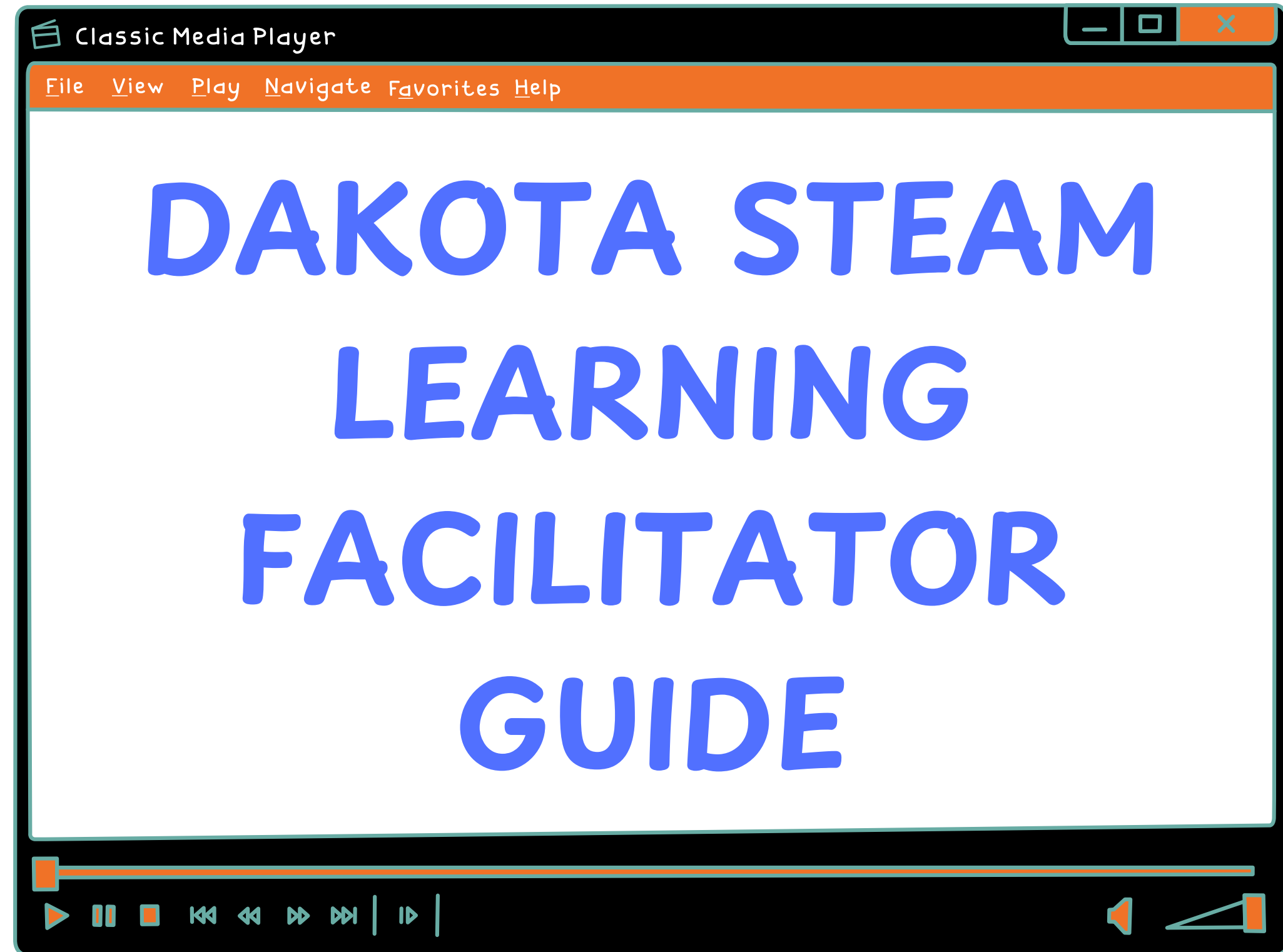


Engineering Challenge

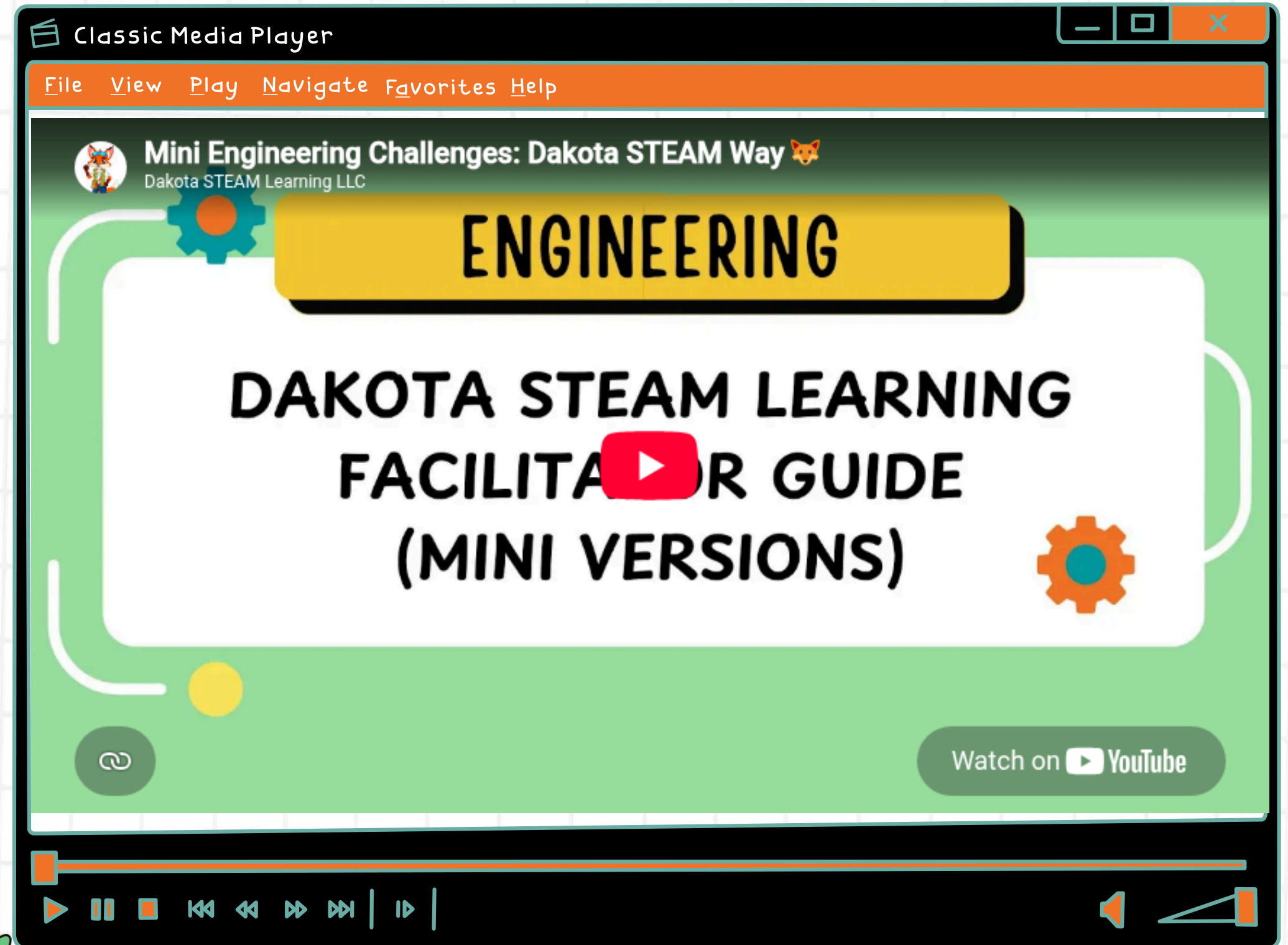
Dakota STEAM Learning
Mini Engineering
Challenge Presentation

Click the play button to watch a
video explaining the challenge.

Scroll through the challenge slides
by using the <> buttons at the
bottom of the screen.



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.

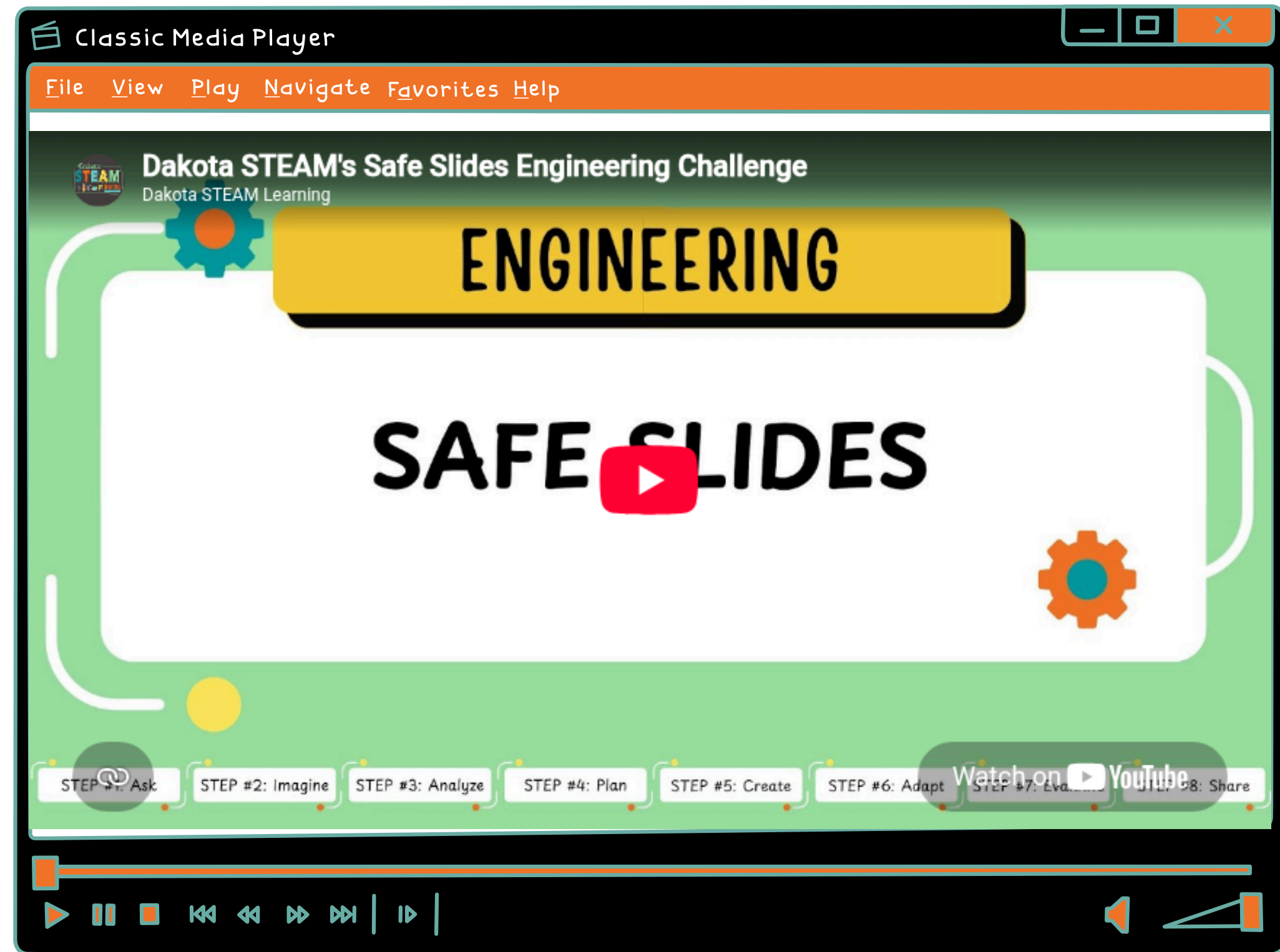
Engineering Challenge

Safe Slides

Dakota STEAM Learning
Mini Engineering
Challenge Presentation

Click the play button to watch a
video explaining the challenge.

Scroll through the challenge slides
by using the <> buttons at the
bottom of the screen.



STEAM Slide Example

Problem

The problem they are being asked to solve is identified. It is presented as a question.



KEY INFORMATION

CRITERIA FOR SUCCESS

Criteria for success (what the students need to do) is identified.



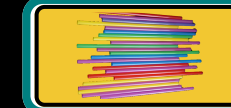
CONSTRAINTS (RULES)

1. Constraints (limitations, etc.) are identified for students.
2. These are typically requirements that make the challenge more specific or difficult.
3. Highlight how much time students have to complete the challenge here.

MATERIALS AVAILABLE



Popsicle Sticks



Straws



Cardstock Paper

List of materials available to participants.

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

Activate Schema: Background Information

Questions designed to prompt students to consider relevant information related to the challenge 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.





STEAM RESEARCH :

We select key, relevant information to share with students. We include key facts and pictures to illustrate key points for students. Typically, multiple pages are included. These might relate to the science being studied, key building considerations, or inspiration for students' creation.

Example → **DEN**

Dens are secret hidden spots that animals use as their homes. Foxes, wolves, and bears are some examples of animals that live in dens.





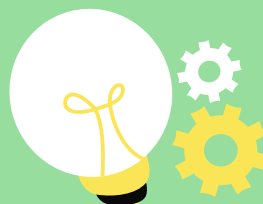
RESEARCH RECAP :

This page provides a concise overview of the research to examine prior to creating a diagram.



1 Brainstorm your idea!

Brainstorm



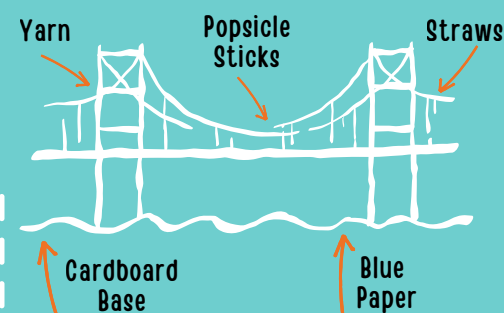
Pictures are pretty!
Diagrams help engineers determine the materials they'll use for different parts of their designs.

2 Draw your idea.

Picture

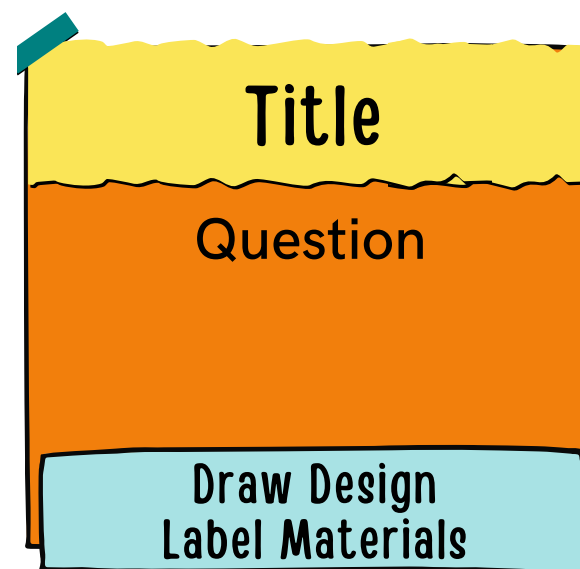
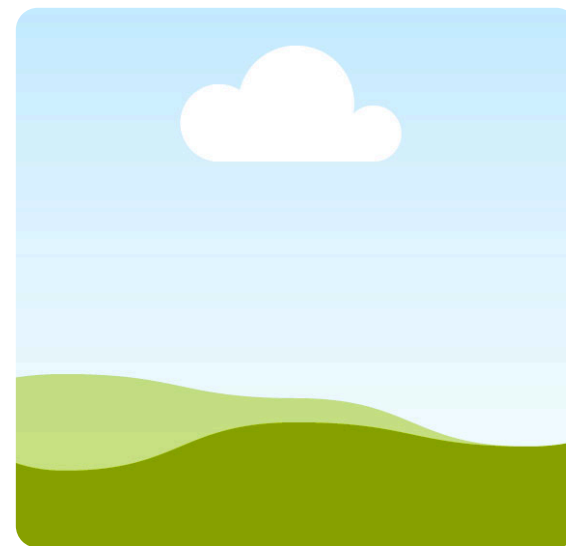


3 Identify what each part of your creation will be made out of.



Diagram

- This slide is designed to break the challenge down for students and help them succeed in planning.
- Relevant considerations are highlighted to prompt students' responses.
- These questions help them think about how their design will adhere to constraints and meet success criteria.
- Universal resources are embedded: how to diagram is reiterated, and how posts and beams must be utilized.



See Next Slide for Example

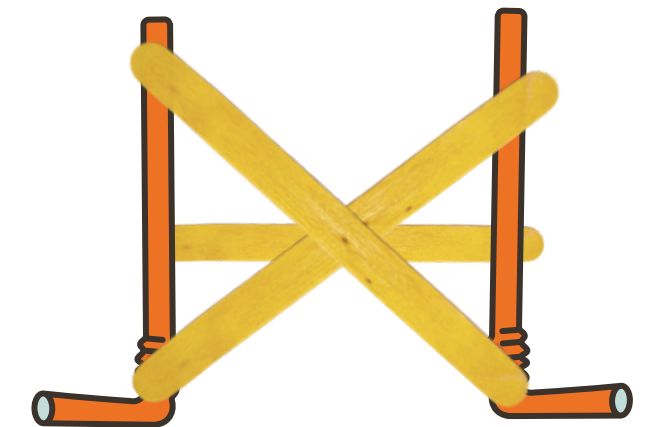


GUIDED DIAGRAM :

REMINDER

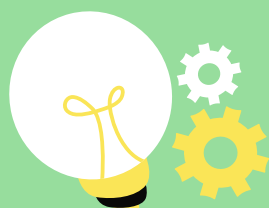
POSTS NEED BEAMS!

- ⚙ Posts stand upright.
- ⚙ Posts require beams to keep them stable and connected.
- ⚙ Every post should connect to two other posts.
- ⚙ Beams can be:
 - Across (horizontal)
 - Diagonal (high to low)
 - Double Diagonal (X-shaped)



1 Brainstorm your idea!

Brainstorm



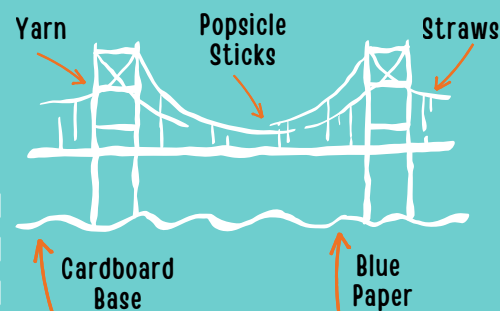
Pictures are pretty!
Diagrams are how engineers can identify what materials they will use for the different parts of their creation.

2 Draw your idea.

Picture



3 Identify what each part of your creation will be made out of.



Diagram



Shape

What shape will you use for the deck of your boat?

Draw Design
Label Materials



Floating

How will you keep water out of the boat?

Draw Design
Label Materials



Sail

How will you make sure your sail can move your boat? -size/way to inflate

Draw Design
Label Materials



GUIDED DIAGRAM :

EXAMPLE

Sail Support

How will your sail be connected to your boat?

Draw Design
Label Materials

Figurine

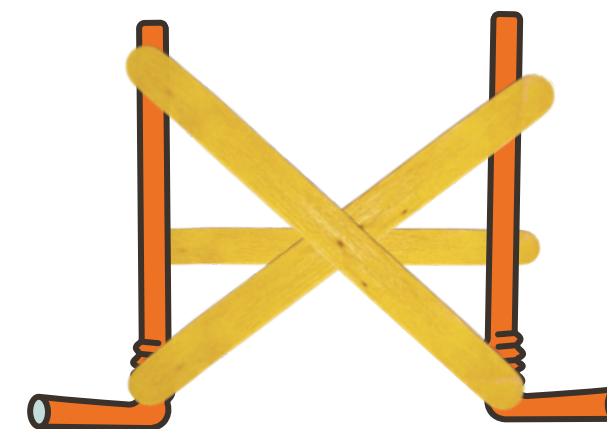
Where will your figurine sit? Will it stay dry?

Draw Design
Label Materials

REMINDER

POSTS NEED BEAMS!

- ⚙ Posts stand up.
- ⚙ Posts need beams to keep them sturdy and connected.
- ⚙ Every post should be connected to 2 other posts.
- ⚙ Posts can be:
 - Across (horizontal)
 - Diagonal (high to low)
 - Double Diagonal (x shaped)



STEP #1: Ask

STEP #2: Imagine

STEP #3: Analyze

STEP #4: Plan

STEP #5: Create

STEP #6: Adapt

STEP #7: Evaluate

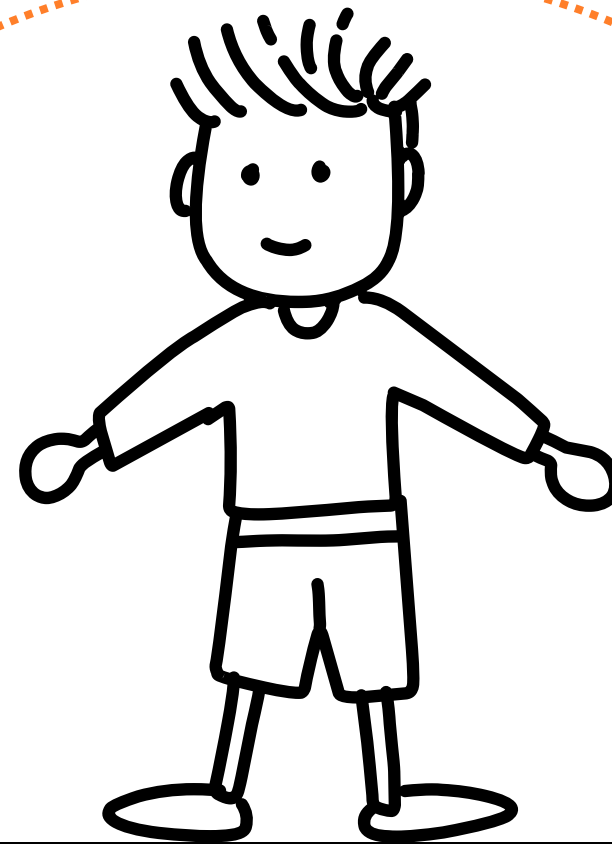
STEP #8: Share

FIGURINE CREATION

- Figurine templates are in the lesson plan.
- This slide helps students understand how to cut them out and use them in their STEAM project.
- We place this slide here because the figurine's size will help them determine the scale of their STEAM project.
- See the next slide for the example.
- Each STEAM challenge has a unique character associated with it.
- If a specialty figurine is being provided for students, it can be passed out at this time.

FIGURINE CREATION

Cut on the dotted
line.
Staple or tape the
stars together. This
helps it stand up!



Place your
name on the
strip or give
your figurine a
name!



Mini-testing

For this challenge, we will mini-test to check the following:

This slide leads students through mini-evaluations of their creation. These are designed to share insight without ruining the creation. They will be prompted to check for:

- Criteria for success progress.
- Constraint adherence.
- Often, these are presented as questions to allow students to reflect on their failure points and prompt them to make necessary changes to their design.

We use mini-tests to identify *failure points* and see what needs to change before final testing.

Then, during the final test we can be *confident* our creation will be *successful*.



Final Testing

Steps To Setup Testing:

Steps to setting up the creation for final testing.

Example

Place your bridge on a desk or table. Check to make sure the bridge meets all suspension requirements.

Conducting Testing for Requirements- Check for the following:

Key testing information is identified to help test creations effectively.

- Steps for final testing:
 - Testing procedures are identified with emphasis on constraint adherence.
- STEAM Journal:
 - Have students record whether they met the challenge criteria.
- If the challenge is finished early:
 - Ideas for early finishers to do while the rest of the class is testing.

If you finish the challenge early:

1. Conduct mini-testing one more time.
2. Head to the testing area and complete your final testing.

Then, you can:

1. Add decorative elements to your creation
2. Help a friend at your table (only if they want help!)



CHALLENGE OVERVIEW

CONSTRAINTS (RULES)

This slide provides a snapshot overview of all the necessary information. It is a good place to pause to review all the details of the challenge.

If you are presenting this challenge at an event, this is the perfect slide to display so all participants can review it before starting the challenge and refer back to it during their build.

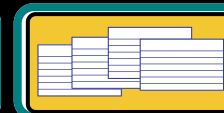
CRITERIA FOR SUCCESS



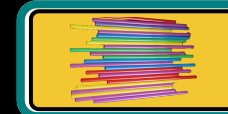
MATERIALS AVAILABLE



Popsicle Sticks



Index Cards



Straws



Tissue Paper



Cardstock Paper



Pipe Cleaners

Optional Materials



Letters

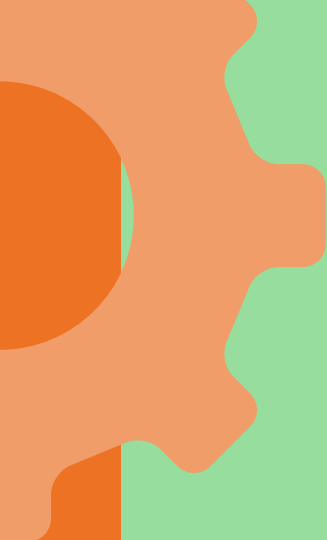


Craft Rolls

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

TESTING REQUIREMENTS

Complete the following:



Thank you for creating
with us today!

This concludes today's
activity!

Dakota STEAM Learning LLC



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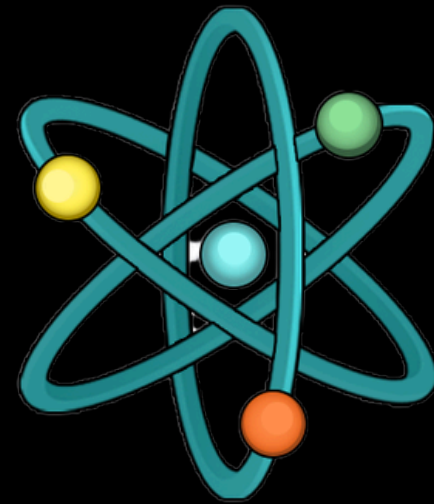
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