directing original interactive comedy across the US and Canada. He believes strongly in service, is a veteran of the US Army, and volunteers as an EMT and firefighter with his local Fire/Rescue department.

David created the character of Doktor Kaboom because he wants all students to know three things:

1. Science is for everyone - not just the guy in the lab coat or the girl who wins the science fair every year.
2. Science is not hard, but it does take effort. That's not hard. That's just work, and that's life.
3. Every child is intelligent, creative and valuable and should know that about themselves.

Name: _____

Scientific Investigation

(SC.4.N.1.3, SC.5.N.1.5, SC.5.N.2.1)

Science is the use of evidence to construct testable explanations of natural phenomena. But how do we come to those explanations? We are able to question and test our ideas through scientific investigation. A scientific investigation requires a research **question**, careful **observations**, **data gathering**, and **analysis** of the data to identify the patterns that will explain the findings.

What ways do you use scientific investigations in your everyday life?

For example:

- Observing the weather before deciding what clothes to wear
- Listening to the sounds of popcorn popping to determine when to take it out of the microwave
- Watering plants when you notice the soil is dry or that the leaves are wilting

Use the table below to brainstorm and explain other ways you use scientific investigations in your everyday life:

Example:	How does this activity use the process of scientific investigation?


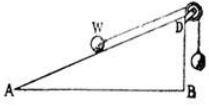


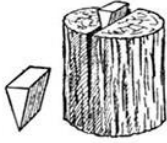
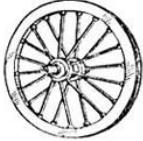
Name: _____

Simple Machines

(LAFS.4.W.1.3, LAFS.5.W.1.3)

Simple machines are everywhere! A simple machine is a machine with few or no moving parts that makes work easier. Simple machines surround us in our daily life. They magnify, spread or change the direction of force, making it easier to cut, move or bind objects. Doktor Kaboom created a catapult using his knowledge of simple machines — specifically levers.

Can you think of everyday examples of each type of simple machine? Use the table below to share your ideas! Then, follow the directions on the next page to write a story incorporating your examples.

Simple Machine Type	Example	Explanation - How is this an example of this type of simple machine?
 LEVER		
 INCLINED PLANE		
 PULLEY		
 SCREW		
 WEDGE		
 WHEEL AND AXLE		

Name: _____

Simple Machines - Continued

(LAFS.4.W.1.3, LAFS.5.W.1.3)

Now that you've thought of everyday examples of each type of simple machine, write a short story incorporating as many of your examples into the narrative as possible. What storyline could incorporate these examples in a natural way? How might your characters use your examples in the plot of the story? Make sure your story has a clear beginning, middle, and end, and incorporates descriptive details.

Name: _____

Create a Character!

(TH.5.S.3.1)

Draw yourself as an entertaining character that teaches a topic you have learned in school. Design your costume to catch the audience's eye and support your topic. Fill in the spaces underneath your image to share your character's name and the topic they will teach.

<i>Stage Name</i>	<i>Teaching Topic</i>

Arts Integration

Characterization (TH.5.S.3.1)

David Epley has created a character (Doktor Kaboom) that teaches science in an entertaining way. Ask students to create their own character that could teach a topic they have learned this year. Using the table on page 6, encourage them to design their costume, select their stage name, and identify the topic they will teach on the Character Profile.

Optional Extension: Have your students perform as their character and teach each other!

Reflection (TH.4.S.1.3, TH.5.S.1.3)(LAFS.4.SL.1.1, LAFS.5.SL.1.1)

Have a class discussion about the performance. Encourage students to address specific elements that worked well and those that could use improvement including characterization, music, movement, and production elements.

You can also consider using these discussion questions provided by Doktor Kaboom:

Vacuum

What does Doktor Kaboom mean when he says, “There is no such thing as a vacuum. There is only pressure, or the absence of pressure.”?

“There is no such thing as a scientific fact.”

We call gravity a scientific fact, when in reality it is no such thing. We assume gravity will work as we expect, simply because it always has. Gravity has worked, **so far**. There is always the **possibility** that some time in the future, it will behave differently. We must remember to keep an open mind. Sometimes a ‘scientific fact’ is falsified by newer and better science. That’s how science works.

“Applying science to everyday life.”

We often forget to apply what we know of science to our everyday lives. Doktor Kaboom demonstrates this with his catapult when he discusses how to win the Test of Strength at the state fair, by using our knowledge of levers and fulcrums. What other ways can we apply our knowledge of science to our daily lives?

Being Right

When we have an idea in science, we call it a theory. We test our theory with experiments. Does it matter in science whether we are right or wrong?

Vocabulary

- **Amplify** – to cause to become more marked or intense.
- **Chemical** – a substance with a distinct molecular composition that is produced by or used in a chemical process.
- **Chemical Reaction:** occurs when two different elements or compounds come together and at least one of them changes its composition or identity.
- **Demonstration:** showing the existence or truth of something by giving proof or evidence.
- **Exothermic:** chemical reactions that produce (or give off) heat.
- **Experiment:** a scientific procedure undertaken to make a discovery or to test a hypothesis.
- **Force:** anything that acts on a body to change its rate of acceleration or alter its momentum.
- **Fulcrum:** the point on which a lever rests or is supported and on which it pivots.
- **Inclined Plane:** an even sloping surface that makes it easier to move objects to higher or lower surfaces.
- **Lever:** a rigid bar resting on a pivot, used to help move a heavy or firmly fixed load with one end when pressure is applied to the other.
- **Pulley:** a wheel with a grooved rim around which a cord passes. It acts to change the direction of a force applied to the cord and is used to raise weights.
- **Simple Machine:** a device that has only one function and a minimum of moving parts
- **Theory:** a supposition or a system of ideas intended to explain something .
- **Transmit:** to pass on from one place or person to another.
- **Vacuum:** a space where there is no matter.
- **Vortex:** a mass of whirling fluid or air, especially a whirlpool or whirlwind.
- **Wheel and Axle:** a wheel with a rod attached in the middle as an axle to help it to lift or move loads.

Standards Alignment: The activities in this study guide are aligned with the standards listed below. When teachers incorporate the arts, they increase student engagement, offer multiple points for students to access the curriculum, and provide alternative means for students to demonstrate what they know.

Language Arts Florida Standards	
Grades 4 & 5	
Writing Standards	
LAFS.4/5.W.1.1	Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
LAFS.4/5.W.1.3	Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.
LAFS.4/5.W.4.10	Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
Standards for Speaking and Listening	
LAFS.4.SL.2.4	Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.
LAFS.5.SL.2.4	Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.
LAFS.4.SL.1.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts.
LAFS.5.SL.1.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts.
Language Standards	
LAFS.4/5.L.1.1	Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

Florida Science Standards	
Grades 4 & 5	
Nature of Science	
SC.4.N.1.3	Explain that science does not always follow a rigidly defined method ("the scientific method") but that science does involve the use of observations and empirical evidence.
SC.5.N.1.3	Recognize and explain that authentic scientific investigation frequently does not parallel the steps of "the scientific method."
The Practice of Science	
SC.5.N.2.1	Recognize and explain that science is grounded in empirical observations that are testable; explanation must always be linked with evidence.

Florida Theater Standards	
Grades 4 & 5	
Skills, Techniques, and Processes	
TH.4.S.1.3	Use theatre terms to evaluate a live performance and discuss the qualities that directly impacted the audience's response to the production.
TH.5.S.1.3	Evaluate a performance, using theatre terminology, and articulate emotional responses to the whole and parts of dramatic performances.
TH.5.S.3.1	Create and sustain imagined characters and relationships, using basic acting skills, to tell an original story based on historical, literary, or everyday situations.

Student Work Samples

Teachers:

Thank you for your continued support of the SEAS Program. Using the suggestions and/or activity pages included in this Study Guide, please collect student work samples, and upload them using the link below.

Please click on the link below to upload your student's work samples to their respective show folder:

[Click Here to Upload Student Work Samples](#)

Should you have any questions, please contact Lauri Foster at:

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