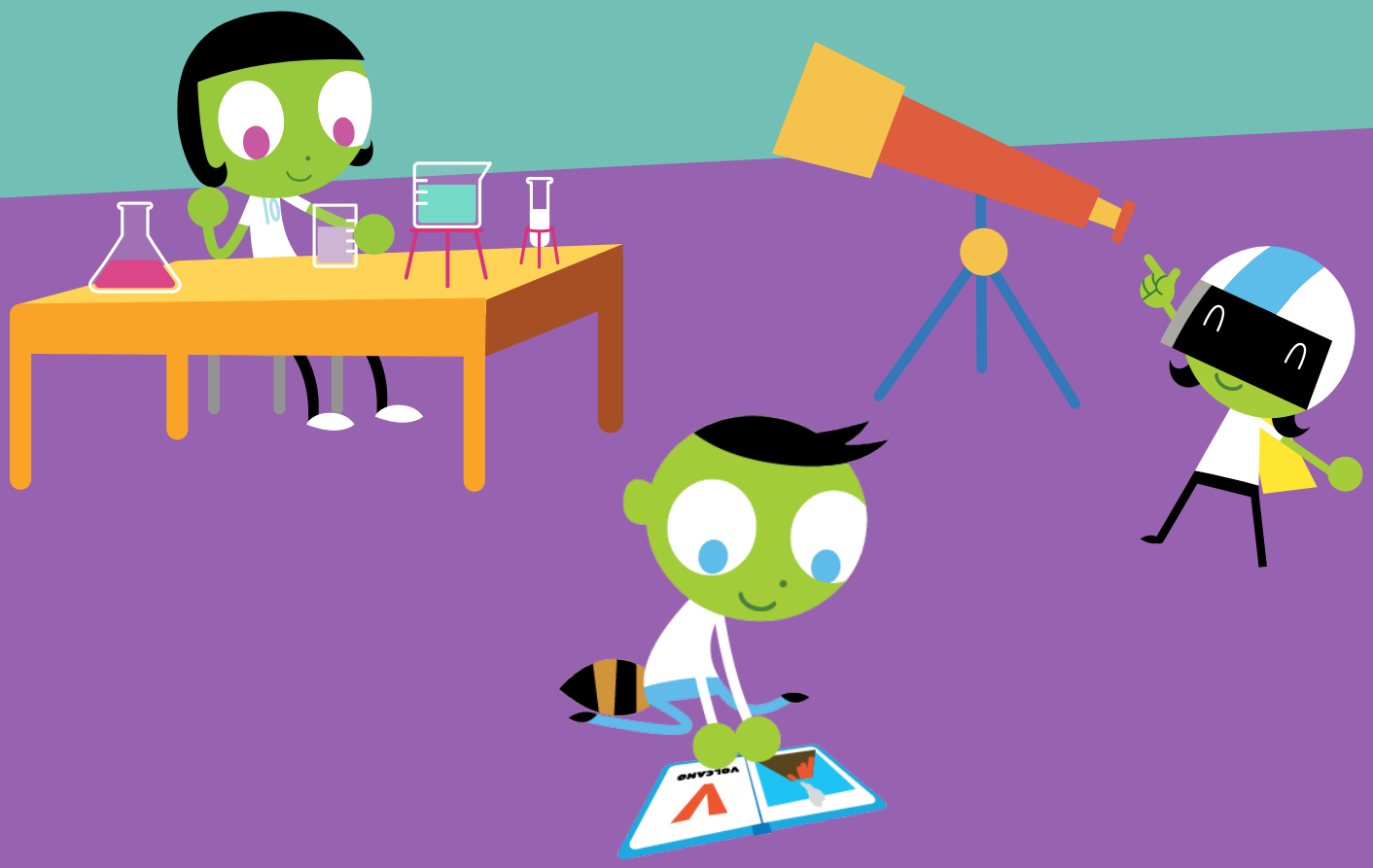
PBS KIDS Digital Box for Educators

STEM



PBS SOCAL

PBS KIDS

Welcome to your PBS KIDS Digital Box!

At PBS SoCal, just like you, we know that the best way to help young children learn is to provide them with multiple occasions to learn and practice new skills in a variety of situations. That's why PBS SoCal designs its content and activities to use video, digital games and apps, and hands-on learning to introduce children to new concepts and give them opportunities to practice those new skills in different ways.

The PBS KIDS Digital Box takes advantage of that approach and has been specifically made for Early Childhood Educators like you. In each PBS KIDS Box you'll find:

- A teacher guide with a hands-on classroom activity.
- Links to PBS KIDS video clip(s) to introduce the learning topic. You can access the videos for this lesson for free through this link: https://bit.ly/2RtFPM7.
- A parent letter and take-home activity to help students practice the learning at home with parents or caregivers.
- A media and tech guide with additional resources.

The resources in this STEM-themed box are built on content from the popular PBS KIDS series, CAT IN THE HAT KNOWS A LOT ABOUT THAT! In the lesson, children will explore science inquiry and engineering through relevant video from CAT IN THE HAT, and practice bridge building in a classroom activity. Children can then build on the learning at home with interactive learning games from CAT IN THE HAT through the free CAT IN THE HAT BUILDS THAT! App. This PBS KIDS Box can be used as a supplement to support your existing curriculum or as a stand-alone lesson.

For more interactive learning resources, visit pbssocal.org/athomelearning and pbslearningmedia.org. To explore more of PBS KIDS apps, visit pbskids.org/apps. To explore more digital activities from Cat in the Hat, you can also visit pbskids.org/catinthehat.

Happy Learning!

The PBS SoCal Education Team

Building Bridges Teacher Guide

In **The Cat in the Hat Knows a Lot About That!**, the Cat is here to help lead you and your students on engineering adventures. In **"Building Bridges,"** the Cat invites students along to solve a problem: how to cross a gap before a big, scary dragon shows up!

Table of Contents

Learning Goals

- **Engage** with the Engineering Design Process to help solve problems.
- **Draw** and use models to **test** ideas.
- **Discover** that materials have different properties which affect their strengths.
- **Determine** that materials need to be the right size (length) to function in models and real life.

Building Bridges

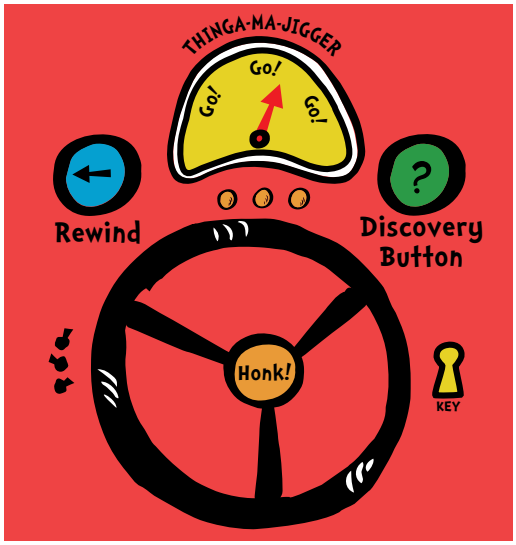
Go, Go, Go, On An Adventure

Engage your students by imagining that they are all getting in the Thinga-ma-jigger to go on an engineering adventure!

Teacher callout: Are you ready for an adventure?
Class Response: To the Thinga-ma-jigger!

Ready for an adventure? After the kids get in the Thinga-ma-jigger, play the story segment **"Building Bridges"**. Watching together as a class offers the students a common experience that they can talk about to problem solve together.

When the segment ends, **discuss and define** with your class the potential engineering problem(s) found in the video. For this adventure, the lesson will focus on teaching your students how to make a bridge for a classroom **model**. A model is a tool that can have many uses, including visualizing and testing possible solutions to a problem. Students will need to **define the problem** they are working to solve, so be sure to have the whole class focused on making a bridge by the end of the discussion. Ready? Let's build some bridges!



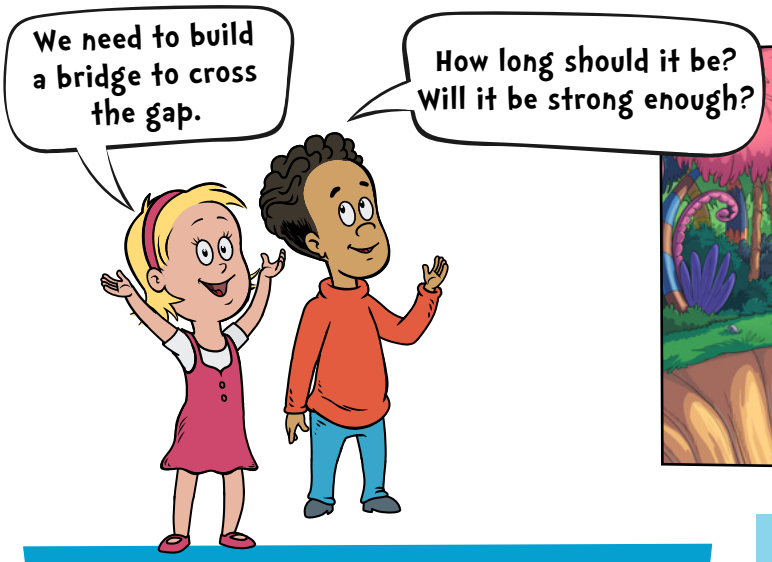
Resource Tip

Thinga-ma-jigger Dashboard - There is a printable image of the Thinga-ma-jigger's dashboard in the Support Materials section. Print it out so your students can pretend they are riding in the Thinga-ma-jigger!

Bridge Pictures - We have a full selection of bridge images on PBS Learning Media for you to download and share with your students. You can find them under the "Support Materials" section of the page.

Creating a Cat in the Hat Classroom - Want to make the best of your learning adventure? Use this guide to help transform your classroom using the Thinga-ma-jigger Dashboard and the Engineering Design Process Circle!

Building Bridges



Thinga-ma-jigger Discovery Button

Your students know what the problem is. Now they could really use some information about bridges and how engineers build them.

To find out more about bridges ask the students: What do we know about bridges?

Finding out what the students know can help you create a great formative assessment list as you begin the lesson. Be sure to **save the list on an anchor chart or the board** so you can come back and find out how much your students have learned.

Next, to have the students get used to looking for more information, pretend that the Thinga-ma-jigger stores pictures of places it has been to, and that they can download them with the press of a button. Luckily, the Thinga-ma-jigger went to Spansylvania, and some other places too, where there are a lot of bridges! The students can pretend to press the Thinga-ma-jigger Discovery Button on the printable dashboard to display these pictures on the screen. One way to use the dashboard is to distribute them to each group of students. The table area can be set with the dashboard on top and, when you give the signal, they can press the Discovery Button and lift the dashboard to get their printed pictures below.

Once you have the images, this is a great time for students to practice their observation skills and discover how bridges are the same and different. There are many approaches for teaching this. Each student can hold one picture and participate in a whole class discussion. **The questions above** will help get a discussion going. Students can have one picture and practice meeting with a friend to compare how their pictures are the same or different.

Questions

To find out more about bridges, ask the students:

1. **What do you see?**
2. **What makes the bridges the same?**
3. **What makes the bridges different?**
4. **What is the bridge made out of?**
5. **What do you notice about the length of the different bridges?**
6. **Why do you think they might need to be different lengths?**
7. **Do you think a person could walk on that bridge? Could a car drive on that bridge? Why do you think that?**

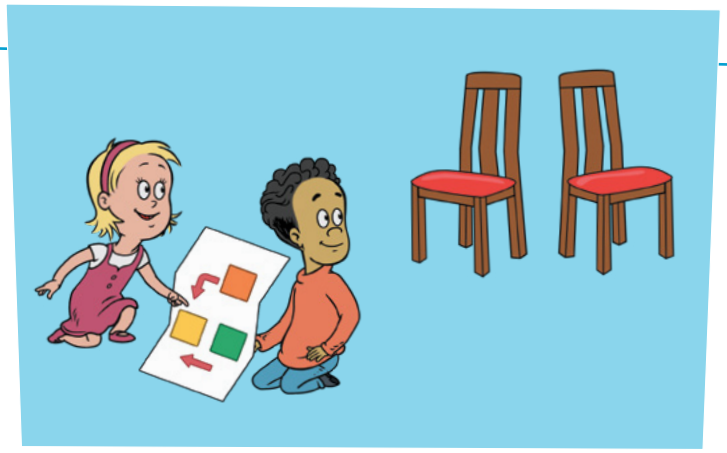
Building Bridges

Picture This

Wow, your students know a lot about bridges! Could they learn more? Our next step is to use the Engineering Design Process to imagine and plan possible designs that could solve the problem.

Learning to draw plans and make model drawings is a big part of engineering. Engineers draw models to work out their design ideas, and your students can too! By modeling and drawing ideas, you can help students develop conceptual images in their mind and on paper, and encourage them to turn and talk with each other.

You may want to tell the students to hit the rewind button on the dashboard to go back to the part of the story when Nick, Sally, and Cat discuss how they will get across the gap. Next, choose some simple materials in your classroom that you (the teacher) can use **to build a model to represent the gap**. Consider using two chairs or two upside down trash cans. Don't forget to keep an eye on size and stability so that you can easily find items to test for a bridge later!



Now that the class has built a physical model, have the students make a simple drawing of the model. See if they can draw a bridge that they think can span across the gap. Then, encourage them to share their sketches with one another.

Resource Tip

Engineering Design Process - Are your students stuck? Use the Engineering Design Process circle and the included sentence stems to help them get back on track!

Building Bridges

Materials Needed

- **A few materials that can be tested for length and strength.** Don't forget forget we want some materials not to pass the test! The list could be endless, but some examples to add for testing might include: carpet samples, a leaf, a twig, a block, a piece of fabric or a scarf or paper.
- **Rulers**
- **Masking tape to hold materials in place.**
- **An item to test for strength.** It can be a block, a stuffed animal, a bag of a predetermined number of pennies or another appropriately sized item.
- **Model of gap from Picture This section.**
- **Snail-a-ma-bob measuring tool.**

We Can Solve Problems

Now that your students have finished drawing the model, they need to make a bridge that spans the gap and can be crossed. They will need to engineer for two criteria:

1. **Can we make a bridge that is long enough to get from one side to the other?**
2. **Will the bridge be strong enough to hold our (pretend) weight?**

This is a great time to ask the students how they will know if their chosen **material** will work. Then, define for your students that materials are what things are made out of. Have the class brainstorm the parameters for their testing. Be sure to document their ideas to show their learning over time. The following questions will help you guide the adventure but still allow the students to do the thinking and problem solving:

- **Do you want to hit the Rewind Button and check what Nick and Sally tested for?**
- **How will we know our bridge is long enough?**
- **How can we test how strong our bridge material is?**
- **How can we keep track of what we find out?**

Video Clips

Is it Long Enough?

Nick and Sally find a bamboo stalk that they want to use as a bridge. It's definitely strong enough...but is it long enough?

Is it Strong Enough?

After they realize the bamboo stalk is too short, Nick and Sally try to find something longer. A leaf from the banana cabana tree is the perfect length...but will it be strong enough to support their weight? Time to call on Thing 1 and Thing 2 to test it out!

Building Bridges

We Can Solve Problems continued

Have the students choose materials to test for **length and strength**. Encourage them to test for length first before they move onto strength. They can measure the gap in the model using the Snail-a-ma-bob and then compare it to their materials. Once they have tested two or three materials for length, have them talk with you about their drawings and results. Then they can test the materials that were long enough for strength.

Questions

Ask the students these questions as they test their materials:

1. **Is your material sample long enough to cross the gap? How do you know?**
2. **Is your material strong enough to hold the test object?**
3. **Could your material hold more objects?**

Resource Tip

Snail-a-ma-bob Measuring Tool - You'll find instructions for making a snail measuring tool in the Support Materials section.

Building Bridges

See What I Know About That

To celebrate our engineering adventure and see what we have learned and discovered about building bridges, have the students come back to the Thinga-ma-jigger to narrate their learning adventure.

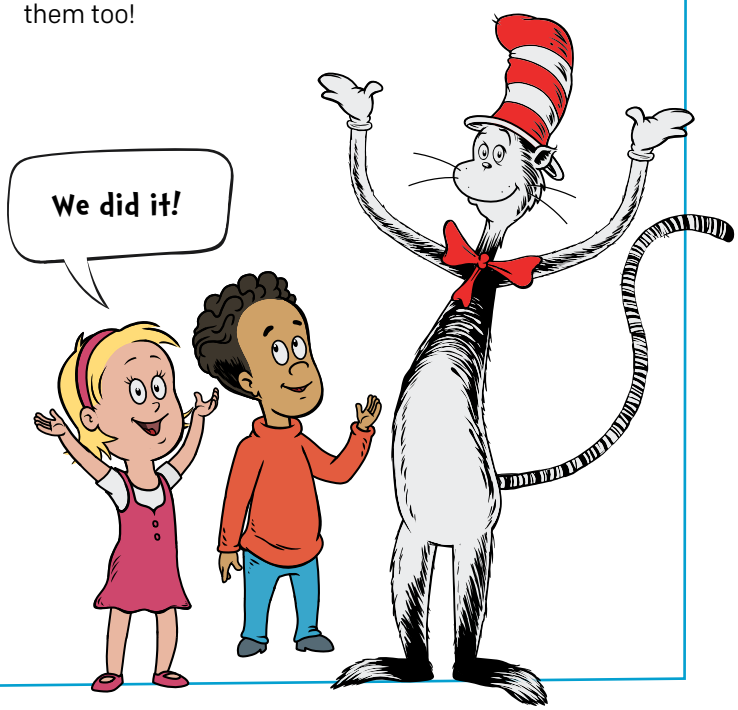
They can visit each workstation to see and hear what their friends have learned. Make sure to encourage them to share what worked and what did not work. They may want to imagine if the material they chose will work in the real world too. Share with them what they knew when they started on the brainstorm list and see how much they have learned on our bridge adventure.

Extend

Building time! Have the students take the time to build and test new ideas. You might set up a bridge building station in the room for the week. Have the students think of any new ideas they might want to try. Be sure to include different materials, test charts and paper to draw their new ideas on.

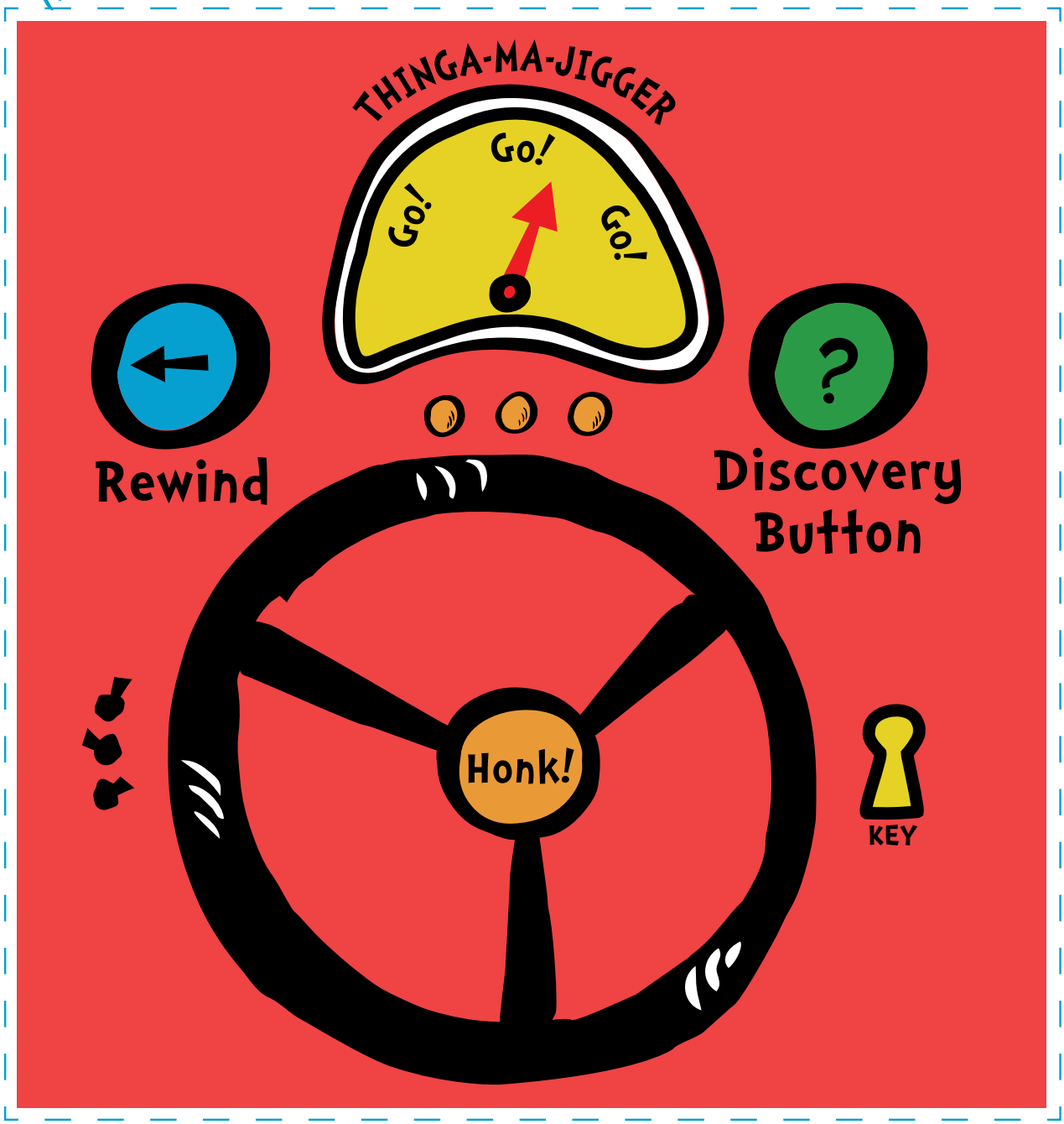
Connect

You can send a Parent Letter home with your budding engineers with ideas to extend their learning even further. Make sure they bring their drawings home with them too!



Building Bridges

Thinga-ma-jigger Dashboard



Find related games in the FREE *The Cat in the Hat Builds That* app. Download it now!

pbskids.org/catinthehat

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Building Bridges

The Engineering Design Process

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Building Bridges

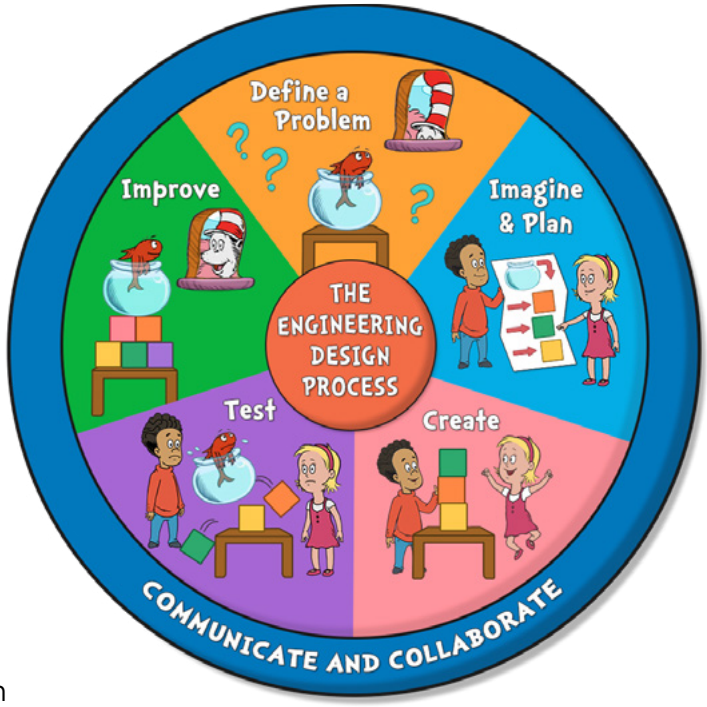
Hello,

We have been going on adventures as engineers with the **Cat in the Hat** from the **PBS KIDS** program **The Cat in the Hat Knows A Lot About That!**

Our adventure began when we imagined we were in the Thinga-ma-jigger going to visit a place called Spansylvania. While we were there, we ran into a dragon and discovered that we needed to make a bridge to get away. We were up to the challenge and now we know how to solve the problem! As a class, we imagined and planned using drawings of our model bridge. Next, we tested different materials to see what would be long enough and strong enough to work as a bridge in this situation.

To find out more about what your child learned, you can ask:

- Can you tell me about your drawing?
- What did you make your bridge out of?
- Why did you choose those materials?
- Did it work out the way you planned?
- Did you make any changes to your bridge to improve it?
- Did the changes you made turn out how you planned?
- Would you do anything differently?



Next, watch **"Building Bridges"** together:

https://bit.ly/2HX7MZJ

By watching this with your child, you can talk to them about how they have been learning to solve problems.

In class, we have been using **The Engineering Design Process** to help us think about solving problems. Improving and communicating are very important parts of any engineering design process. See if you can challenge your child to improve their design and explain to you their thinking process.

Building Bridges

Playing is an essential part of learning. When you play with your child they will learn about how the world works, which is what science and engineering is all about. Some ideas to keep the learning going might include:

1. Create a pretend river and ask your child how they would build a bridge over it using paper towel rolls, cans of food, boxes, or whatever you have at home.

2. Engineers often make and use simulations. Playing the digital game **Bridge-a-Rama (pbskids.org/catinthehat/games/bridge-a-rama)** together is a great way to model, or show, the process.

I look forward to hearing about the new ways you and your child are learning together.

On to the next learning adventure!

Find related games in the FREE *The Cat in the Hat Builds That* app. Download it now at pbskids.org/apps

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Measuring This and That

THE CAT IN THE HAT Knows a Lot About That!

Make and test The Cat in the Hat measuring tools.

Which cereal box is taller? Are you taller than your friend?
Which tree trunk is wider? If you want to know for sure, you need to get evidence.
Make the Cat's hat and a Measuring Snail to measure and compare all sorts of things.

Materials

- Cardstock or paper
- The Cat's Hat printable
- Measuring Snail printable

Create Your Measuring Tools

1. Using cardstock, print the Cat's hat and Measuring Snail printables.

   Tip No cardstock? No problem! Just glue the Cat's hat and the Measuring Snail to an old greeting card, flattened cereal box, or piece of cardboard for stability.

2. Cut out the Cat's hat and build the Measuring Snail as directed.
3. Use the stripes on the Cat's hat and the segments on your Measuring Snail's measuring line to measure the length of various household items.

Measure, Share, Compare!

1. Measure the length of the Cat's hat using the Measuring Snail. How long is it? Now measure the Measuring Snail with the Cat's hat. What do you notice?
2. Find 4 or 5 household items that are similar but different. (For example: different kinds of shoes, drinking glasses, toy cars, or chairs.) Predict which is the longest or shortest. Using the Cat's hat or the Measuring Snail, measure and compare the lengths. Did anything surprise you? Why?
3. What if you need to measure something round? What would be the best tool? Find a tree trunk, can of food, or something similar. Measure it using the Cat's hat and the Measuring Snail. What do you notice?
4. The Cat uses his hat to measure and improve the length of a stool leg when he visits Blueprintia. With the help of your measuring tools, design something that balances on three or four legs. Share your creation with a friend and use the Cat's hat or the Measuring Snail to show details about your design.

Find related games in the FREE *The Cat in the Hat Builds That* app. Download it now!

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The Cat's Hat

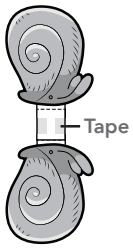
With an adult's help, cut out the Cat's hat along the outer solid black line.

Measuring Snail

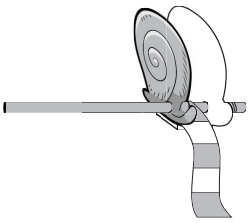
Materials

- Scissors
- Markers or crayons
- Clear tape
- Hole punch
- Unsharpened pencil

Instructions



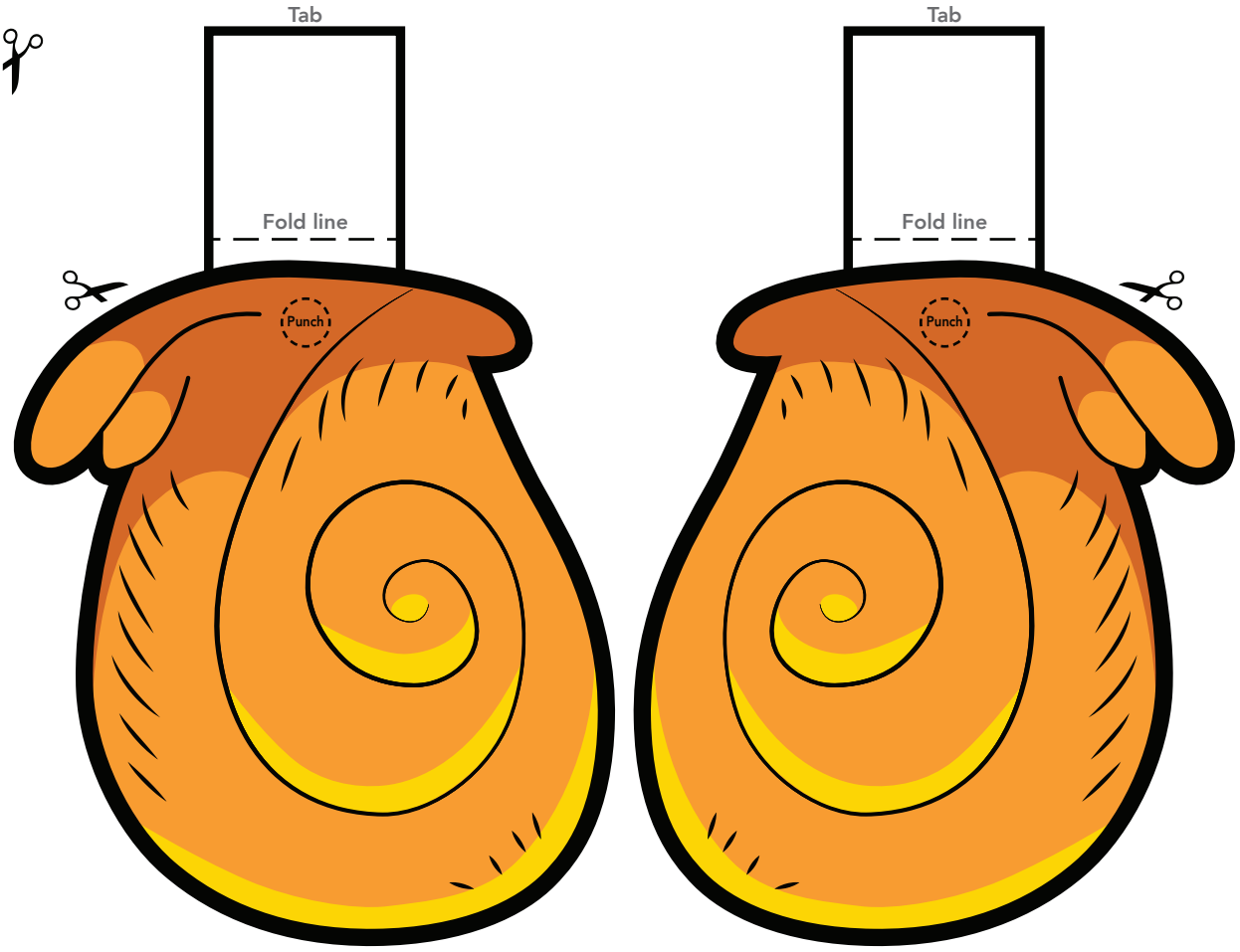
1. With an adult's help, cut out the two halves of the Measuring Snail's body and the measuring line.
2. Join the halves by overlapping the two tabs and taping them together.
3. Punch holes in each side of the Measuring Snail as marked.
4. Stick a pencil through the two holes.
5. Color the stripes on the measuring line. Use two colors and alternate them.
6. Tape one end of the measuring line—colors facing up—to the pencil, and roll up the measuring line by turning the pencil.
7. Pull the measuring line and put your Measuring Snail to work!



Test & Improve!

Explore the measuring ideas in the "Measuring This and That" activity. What could make your Measuring Snail better? Can you make it longer? What if you wanted it to pull easier and not bounce back? What other materials around your house could you use as a measuring line?

Measuring line



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STEM

MEDIA AND TECH

Technology tools can extend learning in powerful ways. We've compiled a list of media and tech tools to help educators support science learning at home and in the classroom.

CLASSROOM ACTIVITIES

- Citizen Science has multiple citizen science and crowdsourcing projects that students can join to practice science skills. Students can help with cloud spotting, tree types, and more.
- Skype in the Classroom is a free global community that enables teachers and students to participate in live learning experiences. Teachers and classes can collaborate with scientists from around the world.
- Science Buddies provides lesson plans, ideas, Google Classroom connections, and more.

AT-HOME ACTIVITIES

- Science at Home by the 3M Foundation provides fun science activities families can do at home to expand what students are learning at school.
- The Museum of Science and Discovery provides home activities that help inspire students to learn about oceanography, National Parks, and more.

PBS KIDS RESOURCES

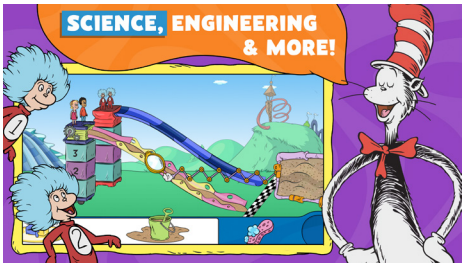
-  Ready Jet Go! Space Explorer is an an app that helps kids explore the solar system and visit planets, stars and constellations with Jet and his friends.
-  PBS KIDS ScratchJr is a coding app for children ages 5-8. Kids can create their own interactive stories and games featuring their favorite PBS KIDS characters.
- PBS KIDS Science Games are designed to help children learn about science while having fun playing science challenges with their favorite PBS KIDS characters like Sid the Science Kid, Dinosaur Train and the Cat in the Hat!
- "Science! Kids" showcases fun science experiments designed for children to learn more about science and technology.
- PBS LearningMedia has curated videos, lesson plans, and interactive tools to help explore science concepts.
- PBS KIDS for Parents provides expert tips, activities, and printables to support children's science learning.

APP

THE CAT IN THE HAT KNOWS A LOT ABOUT THAT!

Do you want a science app? The Cat in the Hat gives you that with a tap! Kids play and learn in their backyard, to see how science is fun, not hard! Based on the PBS KIDS series THE CAT IN THE HAT KNOWS A LOT ABOUT THAT!, this app introduces Pre-k kids to science inquiry and engineering (STEM) concepts through games tailored to their learning progress.

- Kids can build bridges, explore friction through slides and sort fun objects and tools in fantastical lands along with the Cat in the Hat, Nick and Sally.
- As kids play, they earn rewards to decorate their treehouse and backyard, and unlock games that let them tinker and explore in their own way.
- Includes simple and fun hands-on activities that parents and kids can do together, extending the STEM fun to home and everyday materials.



TARGET AGE	3-5
CURRICULUM	STEM (Science, Technology, Engineering, Math)
COST	Free
AVAILABILITY	iOS App Store, Google Play Store, Amazon Store
OFFLINE FEATURES	This app requires online connectivity only for initial download and updates. Once downloaded, Cat in the Hat Builds That app is playable on the go!
PARENTAL FEATURES	English/Spanish Localization