

SCIENCE ACTIVITIES

DAKOTA STEAM LEARNING FACILITATOR GUIDE



STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

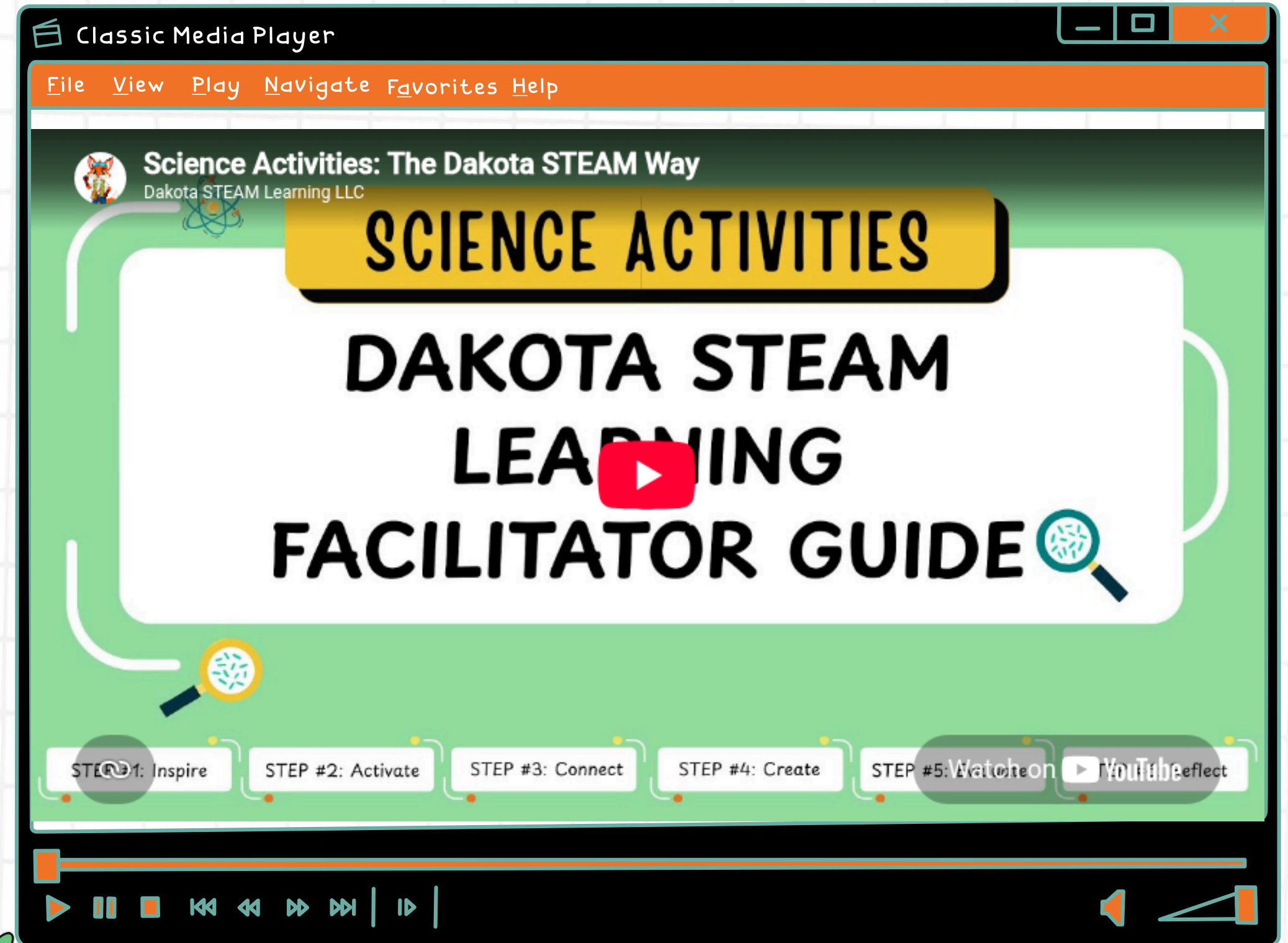
STEP #5: Evaluate

STEP #6: Reflect

Science Activity STEAM Challenge

Facilitator Guide

Our Facilitator Guides give educators the clarity, confidence, and support needed to lead engaging STEAM experiences with purpose. Organized by topic, the guides provide a diverse range of meaningful content, with a strong emphasis on science and robust engineering and art strands. They also offer intentional opportunities to connect math, technology, and other STEAM elements in ways that help students see how learning works together across disciplines. This slide guide matches our products found on our website.



Use the resources embedded to watch a follow-along video version of this lesson.

Science Activity



Students engage in a guided activity that allows them to experience a scientific principle.

A science activity allows students to better understand a scientific principle.

Can be shorter in time.

Science Experiment

Students are led through a science experiment following the scientific method.

The experiment includes control variables as well as independent and dependent variables.

May be longer in time.



Today We Will...

LEARNING TARGETS

Complete a science activity that allows us to better understand a scientific principle.

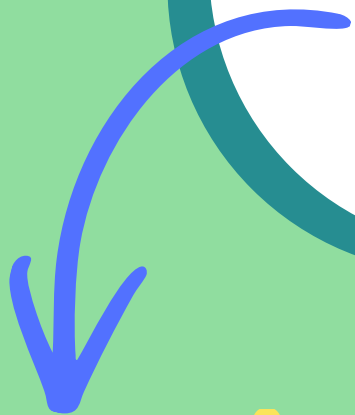
Find the STEAM inside the project and use our inspiration to be creators.

Be careful and follow our directions to be successful.



Progress Bar

The bottom bar serves as a valuable visual aid for your students, helping them understand their progress within the STEAM steps and allowing them to connect it with their journals.



STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

Step #1: Inspire

*See the scientific
inspiration for this
project*

STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

What scientific principle are we exploring?

STEAM JOURNAL

STEP #1: INSPIRE

Which scientific principle are you exploring in this activity?

REVIEW THE PHENOMENA

Stop students and record in STEAM Journal

NAME OF EXPERIMENT

The slide identifies the STEAM challenge science inspiration.

- Questions to ask on this slide are:
 - What do you notice about the example(s)?
 - What do you know about it?
 - What are you wondering?

STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

STEAM Slide Example

What scientific principle are we exploring?

STEAM JOURNAL

STEP #1: INSPIRE

Which scientific principle are you exploring in this activity?

REVIEW THE PHENOMENA



STATIC ELECTRICITY



STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

History of Science



- Some lessons focus on a specific scientist and their work on scientific principles.
- Other lessons focus on the history of the scientific principles.
- Other lessons may include real-world connections.
- This info would be explained here.

STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

History of Science

CHEMICAL REACTIONS

STEAM Slide Example

Chemical reactions have been studied for a very long time. Early scientists noticed that some materials changed into new substances when they were burned, mixed, or heated, but they did not yet understand why these changes happened. Over time, scientists began to carefully observe, measure, and test these changes, which helped them discover that chemical reactions can produce new substances with different properties. As science advanced, people learned more about atoms and molecules, and how they combine and dissociate during reactions.



STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

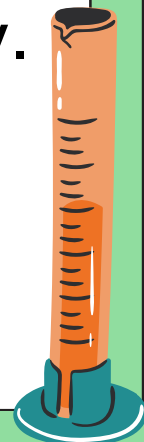
STEP #5: Evaluate

STEP #6: Reflect

HISTORY OF SCIENCE

KEY SCIENTIST

Benjamin Franklin became interested in electricity after hearing about experiments in Europe, where scientists used machines to generate electric sparks. He studied static electricity by making careful observations and testing ideas, including his famous kite experiment, which helped him learn that lightning is a form of electricity. His work showed that electricity could be studied through observation, evidence, and experimentation.



IMPACT

The study of static charge and electricity has had a major impact on daily life by leading to the development of many useful technologies. This work helped people create lightning protection, electric generators, and many of the electrical devices used in homes, schools, and hospitals today.

EXAMPLE



STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

Step #2: Activate

Use prior
knowledge to build
connections

STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect



STEP #2: ACTIVATE
What prior knowledge will help you understand this activity?

Draw or write what you know.

Stop students
and record in
STEAM Journal

Activate Schema: Background Information

INSPIRATION

Slide Overview
This slide emphasizes the inspiration behind the scientific principle and encourages reflection on related questions.

- Engage students in a discussion centering around these guiding questions.

PONDER

What do you know about chemical reactions?

What do you know about lemons?

INSPIRATION

Questions designed to prompt students to consider relevant information about the activity are posed to initiate discussion.

You would then lead students through a discussion, pairs/small groups, and then a whole group, if possible. We recommend using your typical discussion structure.

STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect



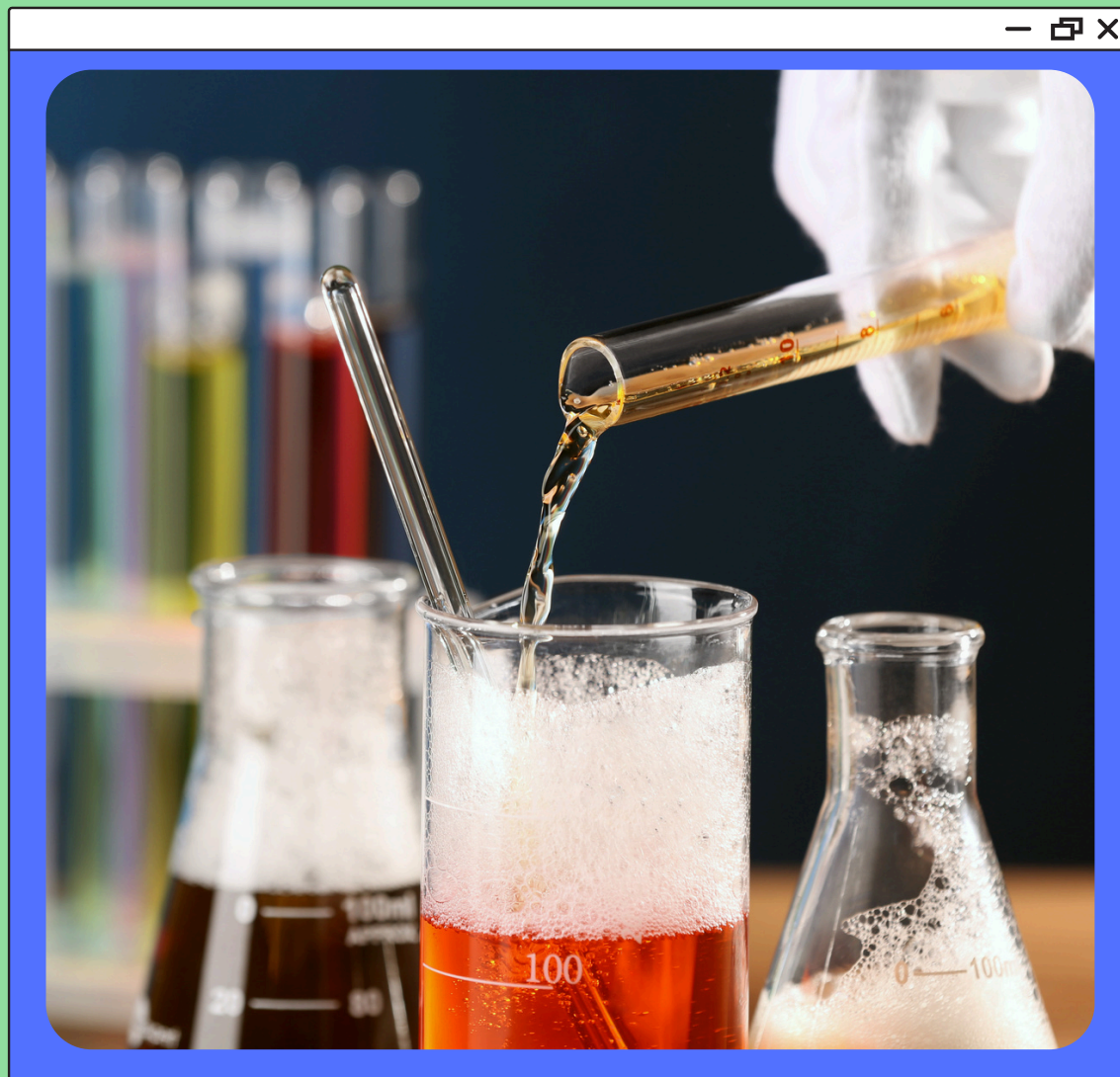
STEP #2: ACTIVATE
What prior knowledge will help you understand this activity?

Draw or write what you know.

STEAM Slide Example

Activate Schema: Background Information

INSPIRATION



STEP #1: Inspire

STEP #2: Activate

PONDER

What do you know about chemical reactions?

What do you know about lemons?

STEP #3: Connect

STEP #4: Create

INSPIRATION



STEP #5: Evaluate

STEP #6: Reflect

Step #3: Connect

Identify the STEAM
components that
influence this
scientific activity

STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

Science

Technology

Math

Creativity

Critical Thinking

Other

Bar above will highlight where the STEAM is!

Where's the
STEAM?

Stop students
and record in
STEAM Journal



STEAM JOURNAL

123

STEP #3: CONNECT
How does STEAM impact this activity?

Draw or write what you learned.

Which STEAM elements are involved?

☐ Science	☐ Technology	☐ Math
☐ Creativity	☐ Critical Thinking	☐ Other_____

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SCIENCE

- Information and images specific to this STEAM category are explained here on these slides.
- Optional for students to do their own research to share with others.



STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

Science

Technology

Math

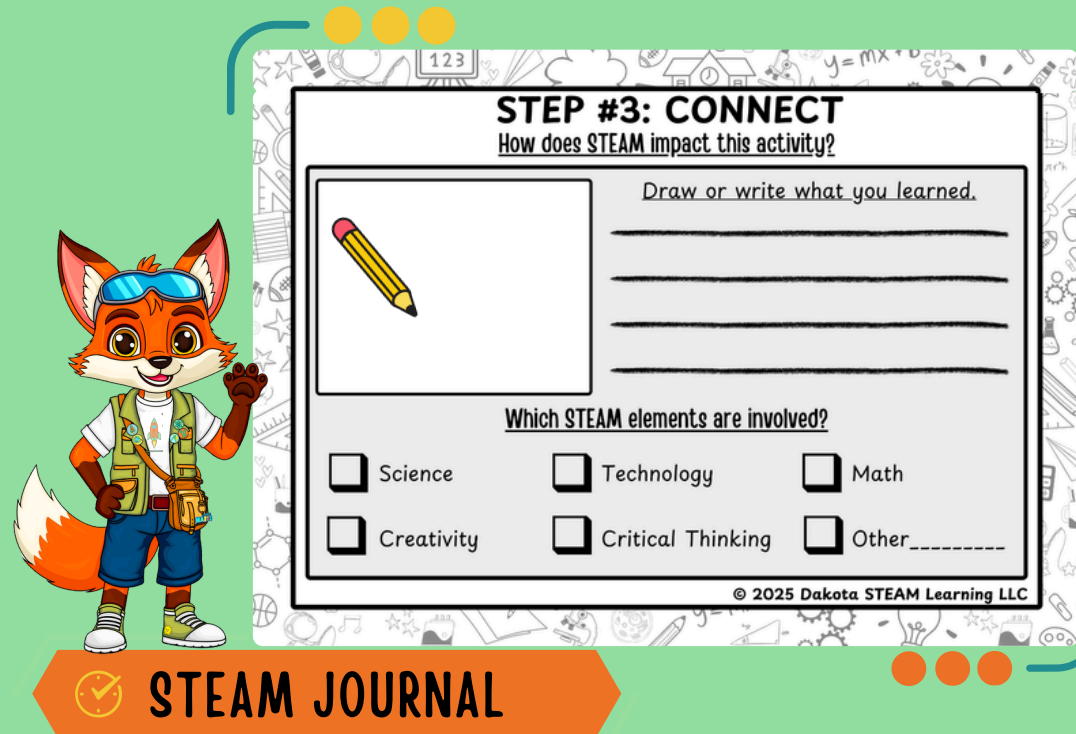
Creativity

Critical Thinking

Other

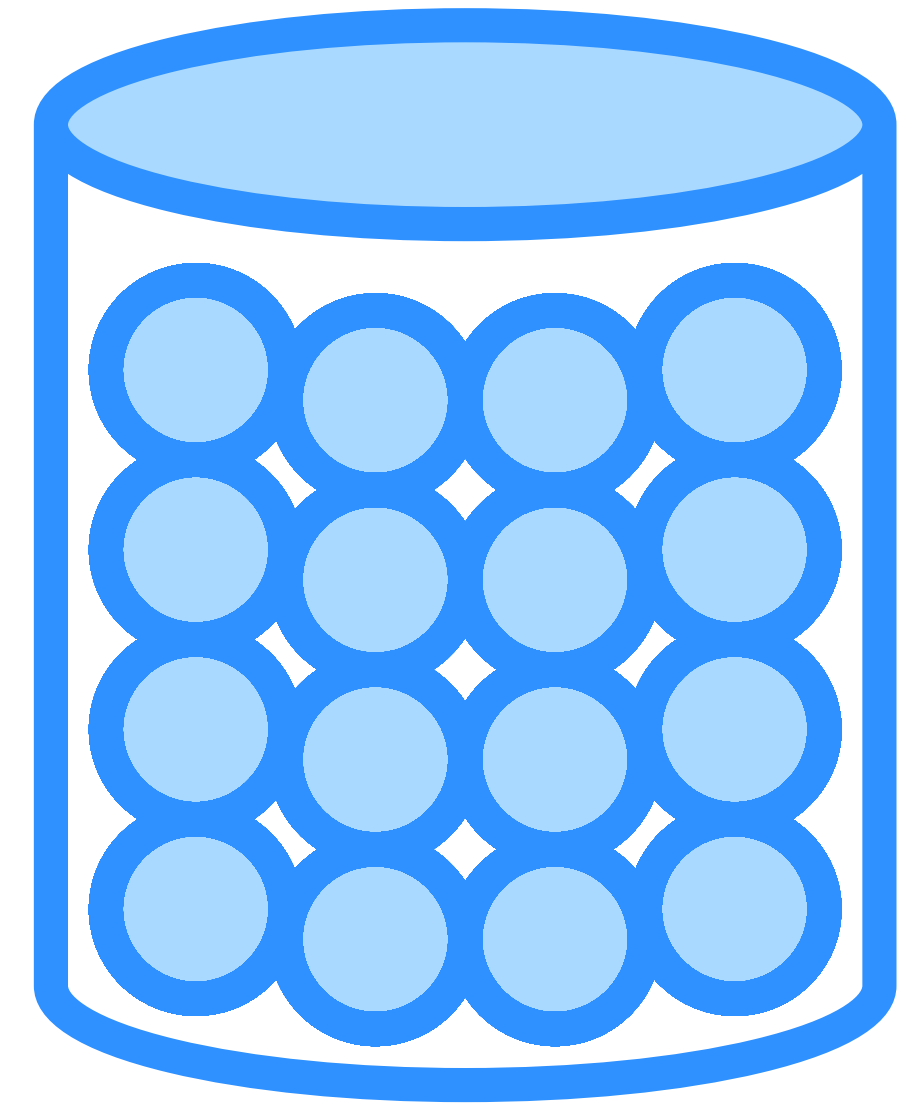
STEAM Slide Example

Where's the STEAM?



SCIENCE

Density is a measure of how much matter is packed into a certain space. Matter is anything that has mass and takes up space, and mass is the amount of matter in an object. When something has a lot of mass in a small space, it is dense. When it has less mass in the same space, it is less dense.



STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

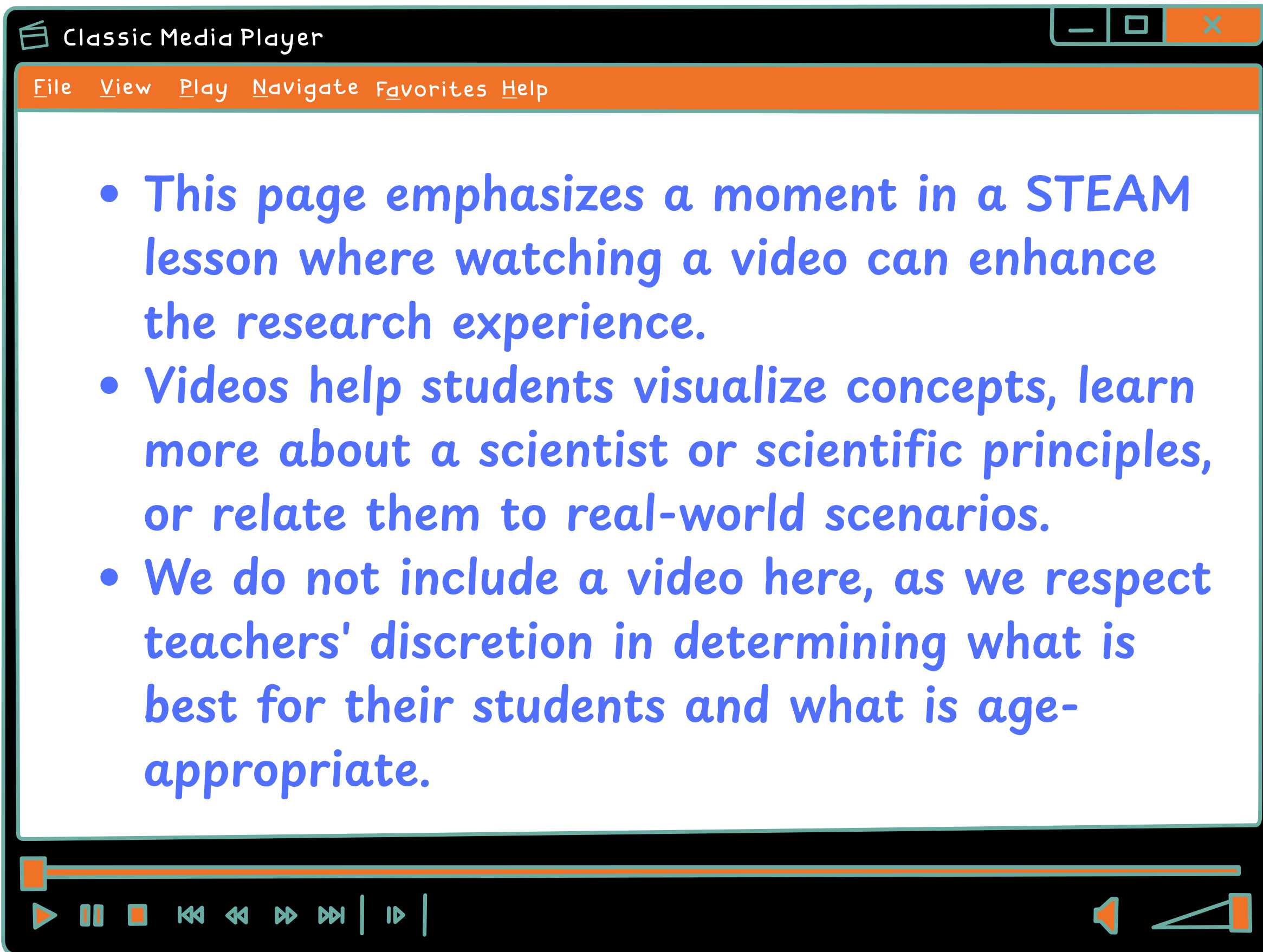
STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

STEAM RESEARCH

Optional:
Find a video to
learn more
about (research
topic).



STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

Step #4: Create

Follow the steps to
create a project that
demonstrates the
scientific principle

STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

STEAM Materials



Remember
Tools, Not
Toys!
Be Safe, Have
Fun!

- A material list is provided for students.
- The list is specific.
- A detailed list for teachers is also included in our resources and lesson plans.

STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

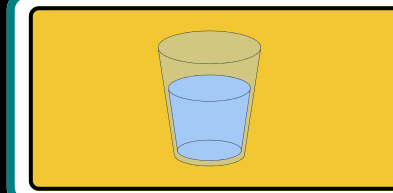
STEP #5: Evaluate

STEP #6: Reflect

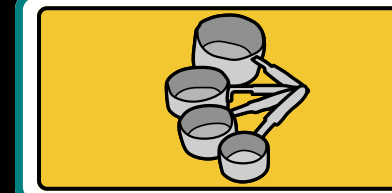
STEAM Slide Example



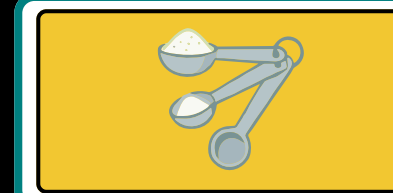
Remember
Tools, Not
Toys!
Be Safe, Have
Fun!



Water
Cups



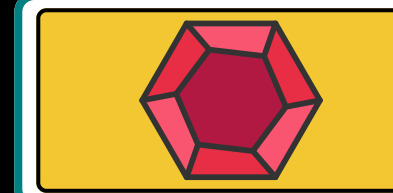
Measuring
Cup



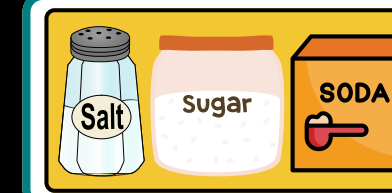
Measuring
Spoon



Plastic
Spoon



Fake
Gems



Salt, Sugar, &
Baking Soda



Pencil



Labels



Safety
Goggles

**Please wear safety goggles during
the science activity.**

STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

Create Step #1

Create Step #2

Create Step #3

Create Step #4

Create Step #5

Create Step #6

Create Step #7

Create Step #8

↪ The bar above will emphasize the Create Steps and indicate the number of steps involved in each challenge.

CREATE #1

Each "Create Step" slide may include:

- An indication to complete a STEAM journal draft.
- Detailed descriptions of the step.
- Pictures may be provided to guide the step's process.
- Videos may also be provided that help guide the step's process.

A stack of three worksheets from STEAM Learning LLC. The top worksheet is titled "DATA COLLECTION" and includes a table for recording data. The middle worksheet is titled "STEP #4: CREATE" and includes a section for "Steps to Success". The bottom worksheet is also titled "STEP #4: CREATE" and includes a section for "Create your project to demonstrate the scientific principle.".

AMOUNT OF TIME	DISTANCE	NOTES

OBSERVATIONS/CONCLUSIONS

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STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

CREATE #3



STEAM Slide Example

Add Candy #1 into a base solution cup

- Observe for 2 minutes
 - Look for signs of a reaction.
- Record your results.

DATA COLLECTION			
Follow the process and collect your own data.			
Independent Variable	Category	Dependent Variable	Notes
Physical Properties Identify 3-5 per candy	Circle sweet or sour	Circle any present signs of a chemical reaction	Notes
Candy #1:	Sweet	  	
	Sour	  	
Candy #2:	Sweet	  	
	Sour	  	
Candy #3:	Sweet	  	
	Sour	  	
Candy #4:	Sweet	  	
	Sour	  	
Candy #5:	Sweet	  	
	Sour	  	

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COLOR
CHANGE



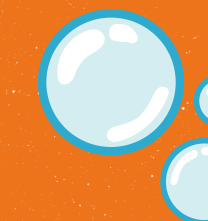
RELEASE OF
LIGHT



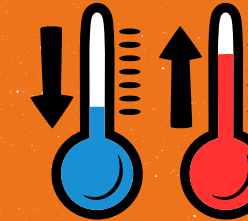
CHANGE IN
ODOR



SOLID
FORMATION



BUBBLE
FORMATION



TEMPERATURE
CHANGE

Step #5: Evaluate

Review the project and
make final
connections to the
scientific principle

STEP #1: Inspire

STEP #2: Activate

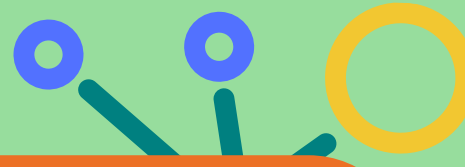
STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

Step #5 & #6 Slides



Step #5 focuses on making connections and learning from the science activity.

- Key information is included to ensure each student understands what they experienced during the activity.
- Criteria for Success is highlighted.
- The STEAM Journal can be used to record information.
- “In Case You Missed It”, information is shared with students.

Step #6 focuses on reflection and concluding the STEAM Journal.

- At times, a STEAM Career may be highlighted for real-world connections.
- Conclude the STEAM Journal and determine what students will do with the completed journal.

STEP #1: Inspire

STEP #2: Activate

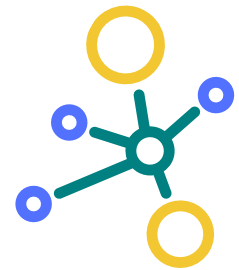
STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

Evaluations



CONNECTIONS

- How would you explain this scientific principle to someone else?
- Did you discover anything new about the scientific principle after completing the project?
- Does this scientific principle relate to any other projects you have completed?

Criteria for Success

You must be able to explain the scientific principle.

Stop
students
and
record in
STEAM
Journal

STEAM JOURNAL

STEP #5: EVALUATE
Evaluate your project and connect to the scientific principle.

What conclusions can you draw from this activity?

Break it down! How would you explain this scientific principle to someone else?	
Did you discover anything new about the scientific principle after completing the project?	
Does this scientific principle relate to any other projects you have completed?	

STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

In case you missed it!



DNA

In case you missed it, here is the scientific explanation of what occurred:

- You created a model of DNA.
- You used colored Dots candies to represent the nucleotides and Twizzlers to model the “backbones”.
- DNA determines all the features of living things and very complex!

STEAM RECAP

In case you missed it!

Classic Media Player

File View Play Navigate Favorites Help

- This page emphasizes a moment in a STEAM lesson where watching a video can enhance the research experience.
- Videos help students visualize concepts, learn more about a scientist or principle, or relate them to real-world scenarios. This area would be great for finding a video on a STEAM career, a scientist, or a scientific principle.
- We do not include a video here, as we respect teachers' discretion in determining what is best for their students and what is age-appropriate.

STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

STEP #6: Reflect

Reflect on the
experience of
investigating the
scientific principle.

STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect



STEAM CAREER

FIELD

A Food Scientist studies food using scientific methods. They study subjects like chemistry and biology to understand how food works. Their job is to make sure the food we eat tastes good, stays fresh for a long time, and is safe to eat.

WHAT THEY DO

Food scientists experiment with different ingredients to create food with the perfect taste, preservation, or appearance. For example, baking soda reacts with acids to make bubbles of carbon dioxide. These bubbles help create fluffy baked goods. Also, they experiment with adding lemon juice to different foods to prevent bacterial growth or color change.

WHY THEY MATTER

Food scientists are important because many foods need to be stored and are not immediately eaten right after they are made. Not only do food scientists help make food taste better through chemistry, but they also help ensure the safety of food found in grocery stores.

STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

STEP #6: Reflect

REFLECTIONS

Reflect
What was surprising about this activity?
Was your creation effective?
Why or why not?

Reflect
Is this a scientific field you would be interested in exploring further?

STEP #6: REFLECT
Reflect on your experience and results.

Results What was surprising about this activity?	
Reflect Was your creation effective? Why or why not?	
Career Is this a scientific field you would be interested in exploring further?	

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Stop students and record in STEAM Journal

STEAM JOURNAL

- STEP #1: Inspire
- STEP #2: Activate
- STEP #3: Connect
- STEP #4: Create
- STEP #5: Evaluate
- STEP #6: Reflect



Thank you for creating
with us today!

This concludes today's
activity!



Dakota STEAM Learning LLC

Discover More STEAM Content on Our Website and Social Media!



Be sure to tag us in your projects!

STEP #1: Inspire

STEP #2: Activate

STEP #3: Connect

STEP #4: Create

STEP #5: Evaluate

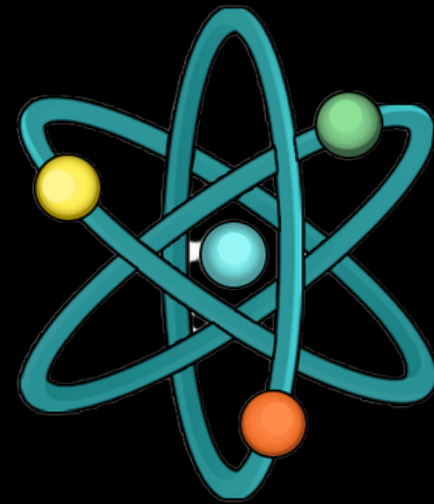
STEP #6: Reflect

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