CHECKOUT

STEM

IOWA STATE UNIVERSITY
Extension and Outreach
Human Sciences
Description
Checkout STEM was created to expand access to research-based literacy and STEM (science, technology, engineering, and math) experiences for K-3 children and their families. Checkout STEM kits are designed to support the development of literacy and STEM skills.

Objectives identified for Checkout STEM kits:

• Develop foundational understandings in key STEM concepts.
• Develop and extend foundational literacy skills.
• Experience the joy of learning by participating in learning experiences that are supportive, creative, challenging, and fun.
• Increase libraries’ access to engaging STEM programming.

Materials
Activity guides are provided for download free of charge. Purchase and assembly of kit materials is handled locally. Each completed kit contains two books, materials for STEM play, and an activity guide. Kit titles include:

• Bee and Me
• Curious Coding
• Fabulous Five Senses
• Super Slinky
• Building Bridges
• Humpty Dumpty
• Magic Eye

Implementation
The activity guides utilize the Experiential Learning Model to assist in the development of STEM process skills. This model encourages children to first DO an activity, REFLECT on the activity, and then APPLY knowledge learned to other life experiences. Steps outlined in the activity guide encourage children and their families to:

1. Read a fiction book to help focus the experience around a problem or theme.
2. Take part in a variety of hands-on STEM experiences or STEM play (DO).
3. Discuss the experience and encourage children to make connections to their lives. Learn more about the topic by reading a nonfiction text (REFLECT/APPLY).
Authors
This program was created through a unique partnership between the Ames Public Library and Iowa State University that brought together librarians, university faculty, and undergraduate students.

- Sara Nelson, PhD, Iowa State University School of Education: Science & Literacy
- Students enrolled in Iowa State University Spring 2018 CI 439 (Teaching Science in the Primary Grades)
- Constance Beecher, Assistant Professor, Iowa State University School of Education and State Family Life Specialist in Literacy, Iowa State University Extension and Outreach
- Jerri Heid, Youth Services Manager, Ames Public Library

Research Background

STEM Programming and Partnerships

Children face increased learning expectations within schools. With new learning standards, literacy and STEM (science, technology, engineering and math) learning expectations continue to increase (Porter, McMaken, Hwang, & Yang, 2011), and children need support outside of school to be ready for grade level performance. Recent research suggests that much of STEM learning happens in informal learning spaces outside of schools, including libraries, science centers, and museums. Summer learning in particular is critical for children to continue to practice and gain skills in literacy and STEM (Falk & Dierking, 2010).

While library resources have decreased, the breadth of their expected services has increased. Community libraries have experienced a decrease in funding, hours of operation, and staffing, while being required to evolve to meet the fast pace of knowledge generation, particularly in growth areas such as STEM and literacy (Grant, 2010). Research shows that what happens outside of school can be equally as important or more important than what happens in school, to set a child’s direction and activate his or her interest in STEM (Calabrese et al., 2013).

Despite a natural eagerness and ability to engage in a range of STEM activities at an early age (English, 2013; Inagaki & Hatano, 2006), many young children have limited exposure to and experience with basic STEM concepts (Eshach & Fried, 2005; NRC, 2013). Consequently, there is great concern that without access to adequate educational STEM experiences in the early years, young children will be ill-prepared to participate effectively in the modern STEM-based society where interdisciplinary innovation, creativity, and problem solving are valued (After School Alliance Executive Summary, 2017; Mishra & Mehta; 2017). STEM-Literacy backpacks are one way to address this gap by providing engaging and innovative home STEM-literacy experiences that will encourage families to participate in STEM learning. Partnerships between public libraries and Extension are an ideal vehicle to drive innovative STEM learning.
Ordering Information

Purchase and assembly of kit materials is completed locally. Included is a list of kit materials and links to possible sources. Follow your individual organization’s purchasing guidelines and process to procure supplies.

Based on pilot testing, it is recommended that local sites purchase materials as listed below. For example, the recommended clear backpack increases interest because children are able to view kit contents and is an appropriate size and durability to accommodate travel to and from the checkout location.

Reference in this publication to any commercial product, process, or service, or the use of any trade, firm, or corporate name is for general informational purposes only and does not constitute an endorsement, recommendation, or certification of any kind. Persons using such products assume responsibility for their use and should make their own assessment of the information and whether it is suitable for their intended use in accordance with current directions of the manufacturer.

<table>
<thead>
<tr>
<th>Items to Purchase</th>
<th>Quantity per Kit</th>
<th>Possible Vendor</th>
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<tbody>
<tr>
<td><strong>Bee and Me Kit</strong></td>
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| Clear Backpack                        | 1                | Lakeshore® Learning (www.lakeshorelearning.com)  
  “Large Take-Home Clear Backpack”—Product #: GG964 |
| Book—*Bee & Me* by Alison Jay         | 1                | Amazon (http://a.co/d/jbifmBW)  
| Book—*Explore my World: Honey Bees* by  
  Jill Esbaum                          | 1                | Amazon (http://a.co/d/6JPp081)  
| Bee-Bot® Programmable Robot           | 1                | Lakeshore® Learning (www.lakeshorelearning.com)  
  “Bee-bot® Programmable Robot”—Product #: BT363 |
| **Curious Coding Kit**                |                  |                                          |
| Clear Backpack                        | 1                | Lakeshore® Learning (www.lakeshorelearning.com)  
  “Large Take-Home Clear Backpack”—Product #: GG964 |
| Book—*Hello Ruby Adventures in Coding* by Linda Liukas | 1 | Amazon (http://a.co/d/fMd6WBq)  
| Book—*The Story of Coding* by James Floyd Kelly | 1 | Amazon (http://a.co/d/6gJ8hBH)  
| Code & Go™ Robot Mouse Activity Set    | 1                | Learning Resources (www.learningresources.com)  
  “Code & Go™ Robot Mouse Activity Set”—Item #: LER 2831 |
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<th>Items to Purchase</th>
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<tr>
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| Clear Backpack                    | 1                | **Lakeshore® Learning** ([www.lakeshorelearning.com](http://www.lakeshorelearning.com))
                                      |                  | “Large Take-Home Clear Backpack”—Product #: GG964 |
| Book—*Flotsam* by David Wiesner   | 1                | [Amazon](http://a.co/d/d7z7Wqy)                      |
| Book—*My Five Senses* by Aliki    | 1                | [Amazon](http://a.co/d/gi1BZEV)                      |
| Spice Holders (plastic)           | 1                | [Amazon](https://www.amazon.com/Qty-20-Plastic-Volcanic-Peppers/dp/B00B9F79JA) |
| Microscope                        | 1                | **Lakeshore® Learning** ([www.lakeshorelearning.com](http://www.lakeshorelearning.com))
                                      |                  | “My First Microscope”—Product #: FA706              |
| Hearing Capsules                  | 4 per kit        | **Lakeshore® Learning** ([www.lakeshorelearning.com](http://www.lakeshorelearning.com))
                                      |                  | “What’s the Sound? Mystery Capsules”—Product #: HH506 |
| Small Canvas Drawstring Bags      | 2 per kit        | **Montessori Services** ([www.montessoriservices.com](http://www.montessoriservices.com))
                                      |                  | “Mystery Bag”—Item #: Y24S                           |
| **Super Slinky Kit**              |                  |                                                    |
| Clear Backpack                    | 1                | **Lakeshore® Learning** ([www.lakeshorelearning.com](http://www.lakeshorelearning.com))
                                      |                  | “Large Take-Home Clear Backpack”—Product #: GG964   |
| Book—*The Marvelous Thing That Came from a Spring* by Gilbert Ford | 1               | [Amazon](http://a.co/d/bNUrEmL)                      |
| Book—*Slinky Innovators* by Lee Slater | 1       | [Amazon](http://a.co/d/06Kn9dp)                      |
| Stop Watch                        | 1                | [Learning Resources](www.learningresources.com)      |
                                      |                  | “Simple Stopwatch”—Item#: LER 0808                  |
| Slinkys                           | 4 (1 of each slinky per kit) | [Amazon](http://a.co/d/23nwfPU)
                                      |                  | Large Metal Slinky                                  |
                                      |                  | [Amazon](http://a.co/d/9USeq5e)
                                      |                  | Large Plastic Slinky                               |
                                      |                  | [Amazon](http://a.co/d/48PBzYb)
                                      |                  | Small Metal Slinky                                 |
                                      |                  | [Amazon](http://a.co/d/dve1Kik)
                                      |                  | Small Plastic Slinky                               |
| **Building Bridges Kit**          |                  |                                                    |
| Clear Backpack                    | 1                | **Lakeshore® Learning** ([www.lakeshorelearning.com](http://www.lakeshorelearning.com))
<pre><code>                                  |                  | “Large Take-Home Clear Backpack”—Product #: GG964   |
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<p>| Book—<em>A Book of Bridges: Here to There and Me to You</em> by Cheryl Keely | 1               | <a href="http://a.co/d/hDEVuWuNJ">Amazon</a>                    |
| Book—<em>Bridges</em> by Katie Marsico   | 1                | <a href="http://a.co/d/iGvKUzz">Amazon</a>                      |
|                  | “20-piece basic train set”—Product # 00320054       |
|                  | “5-piece train bridge set”—Product # 10320063       |</p>
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<td></td>
<td></td>
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<tr>
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<td>Nesting Cups</td>
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<td>Amazon (<a href="https://www.amazon.com/First-Years-Stack-Up-Cups/dp/B00005C5H4/ref=sr_1_3_a_it?ie=UTF8&amp;qid=1535037150&amp;sr=8-3&amp;keywords=nesting%2Bcups%2Bbaby&amp;th=1">https://www.amazon.com/First-Years-Stack-Up-Cups/dp/B00005C5H4/ref=sr_1_3_a_it?ie=UTF8&amp;qid=1535037150&amp;sr=8-3&amp;keywords=nesting%2Bcups%2Bbaby&amp;th=1</a>)</td>
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<tr>
<td>Humpty Dumpty’s Wall Game</td>
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<td>Amazon (<a href="http://a.co/d/3wi8V90">http://a.co/d/3wi8V90</a>)</td>
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<tr>
<td>Stacking Blocks (similar to DUPLO® or Mega Bloks® ~52 pieces)</td>
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<tr>
<td>Book—After the Fall: How Humpty Dumpty Got Back Up Again by Dan Santat</td>
<td>1</td>
<td>Amazon (<a href="http://a.co/d/aTuGA8L">http://a.co/d/aTuGA8L</a>)</td>
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<tr>
<td>Move It: Movement, Forces and You by Adrienne Mason</td>
<td>1</td>
<td>Amazon (<a href="http://a.co/d/7hPBgRg">http://a.co/d/7hPBgRg</a>)</td>
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<tr>
<td>Humpty Dumpty Puppet</td>
<td>1</td>
<td>ThePuppetStore.com (<a href="http://www.thepuppetstore.com">www.thepuppetstore.com</a>)</td>
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<tr>
<td></td>
<td></td>
<td>“Humpty Dumpty Finger Puppet (6”)”—Item #: PC030453</td>
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<tr>
<td><strong>Magic Eye Kit</strong></td>
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<td>Clear Backpack</td>
<td>1</td>
<td>Lakeshore® Learning (<a href="http://www.lakeshorelearning.com">www.lakeshorelearning.com</a>)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Large Take-Home Clear Backpack”—Product # GG964</td>
</tr>
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<td>Book—Hello, Red Fox by Eric Carle</td>
<td>1</td>
<td>Amazon (<a href="http://a.co/d/hOcvfKw">http://a.co/d/hOcvfKw</a>)</td>
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<td>Book—Magic Eye: A New Way of Looking at the World by NE Enterprises (optional)</td>
<td>1 (optional)</td>
<td>Amazon (<a href="http://a.co/d/asa3x8T">http://a.co/d/asa3x8T</a>)</td>
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<td>1</td>
<td>Amazon (<a href="http://a.co/d/2DBegXb">http://a.co/d/2DBegXb</a>)</td>
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<td>Book—Eye: How it Works by David Macaulay</td>
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<td>Amazon (<a href="http://a.co/d/5DTIKA2">http://a.co/d/5DTIKA2</a>)</td>
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<td>Model of Eye</td>
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<td>Learning Resources (<a href="http://www.learningresources.com">www.learningresources.com</a>)</td>
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<td></td>
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<td>“Soft Foam Cross-Section Eye Model”—Item# LER 1907</td>
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<tr>
<td>Melissa and Doug Magic Set</td>
<td>1</td>
<td>Melissa and Doug (<a href="http://www.melissaanddoug.com">www.melissaanddoug.com</a>)</td>
</tr>
<tr>
<td></td>
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<td>“Magic in a Snap—Magician’s Pop-Up Magical Hat with Tricks”—Product # 4042</td>
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CHECKOUT STEM

STEM PLAY

Children are natural explorers and creators. Checkout STEM can assist in guiding that natural sense of curiosity to new and deeper discoveries and allow for the development of important STEM (and literacy) skills. Checkout STEM has been designed to promote STEM play that:

- Engages children with hands-on learning experiences.
- Responds to children's interests and experiences.
- Connects to children’s lives and their communities.

Ways to Support STEM Play

- Encourage children to take the lead in experiences and discussions. Take a step back and say yes whenever possible to their ideas.
- Ask questions to encourage children to share their thoughts and ideas with you. There are many times that the best question to ask is “Why?” or “Why do you think that?”.
- Connect the STEM play whenever possible to children's lives. For example, asking “Have you seen anything else like this?” or “Is this similar to …?”.
- Encourage children to use and understand the engineering design process whenever possible.

ASK: What is the problem to be solved?

IMAGINE: How can the problem be solved? Create a list of ideas and then pick the best one.

PLAN: Create a plan to help solve the problem. Ideas might include drawing a diagram or making a list of materials needed.

CREATE: Follow your plan and create something. Test it out!

IMPROVE: Think about what you did. What worked? What didn’t? What could work better? Change the design to make it better. Test it out again!
HELPFUL HINTS FOR A FANTASTIC READ ALOUD!
Fiction and Nonfiction

Before reading the text...
• Point out the parts of the book:
  • Title, author, illustrator, and
  • Table of contents, glossary, index.
• Ask your child to predict what the book might be about.
• Preview what the book is about by quickly turning pages and talking about what is on them. Do a picture walk!
• Share a personal story tied to the book.

During reading...
• Point to pictures to draw attention to the text or illustrations.
• Define important words in a child-friendly way.
• Ask your child to predict what will happen on the next page.
• Invite your child to participate in the reading by having him/her finish a sentence or repeat repetitive lines.
• Check for comprehension:
  • Who is doing what?
  • What is going on?
  • How did it happen?
  • Why did it happen?

After reading...
• Ask and answer questions about the book and have a conversation.
• Encourage your child to retell the story.
• Encourage your child to give a summary of the story.
• Share personal experiences that tie to the book.
• Do the related STEM activity.
Activity Overview

• Read Bee & Me
• STEM activity: Program Bee-Bot® to go from flower to hive
• Read Explore My World: Honey Bees

Backpack Contents

• Activity Guide
• Bee & Me by Alison Jay
• Bee-Bot® Programmable Robot
• Flower and Hive Pictures
• Bee-Bot Ruler
• Explore My World: Honey Bees by Jill Esbaum

Extra Reading Fun

• Bees by Piotr Socha
• Flight of the Honey Bee by Raymond Huber
• Ant and Honey Bee, What a Pair by Megan McDonald
• My First Coding Book by Kiki Prottsman

Read Aloud: Fiction

Read the book Bee & Me with your child. Be sure to ask questions and discuss the book with your child.

STEM Play: Do

Introduce the Bee-Bot to your child. Allow time for play with the Bee-Bot. Can you make it go forward, left, and right? Press the arrows in the order you want your Bee-Bot to move. Then push the go button. To start again, press the clear button. The Bee-Bot travels about 15 cm each time so a ruler can be helpful when charting a path.

After time for play, set out the flower and hive photos on the floor. Program the Bee-Bot to go from the flower to the hive. To make it more challenging—be sure to add some obstacles!

Reflect/Apply

Discuss with your child what went well and what was challenging. Then, ask him/her to share thoughts on how real bees might figure out where to go and/or if he/she has any questions about bees.

Read Aloud: Nonfiction

Read the book Explore My World: Honey Bees with your child. Be sure to discuss new vocabulary and how bees help us!
**BEE-BOT® RULER**

**Instructions:** Cut and laminate each Bee-Bot® ruler.

A Bee-Bot moves 15cm with each step.
Instructions: Cut and laminate each image.
Activity Overview
• Read *Hello Ruby Adventures in Coding*
• Take part in STEM play with Colby the Mouse
• Read *Story of Coding*

Backpack Contents
• Activity Guide
• *Hello Ruby Adventures in Coding* by Linda Liukas
• *Code & Go™ Robot Mouse Activity Set*
• *Story of Coding* by James Floyd Kelly

Extra Reading Fun
• *Coding Games in Scratch* by Jon Woodcock
• *The Friendship Code (girls who code)* by Stacia Deutsch

Read Aloud: Fiction
Read all or part of *Hello Ruby Adventures in Coding*.

STEM Play: Do
1. First, either choose an activity card with one of the created mazes from Code & Go™ Robot Mouse Activity Set or draw out your maze design and then build. If the maze pieces are not fitting correctly, look at the tabs and ensure that the tabs are fitting into the slots.
2. Second, place walls, tunnels, and cheese based on the activity card chosen or your maze design.
3. Third, set Colby (the mouse) at the chosen starting point and input commands. **Basic operations:**
   • Arrow pointing toward the nose moves the mouse Forward (one square).
   • Arrow pointing to the right turns Colby 90° to the right.
   • Arrow pointing toward the back of Colby moves it Backward (one square).
   • Arrow pointing left turns Colby 90° to the left.
   • Button in the middle of the directional arrows starts the program.
   • Top left button clears all the previously entered commands.
   • Top right button activates a random action.
   • Press your entire sequence in and then press the go button.

Reflect/Apply
Discuss the activity with your child.
• Were you able to input the right commands to get Colby to the cheese? Did you need to make any changes?
Then relate it to your child’s world.
• Do you have something that you program? (Alarm, microwave timer)
• What other items in the house are coded? (Television, computer, phone)
• What are the steps you do to brush your teeth? (Grab toothbrush, then grab toothpaste, put toothpaste on toothbrush, set toothpaste down, bring toothbrush to teeth, brush teeth, rinse, put toothbrush away.)

Read Aloud: Nonfiction
Read the book *Story of Coding*.

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FABULOUS FIVE SENSES

Activity Overview

• Read Flotsam
• Do STEM activities for five senses
• Read My Five Senses

Backpack Contents

• Activity Guide
• Flotsam by David Wiesner
• Five Senses Data Sheet
• Mystery Bag (1)
• Microscope & Accessories
• Mystery Capsules (2-4)
• Smell Containers (2)
• My Five Senses by Aliki

Extra Reading Fun

• Where’s Waldo? by Martin Handford
• I Hear A Pickle (and Smell, See, Touch, and Taste It, Too!) by Rachel Isadora
• You Can’t Smell A Flower With Your Ear by Joanna Cole

Read Aloud: Fiction

Read the book Flotsam aloud. This book does not have words. Discussion about the pictures is a great way to create the story together!

STEM Play: Do

Try out these Guess What I Am Activities with your child. The activities are designed to help children view objects from different perspectives—just like the book! You will need the five senses materials listed below for the activities. Be sure to fill out the Five Senses Data Sheet as you do each activity.

• Touch: Mystery bag with object inside, guess what it might be inside.
• Sight: Microscope slides, look using the microscope and guess.
• Sound: Mystery capsules, shake and guess what might be inside.
• Taste: Complete during snack time (you provide). For example, set out three different types of cheese. Have your child close his/her eyes and offer one sample at a time. Prompt your child to describe the taste of each cheese. Can he/she guess what kind it is?
• Smell: Smell containers, close your eyes and gently sniff, guess what it might be.

Reflect/Apply

Discuss the activities and the data collection sheet together with your child.

• What helped you figure out each mystery object?
• How did your senses help you during the activities?
• Can you think of other times you use your five senses?

Read Aloud: Nonfiction

Read the book My Five Senses to learn more and answer any questions.

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# Five Senses Data Sheet

<table>
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<tr>
<th>Five Senses</th>
<th>Predict – What do you think? Draw or write your idea in the box.</th>
<th>Was your prediction correct? Circle yes or no below.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Touch</strong></td>
<td>Feel what is in the mystery bag but don’t peek!</td>
<td>Yes No</td>
</tr>
<tr>
<td><strong>Smell</strong></td>
<td>Sniff what is in the mystery jar but don’t peek!</td>
<td>Yes No</td>
</tr>
<tr>
<td><strong>Sound</strong></td>
<td>Listen as you shake the mystery capsule!</td>
<td>Yes No</td>
</tr>
<tr>
<td><strong>Taste</strong></td>
<td>Try out different foods during snack time with your eyes closed!</td>
<td>Yes No</td>
</tr>
<tr>
<td><strong>Sight</strong></td>
<td>Look at the microscope slides and predict what you think is on them.</td>
<td>Yes No</td>
</tr>
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</table>
**Activity Overview**

- **Read** *The Marvelous Thing That Came From a Spring*
- Take part in STEM play with Slinkys
- **Read** *Slinky Innovators*

**Backpack Contents**

- Activity Guide
- *The Marvelous Thing That Came From a Spring* by Gilbert Ford
- Slinkys (4–2 plastic, 2 metal)
- Stopwatch
- Slinky Data Sheet
- *Slinky Innovators* by Lee Slater

**Extra Reading Fun**

- *I Fall Down* by Vicky Cobb
- *What Do You Do With An Idea?* by Kobi Yamada and Mae Besom

**Read Aloud: Fiction**

Read *The Marvelous Thing That Came From a Spring*.

**STEM Play: Do**

1. First, make a prediction about which Slinky you think will make it down the stairs the fastest and which will go the slowest. Record on the Slinky Data Sheet. If you are having trouble getting the Slinky to go down the stairs, consider using a ramp or slanted board instead.

2. Second, using the Slinkys and stopwatch, time how fast it takes each slinky to go down the stairs. Test each slinky three times. Record on the data sheet. After you are done timing them, rank the Slinkys from fastest (1) to slowest (4).

3. Third, come up with your own challenges!

**Reflect/Apply**

Discuss the data that was collected with your child.

- Were your predictions correct?
- Why do you think Slinky #____ was the fastest/slowest?
- Why do Slinkys go down the stairs but not up the stairs? (Gravity)
- Where else do you see or notice gravity in your life? (Ex: Falling down)

**Read Aloud: Nonfiction**

Read pages 10 and 11 of *Slinky Innovators*.

- More can be read if the child is interested.
- Ask your child if he/she has any invention ideas!
CHECKOUT STEM

SLINKY DATA SHEET

Draw a STAR in the box for the Slinky you think will go the fastest.

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<thead>
<tr>
<th>#1 Small Plastic Slinky</th>
<th>#2 Small Metal Slinky</th>
<th>#3 Large Plastic Slinky</th>
<th>#4 Large Metal Slinky</th>
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</tbody>
</table>

Draw an X in the box for the Slinky you think will go the slowest.

<table>
<thead>
<tr>
<th>#1 Small Plastic Slinky</th>
<th>#2 Small Metal Slinky</th>
<th>#3 Large Plastic Slinky</th>
<th>#4 Large Metal Slinky</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Record how long it took the Slinky to go down the stairs in seconds.

<table>
<thead>
<tr>
<th>#1 Small Plastic Slinky</th>
<th>#2 Small Metal Slinky</th>
<th>#3 Large Plastic Slinky</th>
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<tbody>
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<td></td>
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</tr>
</tbody>
</table>

Write the number of the Slinky on the line.

Fastest Slinky ______________________

Slowest Slinky ______________________

Were your predictions correct? Yes No
CHECKOUT STEM

BUILDING BRIDGES

Activity Overview
• Read *A Book of Bridges Here to There and Me to You*
• Take part in STEM play with enclosed materials
• Read *Bridges*

Backpack Contents
• Activity Guide
• *A Book of Bridges Here to There and Me to You* by Cheryl Keely
• Wooden Railway with Bridges
• *Bridges* by Katie Marsico

Extra Reading Fun
• *Bridges: Amazing Structures to Design, Build and Test* by Carol Johmann
• Build a bridge out of gumdrops and toothpicks. Use the pictures in the books to help with the design.

Read Aloud
Read the book *A Book of Bridges Here to There and Me to You*. Compare/contrast the different types of bridges and discuss how bridges can help connect people.

STEM Play – Do
Using the Thomas and Friends Wooden Railway work to meet the following challenges!
• **Design Challenge 1:** Use the wooden pieces to create a railway that uses the bridge and makes a complete circle/circuit to help connect people.
• **Design Challenge 2:** Make the longest and/or the shortest railway you can.
• **Design Challenge 3:** Make the most unique (or fun) railway you can.

To start, draw out a potential railway design and then build. For design challenge 1, if your child is struggling to close the railway ask what pieces he/she could switch out to make it work. Remember that you don’t have to use all of the pieces for the challenges. Be sure to discuss how the bridge is supported and the different shapes that can be seen.

Reflect/Apply
Discuss the activity with your child.
• **What worked well? What might you do differently next time?**
• **What did you learn about bridges and railways?**

Then relate it to your child’s world.
• **Where have you seen bridges in our world? What different types have you seen?**
• **What does it take to support a bridge?**
• **Have you ever seen a bridge being built? What kinds of materials did they use?**

Read Aloud Nonfiction
Read the book *Bridges* to learn more about bridges.
Activity Overview

Read After the Fall – How Humpty Dumpty Got Back Up Again

STEM play with enclosed materials

Read Move It: Movement, Forces and You

Backpack Contents

• Activity Guide
• After the Fall: How Humpty Dumpty Got Back Up Again by Dan Santat
• DUPLO® Blocks OR Nesting Cups OR Stacking Blocks OR Humpty Dumpty’s Wall Game
• Soft Humpty Dumpty
• Move It: Movement, Forces and You by Adrienne Mason

Read Aloud

Read After the Fall – How Humpty Dumpty Got Back Up Again. Discuss the story and focus on what happened to Humpty Dumpty.

STEM Play: Do

1. Build a wall for Humpty Dumpty using the cups, DUPLO® blocks, stacking blocks or play the Humpty Dumpty game.
2. Next, talk about and/or draw a wall design for the soft Humpty Dumpty. Think about how you can make a stable and safe wall for Humpty.
3. Then build your wall and place the soft Humpty Dumpty on the top of your wall. Did it stay up? Talk about what happened.

Reflect/Apply

After you are done building your first wall, think about how you might make it better. Then build your new wall idea and test it with Humpty Dumpty again! How did it go?

Discuss together why it is important to have safe, stable walls. Ask your child: Why did Humpty fall off the wall? Have you ever fallen off of something? What happened (stress safety here)? Why do things fall down?

Read Aloud: Nonfiction

Read aloud the book Move It: Movement, Forces and You. Tie the ideas presented in the book to the STEM play done earlier.

Extra STEM Fun

• Retell the story with the soft Humpty Dumpty and your newly designed wall.
• Do the bouncy egg investigation together: Place an egg (right out of the egg carton) in approximately ½ cup vinegar and let it sit overnight. Drain the vinegar. Rinse the egg off with water.
  • What does the egg look like? Is it the same or different? Where did the shell go? What does it feel like?
  • Gently bounce and/or roll the egg on the table or drop into a sink (pretend it is falling from the wall—like Humpty!). What happened? Remember to always wash your hands well with soap and water after handling raw eggs and clean surfaces with a disinfectant spray. Some raw eggs contain salmonella bacteria that can make you really sick!
MAGIC EYE

Activity Overview
• Read Red Fox or Magic Eye: A New Way of Looking at the World
• Magic STEM activities: Various magic and optical illusion activities
• Read Eye: How It Works

Backpack Contents
• Activity Guide
• Red Fox by Eric Carle
• Magic Eye: A New Way of Looking at the World by NE Enterprises
• Houdini’s Magic Coloring Book
• Melissa and Doug Magic Trick Kit
• Pencil
• Spoon
• Eye: How it Works by David Macaulay
• Model of an Eye

Extra STEM Fun
• Look for more from the Magic Eye Series!
• Present a magic show for your family and friends.

Read Aloud: Fiction
Read and examine the books Red Fox or Magic Eye: A New Way of Looking at the World. Have fun noting the different ways to “see” the world!

STEM Play: Do
• Try out the magic coloring book—remember not to actually color in it. Directions on how to use it can be found in the book. What did you notice?
• Next, look through the magic trick kit. Find one or more magic tricks that you might like to try. Remember, it may take a while to learn the tricks—so don’t be afraid to try them more than once! While you are practicing think about how magic tries to trick your eyes.
• Two more magic trick ideas for you to try:
  Rubber Pencil
  • Hold a regular pencil down by the eraser and shaking it at just the right speed, it appears to become made of bendable rubber instead of wood. It may take some practice to get the speed and technique just right.
  Spoon Bending
  • Press down on the spoon while sliding your hand along the handle, which gives the illusion of the utensil bending. It takes some practice to get it just right.

Reflect/Apply
Discuss the activities with your child.
• Have you seen other magic tricks before?
• How do you think they work to trick your eyes?
• How do you think eyes work?

Read Aloud: Nonfiction
Read the book Eye: How It Works. Use the eye model to help you understand the text. Be sure to discuss new vocabulary and how what you are reading might apply to the activities done earlier.