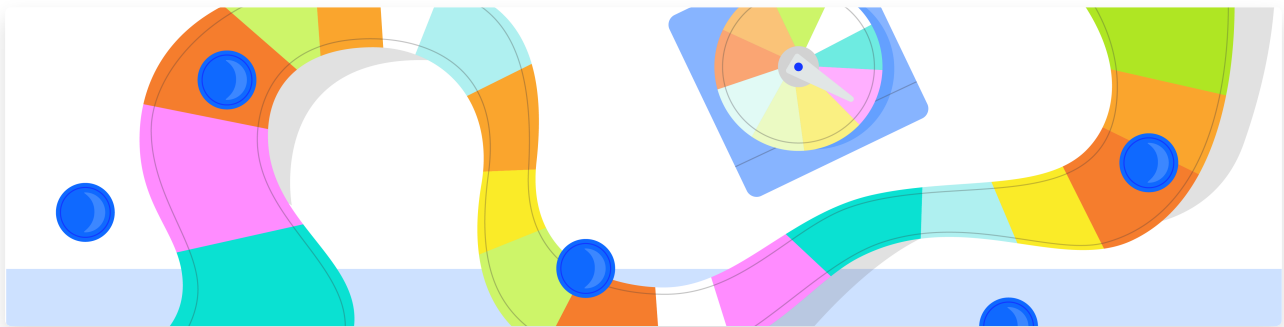


The Design Process, Building Your Own Puzzle, and Debugging

Textbook

The Design Process, Building Your Own Puzzle, and Debugging



Whatever games you like to play, there's something about those games that makes you interested in them. Think about what that might be. What if you were going to make your own game? What would it look like? How would players interact with it? Designing a game, or anything else, takes careful planning, creativity, and testing.

Just like creating your dream game, the design process helps turn ideas into reality, step by step. This way of thinking, called **Computational Thinking**, helps us break down big problems and find solutions using steps similar to how computers work. Let's dive into how designers use this process to create everything from toys to technology!

The Design Process

The design process is a series of steps that guide creators from their first idea to the final product. It helps them solve problems, test their ideas, and make something that works. Here are the stages of the design process:

1. **Generate Ideas:** The first step is brainstorming! You use your imagination to come up with different ideas and solutions for a problem or challenge. This is like the "idea spark" where computational thinkers start to **analyze the problem**.
2. **Test Theories & Get Feedback:** After you have your ideas, it's time to test them out. You might build models or prototypes to see which ideas work best. Testing helps you figure out what needs to be improved. This is also a great time to ask others what they think!
 - Imagine you're building an amazing LEGO castle or drawing your best picture ever. When you ask a friend or a grown-up to look at it, they might say, "What if you added a flag here?" or "Maybe this line could be a bit straighter." That's **feedback!**
 - **Feedback** is when someone gives you helpful ideas or suggestions about your work. Getting feedback from others is super helpful because they might see things you missed, find a tiny mistake, or think of new ways to make your project even better. By sharing ideas and listening to others, everyone's projects (whether you work on them alone or with a team!) can become

stronger, more complete, and more amazing in the end. It's how we learn and grow!

3. **Create Artifacts:** Once you've tested and refined your ideas, it's time to bring them to life. This could be anything from designing a new app to building a new piece of technology. This is where your plans become a real "thing."
4. **Solve Problems:** During the design process, you're always trying to solve problems. Whether you're fixing an issue with your prototype or making sure your design meets your audience's needs, problem-solving is key.

Building Your Own Puzzle



You are going to have the chance to practice building your own puzzle! Go to the Puzzle Playground, using the design process and coding options available, create your own puzzle. Explore the different size grids, themes, and obstacles to create your puzzle. Once you've created the puzzle, test it out! Don't forget to ask for and provide feedback to others!

Debugging

Sometimes when we create something, it doesn't work perfectly the first time. This is where **debugging** comes in. Debugging is the process of finding and fixing problems in a design or code. Just like when something is broken and we need to fix it, debugging helps us get our designs or programs working smoothly.

Computational Thinking in the Real World

The design process, along with debugging and using feedback, is how computational thinking is used to solve real-world issues in science and engineering!

- **For Scientists:** Imagine scientists trying to figure out how pollution travels through a river. They might use the design process to create a computer model (an artifact!) that simulates the river. They'd **generate ideas** about how the pollution spreads, **test theories** with their model, and then **debug** it if it doesn't match what they see in real life. Getting **feedback** from other scientists helps them make their model more accurate.
- **For Engineers:** Think about engineers designing a robot to explore another planet. They would **generate ideas** for how the robot should move, **create artifacts** like small models or computer programs, and then **test theories** by making the robot try different tasks. If the robot gets stuck, they **debug** its code or redesign a part. They use **feedback** from tests to make the robot even better.

By following these steps, scientists and engineers can solve big problems, create new technologies, and understand the world around us, all by thinking like a designer and a computer!

Critical Thinking Questions

1. How can the design process help you solve a problem in your daily life?
2. What might happen if you skipped one of the steps in the design process?

Questions (5)

1. What is the first stage of the design process where you use your imagination to come up with different possibilities?

MULTIPLE CHOICE

Choose the correct answer:

- A. Test theories
- B. Generate ideas
- C. Solve problems
- D. Create artifacts

2. What stage of the design process involves experimenting and exploring to see which ideas work best?

MULTIPLE CHOICE

Choose the correct answer:

- A. Create artifacts
- B. Generate ideas
- C. Test theories
- D. Solve problems

3. In the design process, what is the final stage where you bring your ideas to life by building or making something tangible?

MULTIPLE CHOICE

Choose the correct answer:

- A. Test theories
- B. Generate ideas
- C. Solve problems
- D. Create artifacts

4. True or False: The design process involves only one path from idea to finished product.

MULTIPLE CHOICE

Choose the correct answer:

- A. True
- B. False

5. True or False: Collaboration with others is important in the design process to ensure the best possible outcome.

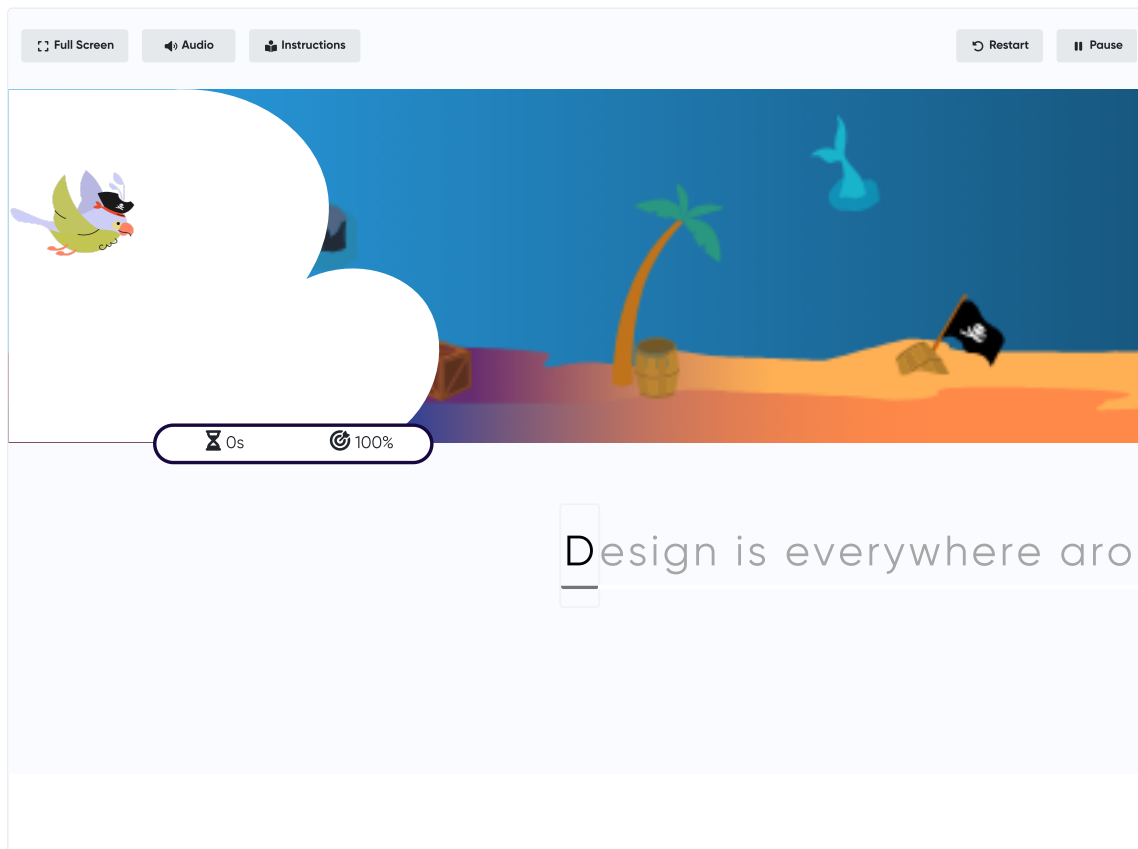
MULTIPLE CHOICE

Choose the correct answer:

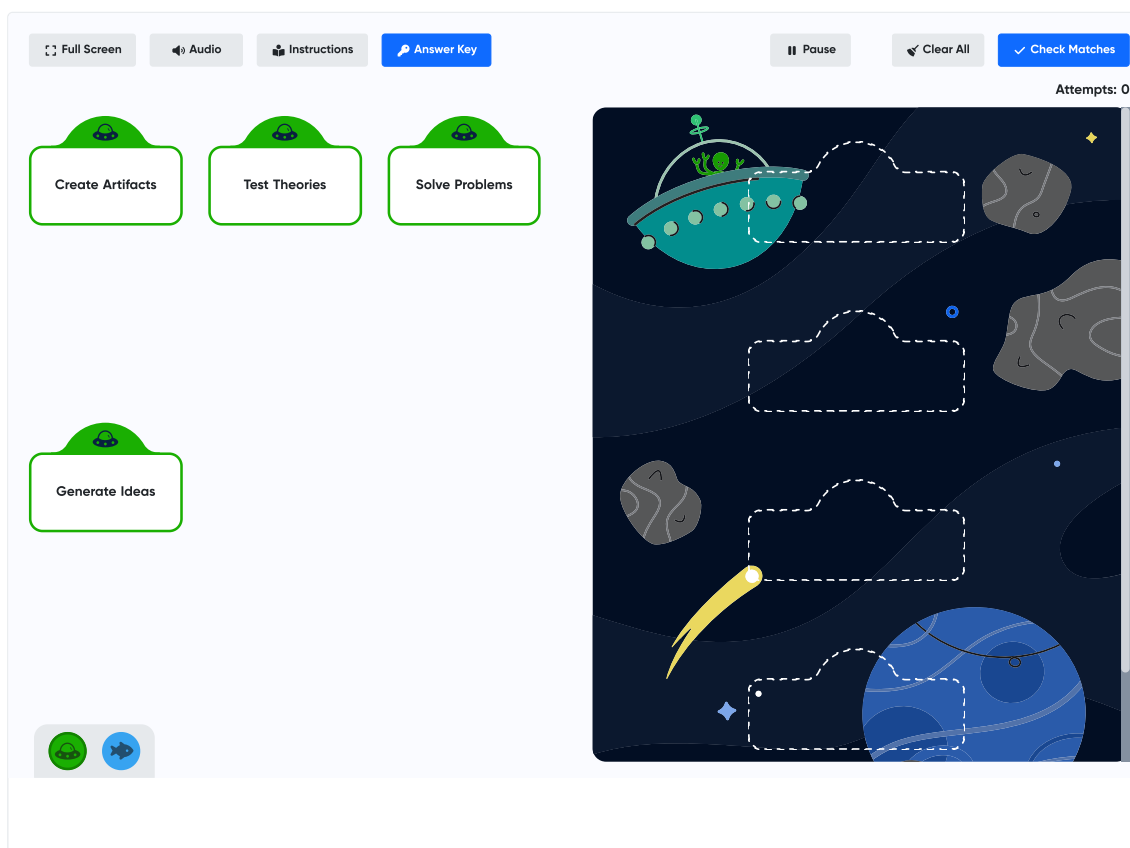
- A. True
- B. False

Games (2)

1. The Design Process, Building Your Own Puzzle Typing Game



2. The Design Process and Building Your Own Puzzle Ordering Game



Answer Keys & Solutions

Questions

1. What is the first stage of the design process where you use your imagination to come up with different possibilities?

MULTIPLE CHOICE

Correct Answer:

- | | |
|---------------------|-------------|
| A. Test theories | ✗ Incorrect |
| B. Generate ideas | ✓ Correct |
| C. Solve problems | ✗ Incorrect |
| D. Create artifacts | ✗ Incorrect |

Explanation:

This stage involves brainstorming and thinking creatively about potential solutions or designs.

2. What stage of the design process involves experimenting and exploring to see which ideas work best?

MULTIPLE CHOICE

Correct Answer:

- | | |
|---------------------|-------------|
| A. Create artifacts | ✗ Incorrect |
| B. Generate ideas | ✗ Incorrect |
| C. Test theories | ✓ Correct |
| D. Solve problems | ✗ Incorrect |

Explanation:

At this stage, you might build models or prototypes to test your ideas practically.

3. In the design process, what is the final stage where you bring your ideas to life by building or making something tangible?

MULTIPLE CHOICE

Correct Answer:

A. Test theories

✗ Incorrect

B. Generate ideas

✗ Incorrect

C. Solve problems

✗ Incorrect

D. Create artifacts

✓ Correct

Explanation:

This stage involves transforming your refined ideas into a physical form or a finished product.

4. True or False: The design process involves only one path from idea to finished product.

MULTIPLE CHOICE

Correct Answer:

A. True

✗ Incorrect

B. False

✓ Correct

Explanation:

Consider whether the design process is a linear or iterative (repetitive) process.

5. True or False: Collaboration with others is important in the design process to ensure the best possible outcome.

MULTIPLE CHOICE

Correct Answer:

A. True

✓ Correct

B. False

✗ Incorrect

Explanation:

Think about whether working with others helps in solving problems and creating better designs.

1. The Design Process, Building Your Own Puzzle Typing Game

Typing game - no answer key needed. Students practice typing the provided content.

2. The Design Process and Building Your Own Puzzle Ordering Game

Correct Order:

1. Generate Ideas
2. Test Theories
3. Create Artifacts
4. Solve Problems

Scoring:

- Gold: 1 attempts or fewer
- Silver: 2 attempts or fewer
- Bronze: 3 attempts or fewer

Students must arrange items in the correct sequence.