

Name:

Date:

Class:

Engineering Design Process Packet Answer Key

ASK: Asking Questions to Understand

As artists and engineers, we ask important questions about our project to understand the problem.

Asking questions in the format “*who, what, when, where, why, and how*” helps us to develop efficient solutions.

Read the questions below and write a complete sentence to answer each one.

IMPORTANT QUESTIONS

WHO IS IN NEED?

Professor (name) is in need.

WHAT IS THE PROBLEM?

On a treasure hunt, the professor got lost while exploring with our art class. All of us were able to find the treasure, but the professor needs clues to find the treasure. The professor does not speak the same language as we do, but we must make directions to help.

WHEN DO WE NEED TO FIND A SOLUTION?

We need to find a solution in 4 art class periods.

WHERE DOES THIS PROBLEM TAKE PLACE?

The problem occurs in our school!

WHY DO WE NEED TO HELP?

We need to help the professor to reveal lost treasure. The treasure includes artifacts from history that can be used for research and cultural learning.

HOW CAN WE SOLVE THE PROBLEM?

We can solve the problem by using pictures as clues. We can make a map!

Name:

Date:

Class:

RESEARCH: Looking at Hieroglyphs

Hieroglyphs are a writing system used in Ancient Egypt. The word Hieroglyphs breaks down to “Holy Writing”; *hier* means “holy,” and *glyphs* means “marks” or “writings.” Hieroglyphs are made up of pictures of animals, objects, and symbols. Hieroglyphs were used to represent words, letters, or sounds.

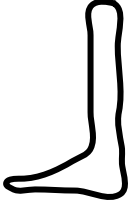

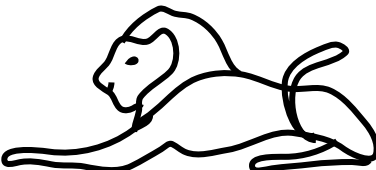
Below are three hieroglyphs. Draw and write what you think the hieroglyph means, and why. The teacher will reveal what the hieroglyph means.

Key Terms

Research: Exploring and studying to learn facts and better understand a topic

Hieroglyph: Ancient Egyptian writing

Symbols: A mark, image, or object that represents something

Hieroglyph	What I think it means	What it means
	Answers will vary.	This hieroglyph is a foot or means “walk.”
	Answers will vary.	This hieroglyph is a leaf, knife, or means “to cut.”
	Answers will vary.	This hieroglyph means lion or “L,” because it is the first letter in the word.

Name:

Date:

Class:

IMAGINE 1: Brainstorming

Put on your thinking caps! Think about how you will create your map prints using your own symbols. Think about how you can represent pictures for important places in the school just as Ancient Egyptians would. Would you recognize the symbols you created? Draw two symbols you can use to give directions around the school. Give one reason why. Draw or write what materials you might use.

My Ideas

SYMBOL



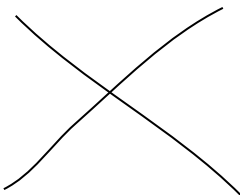
I used this symbol because:

It is simple and it can be used for turning left and right.

I can use:

Sticks

SYMBOL



I used this symbol because:

"X marks the spot." This means they have found the treasure!

I can use:

Sticks

Name:

Date:

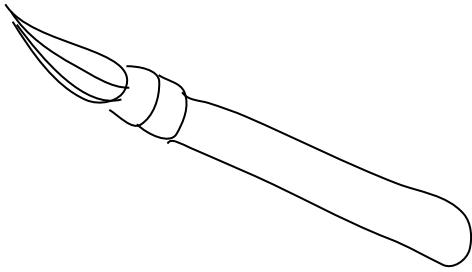
Class:

IMAGINE 2: Brainstorming

Take time to draw more symbols and write what they mean to complete your map.

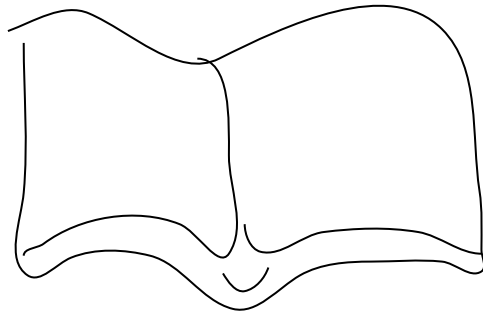
My Symbols

SYMBOL



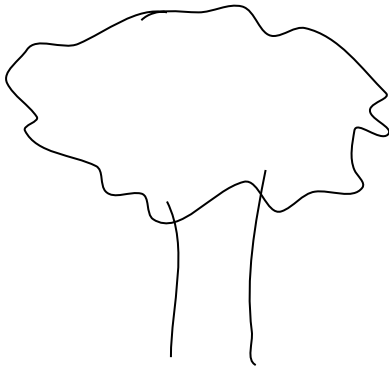
MEANING: Art Room

SYMBOL



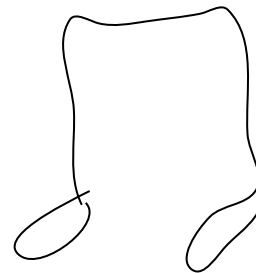
MEANING: Library

SYMBOL



MEANING: Tree/Plant

SYMBOL



MEANING: Music Class

Name:

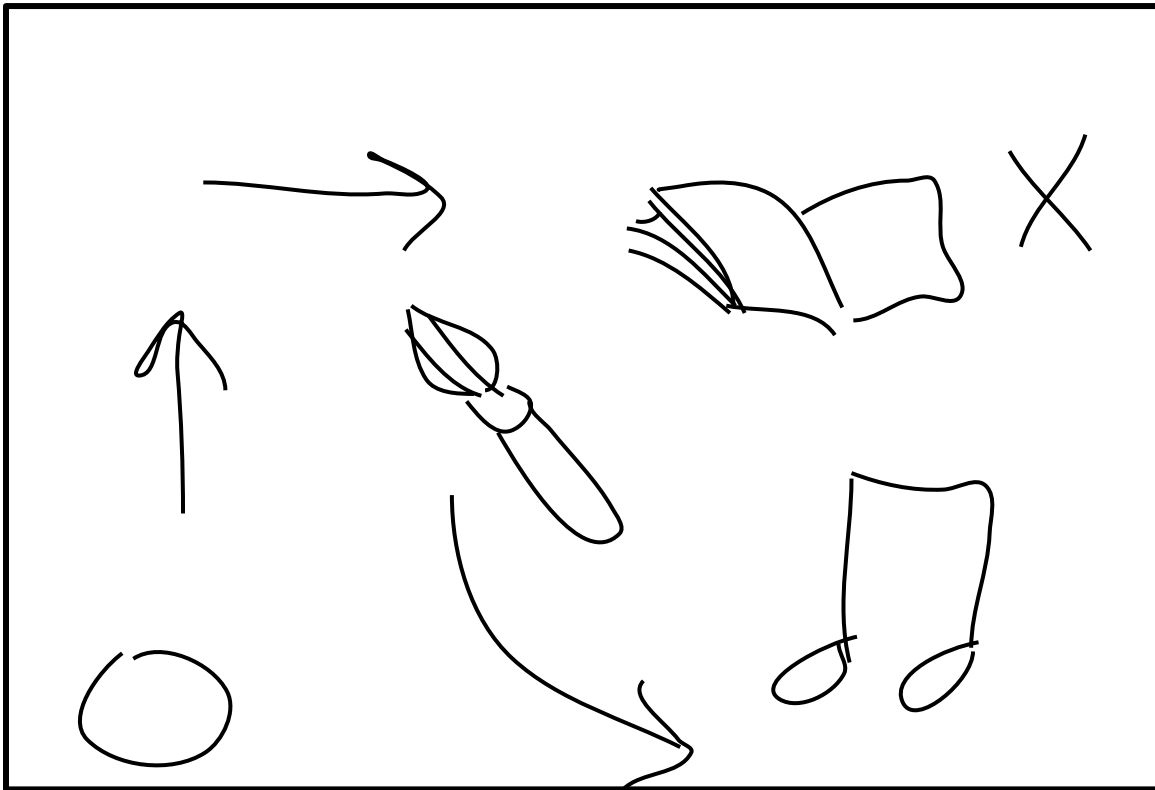
Date:

Class:

PLAN: What's Your Solution? (Individual)

What is your solution? Draw a basic layout of your map and note any personal ideas you may have.

My Solution



Circle= Starting Point "You are here" **Arrows=** left, right direction **X=** End, Treasure
***Important Checkpoints** **Paintbrush=** Art Class **Music Note=** Music Class **Book=** Library

Name:

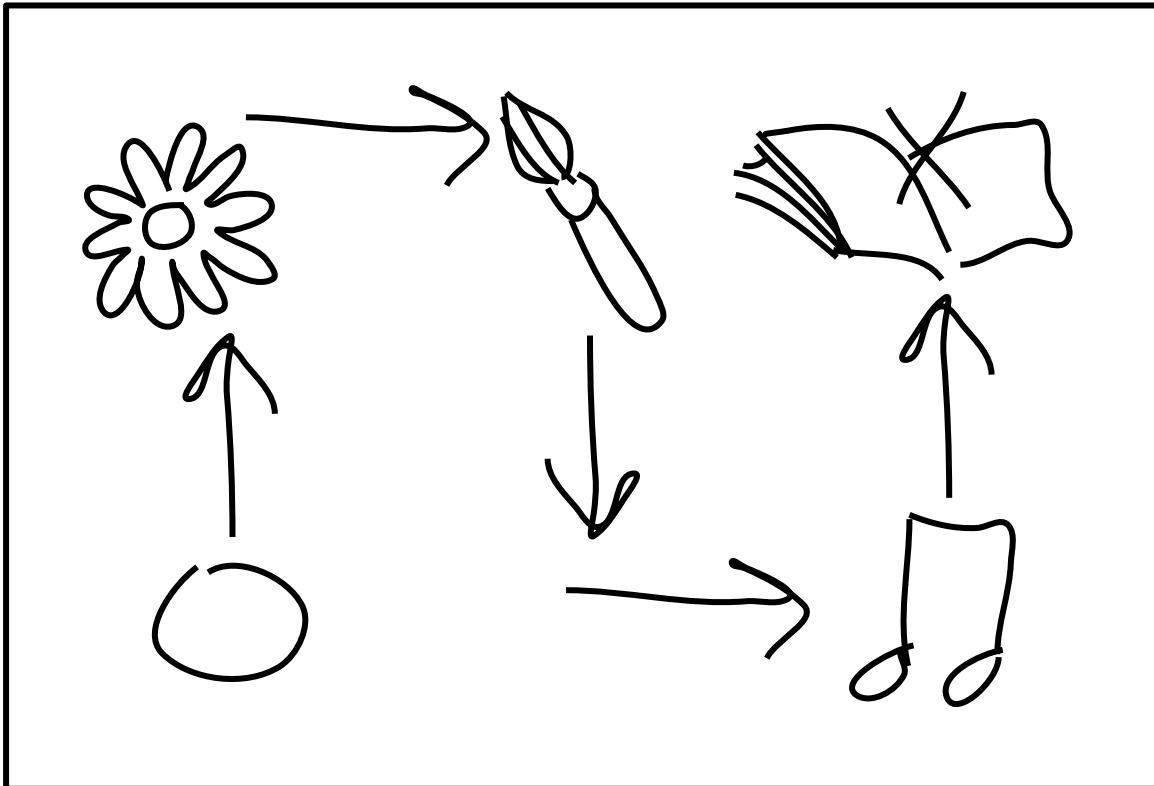
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Class:

PLAN: What's Your Solution? (Group)

Discuss the plan as a group and come together to decide on a final solution!

Our Solution



Circle= Starting Point "You are here" **Arrows=** left, right, straight direction
***Important Checkpoints Flower=** Mural Wall Painting **Paintbrush=** Art Class
Music Note= Music Class **Book=** Library **X=** End, Treasure

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TEST: Test Your Prototype!

Test your map print. Record observations and notes.

Key Terms

Prototype: An original model from which later stages are created

Observation: The process of watching or studying closely

My Observations

- Sticks work well for making straight lines.
- Dirt can be an option for making symbols because it is easy to manipulate.
- Leaves work well for big shapes, not small shapes.
- Flowers are successful for prints.
- Detailed pictures are more challenging to create.
- Simple designs turn out clear on construction paper.
- Darker construction paper works best for more contrast.
- The longer the print sits in the sun, the clearer the print.
- Simplicity is key!

Name:

Date:

Class:

IMPROVE: How Can We Make Our Prints Better?

As a group, think about the outcome of your map. Were the directions successful? How do you think your group can improve your map prints? Discuss as a group and use complete sentences to answer the questions.

Ways We Can Improve

How can your group improve your directions?

My group can improve our directions by adding more clues! We can make our clues easier to read by adjusting our paths. We can improve our symbols.

How can your group improve your symbols to make them clearer?

Our group can improve our symbols by making them relate more to the classrooms. We can make our symbols simpler too, like creating arrows for turning points.

How can your group improve your cyanotype map prints to make them more effective?

My group can improve our cyanotype map prints to make them more effective by leaving them in the sun longer to make an accurate/clearer print. We can change some of the objects in nature (e.g., use sticks for straight lines). We can try using darker construction paper to increase the contrast of our symbols.