



## LESSON 4: Defining and Designing

### LESSON OVERVIEW

This lesson will introduce students to how to define a problem before beginning to design a solution while they apply their newly developed skills in divergent thinking (from YIPLit Lesson 3). As part of this process, they will be briefly introduced to research as they define their problem and develop their solution designs. A further exploration of research and how it contributes to the Invention Process will continue into YIPLit Lesson 5, if using.

This lesson may be used as a stand-alone lesson or extended to further incorporate Lessons 1, 2, 3, 5, 6, 7, 8.

### OBJECTIVE

Students will be able to:

- Explore ways to do initial research.
- Explain the importance of recording work in a journal or logbook.
- Analyze information to define a problem.
- Apply learned information to create a solution.
- Understand and practice combining parts of a problem using a MindMap.

### MATERIALS

- Google Slides: YIPLit Lesson 4
- Book: **Walrus in the Bathtub** by Deborah Underwood, illustrated by Matt Hunt; ISBN-10: 0803741014 OR...
- Read-aloud Video: <https://youtu.be/-dIJrpgFoVs> Reading time- 5:33
- Board/wall space/large sticky notes/online place to record brainstorming
- Pencils and paper for writing
- MindMap Example (not included in YIPLit Inventor's Journal; included in Google Slides: YIPLit Lesson 4; print if needed)
- MindMap Worksheet (included in YIPLit Inventor's Journal)
- Character SCAMPER Worksheet (included in YIPLit Inventor's Journal)
- Problem and Solution Worksheet (included in the YIPLit Inventor's Journal)
- Invention Design #1 Worksheet (included in the YIPLit Inventor's Journal).
- YIPLit Inventor's Journals
- Scratch paper for design drawings
- Pencils, pens, crayons

### NOTES FOR THE TEACHER

Teacher may use slides provided or lead instruction and discussion on their own.

You will be doing more brainstorming in this lesson. You may wish to remind students about the ground rules to create a safe space where all students feel comfortable sharing ideas.

During this lesson, students will “officially” begin to create their own invention project- a re-designed/unique umbrella. If you would like students to work in teams, you will need to assign or choose those teams. You may also wish to have students work independently, or you may allow students to choose if they wish to work in a team or alone. Please note that students should keep their own Inventor’s Journal to document their own personal invention journey, even if they are working with peers.

## INSTRUCTION & ACTIVITIES

***Teacher may lead the following lesson plan with flexibility to adapt as needed to fit technology and class format:***

### **Teacher Instruction:**

Begin by reminding students that for the past few sessions, they have been thinking about the problems of the characters in the book, ***Walrus in the Bathtub***, and some of their problems and how to solve them. They have also learned some new tools to help BRAINSTORM/IDEATE new ideas for solutions to problems through DIVERGENT THINKING and SCAMPER. Now it’s time to dig deeper. An important step in the Invention Process is to define the problem you wish to solve and then understand this problem better. Why is it a problem? Who does it affect? What other solutions, if any, have been tried? Can you make a better solution?

Ask the students how they may be able to learn more about these problems so they can understand them. How can you find answers to your questions? Lead a short discussion about basic research (grade level appropriate research). Prompts such as:

- What resources can we use?
- Who might be able to help us with our research?

*NOTE: While research is a critical step of the Invention Process, the Young Inventor’s Program understands that the youngest inventors are just learning what research is and how to do it. In this curriculum, research can be very basic using resources such as asking an adult for information, doing a basic internet search about a key word, topic, or even browsing an online shopping site such as Amazon or Target to see if an invention idea is already a product on the market. This research can be assisted or guided by the teacher or another adult as a class or individual activity as appropriate for the time available and the level of your students. Any research done as a class or as an individual should be recorded in the YIPLit Inventor’s Journal. Students should list any resources and basic key words or information they learned from such research to the best of their ability. Adult support is acceptable.*

Tell the class that they are going to work on a Problem today (show pages of the leaky ceiling/ “Soggy suppers”, and daughter using the umbrella/ “Easy plant watering! Clean floors?”, or refer to the pictures on the Google Slides: YIPLit Lesson 4.) The problem is that people and things get wet when Walrus is in the bathtub.

Our solution is that everyone in the family will have a special umbrella whenever the Walrus is taking a bath. Your challenge today is to come up with that unique umbrella!

*NOTE: If needed, teacher may wish to read aloud the book again to the class, or you may wish to read just a few pages which refer to the focus of the following activity. If students have a good grasp of the book, you can jump right to the activity, providing any prompts or referring to the book as necessary.*

**Read Aloud (optional 10 minutes):**

*Go back to the theme book, **Walrus in the Bathtub** by Deborah Underwood, illustrated by Matt Hunt. Before reading, explain that sometimes a story starts with a problem and ends with a solution.*

*Read aloud the book, **Walrus in the Bathtub**, and pause using Think Alouds throughout (“What kind of umbrella could \_\_\_\_\_ use?”, “Would \_\_\_\_\_ be able to use an umbrella or do they need some other device to keep them dry?”, etc.)*

*(If video book is used, teacher can incorporate Think Alouds by stopping video briefly for questions. A video read aloud of the book is in the Google Slides if you choose to share the video).*

**Teacher Instruction:**

*NOTE: The class is now at the point where they will start to develop their actual invention. If you would like students to work in teams, now is the time to assign or choose those teams. You may also wish to have students work independently, or you may allow students to choose if they wish to work in a team or alone. If allowing for teams, from this point forward, most work on the project will be completed as a team. Please note that students are still encouraged to keep their own Inventor’s Journal to document their own invention journey, even if they are working with peers.*

Show the MindMap Example to the class (included in Google Slides YIPLit Lesson 4). Then, explain to the students that they will be doing their own MindMap to If working in teams, the team will work together on the MindMap, however, each team member should complete their own worksheet in their journal even though the responses may be the same for each member of the team.

Ask students to list the following:

*Teacher may choose to project the MindMap Example (included in Google Slides: YIPLit Lesson 4 or as a printable document) onto the board and fill in responses to demonstrate how to complete a mindmap.*

“What are ways we protect ourselves from water?”

“How and where are umbrellas used in different ways?”

“Who are all the characters in the book?”

“What are all of the problems with water in the house?”

“How might we create a special umbrella for a character I the book?”

“What might the characters in the story be doing AT THE SAME TIME they may need their special umbrella?”

**Activity: Character SCAMPER (5 minutes):**

In their assigned teams or alone, students will use the Character SCAMPER Worksheet (included in the YIPLit Inventors Journal). Remind students of the characters in **Walrus in the Bathtub**, and ask them to choose (or you may assign) one character. Instruct the groups to come up with a new umbrella that will solve a specific problem for that character. Use some of the knowledge you just listed in the MindMap. Combine- and use other SCAMPER verbs too- to think of ideas for a new, improved umbrella that solves a specific problem for your character.

**Activity: MindMapping (10 minutes):**

*NOTE: This exercise builds off of the previous activity and is intentionally designed to be an activity to allow students to practice the skills of ideating on their own. They should work in project teams or individually if completing a project on their own.*

Ask each student to complete the MindMap Worksheet (included in the YIPLit Inventor's Journal) on their own/team as they consider the ways to make a unique umbrella for their character. Allow time for students to think and complete the MindMap. Walk around the room to provide support as needed.

**Teacher Instruction:**

Tell students that they are now "inventors"! They have identified a problem, learned about it and defined it, and they have SCAMPERED to ideate a solution to this problem. Ask them if they recognize these steps from the Invention Process?

Explain that before they can move on with designing the invention (their new umbrella), they need to record their findings so far. All inventors must always write down what they are doing and record it in a notebook or logbook, just like your YIPLit Inventor's Journal. Why is recording so important?

*Teacher may choose to write down responses on the board or on a large sticky note as a visual aid. Look for responses such as:*

- To keep track of ideas and not forget them if you need to go back later
- To prove that the idea is yours
- To provide a record of your process if you want to do it again (like a recipe)
- To show when you did things and when you thought of the idea

**Activity: Defining the Problem and Solution (10 minutes):**

Ask students to use their YIPLit Inventor's Journals and complete the Problem and Solution Worksheet (included in the YIPLit Inventor's Journal). If working in teams, the team will work together to record their answers, however, each team member should complete their own worksheet in their journal even though the responses may be the same for each member of the team. They will write or draw responses to the prompts: "The problem is", "This is a problem because" and "My solution is".

You may get them started on their Problem and Solution Worksheet by prompting them with the problem statement:

**The problem is:** The ceiling leaks when Walrus is taking a bath. My character (name) needs an umbrella or similar device to keep them dry.

Allow students to complete the rest of the worksheet independently or in a group.

**Activity: Invention Design #1 (10 minutes):**

Finally, it is time to draw the first design of the invention. Students will now design, draw, and label a special umbrella for their particular character on the Invention Design #1 Worksheet (included in the YIPLit Inventor's Journal). If working in teams, each team member should draw their own design in their Inventor's Journal, but the designs should be similar and labeled the same way.

*NOTE: Students are encouraged to make several drafts of a design, especially if working as a team. They may need more scrap paper to sketch ideas. These sketches and drafts can be inserted into the Inventor's Journal later as a further record of the design process. If working as a team, it is ok if just one member of the team*

keeps these “drafts” in their journal, as each team member may not have a copy. However, all students should draw the final first version of their invention in their own Inventor’s Journal.

*NOTE: Since all students in YIPLit are working from the same theme book, **Walrus in the Bathtub**, they are all solving the following problem. PROBLEM: The ceiling leaks when Walrus is taking a bath. Their character needs an umbrella or similar device to keep them dry.*

*NOTE: Responses can be assisted or guided by the teacher or another adult as a class or individual activity as appropriate for the level of your students.*

**Closure/Check for understanding:**

Students will use a Ticket Out the Door or in a Think-Pair-Share answer the prompt: In one sentence, tell me about your ideas/designs from today’s lesson.

**IDEAS FOR VIRTUAL INSTRUCTION**

**Mind Mapping:**

*Explain to the students how a MindMap works and how it can be used to help focus ideas. You may wish to do this via virtual instruction or provide a virtual resource of some kind. Ask students to choose (or you may assign) one character from the book. Have students complete the MindMap Worksheet (included in the YIPLit Inventor’s Journal). Remind them to use SCAMPER verbs to help them think of new ideas for a unique umbrella to that will solve a specific problem for their assigned character. You may also wish to create breakout rooms so that students may work in groups to create a MindMap.*

**Defining the Problem and Solution:**

*Ask students to use their YIPLit Inventor’s Journals and complete the Problem and Solution Worksheet (included in the YIPLit Inventor’s Journal). They should write or draw responses to the prompts: “The problem is”, “This is a problem because” and “My solution is”.*

*You may get them started on their Problem and Solution Worksheet by prompting them with the problem statement:*

**The problem is:** *The ceiling leaks when Walrus is taking a bath. My character (name) needs an umbrella or similar device to keep them dry.*

*Students can share their ideas in a chat, brainstorm with a partner, using a shared document or Zoom breakout rooms.*

**Invention Design #1:**

*Have students design, draw, and label a special umbrella for a particular character on the Invention Design #1 Worksheet (included in the YIPLit: Inventor’s Journal). Students can share their ideas in a chat, with a partner, using a shared document or breakout rooms.*