

EPISODE: TWO	TITLE OF LESSON: Use Design Thinking to Solve Problems
AUDIENCE: 4-12th Grade	DURATION: 60 Minutes
LEARNING OUTCOMES: <ul style="list-style-type: none"> • Design solutions to problems using the design thinking model • Develop, test, and refine a prototype as part of a cyclical design process • Apply Innovative thinking to apply innovative design 	
LEARNING OVERVIEW: <p>Students learn about design thinking and use the process to create a solution(s) to their problem, build a prototype, and test their product. When they complete the task, students work collaboratively to revise the prototype to enhance the original design.</p> <p>This lesson will also utilize concepts drawn from the ISTE Student Standards, specifically standard 4, Innovative Designer.</p>	
IN THIS LESSON: <p>Students will learn about cyclical design thinking and create a model during this session. They will be given the opportunity to practice the model they learned during this session by re-attempting to complete the “Repair the Broken Radio Tower” challenge they have completed in Episode 2.</p>	
FINAL PRODUCT: <p>Students construct a new tower using a few new objects included in the design. Students will construct this tower using the design thinking elements they will learn during the lesson.</p>	
FACILITATOR RESOURCES: SLIDES LINK:	ADDITIONAL MATERIALS NEEDED: Spaghetti (Dry), Marshmallows, Tape
FLOW OF LESSON: <ul style="list-style-type: none"> - Recap the “Repair the Broken Radio Tower” challenge as described in the Episode 2 gameplay - Teach the students about design thinking using the Design Thinking Slidedeck - Challenge students with the new assignment & objective “Redesign Your Tower with New Specifications” <ul style="list-style-type: none"> - Allow the students time to ideate and work with their teams to formulate and prototype strategies for building a new tower given the new specifications - Ask students to submit their final build (based on new specifications) and ask them to explain their modifications and the reasons behind them - Use discussion questions to stimulate an ending discussion centered around design thinking and prototyping 	
INTRO: <p>Begin this lesson by asking your students to recall the “Repair the Broken Radio Tower” challenge they faced while playing through Episode 2 of the Quest gameplay.</p> <p>Ask them to recall what the specifications were and what the rules were for the challenge. Ask them to keep those rules and specs in mind while learning the information they are about to be presented with.</p>	
INSTRUCTION: <p>Follow the session flow as listed and use the presentation slide deck to present the materials. After the instructional content is complete, move on to the activity outlined below this section.</p>	

ACTIVITY:**Overview:**

- If you have just completed the Episode 2 challenge called “Repair the Broken Radio Tower,” then your students have already attempted to solve an engineering-based problem centered around building a radio tower out of spaghetti, tape, and a marshmallow. Students will now be instructed that they must re-attempt this challenge with the goal of improving the effectiveness of the building and the overall height of the tower. This task comes with a twist; the students will be able to add an extra item to their build
- Using the design thinking process learned in the instruction portion, each tribe will need to understand and define the problem clearly, ideate various strategies and finally, prototype at least three different items. Tribes should document their entire process of using design thinking to come up with the best solution and all tribes will repeat the challenge together, using their one additional item

Objective:

- Use the design thinking model to redesign a “Radio Tower” that is 2 inches taller than the goal given on their first attempt. (As the instructor, you may have given a different goal on the first attempt. The standard is 20 inches, so if you kept that the same in the first activity, the goal for this activity would be 22 inches)

Activity Set Up:

- Provide the students with additional materials. (Listed in the materials section)
- Prepare to display the Episode 2 presentation slides

Activity Step 1:

- Begin this activity by reviewing the “Repair the Broken Radio Tower” challenge instructions
- Review the new rules added to the instructions

Activity Rules:

1. Students must use an item that meets the criteria below:
 - Cannot be longer than 1 inch in any direction
 - Can only use a maximum quantity of 6 units of the new item
 - Each of the 6 pieces must be identical
2. The new tower must stand for 5 Seconds
3. You must brainstorm your tower on paper at least once

Activity Step 2:

- Introduce the “Radio Tower Design Thinking Questions”
- Allow the students time to ideate and work with their team to formulate and prototype strategies for building a new tower, given the new specifications

Activity Step 3:

- Give students roughly 7-10 Minutes to complete their final builds and get ready to submit them
- Ask students to submit their final build (based on new specifications) and ask them to explain their modifications. Students should also be able to explain how they came up with their final design

Activity Step 4:

- Use discussion questions to stimulate an ending discussion around design thinking and prototyping

Example:

- Click this [Link](#) to view an example of

CONCLUSION:

After allowing the teams to retry building the tower with the new specifications, have the students explain how their design thinking process helped them succeed or come close to succeeding. Specifically, ask them to describe their prototypes.

Students could also be asked to turn in their notes documenting the process they used.

Vocabulary

- **Design Thinking** - a process in which we seek to understand the user, challenge assumptions, and redefine problems in an attempt to identify alternative strategies and solutions
- **Prototype** - an early sample or model of a product built to test a concept or process
- **Ideate** - to imagine, conceive, or form an idea
- **Challenge/ Problem** - a task or problem that is difficult to solve or accomplish
- **Solution** - a means of solving a problem or dealing with a difficult situation

DISCUSSION QUESTIONS:

Here are some discussion questions you could ask to conclude the assignment:

- Why did you choose the solution you ended up choosing?
- Do you think adding a new piece made this harder or easier?
- How many prototypes did you attempt and why did the ones that failed, fail?
- What did you discover about designing a solution to this particular problem?
- Describe one situation that you encountered in your day to day that you could use the design thinking process to solve (Be descriptive)

(Or you can use either set of questions depending on how you would like to direct your students thinking)

Reflection piece/ Discussion questions

- What did we learn in this process?
- What were some of the complications in making the prototype taller?
- If you were required to make it 2 inches taller, how would you do that?

Differentiation Tips:

The goal of differentiation is to give every student access to understanding or solving a problem. We do not want to take away the opportunity to think through the challenge, but rather give them the scaffolding necessary to reach their own conclusions.

- Open up the lesson with the [Design thinking: Problem Solving Framework](#) Video
- Guide students in reflecting on what was challenging about solving the problem in the episode. Allow students to go back and revisit the episode as a refresher. Ask students what points were challenging and how they were able to move past them. Highlight those same strategies for this challenge. Reference how you did this in episode one, if it was completed recently.
- Lower the height by one inch if necessary or adapt item criteria as you see fit.
- Allow students additional time and questioning during the brainstorming on paper process.
- Give additional time for the building portion when necessary.

Use sentence frames to help guide student thinking during the sharing time.

For example...

- We used _____ in our prototype, and that made it _____.
- I realized that if we _____, then _____.
- One thing that could have possibly worked better is _____.
- Design thinking helped me to _____.