PictureSTEM

Designing Toy Box Organizers

PURDUE UNIVERSITY

INSPIRE
Research Institute for Pre-College Engineering

IOWA STATE UNIVERSITY

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About PictureSTEM
The PictureSTEM Project includes an instructional module at each grade level, K-5, which employs engineering and literary contexts to integrate science, technology, and mathematics content instruction in meaningful and significant ways. These transformative new models for STEM learning use picture books and an engineering design challenge to provide students with authentic, contextual activities that engage learners in specific science and mathematics content while integrating across traditional disciplinary boundaries. Currently, there are limited curricula that address this need for integration. The goal of PictureSTEM is getting these high-quality, research-based materials into practice in a form that fits with teachers' current implementation structures.

To learn more about the PictureSTEM Project and to view additional integrated STEM units, contact us:

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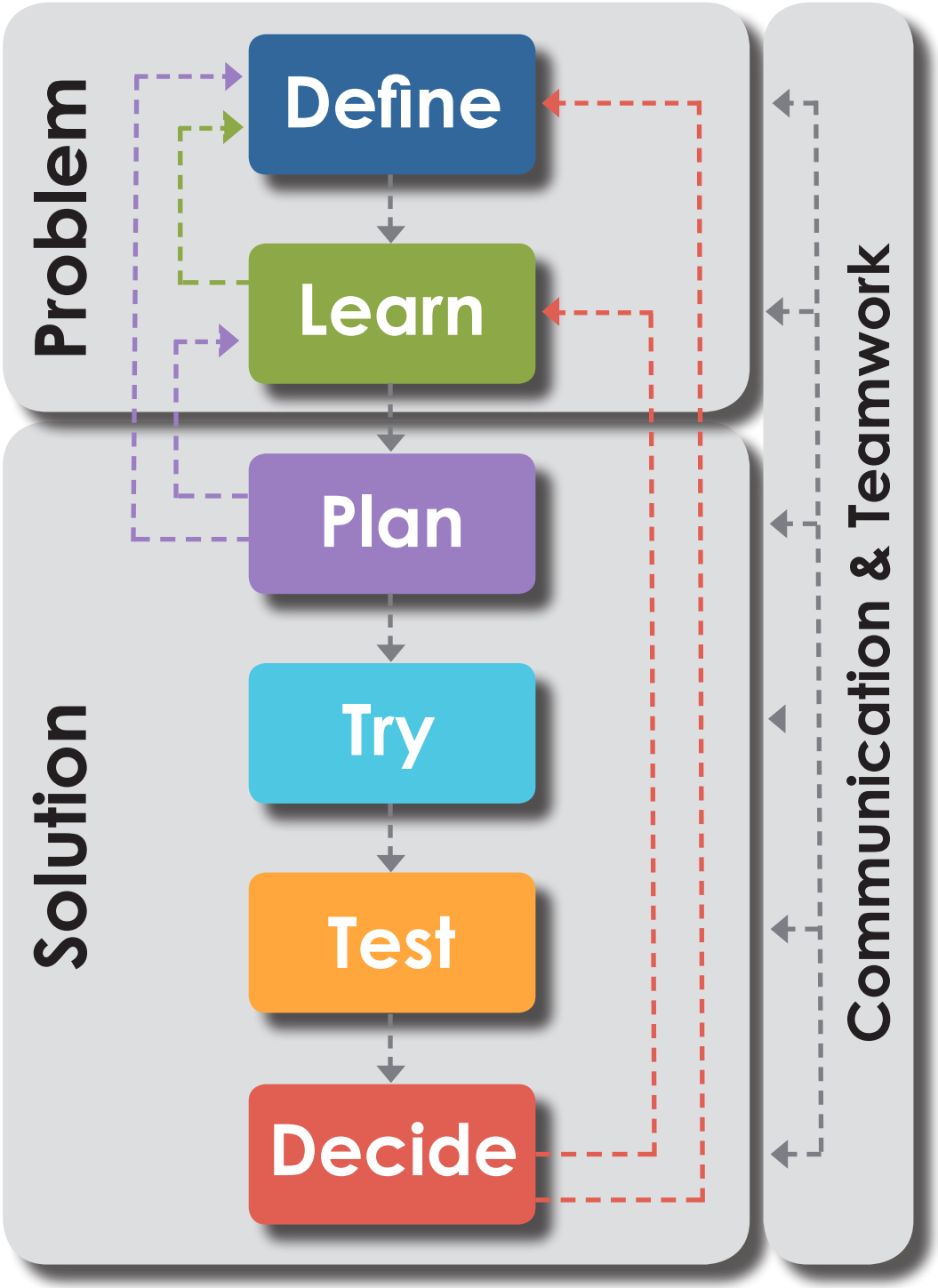
Engineering Design Process

A way to improve



DEFINE THE PROBLEM

- Who is the client? What does the client need? Why does she or he need it?
- Why is the problem important to solve? What are the criteria (requirements) of the solution? What are the constraints (limits)?
- Problem Scoping: WHO needs WHAT because WHY

LEARN ABOUT THE PROBLEM

- What kind of background knowledge is needed to solve the problem? What science/ mathematics knowledge will be needed? What materials will be needed?
- What has already been done to solve the problem What products fill a similar need?
- How should we measure improvement?

PLAN A SOLUTION

- Continue to specify the criteria and constraints
- Idea generation
- Develop multiple possible solution paths
- Consider trade-offs and relative constraints
- Choose a solution to try
- Develop plans (blueprints, schematics, cost sheets, storyboards, notebook pages)

TRY A SOLUTION

- Put the plan into action
- Consider risk and how to optimize work
- Use criteria, constraints, and trade-offs from problem/plan to build a prototype (a testable representation of a solution), model, or product

TEST A SOLUTION

- Consider testable questions or hypotheses
- Develop experiments or rubrics to know if solution are meeting the stated criteria, constraints, and needs
- Collect and analyze data

DECIDE WHETHER THE SOLUTION IS GOOD ENOUGH

- Are users able to use design to help with problem?
- Does your design meet the criteria and stay within the constraints?
- How could your design be improved based on your test results and feedback from client/user?
- Iterative nature of design: Consider always which step should be next!

COMMUNICATION & TEAMWORK

- Good oral and written communication and teamwork is needed throughout the entire design process.
- The client should be able to create/follow the solution without ever speaking to you. Include claims (use evidence to support what you believe is true) about your solution so the client knows why they should use it.

Lesson Intro

FOCUS/KEY CONCEPTS

Students will be able to:

- Ask questions and gather information to define a problem about a situation people want to change through developing a new tool

STANDARDS

National

- NGSS: K-2-ETS1-1,SL.K.1, SL.K.6

MATERIALS

- Chart paper (3+ pieces)
- Markers (for teacher)
- Large copy of the Engineering Design Process
- Engineering Design Process sliders (1 per student)
- Paper clip (for EDP sliders) (1 per student)
- 1 toy box with toys inside
- Talia's letter/email
- Large copy of Talia's email/letter
- Optional: Talia's email/ letter

TEACHER PREPARATION

- Prepare a large copy of the Engineering Design Process.
- Write each heading on its own sheet of chart paper: Problem, Goals/Criteria, Rules/Constraints

VOCABULARY

- **Engineer** A person who uses mathematics, science, and creativity to solve problems to help people
- **Engineering Design Process** A series of steps used by engineers to help them solve a problem or meet a need

Defining the Problem

INTRODUCTION

1. **Introduce engineering.** **Say:** *We are going to be working as engineers over the next few days. Does anyone know what an engineer does?* Take student answers. *Engineers are people who use science, mathematics, and creativity to solve problems to help people. Typically their solution is a new or improved technology or a process.*

2. **Make a personal connection.** (Give an example of a problem that you have had and ask students to help you think of a solution.) Then ask students to share a problem they might have or have had in the past. **Say:** *Those are some good problems, and just like that you are starting to think like engineers.*

3. **Introduce the engineering design process.** Display the engineering design process and have students place their engineering design processes sliders in front of them. **Say:** *Engineers use this process, the Engineering Design Process along with science, mathematics, and creativity to understand a problem and come up with a solution. We are going to use the Engineering Design Process as we work as engineers over the next several days to help find a solution to Talia's problem.*

4. **Introduce the problem.** Read Talia's letter/email.

5. **Identify where they are in the engineering design process. (Define)** **Ask:** *Where do you think we are in the engineering design process? (point to the classroom Engineering Design Process chart) Where should we move our paper clip and why should we move it there? Engineers need to define the problem they will solve before they can learn about the problem, plan a design, try the design, test the design, and decide if their design works.*

ACTIVITY - Defining the problem

1. **Define the problem.** **Say:** *Let's think back to the letter/email we received.* **Ask:** Who is the client? What does the client need? Why does she need it? Record students' responses on the chart paper labeled "Problem".

2. **Provide feedback to Talia.** **Ask:** Do you have any questions for Talia about the Travel with Me Toy Box? Record questions. **Ask:** *What are some of your ideas about how Talia can make her toy box neat so kids can find their toys easily?* Record responses from students where they can see them. You may need to develop answers to the students' questions that help them focus in on the problem and not be distracted by other ideas. Pretend to send this information to Talia via email (or mail).

3. **More information about the engineering challenge.** Read the second letter from Talia's Toy Box Company.

4. **Provide more feedback to Talia.** **Ask:** *What two things does Talia say she wants the organizer to do?* Record their responses. *What are some of your ideas about what other things make a toy box organizer good?* Add their answers to the list. *What are ways that we can test*

Defining the Problem

the organizers to make sure that they do or have the things we put on our list? Record student responses. (e.g. Cleanup test: Time how long it takes to put all of the toys back where they belong in the toy box. Upside down test: With all the toys inside the toy box place the lid on and secure. Turn the toy box over and then flip it right side up. Open the lid. Record what things are out of place.) Pretend to send this information to Talia via email (or mail).

5. **Even more information about the challenge.** Read the third letter from Talia's Toy Box Company.

6. **Define what an engineer is and why they do.** **Say:** *We are going to think like engineers while we work to design a toy box organizer.* Talk with students about what an engineer is and what they do. **Say:** *Engineers use mathematics, science, and creativity to solve problems to help people.*

7. **Identify the criteria and constraints.** **Say:** *In Talia's letters/emails, she said she wants several things to be true about the toy box organizer. I'm going to read her letter/email again, raise your hand when you hear something that Talia wants to be true about the toy box organizer.* Read Talia's letter/email aloud and record students' responses on the chart paper.

   Point to the list and **say:** *Which ones of these are constraints (limit the ways we can solve the problem) and which of these are criteria (things that we will use to judge the success of our design)?* Have the students help you decide which are criteria. Mark the correct criteria (Grab Test, Shake Test, student identified test(s)) and the constraints (must fit and work inside toy box and lid must be able to close with organizer and toys inside.
   Note: We will define the constraints and criteria as the unit continues.

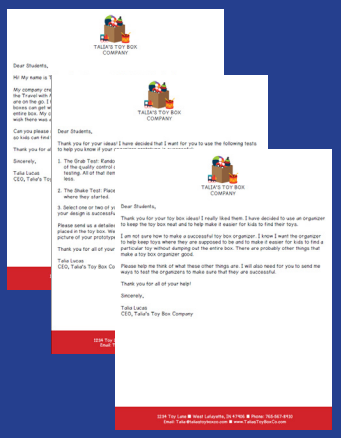
CLOSURE

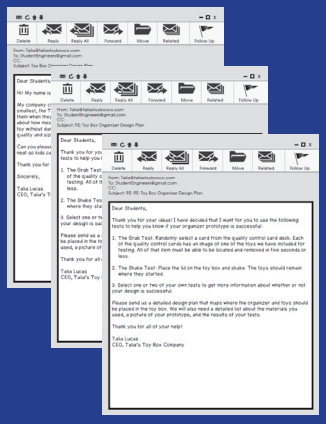
1. **Check in with students.** Encourage students to share any questions they may have about the problem, goals, and rules. Record their questions on a sheet of chart paper. Share that engineers also ask questions about the problems they are trying to solve to help them know what they need to learn more about and what kind of tests they must do before brainstorming a solution.

TEACHER NOTES

Lesson Intro

DUPLICATION MASTERS





TALIA'S TOY BOX
COMPANY

Dear Students,

Hi! My name is Talia and I am the owner and CEO of Talia's Toy Box Company.

My company creates many different toy boxes but the most popular one is the smallest, the Travel with Me Toy Box. It allows children to carry small toys with them when they are on the go. I have started to receive complaints from parents about how messy the boxes can get which makes it very hard to find a particular toy without dumping out the entire box. My customers have said that they love the quality and size of the box but wish there was a way to keep the toys organized.

Can you please send me some ideas about how to keep the Travel with Me Toy Box neat so kids can find their toys easily?

Thank you for all of your help!

Sincerely,

Talia Lucas
CEO, Talia's Toy Box Company

1234 Toy Lane ■ West Lafayette, IN 47906 ■ Phone: 765-567-8910
Email: Talia @taliastoyboxco.com ■ www.TaliasToyBoxCo.com

TALIA'S TOY BOX
COMPANY

Dear Students,

Thank you for your toy box ideas! I really liked them. I have decided to use an organizer to keep the toy box neat and to help make it easier for kids to find their toys.

I am not sure how to make a successful toy box organizer. I know I want the organizer to help keep toys where they are supposed to be and to make it easier for kids to find a particular toy without dumping out the entire box. There are probably other things that make a toy box organizer good.

Please help me think of what these other things are. I will also need for you to send me ways to test the organizers to make sure that they are successful.

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1. The Grab Test: Randomly select a card from the quality control card deck. Each of the quality control cards has an image of one of the toys we have included for testing. All of that item must be able to be located and removed in five seconds or less.
2. The Shake Test: Place the lid on the toy box and shake. The toys should remain where they started.
3. Select one or two of your own tests to get more information about whether or not your design is successful.

As you create your design, you need to make sure the following are true for your organizer. The toy box organizer must fit and work inside the Travel with Me Toy Box. The lid of the box must be able to still close when the organizer and all of the toys we have provided you for testing are inside.

Please send us a detailed design plan that maps where the organizer and toys should be placed in the toy box. We will also need a detailed list about the materials you used, a picture of your prototype, and the results of your tests.

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Delete


Reply


Reply All


Forward


Move


Related


Follow Up

From: Talia@taliastoyboxco.com
To: StudentEngineers@gmail.com
CC:
Subject: Toy Box Organizer Design Plan

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Talia Lucas
CEO, Talia's Toy Box Company

Lesson 1A

Henry's Map

FOCUS/KEY CONCEPTS

- Students will be able to:
- Literacy: Use sequencing to retell main events in the story
- Computational Thinking: Illustrate thoughts, ideas, and stories in a step-by-step manner.

STANDARDS

National

- CCSS-ELA: RL.2.2
- CSTA: L1:3.CT.2

MATERIALS

- Book: Henry's Map by David Elliot
- Large copy of the Sequencing the Story BLM
- Optional: Large copy of the Sequencing Cards BLM
- Optional: Sequencing the Story BLM (1 per student)
- Optional: Sequencing Cards BLM (1 per student)
- Optional: If you ue the Sequencing Cards - Scissors, glue/tape
- Engineering Design Process sliders

TEACHER PREPARATION

- Prepare a large copy of the Sequencing the Story BLM
- Optional: Prepare a large set of the Sequencing Cards.

VOCABULARY

- **map** a visual representation (a picture or chart) that shows the position of different parts of something

INTRODUCTION

1. **Tie to engineering challenge.** **Say:** *We received several letters/emails from Talia who needs our help. Who can remember what she needs help with?* (Create an organizer for their Travel with Me toy box to keep the toys organized.) *How can we help her? What are some of the rules/ constraints that we need to keep in mind when designing our organizer?*

2. **Identify where they are in the engineering design process. (Learn).** **Ask:** *Where do you think we are in the engineering design process?* (point to the classroom Engineering Design Process chart) *Where should we move our paperclip and why should we move it there? (learn about the problem phase)* **Say:** *Like engineers, we want to make sure that we understand what the problem is and who we are solving it for. We also need to learn as much as we can about the problem and ways to solve the problem before we start on our designs. One of the important parts of our design is that the plan needs to show Talia where the organizer and toys should go. Today, we will learn about maps and how they can help us communicate where something should go.*

3. **Connect to prior knowledge.** **Ask:** *If someone new wanted to come visit our classroom and they were in the front office, how could we help them get here?* (Give them directions, show them the way.) *What if we were out at recess, is there a way they could get here on their own?* (Give them directions or a map.)

ACTIVITY - Sequencing

1. **Introduce the book.** **Say:** *Today we will read a story about a little pig named Henry, who likes to be organized. He likes for everything to be in its place so that he and others can easily find things. One day Henry looks out his window and sees that the farm where he lives is a mess. He worries that no one will be able to find anyting on the farm. So, Henry thinks of a plan. Let's see what happens to our friend Henry and how he solves the messy farm problem.*

2. **Introduce/Explain the reading strategy.** **Say:** *Today we are going to continue to work on becoming better readers by practicing different skills that we can use to remember what happened in the story. Good readers use different strategies to make sure that they understand what they are reading, and one way to do that is using sequencing to put the main events from the story in the order of how they happened in the story. This helps us to better understand what we have read.*

3. **Start reading.** Read the book out loud and remember to use some of the strategies that help with reading and comprehension development:
   - Teach new vocabulary at the point of contact
   - Target the reading skill – sequencing to help identifying main events from the story
   - Encourage higher-level thinking and comprehension monitoring by pausing for "teacher think alouds" and asking questions about or discussing the text

4. **Re-read and practice.** Have students help you recount the story by identifying and ordering the Sequence Cards that picture the places

that Henry visited in the story (key details).

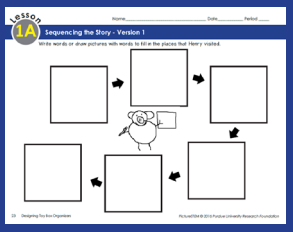
CLOSURE

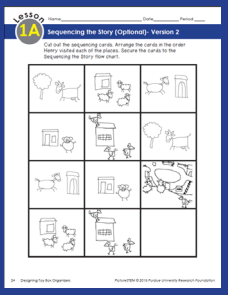
1. **Tie back to engineering challenge. Ask:** *How is Henry's problem similar to the problem that we will be solving?* The farm is messy and he needs a way to keep the farm organized and we are helping to keep the toy boxes organized. *How does Henry solve his problem?* He makes a map. *Do you think we could do that with our toy boxes? Yes we could map where the organizer should go) Will a map be enough to keep the toys organized?* No, a map alone will not keep the toys organized but it might help people find things easier, be a good way to communicate our plan for the organizer to Talia. *For the next lesson, we are going to continue to think and learn about maps and what we need to do in order to make a map that someone else can follow.*

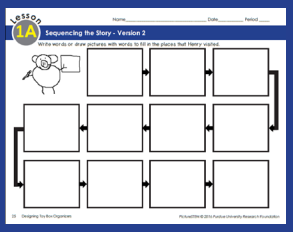
TEACHER NOTES

Lesson 1A

DUPLICATION MASTERS





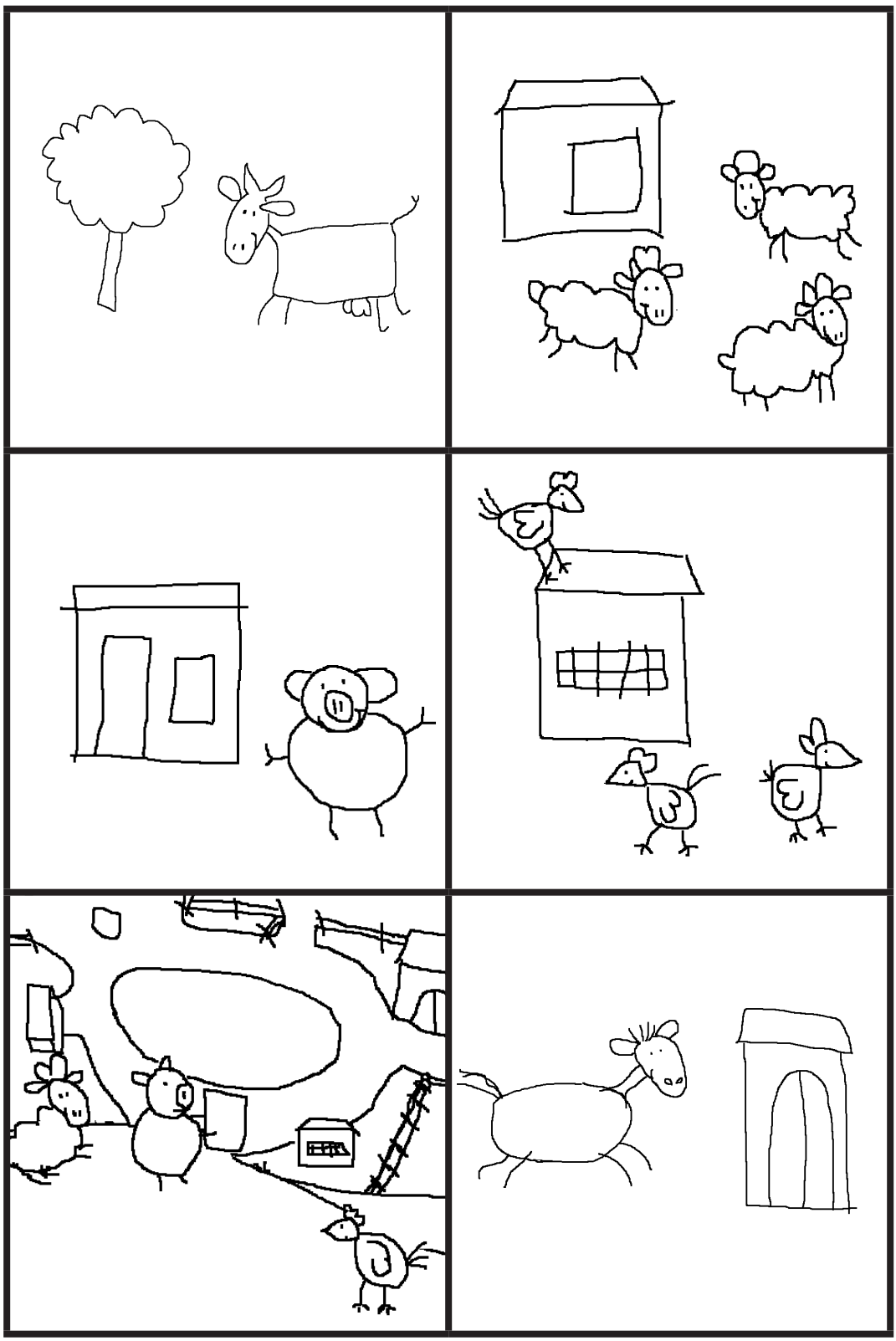


Lesson 1A

Name_____ Date_____ Period _____

Sequencing Cards (Optional) - Version 1

Cut out the sequencing cards. Arrange the cards in the order Henry visited each of the places. Secure the cards to the Sequencing the Story flow chart.

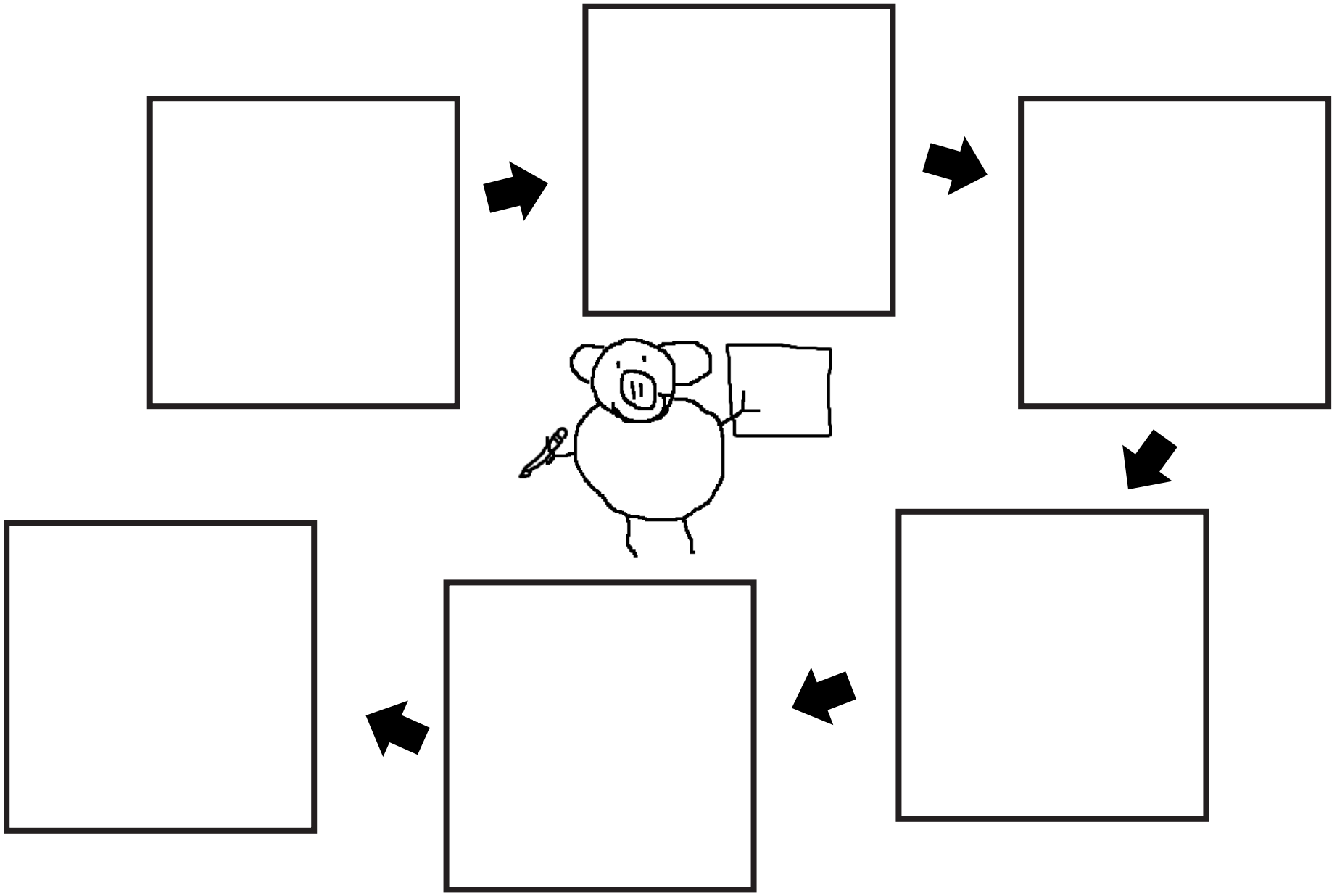


Lesson 1A

Name_____ Date_____ Period _____

Sequencing the Story - Version 1

Write words or draw pictures with words to fill in the places that Henry visited.

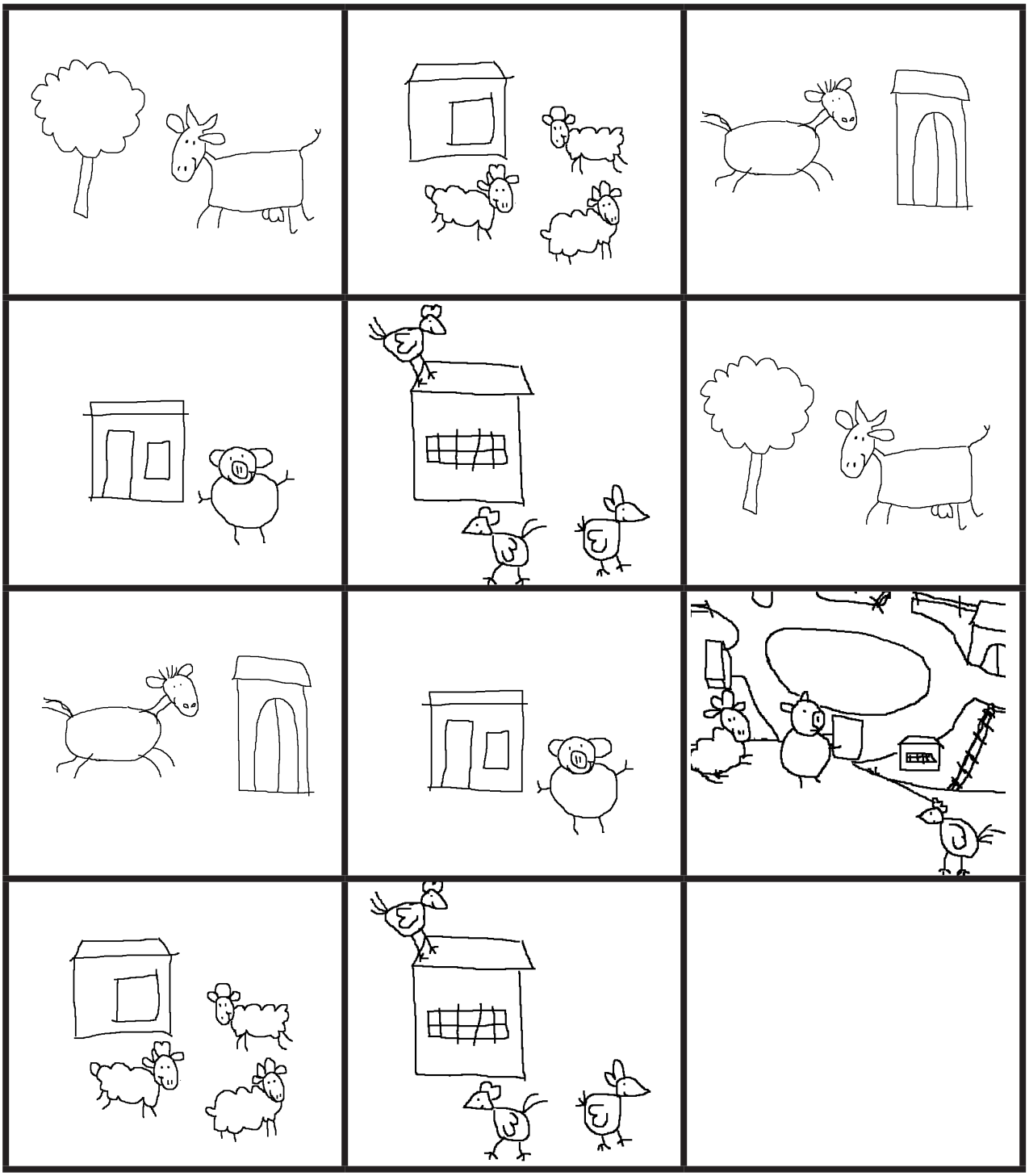


Lesson 1A

Name_____ Date_____ Period _____

Sequencing the Story (Optional)- Version 2

Cut out the sequencing cards. Arrange the cards in the order Henry visited each of the places. Secure the cards to the Sequencing the Story flow chart.

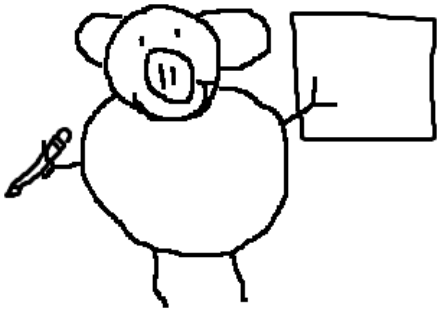


Lesson 1A

Name_____ Date_____ Period _____

Sequencing the Story - Version 2

Write words or draw pictures with words to fill in the places that Henry visited.



Lesson 1B

FOCUS/KEY CONCEPTS

Students will be able to:

- Computational Thinking: Use technology resources to solve age appropriate problems.
- Illustrate thoughts, ideas, and stories in a step-by-step manner.

STANDARDS

CSTA: L1:3.CT.1, L1:3.CT.2, L1:3/CL.2

MATERIALS

- 1 Learning Essentials: STEM Robot Mouse Kit per group of 4 students
- Robot Mouse BLM
- Map It BLM
- Markers, colored pencils, or crayons (green, orange, yellow, blue, red, purple)
- Engineering Design Process sliders

TEACHER PREPARATION

- If you have new kits, remove all plastic wrap.

VOCABULARY

- **Map** a visual representation (a picture or chart) that shows the position of different parts of something
- **Code** a set of instructions written for a computer
- **Debug** identify and address problems that prevent a task to be completed
- **Robot** a machine that has been programed to perform tasks
- **Flow chart** a diagram that represents an alogrithm/ process, showing the steps in boxes and their order by connecting them with arrows

Robot Mouse

INTRODUCTION

1. **Tie to engineering challenge.** Have students recall what they remember about the toy box organizer challenge. **Ask:** *What problem are we helping Talia solve?* (e.g. Customers are complaining that the toy boxes get too messy.) *How are we going to help her solve the problem?* (e.g. By designing a toy box organizer.)

2. **Introduce the concept. Ask:** *What is a map?* **Say:** *Talia wants us to map where the organizer and toys will go. Earlier we read Henry's Map. What did Henry make a map of? (The farm he lives on - it tells him where everyone belongs) Today we will learn more about maps. We will help a company make new map cards for their toy robot mouse.*

3. **Identify where they are in the engineering design process. (Learn) Ask:** *Where do you think we are in the engineering design process? (point to the classroom Engineering Design Process chart) Where should we move our paper clip and why should we move it there?* **(***learn about the problem phase) We need to continue to learn as much as we can about the problem before we start to plan a solution. Today, we will learn about how to create a map that clearly communicates where objects belong.*

ACTIVITY - Developing an algorithm

1. **Introduce the activity. Say:** *The company that makes this Robot Mouse kit needs our help.(Hold up kit.) Their customers want more map cards to play with. The company would like for each team of students to create a map card for them to consider including in their new pack of cards.*

2. **Learn about the Robot Mouse kit: Say:** *Before we can help make new map cards for the company we will have to learn about the toy robot mouse kit. It comes with the following things:* (hold up each item as you say it) *a mouse, coding cards, course squares, map cards, cheese, walls, and tunnels. To play with the toy you must build the course on the card, create a flow cart using the coding cards, enter the code into the mouse, and then have the mouse run through the course. If the mouse does not reach the cheese, the player must debug the code until the mouse reaches the cheese.*

3. **Build a course.** Have groups locate Card 20. Using the mapping card have students construct the course. Give students about 10 minutes to build the course. Talk about what they learned about the parts of the course and any helpful hints for building with the manipulatives. Explain that walls cannot be moved, the mouse must go through each tunnel and complete each action on the course before reaching the cheese.

4. **Learn how the robot works. Say:** *First we will learn about how the mouse works. Take out your mouse and put it in the center of you and your teammates. Look but do not touch the buttons on top of the robot mouse. Each of these buttons tells the mouse a certain command. The yellow circle button clears the mouse's memory. The green circle button makes the mouse go - but remember it will only go where you have programmed it to go. I want you and your team to take a few minutes to try to figure out what each of the other buttons do. Let everyone*

have a chance to push one button. After about 3-5 minutes have students share what they learned about the buttons.

5. **Practice using the coding cards.** Have students locate the coding cards in their kit. Help students connect the images on the cards with the buttons on the mouse. As a class, work together to create a flow chart of the code you will use to program the mouse to help it successfully reach the cheese on the course pictured on Card 20. Have the students program their mouse and have the mouse run through the course. If there is an error, work as a class to debug the code until the mouse successfully reaches the cheese. Record the code on the Robot Mouse BLM. Students should draw simple versions of the images that appears on their coding cards in the boxes to create a simple flow chart. Students will need to add arrows between the boxes to show which order the steps should be followed.

6. **Investigate the robot mouse kit.** **Say:** *I am going to give you 20 minutes to learn as much as you can about the robot mouse kit. Complete the three map cards listed on your paper. Remember you must create the course using the map card, create a flow chart using the coding cards, program the mouse, test the code by letting the mouse run through the course, and record the flow chart of your code on the BLM.* At the end of the 20 minutes have students share what they learned.
Hint: *Allow students to select one of the following roles on the team: course builder, coder, programmer, and recorder. Have students rotate jobs for each new card they try.*

7. **Revisit the problem.** **Ask:** *What does the company who makes the robot mouse kit need our help with? (e.g. to create new map cards for the robot mouse) What other information do you need to know before you begin to create your map?*

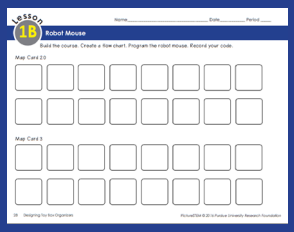
8. **Solve the problem.** Give students 20 minutes to physically build a course and then draw it on the Map It! BLM. At about 10 minutes they should be drawing their map. If time permits allow teams to check each others' work.
   - Option 1: Have teams switch spaces with another team. Teams should ensure that the maps match the physical model. Have students come together and share feedback.
   - Option 2: Have students take pictures of their physical courses and then take them apart. Have team's switch maps and construct the course. Compare the photo to the newly constructed course to see if it matches. Provide feedback.

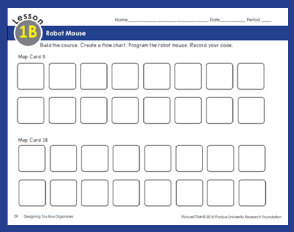
CLOSURE

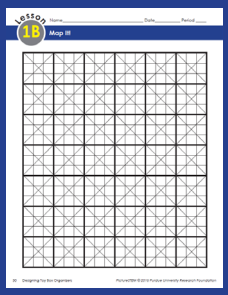
1. **Tie back to the engineering challenge.** What are some things to remember when creating a map? Think about toy box organizer challenge. What similarities do you these two challenges have? What differences?

TEACHER NOTES

DUPLICATION MASTERS







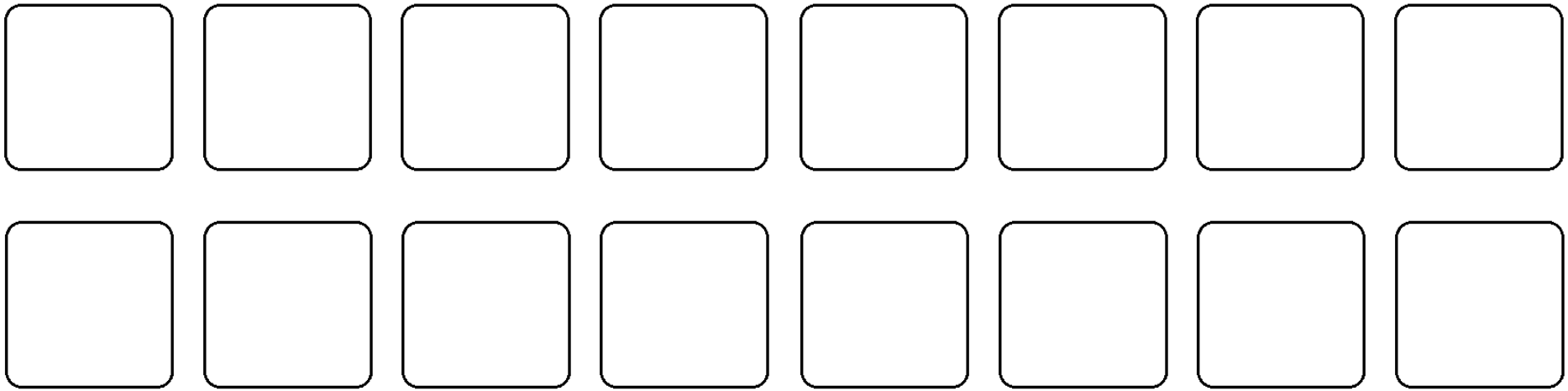
Lesson 1B

Name_____ Date_____ Period _____

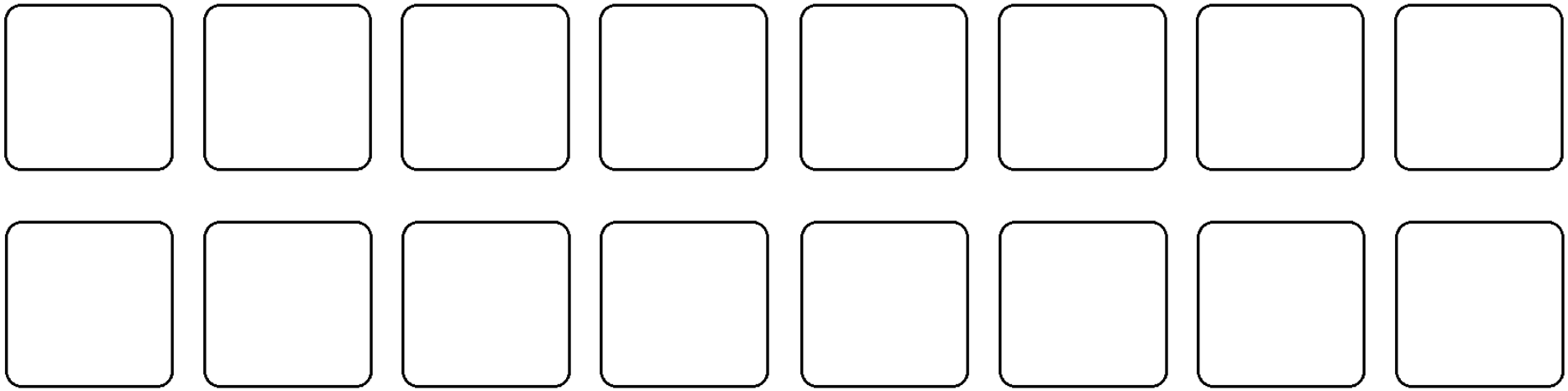
Robot Mouse

Build the course. Create a flow chart. Program the robot mouse. Record your code.

Map Card 20



Map Card 3



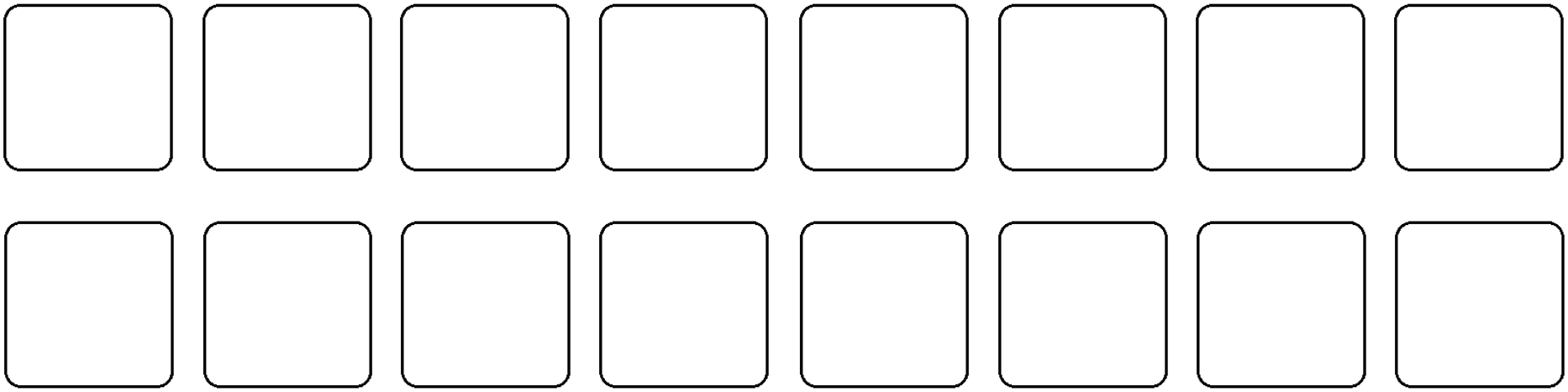
Lesson 1B

Name_____ Date_____ Period _____

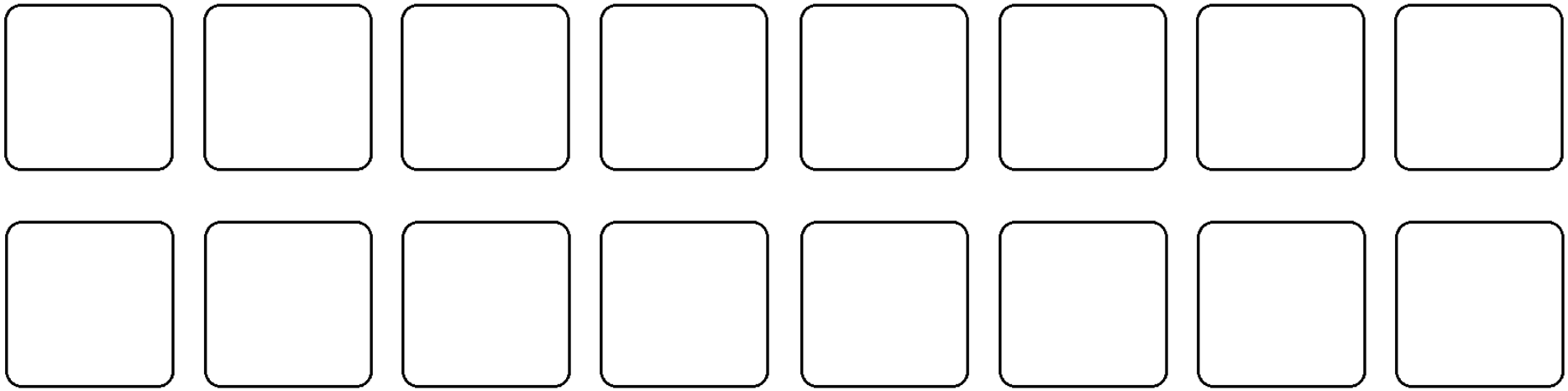
Robot Mouse

Build the course. Create a flow chart. Program the robot mouse. Record your code.

Map Card 5



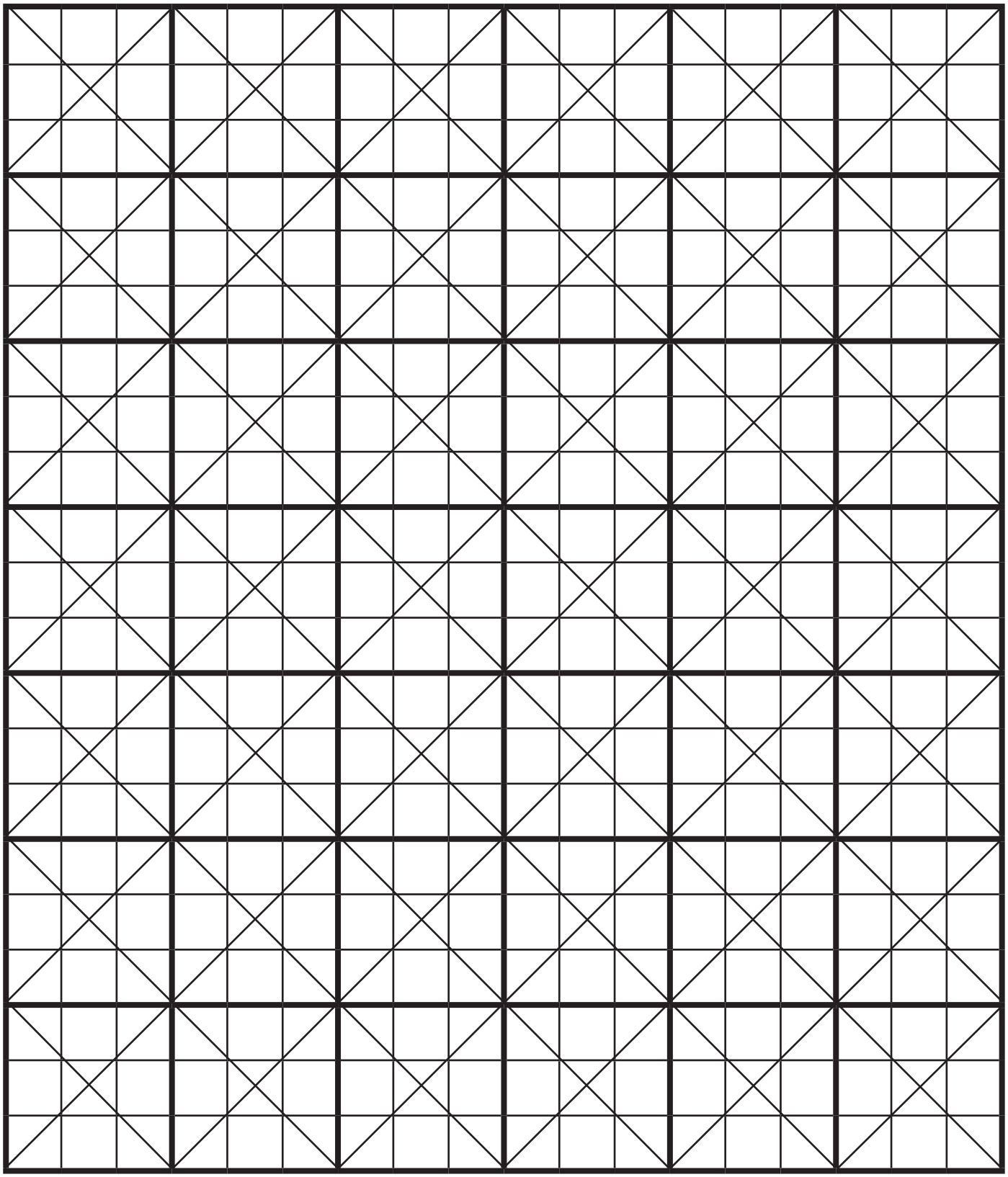
Map Card 18



Lesson 1B

Name_____ Date_____ Period _____

Map It!



Lesson 2A

FOCUS/KEY CONCEPTS

Students will be able to:

- Recognize that standard units are necessary to translate distances to others

STANDARDS

CCSS-Mathematics: 2.MD.A.1

MATERIALS

- Large copy of Treasure Hunt Educator Resoures
- Character cards (Susie, father, brother) (1 class set)
- Treasure Hunt - Help Find a Solution BLM (1 per student)
- Engineering Design Process sliders

TEACHER PREPARATION

- Prepare a large copy of the Treasure Hunt Educator Resources
- Prepare character cards (front and back) for Susie, brother, and father. Print out, cut out, laminate, punch hole, and add and knot string to make name badges that can be worn around the neck.
- Print and hang up location signs around the room.

VOCABULARY

- **Unit** An amount used again and again to measure something

Treasure Hunt

INTRODUCTION

1. **Tie to engineering challenge.** Remind students of the toy box organizer challenge. **Ask:** *Who can tell me why we're helping the toy box company?* (e.g. Customers are complaining that the toy box gets too messy.) *What problem we are helping them to solve?* (e.g. Create an organizer to keep the toy boxes from getting so messy.)

2. **Introduce the lesson. Say:** *Before we can make our designs, we need to learn a little more about the science and mathematics that we are going to need to help make our toy box organizers. We are going to help Susie with a problem she is having. By helping Susie, we are also going to help ourselves learn some things we need to know to design our toy box organizers.*

3. **Identify where they are in the engineering design process. (Learn) Ask:** *Where do you think we are in the engineering design process?* (point to the classroom Engineering Design Process chart) *Where should we move our paperclip and why should we move it there?* Remind students that an important part of the engineering design process is learning about the problem and ways to solve the problem.

ACTIVITY - Modeling activity

1. **Context setup.** Find three volunteers from the class to help act out the problem. Assign each student a role: Susie, Brother, and Father. Quietly inform them of the size step their character needs to take: normal (Susie), little (Brother), and big (Father).

2. **Treasure Hunt Problem.** Introduce the class to the problem by having three students role play the scenario as you read it. After watching the problem scenario, **Ask:** *What is Susie's problem?* (She wants her friends to go on a treasure hunt, but doesn't know where to bury the treasure and what directions to give them.)

3. **Solve the problem.** Put students into pairs and have them work together to solve the problem and figure out a way to help Susie. Tell students that there are many different possible answers to this problem. After giving students a few minutes to talk together, have students share different ideas for how to help Susie.
   Note: *The first version of the Treasure Hunt maps do not have a grid on them and are therefore more suitable for younger students.*

CLOSURE

4. **Sharing Solutions.** It is important to allow students to present and share their answers with the class to get at the idea that there can be many different ways to solve problems and that there is no one correct/best answer.

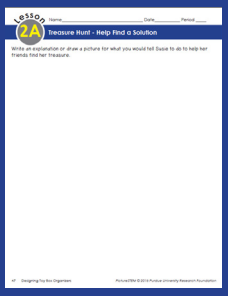
5. **Tie back to engineering challenge.** Remind students of the engineering challenge. **Ask:** *What did you learn from solving Susie's problem that we should remember and use when we design our toy box organizers?*

Treasure Hunt

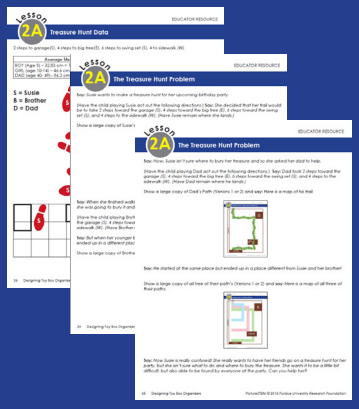
TEACHER NOTES

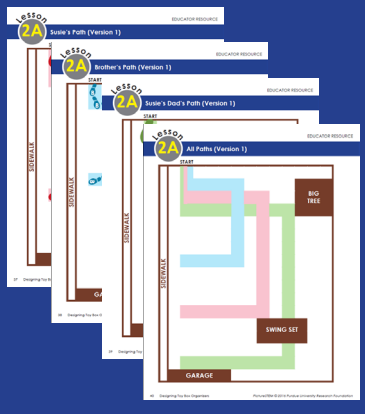
Lesson 2A

DUPLICATION MASTERS



EDUCATOR RESOURCES



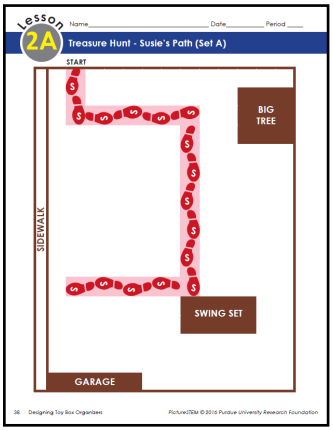


Lesson 2A The Treasure Hunt Problem

Say: *Susie wants to make a treasure hunt for her upcoming birthday party.*

(Have the child playing Susie act out the following directions.) **Say:** *She decided that her trail would be to take 2 steps toward the garage (S), 4 steps toward the big tree (E), 6 steps toward the swing set (S), and 4 steps to the sidewalk (W). (Have Susie remain where she lands.)*

Show a large copy of Susie's Path (Versions 1 or 2) and **say:** *Here is a map of her trail.*

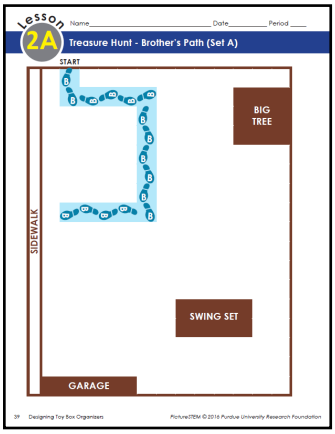


Say: *When she finished walking those directions, she placed her treasure box on the location where she was going to bury it and went to get her younger brother to have him try to follow her map.*

(Have the child playing Brother act out the following directions.) **Say:** *Brother took 2 steps toward the garage (S), 4 steps toward the big tree (E), 6 steps toward the swing set (S), and 4 steps to the sidewalk (W). (Have Brother remain where he lands.)*

Say: *But when her younger brother started in the same place and followed the same directions, he ended up in a different place!*

Show a large copy of Brother's Path (Versions 1 or 2) and **say:** *Here is a map of his trail.*

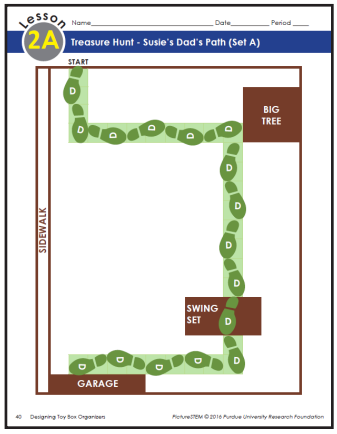


Lesson 2A The Treasure Hunt Problem

Say: *Now, Susie isn't sure where to bury her treasure and so she asked her dad to help.*

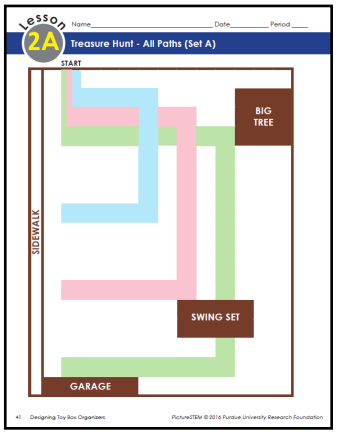
(Have the child playing Dad act out the following directions.) **Say:** *Dad took 2 steps toward the garage (S), 4 steps toward the big tree (E), 6 steps toward the swing set (S), and 4 steps to the sidewalk (W). (Have Dad remain where he lands.)*

Show a large copy of Dad's Path (Versions 1 or 2) and **say:** *Here is a map of his trail.*



Say: *He started at the same place but ended up in a place different from Susie and her brother!*

Show a large copy of all tree of their path's (Versions 1 or 2) and **say:** *Here is a map of all three of their paths.*



Say: *Now Susie is really confused! She really wants to have her friends go on a treasure hunt for her party, but she isn't sure what to do and where to bury the treasure. She wants it to be a little bit difficult, but also able to be found by everyone at the party. Can you help her?*

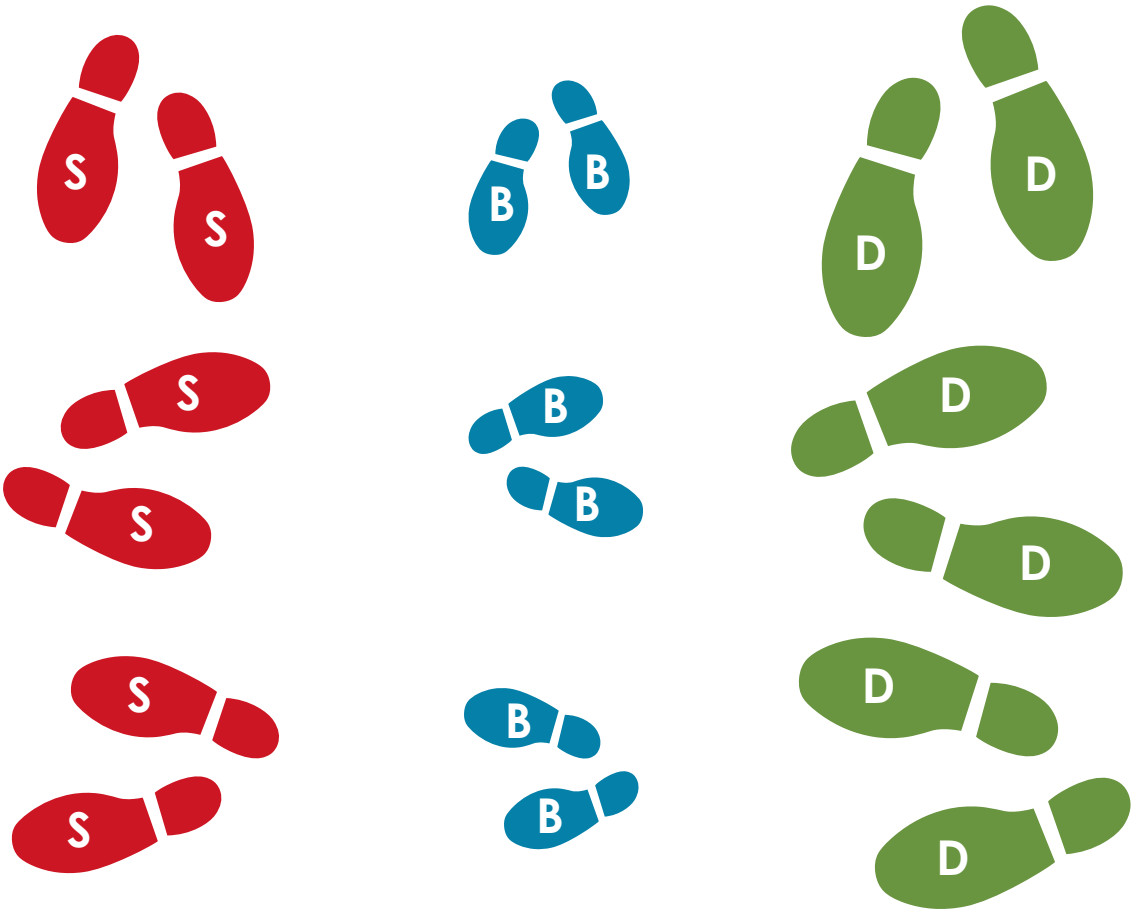
Lesson 2A

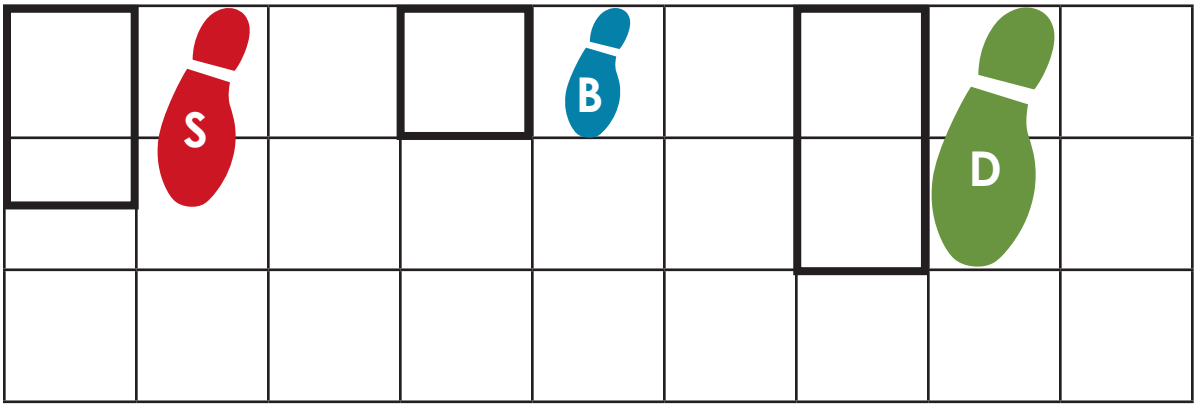
Treasure Hunt Data

2 steps to garage(S), 4 steps to big tree(E), 6 steps to swing set (S), 4 to sidewalk (W)

Average Step Length	Treasure Hunt Distances (1 box = 12 in)
BOY (Age 5) – 32.83 cm = 12.93 in (12) GIRL (age 10-14) – 46.6 cm = 18.35 in (18) DAD (age 40- 49)– 56.2 cm = 22.13 in (24)	BOY – 2(S), 4(E), 6(S), 4(W) GIRL – 3(S), 6(W), 9(S), 6(E) DAD – 4(S), 8(W), 12(S), 8(E)

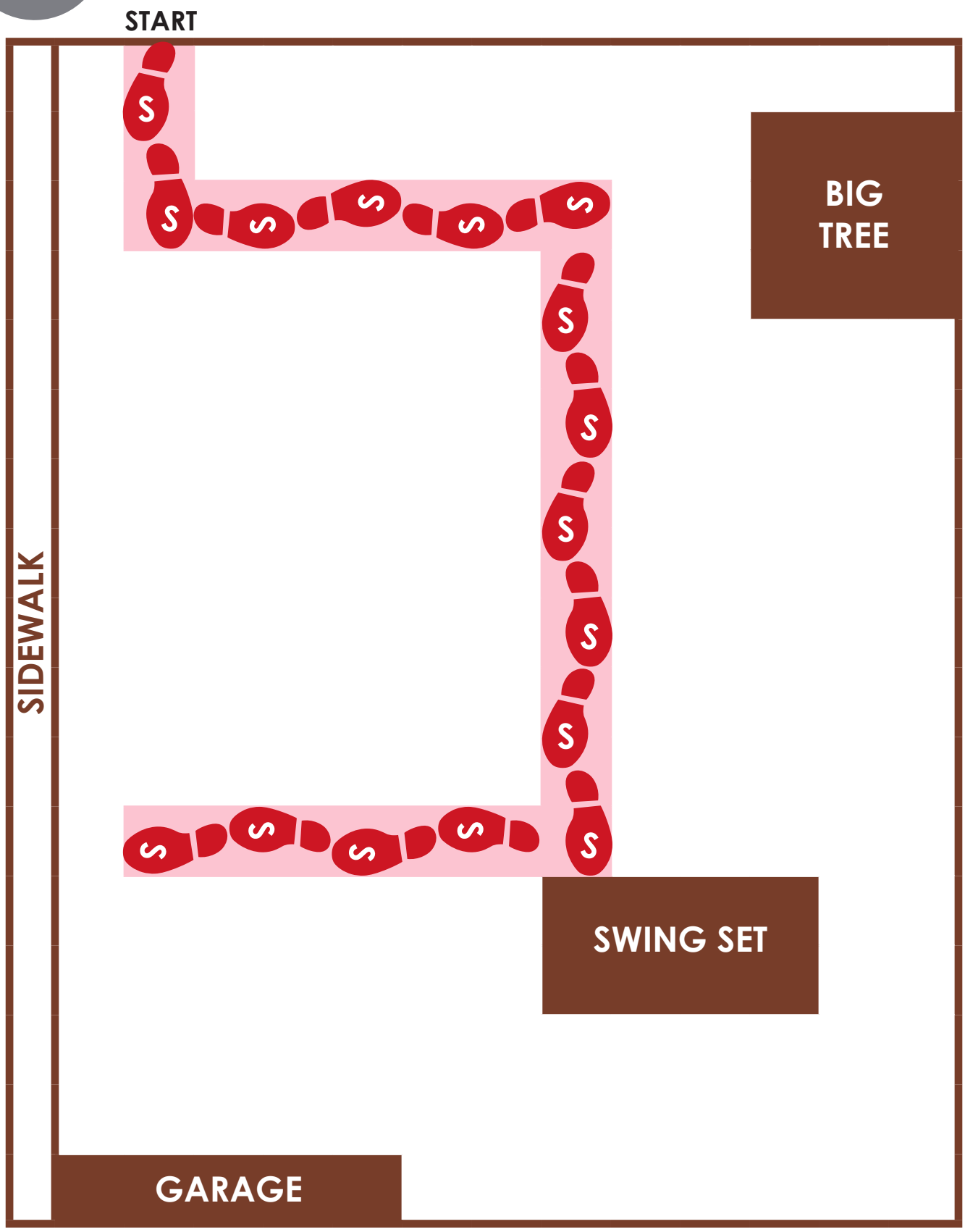
S = Susie
B = Brother
D = Dad





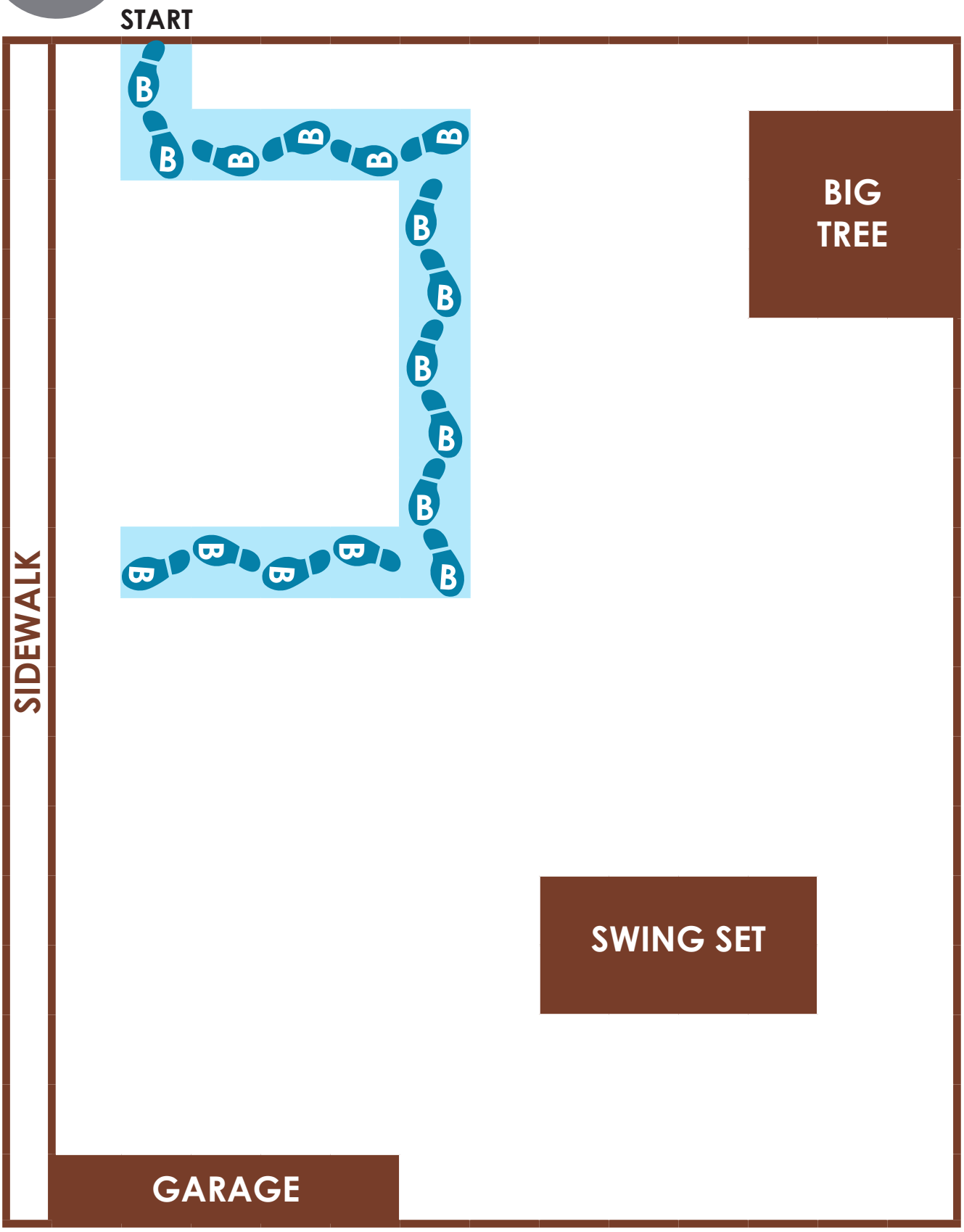
Lesson 2A

Susie's Path (Version 1)



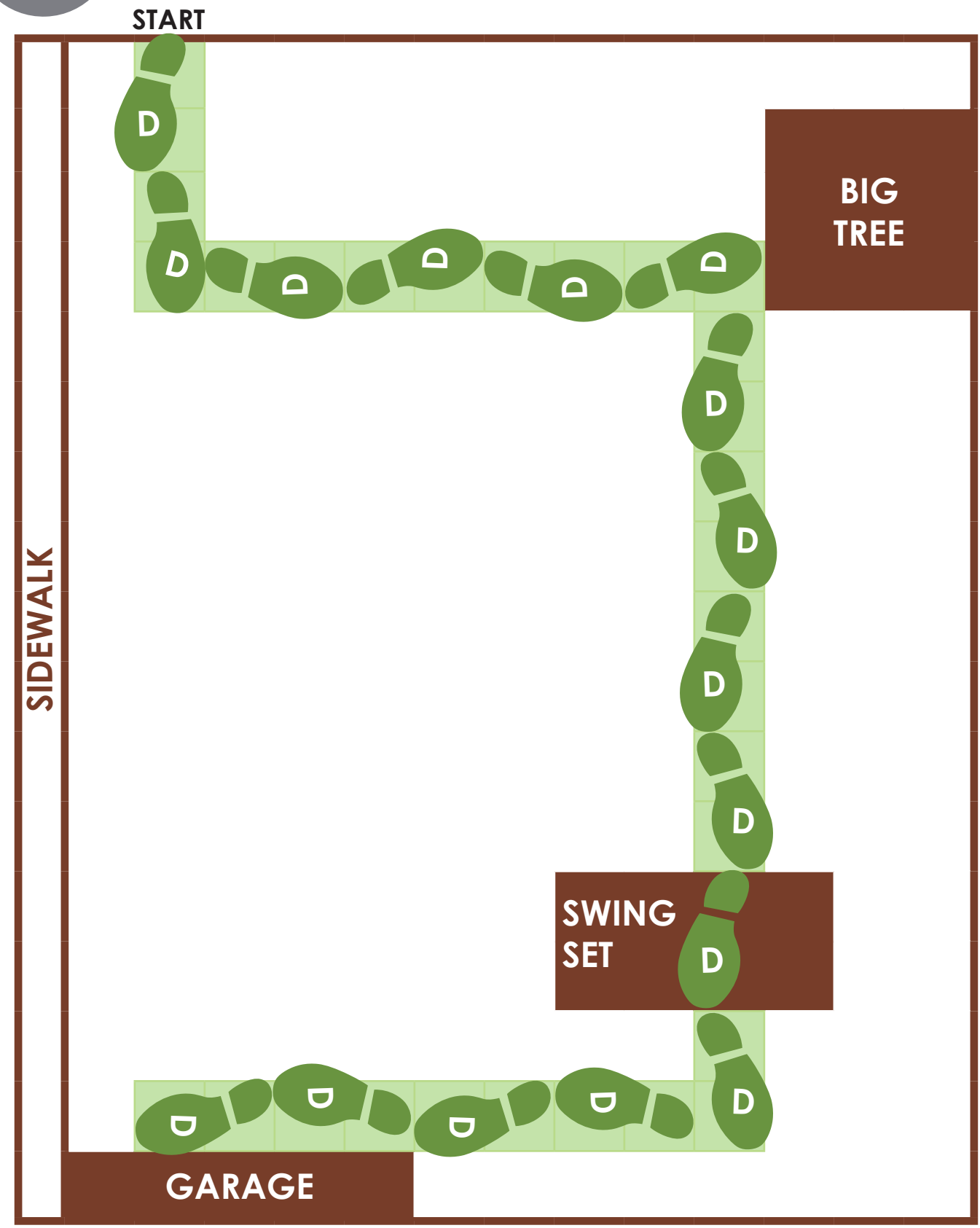
Lesson 2A

Brother's Path (Version 1)



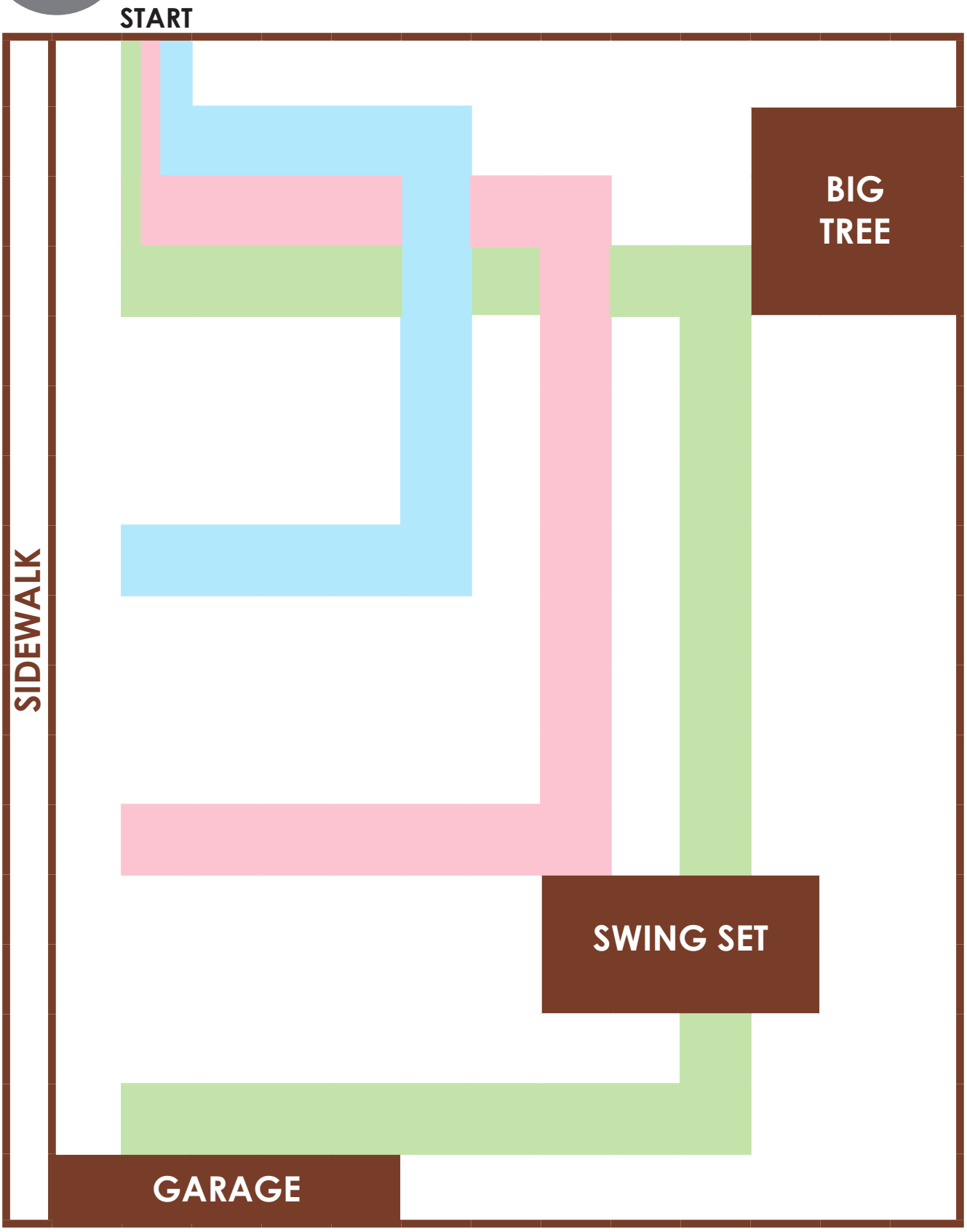
Lesson 2A

Susie's Dad's Path (Version 1)



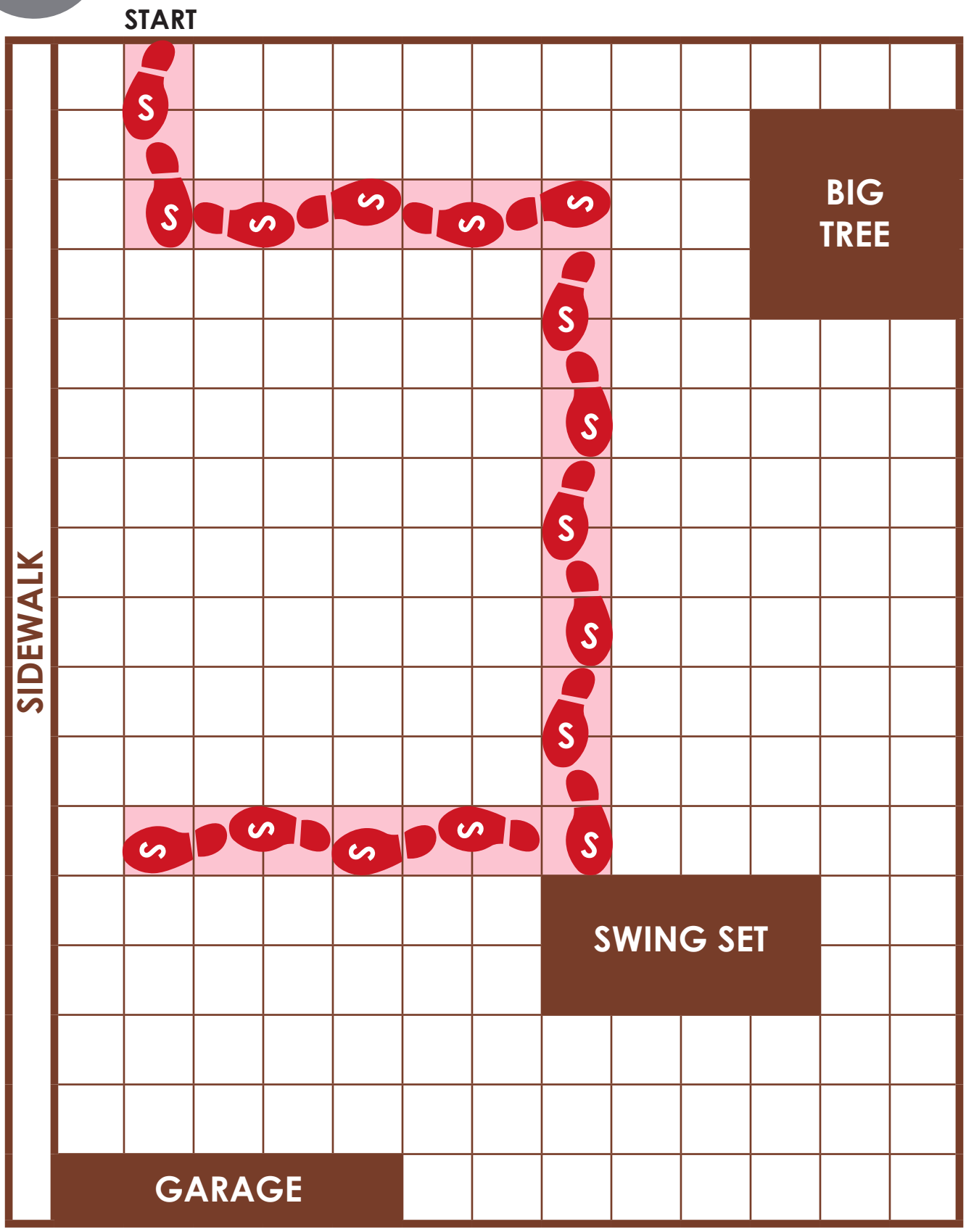
Lesson 2A

All Paths (Version 1)



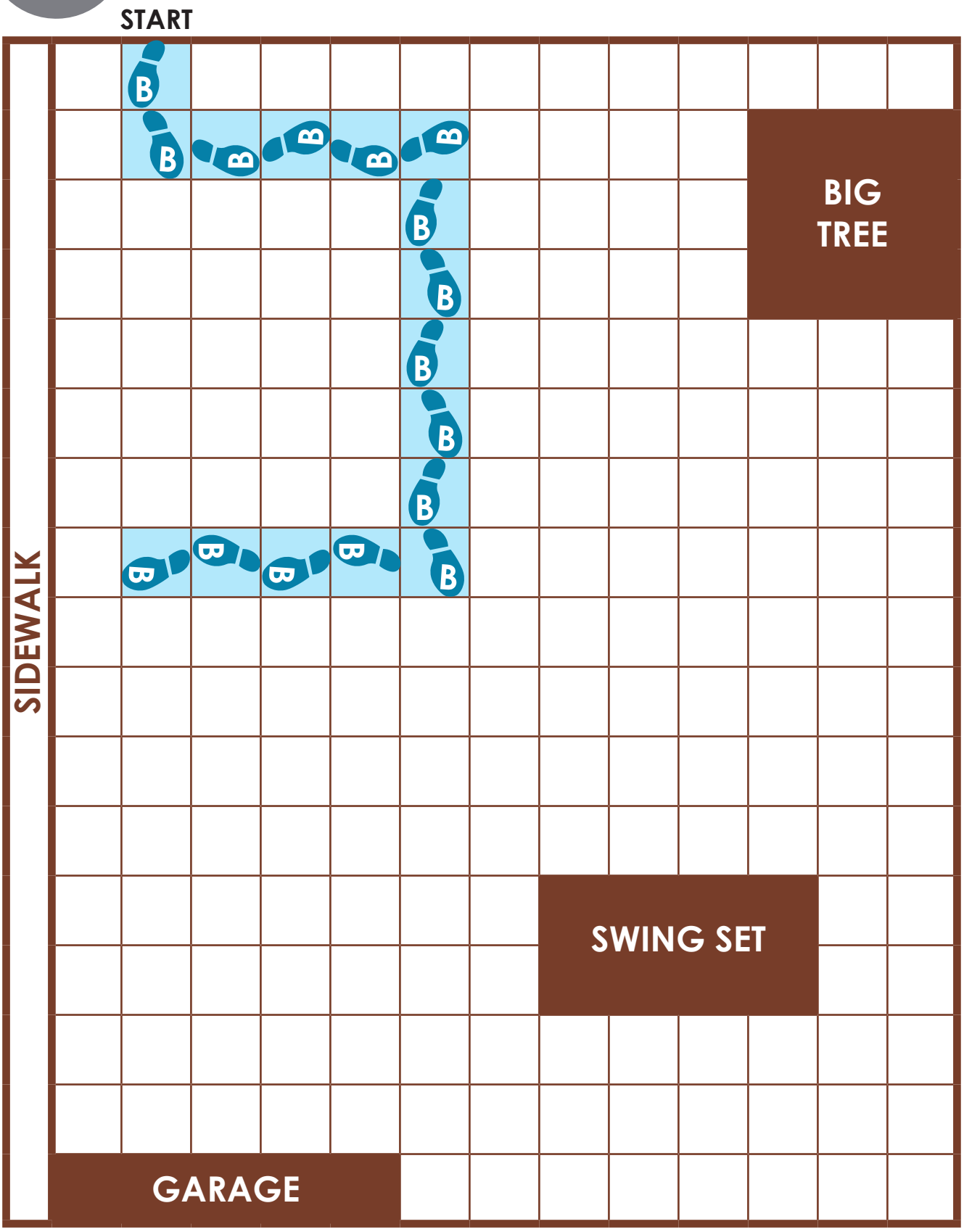
Lesson 2A

Susie's Path (Version 2)



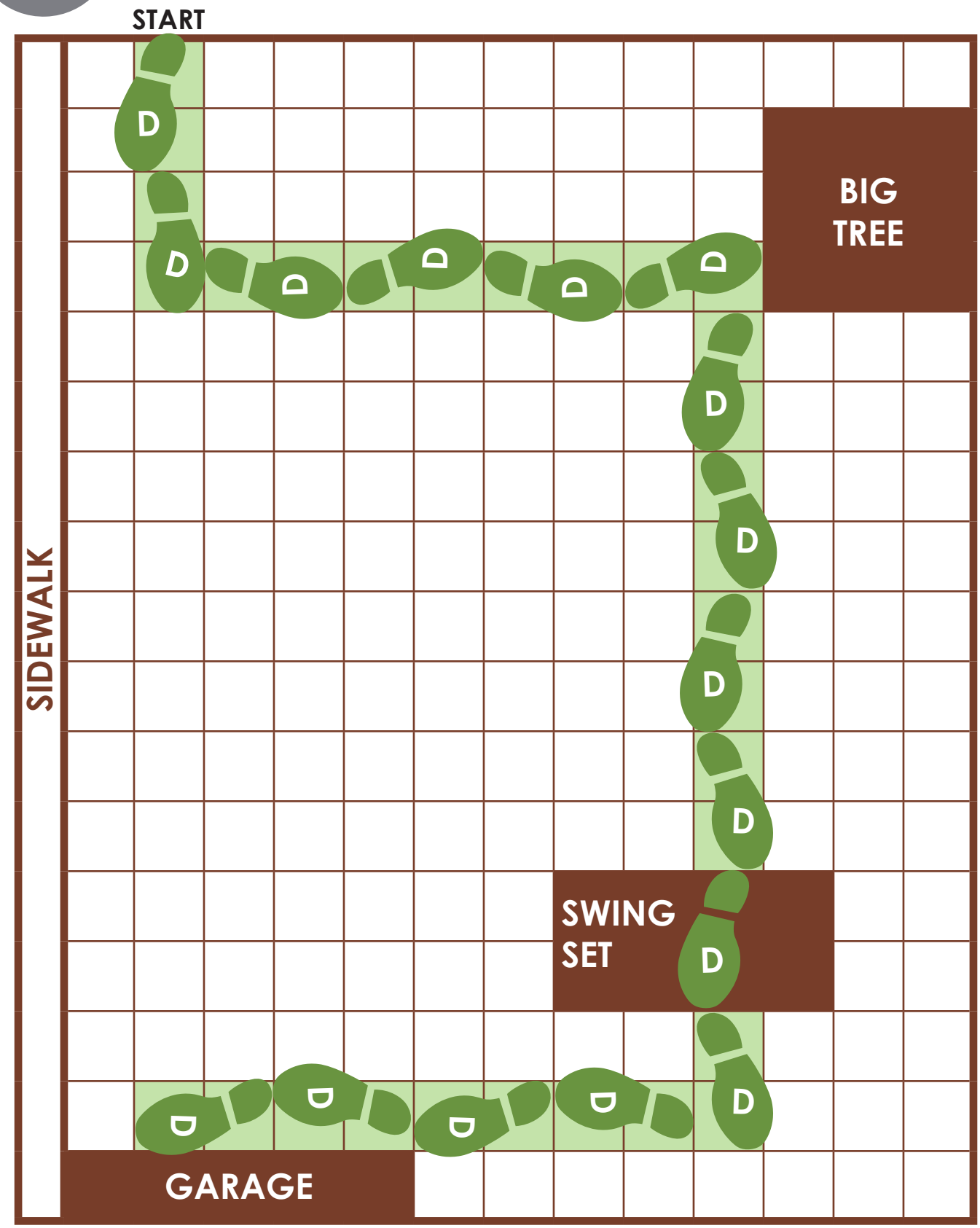
Lesson 2A

Brother's Path (Version 2)



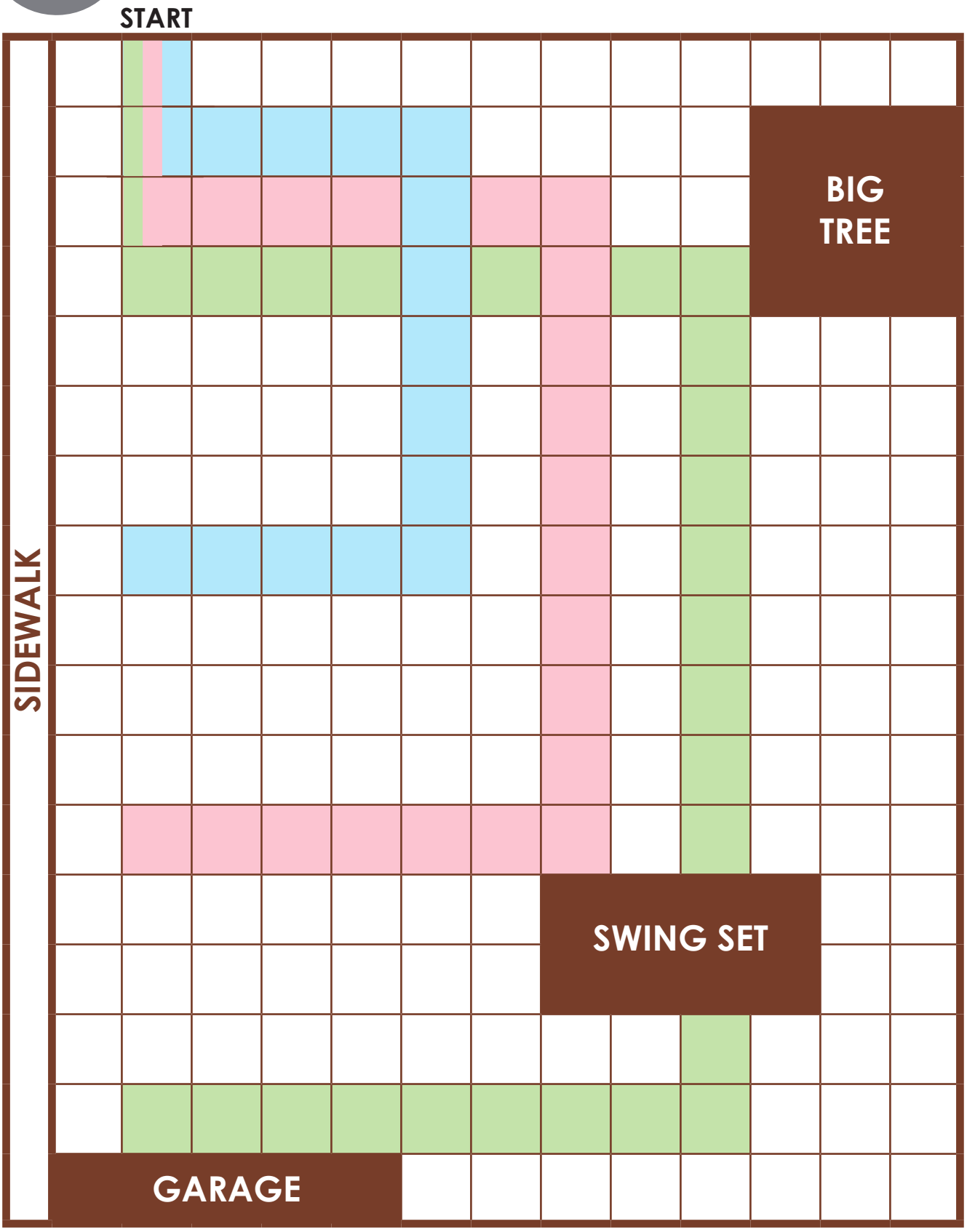
Lesson 2A

Susie's Dad's Path (Version 2)



Lesson 2A

All Paths (Version 2)



Lesson 2A

Character Name Tags (Susie & Brother)

Susie

Brother

Lesson 2A

Character Name Tags (Dad)

Dad

big

tree

swing

set

garage

sidewalk

Lesson 2A

Name_____ Date_____ Period _____

Treasure Hunt - Help Find a Solution

Write an explanation or draw a picture for what you would tell Susie to do to help her friends find her treasure.

Lesson 2B

FOCUS/KEY CONCEPTS

Students will be able to:

- Literacy: Identify key ideas and details in the story by asking and answering questions such as who, what, when, where, why and how
- Math: Identify why it is important to use standard units of measurement when building an object

STANDARDS

- CCSS-ELA: RL.2.1
- CCSS-Mathematics: MD.A.2

MATERIALS

- Large copy of story structure sheet (on chart paper, whiteboard, SMART board, etc.)
- Book: How Big is a Foot? by Rolf Myller
- Story Structure BLM
- Engineering Design Process sliders

TEACHER PREPARATION

- Prepare a large copy of story structure sheet (on chart paper, whiteboard, SMART board, etc.)

VOCABULARY

- **Carpenter** A person who builds objects out of wood
- **Apprentice** A person who is learning a skill from another person

How Big is a Foot?

INTRODUCTION

1. **Tie to engineering challenge. Ask:** *What problem are we trying to solve for Talia's Toy Box Company?* (Their travel toy box gets too mess; they need us to design a toy box organizer that will help keep the toys organized and easy to grab)

2. **Identify where they are in the engineering design process. (Learn) Ask:** *Where do you think we are in the engineering design process?* (point to the classroom Engineering Design Process chart) *Where should we move our paperclip and why should we move it there?* **Say:** *Before we can help the toy company create a better toy box, we need to learn a little bit more about measurement. This will help us give the toy box company detailed instruction on how to build our toy box organizers and to communicate exactly how much material they will need to build them.*

ACTIVITY - Using story structure to identify key details

1. **Introduce the book.** Have students gather on the floor. Introduce the book, *How Big is a Foot?* by Rolf Myller.

2. **Introduce/Explain the reading strategy and why it is useful.** Tell students that they will be working on some strategies that they can use to understand what is happening in the story. They will answer some key questions that include the following words: who, when, what, why and how.

3. **Model the comprehension strategy – story structure.** During this lesson, students will be listening to the story, while the teacher reads the story aloud and then they will practice using the strategy. Before reading the story aloud – explain that stories have a structure which helps the reader to understand what is going on and by identifying different parts of this story then that can help you to better understand the story. **Say:** *We will be using question words to help us identify important parts of the story. For example, we can ask, "Who are the main characters of this story?"*

4. **Read the story aloud.** While reading, use the following to guide the lesson development process.
   - Teach new vocabulary at the point of contact
   - Target comprehension skill- answering questions about who, what, when, where, why and how
     - **WHO** are the main characters?
     - WHEN did this story take place (current days, in the past, in the future)?
     - **WHAT** was the king's first problem? **WHAT** happened in the story?
     - **WHAT** was the problem in this story?
     - **WHY** was the king unhappy?
     - **HOW** did the apprentice solve the problem?)
   - Encourage higher-level thinking and comprehension monitoring by pausing for 'teacher think alouds' and asking questions about the text.

CLOSURE

1. **Whole group practice/review.** Review the story structure organizer and fill in any questions that have not yet been answered.

2. **Summarize.** Show students how they can use the information from their organizer to help retell what happened in the story. Example: The main characters in this story were the king, queen, and the apprentice (who). The king wanted to surprise the queen with a present for her birthday so he decided to give her a bed, but didn't know how big to tell the apprentice to make it so he measured with his feet (what). However, the bed was too small and the king was unhappy so he threw the apprentice in jail (why). The apprentice realized that his feet were smaller than the king's feet and so he asked for a marble copy of the king's foot and was able to build a bed that fit the queen (how).

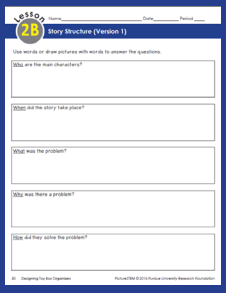
3. **Connect back to Treasure Hunt.** If students have not made the connection on their own, ask them about how the king's problem was similar to Susie's problem.

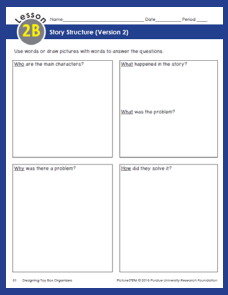
4. **Tie back to the design challenge.** Help students connect what they have learned to the design challenge. **Ask:** *Why was it important for the apprentice to use the king's foot?* (So the bed was the right size) *Why did their feet* (measuring tool) *need to be the same size?* (What they were building would not be the same size) *If we think about the toy boxes and organizers that we will be building for the toy company – do we need the same size measuring tools for those too?* (yes) *Why?* (so that our ideas/designs can be the correct size)

TEACHER NOTES

Lesson 2B

DUPLICATION MASTERS


Lesson 2B Name_____ Date_____ Period ____
Story Structure (Version 1)
Use words or draw pictures with words to answer the questions.
Who are the main characters?
When did the story take place?
What was the problem?
Why was there a problem?
How did they solve the problem?
32 Designing Toy Box Organizers PictureSTEM © 2015 Purdue University Research Foundation


Lesson 2B Name_____ Date_____ Period ____
Story Structure (Version 2)
Use words or draw pictures with words to answer the questions.
Who are the main characters?
What happened in the story?
What was the problem?
Why was there a problem?
How did they solve it?
32 Designing Toy Box Organizers PictureSTEM © 2015 Purdue University Research Foundation

Lesson 2B

Name_____ Date_____ Period _____

Story Structure (Version 1)

Use words or draw pictures with words to answer the questions.

Who are the main characters?

When did the story take place?

What was the problem?

Why was there a problem?

How did they solve the problem?

Lesson 2B

Name_____ Date_____ Period _____

Story Structure (Version 2)

Use words or draw pictures with words to answer the questions.

Who are the main characters?

What happened in the story?

What was the problem?

Why was there a problem?

How did they solve it?

Lesson 3A

FOCUS/KEY CONCEPTS

Students will be able to:

- Math: Understand that different measuring units produce different results.
- Math: Understand that for individuals to have an idea of the quantity or attribute measured there should be a common unit of measurement, 'standard unit'.

STANDARDS

CCSS-Mathematics: MD.A.2

MATERIALS

- Measuring tool bags with arbitrary units (1 per group)
- Common measuring tool for all groups
- Toy Boxes (1 per group)
- Inch grid paper
- Measuring Tools BLM
- Unit comparison chart
- Talia's Letter/Email
- Engineering Design Process sliders

TEACHER PREPARATION

- Prepare measuring tool bags with arbitrary units.
- The bags should each contain a different arbitrary object that can be used to measure the length of their toy boxes.
- Unit comparison chart: Create a table with two columns (on chart paper, whiteboard, etc.), one for arbitrary unit and the other for the number of times the unit was used to measure the length of the toy box.

VOCABULARY

- **Unit** An amount used again and again to measure something

Standard vs. Non-Standard Units

INTRODUCTION

1. **Introduce the concept.** Hold up a medium-sized object. **Ask:** *How big is this object?* Allow students without physically measuring the object to use their own words to describe how big the object is. Record these "measurements" on the board, under the name of the object. Present a second object that is of a different size. **Ask:** *How big is this object?* Again allow students without measuring to describe the size of the object in their own words. Record these "measurements" on the board, under the name of the object. Point out that although they were all describing the same objects, they used a number of different words to describe it. **Say:** *Think back to Susie and her Treasure Hunt – what was her problem?* (They were all using different tools to measure). *What happened when they all used different foot lengths, or different tools?* (They got different measurements). Let's explore this idea a little more and see why it is important that we all use the same measuring tools.

2. **Tie to engineering challenge.** **Say:** *Now let's think about our design challenge. Why can't we just use words like we put on the board* (example: medium-sized, about the size of… etc.) *to communicate our design plan to Talia and her toy company?* (Take student responses)

3. **Identify where they are in the engineering design process. (Learn)** **Ask:** *Where do you think we are in the engineering design process?* (point to the classroom Engineering Design Process chart) *Where should we move our paperclip and why should we move it there? (learn about the problem phase) We are learning about why measurement might be important in our design challenge.*

ACTIVITY - Standard units of measurement

1. **Introduce the activity.** *Let's see what happens when we use different measuring tools. I am going to pass out a bag and in the bag you will find a bunch of objects that you will use to measure the length of your toy box.* Demonstrate how to measure just the bottom and across the longest part of the toy box with their tool. Pass out the toy boxes, bags of measuring tools, and Measuring Tools BLM. Have the following table ready:

Unit	Measurement

2. **Measure.** In pairs, let students measure the length of their toy boxes using one of the arbitrary units. Have students draw their measuring tool and record the length of the toy box using that tool on their worksheets. Observe students work to ensure that they are measuring accurately and then record their values in the chart.

3. **Discuss.** When students have finished measuring, ask each of the groups to share how many of each tool it took them to measure. **Ask:** *When we all used different measuring tools, we got different answers, what will happen if we use the same measuring tool?*

4. **Measure again.** As a class, decide on a common measuring tool that

everyone can use to measure their toy boxes and whose results will be understandable to all students in the class. Have students measure their toy boxes using the same tool. Have students draw the chosen measuring tool and record the length of the toy box using that tool on their worksheets. Compare the results that each of the groups got when using the same measuring tool.

CLOSURE

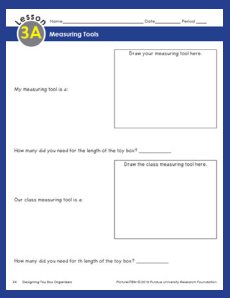
1. **Tie back to the engineering challenge.** Have students think about the toy box organizer challenge. **Ask:** *If we are designing a toy box organizer for Talia's Toy Box Company, why is it important for us to use the same measuring tool?* (So we can give the correct or same measurements to the toy box company, so they know how much material and how long for each of the parts)

2. **Introduce the grid paper.** Explain that we will be using the grid paper as our measurement tool. (Pass out the grid paper). Ask students to place their toy box on top of the grid paper – what do they notice? (The dark line is the same size as their toy boxes!) Then ask students to count how many squares they have for the length and width. (It should be the same). They will use these measurements and the squares to help with measuring their toy box organizer designs.

TEACHER NOTES

Lesson 3A

DUPLICATION MASTERS


Lesson 3A Measuring Tools

Name_____ Date_____ Period_____

Draw your measuring tool here.

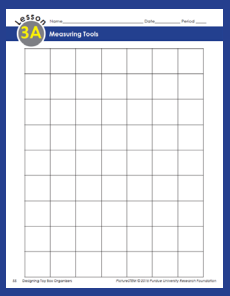
My measuring tool is a:

How many did you need for the length of the toy box? _____

Draw the class measuring tool here.

Our class measuring tool is a:

How many did you need for th length of the toy box? _____


Lesson 3A Measuring Tools

Name_____ Date_____ Period_____

Lesson 3A

Name_____ Date_____ Period _____

Measuring Tools

Draw your measuring tool here.

My measuring tool is a:

How many did you need for the length of the toy box? _____

Draw the class measuring tool here.

Our class measuring tool is a:

How many did you need for th length of the toy box? _____

Lesson 3A

Name_____ Date_____ Period _____

Measuring Tools

Lesson 3B

FOCUS/KEY CONCEPTS

Students will be able to:

- Literacy: Compare and contrast measurements.
- Science: Identify different attributes that were measured.
- Math: Understand that attributes can be measured in different ways using either standard or non-standard units of measure.

STANDARDS

- CCSS.ELA: RL.2.3
- CCSS-Mathematics: 2.MD.A.1, 2.MD.A.4

MATERIALS

- A large copy of the comparing and contrasting sheet (on chart paper, whiteboard, SMART board ,etc.)
- Book: *Measuring Penny* by Loreen Leedy
- Measuring Penny BLM (1/student)
- Engineering Design Process sliders

TEACHER PREPARATION

- Prepare one large copy of the compare/contrast chart (on chart paper, overheard, SMART board, etc.)
- Have one copy of the Engineering Design Process chart for whole class use.

VOCABULARY

- **Unit** An amount used again and again to measure something

Measuring Penny

INTRODUCTION

1. **Tie to engineering challenge.** Have the students explain the engineering design challenge in their own words. If necessary, reread Talia's letter/email.

2. **Identify where they are in the engineering design process. (Learn)** **Ask:** *Where do you think we are in the engineering design process?* (point to the classroom Engineering Design Process chart) *Where should we move our paperclip and why should we move it there?* Have students remind you of what they have done so far to help them get ready for designing their toy box organizer. (Developed understanding of ways to measure with examples from Susie's Treasure Hunt, How Big is a Foot?, and measuring items in the classroom.) **Say:** *We're going to continue to learn about measurement so we can create better plans for our toy box organizers.*

ACTIVITY - Compare and contrast

1. **Introduce the book.** Have students gather on the floor. Introduce the book, *Measuring Penny* by Loreen Leedy.

2. **Introduce/Explain the reading strategy and why it is useful.** Tell students they will be working on comparing and contrasting. Introduce the compare and contrast measurements sheet and how they will use it during the reading. Explain that, as a class, you will talk about how Lisa's different ways of measuring are similar or different after you read the story.

3. **Read the story aloud.** While reading, use the following to guide the lesson development process:
   - Teach new vocabulary at the point of contact.
   - Target the measurement types by having students record Lisa's different manners of measurement as you read.
   - Make sure to read the words within the pictures as well.
   - Encourage higher-level thinking and comprehension monitoring by pausing for 'teacher think alouds' and asking questions about the text.

4. **Whole group practice.** After reading *Measuring Penny*, compare and contrast Lisa's different ways of measuring. For example, **Ask:** *Were noses measured the same as tails?* Have the students identify why they were similar or different. Pick out a few more to compare and contrast.

5. **Whole group instruction.** Fill out the compare/contrast chart as a class. Help students decide whether each measure is a standard or non-standard unit.

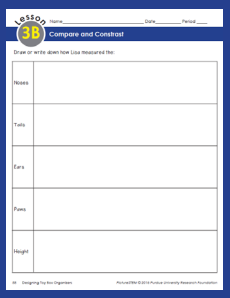
CLOSURE

1. **Tie back to the engineering challenge.** Remind students that we are working toward designing our toy box organizer. **Say:** *We are working on learning background knowledge in the Engineering Design Process* (point to Learn). *This will help us figure out how much material we need to design our toy box organizers.*

Measuring Penny

TEACHER NOTES

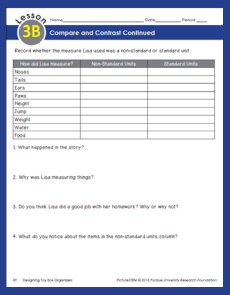
DUPLICATION MASTERS


Lesson 3B Name_____ Date_____ Period ____

Compare and Contrast

Draw or write down how Lisa measured her:

Noses	
Tails	
Ears	
Paws	
Height	


Lesson 3B Name_____ Date_____ Period ____

Compare and Contrast Continued

Record whether the measure Lisa used was a non-standard or standard unit.

How did Lisa measure?	Non-Standard Units	Standard Units
Noses		
Tails		
Ears		
Paws		
Height		
Jump		
Weight		
Water		
Food		

1. What happened in the story?

2. Why was Lisa measuring things?

3. Do you think Lisa did a good job with her homework? Why or why not?

4. What do you notice about the items in the non-standard units column?

Lesson 3B

Name_____ Date_____ Period _____

Compare and Constrast

Draw or write down how Lisa measured the:

Noses	
Tails	
Ears	
Paws	
Height	

Lesson 3B

Name_____ Date_____ Period _____

Compare and Contrast

Record whether the measure Lisa used was a non-standard or standard unit.

How did Lisa measure?	Non-Standard Units	Standard Units
Noses		
Tails		
Ears		
Paws		
Height		
Jump		
Weight		
Water		
Food		

1. What happened in the story?

2. Why was Lisa measuring things?

3. Do you think Lisa did a good job with her homework? Why or why not?

4. What do you notice about the items in the non-standard units column?

Lesson 4A

FOCUS/KEY CONCEPTS

Students will be able to:

- Science: Recognize that living things are very diverse
- Literacy: Identify the purpose of the text and the author's meaning.
- Literacy: Identify how images contribute to and clarify the text

STANDARDS

- CCSS – ELA: RI.2.3, RI.2.6, RI.2.7
- NGSS: 2-LS4-1

MATERIALS

- A large copy of the What does the color mean BLM (on chart paper, whiteboard, SMART board, etc.)
- Book: *Living Color* by Steve Jenkins
- What does the color mean BLM (1/student)
- Engineering Design Process sliders

TEACHER PREPARATION

- Prepare one large copy of the What does the color mean BLM (on chart paper, overheard, SMART board, etc.)

VOCABULARY

- **Diversity** A variety or range of differences

Living Color

INTRODUCTION

1. **Tie to engineering challenge.** Continue to tie students' learning to the engineering design challenge. **Ask:** What is our final design challenge? (to design a toy box organizer) How will we know that we have a good design? (the toys stay in place, the toys can be found and removed in less than 5 sec, other tests you may have defined)

2. **Identify where they are in the engineering design process. (Learn)** **Ask:** *Where do you think we are in the engineering design process?* (point to the classroom Engineering Design Process chart) *Where should we move our paperclip and why should we move it there?* When we design our organizers we are only going to be able to use a few different materials. To help us make good choices we are going to explore the different properties of these materials to determine which one we think will be best for our toy box organizer. Today we are going to be learning about physical properties and the properties of the materials that we are going to be able to use.

ACTIVITY - Identifying the main purpose of a text

1. **Introduce the book.** Introduce this informational text, *Living Color* by Steve Jenkins. **Say:** *To help us learn about these physical properties we are going to be reading an informational text called Living Color that explores the property of color and why color is important for helping animals survive.* **Ask:** *Who can think of an animal and what color it is?* (take some student answers). **Say:** *Let's read and find out about some of these animals and how their color helps them to survive.*

2. **Introduce/Explain the reading strategy.** Read the FIRST page of the book, then pause to explain the strategy. **Say:** *Learning to identify the main purpose of the text they are reading, including what the author wants to answer, explain, or describe through the text, is very important. You will be looking for important details on each page (show them the BLM) by identifying the color, one of the animals and why that color is important to that animal, or what the color tells you. For example, the color red in a Scarlet Percher Dragonfly tells you that it is all grown up.*

3. **Start reading.** Continue reading through this book and remember to use some of the strategies that help with reading and comprehension development:
   - Teach new vocabulary at the point of contact
   - Target the reading skill – summarizing the informational text
   - Encourage higher-level thinking and comprehension monitoring by pausing for "teacher think alouds" and asking questions about or discussing the text

4. **Re-read and practice.** Pass out the What does the color mean BLM. Go back and re-read select pages to have students practice identifying the color, animal, and what that color tells you about that animal. Once you have finished reading and identifying the color, animal, and purpose for the color on the BLM, **Ask:** *Now that we have identified some of the details about colors and animals, what do you think the author is trying to tell us through this book?* Either as a class, with a partner, or on their own, help students to complete the bottom question on the worksheet

which gets at the strategy of identifying what the author is trying to describe or explain through this book.

CLOSURE

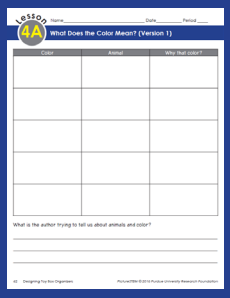
1. **Post-Reading: Connect to STEM lesson**. At the end of this reading, leave enough time to have a short discussion of the story AND to be able to connect this learning to the activity they will be doing in the STEM lesson. For example, **Ask:** *In the book it talked about how animals use color, color is one of the physical properties that can be used to describe objects or things. How else do you think you can describe an object?*

2. **Tie back to the engineering challenge.** It is important to connect this reading with the lesson they will be completing during their STEM lesson and back to the engineering design challenge. For example, **Ask:** *Now that we learned about the importance of the property of color, we are going to learn about other properties and how they can be useful when thinking about the materials we can use in our designs.*

TEACHER NOTES

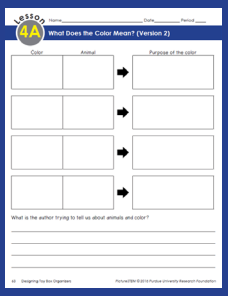
Lesson 4A

DUPLICATION MASTERS


Lesson 4A What Does the Color Mean? (Version 1)

Color | Animal | Why that color?

What is the author trying to tell us about animals and color?


Lesson 4A What Does the Color Mean? (Version 2)

Color | Animal | Purpose of the color

What is the author trying to tell us about animals and color?

Lesson 4A

Name_____ Date_____ Period _____

What Does the Color Mean? (Version 1)

Color	Animal	Why that color?

What is the author trying to tell us about animals and color?

Lesson 4A

Name_____ Date_____ Period _____

What Does the Color Mean? (Version 2)

Color	Animal		Purpose of the color
		→	
		→	
		→	
		→	

What is the author trying to tell us about animals and color?

Lesson 4B

FOCUS/KEY CONCEPTS

Students will be able to:

- Science: Demonstrate an understanding of physical properties of objects by using these properties to sort and describe given objects.

STANDARDS

- NGSS: 2-PS1-1

MATERIALS

- Physical properties bags (one per group)
- Mystery bags (one per group)
- Chart paper
- Engineering Design Process sliders

TEACHER PREPARATION

- Physical Properties bags: Place items in quart sized ziploc bags (use the same two colors for all items, except craft stick and sandpaper): feathers, marble, bead, paper clip
- Cut into 2" x 2" pieces: felt, construction paper, foam, sandpaper
- Cut to 2" in length: pipe cleaners, craft stick
- Mystery bags: Place one "toy" in a paper lunch bag (e.g. Matchbox car, LEGO piece, ball, Playdoh, rubber ball, eraser, etc.) and seal with tape
- Prepare a chart paper with headings of color, size, shape, texture, strength, flexibility, weight, and other. Cover the headings so students cannot see them.

VOCABULARY

- **Property** An attribute, quality, or characteristic of something

Investigating Properties

INTRODUCTION

1. **Tie to engineering challenge.** **Ask:** *Who can tell me what the engineering design challenge is?* See letter/email.

2. **Identify where they are in the engineering design process. (Learn)** Have student look at their engineering design process slider. **Say:** *We are working in the learn the problem phase.* Let students know that we are continuing to work on the background knowledge needed to build our toy box organizers.

3. **Introduce the investigation.** Hold up a medium-sized object. **Ask:** *Pretend that you are talking to a friend or relative on the phone. If you were trying to describe this item to them over the phone, they wouldn't be able to see it, so how would you describe this item to them?* Record student answers under the correct headings in the blank chart that you have created (e.g. If a student says it is white, then write that under the "color" heading, round under "shape" etc.).

4. **Investigate material properties.** After collecting student responses, **Ask:** *Who noticed that I was placing your answers in certain places on the board? I was sorting them according to some titles that I have hidden. I want you to look closely at where I have put your words, what similarities do you notice about the words that I have grouped together?* Let students look for a while and take some ideas, but if students look confused then prompt them to look at the "color" column and ask them what they notice about all of those words. Once students get the first column title, ask them about the other titles. If students are less familiar it might be necessary to scaffold by either proving extra words that would fit or revealing the titles and then asking if they know any words that can be used to describe the title (Example: If you reveal strength, you can ask students for words that describe the strength – strong, weak, etc.). Explain to students that these titles are the names for physical properties that can be used to describe objects and that they will be learning about in this lesson before they can do the Mystery bag activity.

5. **Introduce mystery bags.** To spark their interest in the mystery bags, **Say:** *You might be wondering what a mystery bag is. What do I mean when I use the word mystery? What is a mystery?* (Something that hasn't been solved). *Well, the mystery is that we don't know what is inside these bags and to use them there are a few rules.*
   - You need to have at least 2 people
   - One person is the "looker", the only person who can look inside the bag.
   - The other person/people are the "guessers" and they are trying to guess what is inside without looking at it. They can only ask yes or no questions.
   - Before we can use the mystery bags, we need to practice with some good yes/no questions and we also need to learn more about these physical properties (pointing to the board).

ACTIVITY - Object properties

1. **Physical properties bags.** **Say:** *To practice using these new words, we are going to do a little sorting activity with the materials in these bags.*

Investigating Properties

(Hold up a Physical Properties bag). *We are going to be sorting these materials by taking the items out of the bag and placing similar items together in a pile on one person's desk.* Pass out the Physical Properties bags to each group and ask students to start sorting the materials into piles of similar items. After groups have finished sorting, have a few different groups share how they chose to sort their materials. (For those groups, that have chosen to sort by physical properties point to the heading that matches their sorting category) After the initial sorting of materials, ask students to sort the same materials in a different way and by using one of the physical properties that they see on the board. Once students have had a chance to try sorting by physical properties on their own, choose a few to sort together as a class. To help leave examples of these physical properties, tape similar objects together under the title and descriptive word that is being used to describe them (Ex: Place all of the objects that "bend" together under the title of flexibility and near the word "bend", and the objects that are "stiff or don't bend" together) Tell students, "Now that we have practiced with our new words, it is time to work with the mystery bags!"

2. **Mystery bags.** **Ask:** *Who can remember the rules that go along with the Mystery Bags? If possible, have students recall the following rules (or help remind them):*
   - At least 2 people
   - Only the "looker" can peek inside the bag
   - The "guesser(s)" are trying to guess what is in the bag and can only ask yes/no questions.

   Say: *Before we start trying to solve the mystery object that is inside the mystery bags, we need to make sure that everyone is clear about the types of questions we can ask. What is a yes/no question?* After reviewing yes/no questions, remind students that it will be easiest if they use some of their physical property words to help them describe and visualize what might be inside (Example: Is the object red? Is it heavy? Can it bend?) Then pass out the mystery bags and assign the "looker" and "guesser" and let students gets started on the activity.

CLOSURE

- **Tie back to the engineering challenge.** After students have each had a chance to play the role of looker and guesser, **Ask:** *Why is it important to be able to describe objects using these new words?* (Take some student answers). *It also helps us when we start thinking about our designs and each of these properties can be used for different reasons. For example, If we were building something, when might it be helpful to use something that is strong, like a craft stick?* (Take student answers) *Or soft and flexible like a pipe cleaner? When we start designing, we are going to use these properties to help us design the toy box organizer.*

TEACHER NOTES

Lesson 4B

DUPLICATION MASTERS

None

Lesson 5A

FOCUS/KEY CONCEPTS

Students will be able to:

- Literacy: Identify three cause and effect events from the story
- Literacy: Recount stories, and determine their central message, lesson, and moral
- Engineering: Discuss the importance of testing materials before you build a prototype

STANDARDS

- CCSS-ELA: RL.2.2

MATERIALS

- Book: *Rosie Revere, Engineer* by Andrea Beaty
- A large copy of the cause and effect BLM (on chart paper, whiteboard, SMART board, etc.)
- Optional: Cause and Effect BLM (one per student)
- Engineering Design Process sliders

TEACHER PREPARATION

- Prepare one large copy of the Cause and Effect BLM (on chart paper, overheard, SMART board, etc.)
- Make copies of the Cause and Effect BLM (one for each student)

VOCABULARY

Rosie Revere, Engineer

INTRODUCTION

1. **Tie to engineering challenge.** **Say:** *We have been talking about our final engineering design challenge – who can remind me of this engineering design challenge and what we are trying to do?* (take student responses)

2. **Identify where they are in the engineering design process. (Plan)** Have student look at their engineering design process slider. **Say:** *We are working in the plan the solution phase. Now that we know our problem and we have learned some background information about mapping, measuring and about materials, we will continue to use that information as we move into the next phase of plan, try, test, and decide. Within the plan step, you will start to think of different ways that you can solve the problem (designing an organizer for our toy box to keep the toys from getting all messy) and then decide one solution you want to try ad develop plans for that solution. We are going to be starting on our toy box organizer plans today, so we will be moving into the planning phase.*

3. **Connect to prior knowledge.** **Ask:** *Who has ever had a really great idea for something they wanted to create or invent? What was it and what did you do with that really great idea? Did anyone have a really great idea that they tried out and it didn't work out so well? What did you do then?* (Gather a few answers to help students begin to make connections to one of the underlying theme of the book – how to deal with failure). **Say:** *Today we will read a story about a little girl who has great ideas and loves to make new things, but sometimes her great ideas don't go as planned. Let's see what happens to our friend Rosie and her good ideas.*

ACTIVITY - Author's message

1. **Introduce the book.** **Say:** *Today, we will be talking about engineering. We are going to be learning about Rosie Revere, who is an engineer, what she does with her good ideas and how she makes a flying machine for her great-great aunt Rose.*

2. **Introduce/Explain the reading strategy.** **Say:** *This is a fiction book. It is a story that the author created to tell us about an important message. After we have finished reading the book, I want you to see if you can determine what that message is. We are also going to continue to work on becoming good readers by looking at how we can use cause and effect to help us remember some of the things that Rosie does in the story.*

3. **Start Reading.** Read the book aloud and remember to use some of the strategies that help with reading and comprehension development:
   - Teach new vocabulary at the point of contact
   - Target the reading skill – summarizing the informational text
   - Encourage higher-level thinking and comprehension monitoring by pausing for "teacher think alouds" and asking questions about or discussing the text

4. **Re-read and practice.** Now that you have read the story, have students help you recount the story by identifying the cause an effect of the main

events from the story. Here is an example of what you might include for the cause and effect chart:

Cause	Effect
Rosie made a cheese hat for her uncle Fred and he laughed at her	She kept her ideas to herself (hid her inventions under the bed)
Rosie made a cheese-copter for her great-great-aunt Rose	It didn't work and her Aunt Rose laughed at her and Rosie felt sad
Rosie's first cheese-copter failed	Her Aunt Rose helped Rosie see that failure is a good first step.
Aunt Rose gave her a notebook and they made a plan	They worked together on different designs until they got one that worked
The second graders at Blue River Creek fail on their inventions	They stand and cheer

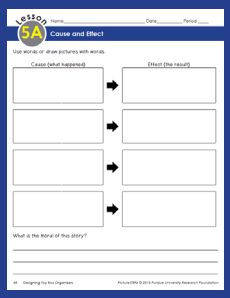
5. **More practice - Author's message.** After recounting the main events of the story by completing the cause & effect chart, ask students to determine what they think was the central message, lesson or moral of the story by completing the bottom of the worksheet.

CLOSURE

1. **Tie back to engineering challenge.** At the end of this reading, leave enough time to connect this learning to the activity they will be doing in the STEM lesson AND back to the engineering design challenge. **Say:** *Today we will be working like engineers and moving into the planning phase with our toy box organizers, why do you think we read about Rosie before we started on our designs?* (sometimes our designs don't work out the first time). *What did Rosie's Aunt Rose tell her after her cheese-copter didn't work?* (that it was a great first try and "the only true failure can come if you quit").

TEACHER NOTES

DUPLICATION MASTERS


Lesson 5A Cause and Effect

Use words or draw pictures with words.

Cause (what happened) → Effect (the result)

What is the moral of this story?

Lesson 5A

Name_____ Date_____ Period _____

Cause and Effect

Use words or draw pictures with words.

Cause (what happened)		Effect (the result)
	→	
	→	
	→	
	→	

What is the moral of this story?

_____

_____

_____

Lesson 5B

FOCUS/KEY CONCEPTS

Students will be able to:

- Science: Describe objects in terms of their materials and physical properties
- Engineering: Describe the steps of an engineering design process
- Engineering: Identify the problem and describe how their design solves the problem

STANDARDS

NGSS: 2-PS1-1, K-2-ETS1-1, K-2-ETS1-2

MATERIALS

- Toy Box (1 per group)
- Set of Toys (1 per group: toy car, legos, golf ball, crayons, bouncy ball, colored pencils,paper, sticker sheet, beads, playdough, eraser
- Sample Materials Bags (1 per group): aluminum foil, pipe cleaners, construction paper, tissue paper, string, foam sheets, craft sticks
- Quality control cards (one teacher set)
- Planning Sheets (1 per student)
- Ruler (1 per group)
- Grid paper (1 per group)
- Masking tape
- Engineering Design Process sliders

TEACHER PREPARATION

- Prepare Sample Materials Bags
- Prepare one box with toys for each group.

VOCABULARY

- **Engineer** Uses mathematics, science, and creativity to solve problems to help people

Plan a Solution

INTRODUCTION

1. **Tie to engineering challenge.** **Ask:** *Can anyone remember what problem we are trying to solve?* (Create an organizer to make it easy to find our toys within the toy box). I *have added your ideas to the board/ chart and now I want you to listen as I read the design challenge again and I want everyone to think about the problem that we are trying to solve and if we have accurately described it.* Re-read the letter/email from Talia. **Ask:** *Thinking about the design challenge that we just listened to, did we correctly describe the problem that we are trying to solve or should we add to what we have written on the board?* (Add to student answers if necessary).

2. **Identify where they are in the engineering design process. (Plan)** Have student look at their engineering design process slider. **Say:** *We are working in the plan the solution phase. Now that we know our problem and we have learned some background information about measuring and about materials, we have been working on the first two steps of the engineering design process. Remember, we can always go back to these if we need to get more information about the problem or about something we need to know. For now, we can continue with the next steps of plan, try, test, and decide if our organized toy boxes will work for the toy box company. Are you ready to plan some better toy box organizers?*

ACTIVITY - Description

1. **Introduce the activity.** Review the project constraints. **Say:** *Before we can start to plan, we need to know the constraints for the toy box organizer designs. Talia has already decided that she wants us to create an organizer for this toy box* (hold up the sample), *so our organizer has to fit inside of this toy box. she has also sent a sample of the types of toys that she would like for you to organize* (Hold up the Ziploc bag of toys) which includes the following: (Pull out and place each of the items into the toy box as you say their name) *Toy Car, LEGO bricks, Golf ball, Rubber bouncy ball, Colored pencils, Paper, Stickers, Beads, Playdough, Eraser. I have put all of these items into my toy box, what do you think will happen to the toys in my toy box when I put the lid on top and walk around with it?* (Take student guesses) *Let's see if you are right.* Walk around with exaggerated swinging of the toy box as you walk. Take the lid off and show students what it looks like. **Ask:** *Do you think that it would be easy to find exactly what I need in this toy box?* (No) *As it is now it, is not a good design for keeping my toys organized and Talia would not be happy with this design. If this is not a good design, let's remember what we said would make a good design. Do we need to add anything else to this list?* (Take some student ideas). We will test the organizer inside the toy box to see if it keeps the toys organized. Here is one way we decided to test to see if it is a good design.

2. **Demonstrate the test.** Show students that each of the toys are pictured on the Quality Control cards and in order to make sure that you can find any of the toys quickly, one person from your group will pull a card and then the teacher has to be able to grab all of the items for that toy within 5 seconds. Review other ways you decided to test the designs. Record new ideas agreed upon as a class. **Say:** *Now that we know*

Plan a Solution

how it is going to be tested we are almost ready to design, but there is one more thing that we want to consider. Remember in yesterday's lesson how we learned about physical properties that we could use to describe objects? Well, using those to describe our toys is really helpful when thinking about our objects. **Ask:** *Who can remember some of those physical properties?* (color, size, shape, strength, weight, flexibility, texture) **Say:** *Remember how we sorted the materials in our bags from yesterday* (hold up physical properties bag)*? We are going to do the same thing with our toys.*

3. **Sort the toys.** Have students sort the toys and then ask groups to talk about how they sorted the toys and what they noticed about the properties of the different groups of toys. Create a Toy Properties Table as a class. Go over some of the properties together and talk about what that means for their toy box designs. For example, the balls, and beads are round – what does that mean for when you put those toys into your toy box (they can roll). Or, the beads are really small, so what does that mean? (they can get lost or slide behind other objects or it might be better for the beads to be by themselves).

4. **Sort the materials.** **Say:** *Now that we know about the properties of our toys, let's look at some of the properties of the materials that we can use.* (Pass out the material sample bags). We are going to fill out a similar chart to describe our materials. After filling out the table go over some of the materials together and talk about what that means for their toy box designs. Ex: Why might it be nice to have something that is flexible, like the pipe cleaners or the foam or the paper? (it is easy to fold and move). Why might it be not so good to use something like paper? (it can tear or not strong enough). What about something that is strong, like the craft sticks – why could they be good? Why could they be bad?

5. **Plan.** Have students brainstorm (on their own) some different ways they might want to organize the toys in their toy box. After giving them some time to think about it, pass out the planning worksheet. Once students have brainstormed some ideas for how they might set it up then have them go back and start on their final plan with their partner. Tell students that tomorrow they will be building, so in order to get the materials that they need from the "Materials Store" they need to label which item they are using on their final plan. They also need to tell you how much they will need and that can be determined by counting the number of boxes they have covered in their final plan and recording it on the last page of their packet (materials sheet), as seen in the Example Plan.

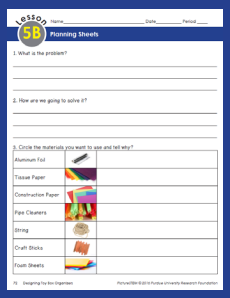
CLOSURE

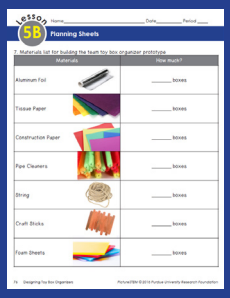
1. **Tie back to the engineering challenge.** Have students think about how their ideas will help the toy company. Ask them to justify their ideas for their designs.

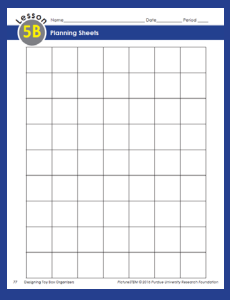
TEACHER NOTES

Lesson 5B

DUPLICATION MASTERS







Lesson 5B

Name_____ Date_____ Period _____

Planning Sheets

1. What is the problem?

_____

_____

_____

2. How are we going to solve it?

_____

_____

_____

3. Circle the materials you want to use and tell why?

Aluminum Foil		
Tissue Paper		
Construction Paper		
Pipe Cleaners		
String		
Craft Sticks		
Foam Sheets		

Name_____ Date_____ Period _____

Planning Sheets

4. Plan #1: How will you use the materials? Draw an idea in the space below.

Name_____ Date_____ Period _____

Planning Sheets

5. Plan #2: Draw a second idea in the space below.

Name_____ Date_____ Period _____

Planning Sheets

6. Plan #3: Let's work together! Come up with a plan for your group.

Lesson 5B

Name_____ Date_____ Period _____

Planning Sheets

7. Materials list for building the team toy box organizer prototype

Materials	How much?
Aluminum Foil 	_____ boxes
Tissue Paper 	_____ boxes
Construction Paper 	_____ boxes
Pipe Cleaners 	_____ boxes
String 	_____ boxes
Craft Sticks 	_____ boxes
Foam Sheets 	_____ boxes

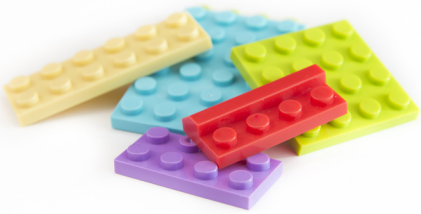
Lesson 5B

Name_____ Date_____ Period _____

Planning Sheets

Lesson 5B

Quality Control Cards

Toy Car 	Legos 	Golf Ball 
Crayons 	Colored Pencils 	Paper Pad 
Stickers 	Beads 	Playdough 
Eraser 	Bouncy Ball 	

Lesson 6A

FOCUS/KEY CONCEPTS

Students will be able to:

- Literacy: Identify main events in the story and how the main character (Spencer) responds to these events
- Literacy: Summarize a story (narrative text) by identifying one sentence to represent the beginning, middle and end

STANDARDS

- CCSS.ELA: RL.2.3

MATERIALS

- Book: *Too Many Toys* by David Shannon
- A large copy of the Summarizing the Story BLM (on chart paper, overheard, SMART board, etc.)
- Optional: Summarizing the Story BLM
- Engineering Design Process sliders

TEACHER PREPARATION

- Prepare one large copy of the Summarizing the Story BLM (on chart paper, overheard, SMART board, etc.)
- Optional: Copies of the Summarizing the Story BLM (one for each student)

VOCABULARY

- **Term** Definition

Too Many Toys

INTRODUCTION

1. **Tie to engineering challenge.** **Say:** *Yesterday, you started planning a solution to the engineering design challenge where you are going to be helping Talia by designing a toy box organizer that will help keep toys in their place and easier to find when stored in their travel-sized toy box.*

2. **Identify where they are in the engineering design process. (Learn and Plan)** Have student look at their engineering design process slider. **Say:** *We are working in the learn about the problem and plan the solution phase.* In this book, the main character will plan and solve a problem. **Say:** *Yesterday, we talked about how it is important to test our materials and how engineers do that before they start to create their designs. As we are reading this story about Spencer and his toys, I want you to be thinking about what problem Spencer has and how he solves this problem.*

ACTIVITY - Summarizing Narrative Text

1. **Introduce the book.** Have students gather on the floor for as you introduce the story *Too Many Toys* by David Shannon.

2. **Introduce/Explain the reading strategy and why it is useful.** As you introduce the strategy of summarizing a story, tell students that as good readers this is something they will need to do when telling their parents or a friend about a book they have read. The person they are talking to won't need to hear every last detail about the story and so they want to tell them just the most important points from the story. **Say:** *If you were telling a parent or friend about this story you don't want to tell them everything from the story, but instead you just want to give them the most important points. We do this when we summarize, we tell the important ideas that happen at the beginning, middle and end of the story.*

3. **Model the comprehension strategy.** Summarizing is a difficult skill, so you can use the story from lesson 4 to model how students can summarize a text. The focus of the previous lesson was to recount events from the story so this should be familiar to them. **Say:** *Today we are going to practice summarizing the book Too Many Toys. Before we do that, let's practice by summarizing the story we read yesterday, Leo Cockroach… Toy Tester. When I summarize I first want to give a sentence about the beginning of the story that tells about the characters, setting, and problem.* Give a summary sentence about the beginning of Leo Cockroach story in your own words and talk aloud as you explain how you came up with that sentence. **Say:** *Next, I will give a sentence that tells about the middle of the story and I will talk about the problem that Leo faced.* Again, talk aloud as you give a sentence for the middle of the story. **Say:** *Finally, I will give a sentence about the end of the story that tells how the problem was solved.* Talk aloud as you give a sentence for the end of the story.

4. **Start reading.** As you are reading through the story, remember to pause and use some of the things that help their development as good readers:
   - Teach new vocabulary at the point of contact

- Target the comprehension skill – main ideas from informational text
- Encourage higher-level thinking and comprehension monitoring by pausing for "teacher think alouds" and asking questions about the text.

5. **Whole group practice.** Once you have finished reading the story, remind students that the purpose of summarizing is to help readers to better understand and remember stories. You can define summarizing as stating important ideas that tell what happens at the beginning, middle, and end of a story. Tell students that you will complete the worksheet together as a class to review what happened in the story. Since summarizing is such a difficult skill, the first part of the worksheet focuses on identifying the main events from the story and how Spencer responds to those main events. This will help students to think about what is happening at the beginning, middle, and end of the story, which will help them with the bottom half of the worksheet looking at summarizing the story.

6. **Individual practice.** Once you have completed the top half of the worksheet, have students summarize the story by writing three sentence that explain what happened at the beginning, middle and end of the story using the boxes to help them.

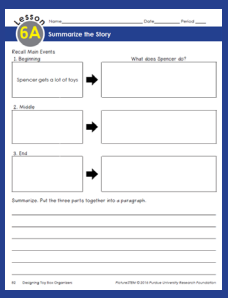
CLOSURE

1. **Share responses.** Once you have completed the story, have students share what they wrote and then combine their answers to create a single summary for the beginning, middle, and end of the story. Tell students that another important part of summarizing is thinking about the author's message and ask them what they think the message of this story might be.

2. **Tie back to engineering challenge.** To get students to engage in higher level talking about text, ask students why they think we might have read this story about Spencer and his toys when working on our engineering design challenge.

TEACHER NOTES

DUPLICATION MASTERS


Lesson 6A Summarize the Story

Recall Main Events

1. Beginning — What does Spencer do?

Spencer gets a lot of toys

2. Middle

3. End

Summarize. Put the three parts together into a paragraph.

Lesson 6A

Name_____ Date_____ Period _____

Summarize the Story

Recall Main Events

1. Beginning

What does Spencer do?

Spencer gets a lot of toys	

2. Middle

3. End

Summarize. Put the three parts together into a paragraph.

Lesson 6B

FOCUS/KEY CONCEPTS

Students will be able to:

- Science: Describe objects in terms of their materials and physical properties
- Engineering: Identify the problem and describe how their design solves the problem

STANDARDS

NGSS: K-2-ETS1-1, K-2-ETS1-3

MATERIALS

- Toy Box (1 per group)
- Set of Toys (1 per group: toy car, legos, golf ball, rubber, bouncy ball, colored pencils,paper, stickers, beads, playdough, eraser
- Building Materials
- (aluminum foil, pipe cleaners, construction paper, tissue paper, string, foam sheets, craft sticks)
- Planning sheet (from 4B)
- Quality control cards (one teacher set)
- Masking tape
- Camera (to take pictures of prototypes)
- Scissors
- Engineering Design Process sliders

TEACHER PREPARATION

- Prepare one box with toys for each group.
- Have building materials available for all groups.
- If time allows, prepare the materials for each group by cutting their materials into the requested sizes.

VOCABULARY

- **Redesign** Making corrections to an original design to make it better

A Solution for Talia

INTRODUCTION

1. **Tie to engineering challenge.** **Say:** *Now that we have read about Spencer and his toy problem, let's revisit the engineering design process and our design challenge. We said that the engineering design process is a set of steps used by engineers to help them think about and solve problems. Then we talked about our problem.* **Ask:** *Who can remember what problem we are trying to solve?* (Create a system/organizer to make it easy to find the toys within the toy box) **Ask:** *Then we started working on our engineering design challenge, who can remember what we did?* (talked about the properties of the toys and materials that we can use, came up with our group plan and a list of the materials that we need to build our toy box organizer)

2. **Identify where they are in the engineering design process. (Try, Test, Decide)** Have student look at their engineering design process slider. **Say:** *Today we will be working in the try the solution and test the solution phase.* **Say:** *Yesterday, we completed an important part of our design challenge, which was the planning step. Now that we have good plans and have thought about our designs, are you ready to try (build) and test them?* Prepare students for the idea that their toy box organizer designs might not work the first time, and failure is a part of engineering. They will be redesigning their toy box organizers to make them better, just like real engineers.

ACTIVITY - Try and test solutions

1. **Introduce the activity.** **Ask:** *I know that you all have an idea of how we will build our designs, but who can remember how we are going to test our designs?* (Have students share and explain the agreed upon tests.)

2. **Planning stage.** Remind students that if they didn't finish their group plan, then they will need to finish that and get it cleared with you before they start building.

3. **Collecting materials.** After students have completed their group plan and materials list, they will go to the "materials store" to get their building materials. After retuning with the supplies, they can set out to build their design with their partner. Remind students that it should look like the plan they drew with their group, and that it is ok even if it isn't working exactly as they thought it might.

4. **Testing.** Once students have finished building, they are ready for testing their toy box organizers. It might be helpful to have a signal for students who are ready to test, or you can have them bring their organizer prototype inside a toy box over to a specific testing station. Before testing each group design, take a picture of their design so they can remember it and use it to help them with their redesign. It is also helpful when sharing their designs with the class. Students should record their test results on the BLM. After testing, take another photo of the organizer.

5. **Sharing designs.** After all of the students have created and tested their toy box organizers, allow students to share their design with others while reminding them to pay attention because they might get ideas that they want to try in their redesign. This is where the pictures are helpful,

because it can be easier for students to explain from a picture which materials they used and how their design fared testing.

6. **Redesign of toy box organizers.** After finding things that didn't work so well and hearing ideas from other groups, students can use what they learned in their redesign. Allow time for pairs to complete the RedesignnBLM and to redesign their toy boxes organizers. This will also give them a chance to fix anything that they might have forgotten during their first design.

7. **Retest.** Allow students to test their designs in the same manner and take another picture so that students can compare their first and second designs.

CLOSURE

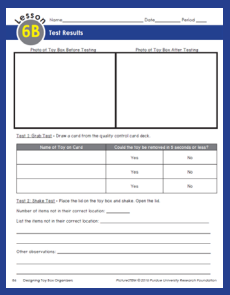
1. **Decide.** Have students look at and compare the pictures of the two designs and decide on the design that they think is best, and why they think that design is best. This will help students to reflect on their designs and how well they met the challenge.

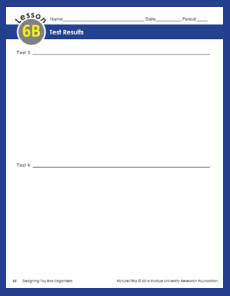
2. **Share decisions.** Have students share with their classmates the design they ultimately chose and why they chose that design. They should also prepare all the documents and information requested by Talia so that their work can be shared with her.

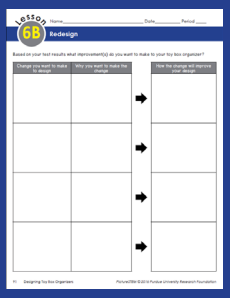
TEACHER NOTES

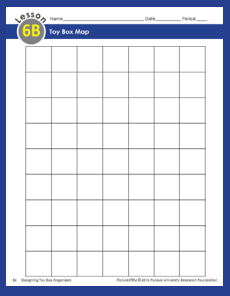
Lesson 6B

DUPLICATION MASTERS









Lesson 6B

Name_____ Date_____ Period _____

Test Results

Photo of Toy Box Before Testing	Photo of Toy Box After Testing

Test 1: Grab Test - Draw a card from the quality control card deck.

Name of Toy on Card	Could the toy be removed in 5 seconds or less?	
	Yes	No
	Yes	No
	Yes	No

Test 2: Shake Test - Place the lid on the toy box and shake. Open the lid.

Number of items not in their correct location: _____

List the items not in their correct location: _____

_____

_____

Other observations: _____

_____

_____

Lesson 6B

Name_____ Date_____ Period _____

Test Results

Test 3: _____

Test 4: _____

Lesson 6B

Name_____ Date_____ Period _____

Redesign

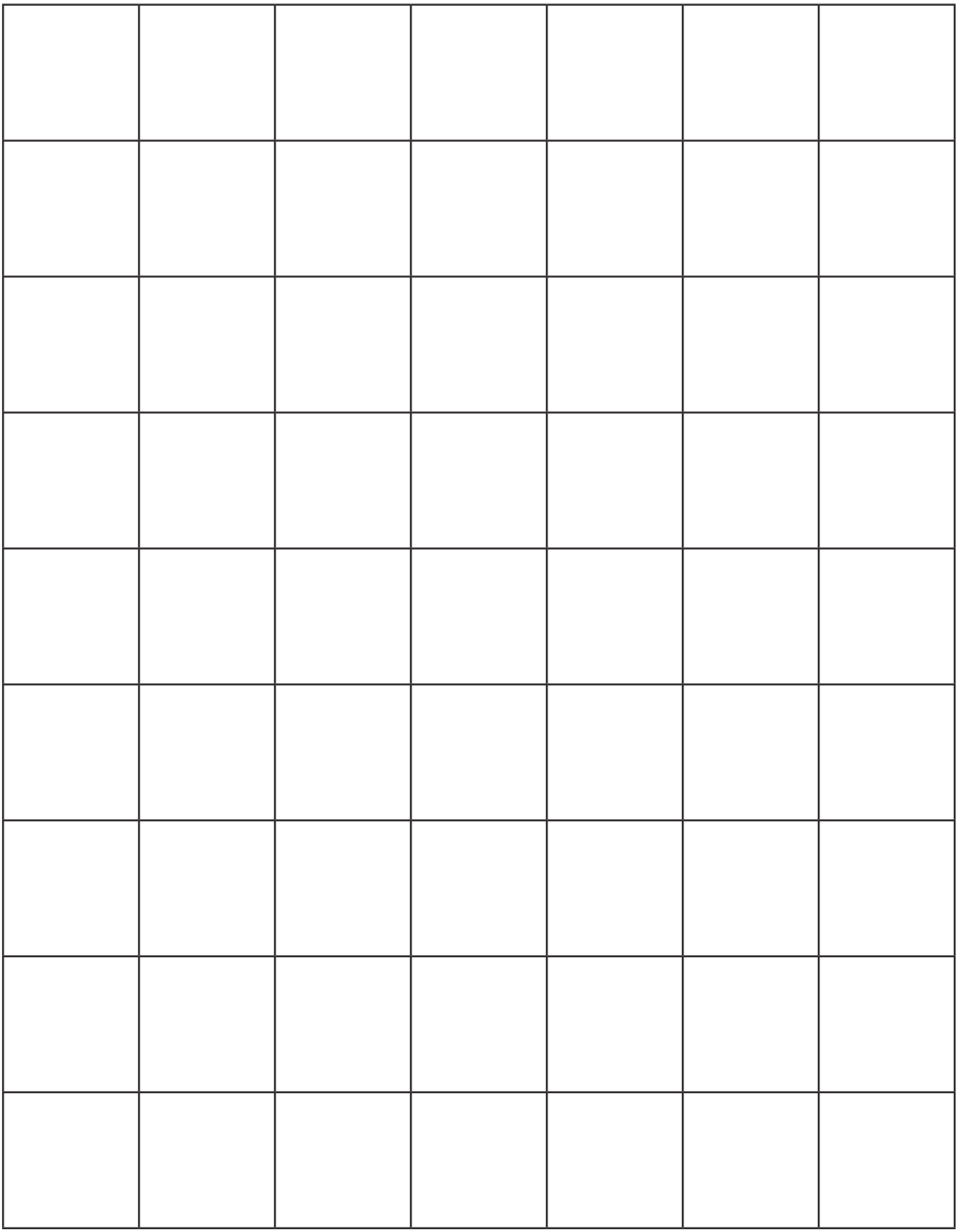
Based on your test results what improvement(s) do you want to make to your toy box organizer?

Change you want to make to design	Why you want to make the change	How the change will improve your design

Lesson 6B

Name_____ Date_____ Period _____

Toy Box Map



Lesson 6B

Name_____ Date_____ Period _____

Materials Report

Complete the table to communicate to Talia's Toy Box Company which materials you used, why you used them, and how much of the materials they will need to build your design.

Materials		Why the material was used	Amount of material used
Aluminum Foil			_____ boxes
Tissue Paper			_____ boxes
Construction Paper			_____ boxes
Pipe Cleaners			_____ boxes
String			_____ boxes
Craft Sticks			_____ boxes
Foam Sheets			_____ boxes