

Lesson 1.3: Guessing Game Part 3

Objectives

In this lesson, students will:

- ❖ Walking through an algorithm
- ❖ Reverse engineer an algorithm
- ❖ Create a decision tree
- ❖ Use patterns to break down problems

Agenda

1. Introduction	10 mins
2. Walking the Tree	20 mins
3. Student assessment	15 mins
4. Wrap Up and Reflections	10 mins

Preparation

- Projector and speakers for video
- Print student activity worksheet (one per student or student pair)

Resources & Links

- Shapes printed and cut (from previous lesson)
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1. Introduction



Remind the students about the previous session. Ask them to explain what is an algorithm and what tool we used to represent our guessing game algorithm (-> a decision tree)

An **Algorithm** is a set of instructions that can be followed by a machine called a computer, in order to solve a problem.

2. Walk the Tree

For this activity, we will be working with the following set of shapes:



Distribute the Activity Sheet 1: Walk the Tree to the students. Ask them to cut out each shape so they can manipulate them during the exercise.

Review the images corresponding to a Yes/No question with the students (Appendix A)

The teacher thinks about 1 shape out of the 8 shapes and the students need to ask questions, following the decision tree. As they move down the tree, they eliminate a set of shapes.

Repeat the exercise, students can split into groups as well to try the same exercise.

Reflections:

The teacher can write down the questions on the board or project them. Let's look at all your shapes and use our **pattern recognition** superpower to answer the following questions:

1. How many shapes are yellow? _____
2. How many shapes are green? _____
3. How many shapes are blue? _____
4. How many shapes are black? _____
5. How many shapes are red? _____
6. What is the number of circles? _____
7. What is the number of triangles? _____
8. What is the number of stars? _____
9. What is the number of squares? _____
10. What is the number of hearts? _____
11. How many shapes are filled? _____
12. How many shapes are outlined? _____
13. Which one of the questions 1 to 12 got the highest score?

14. Why do you think our decision tree starts by asking the question "Is your secret shape filled?" ?



Students will realize that given a set of shapes, dividing into patterns allows us to see which pattern includes the most shape. By asking a Yes/No question linking to those patterns, it allows us to eliminate the most number of shapes before our next question.

Group the shapes that correspond to the answer "Yes" to the first question (Is your secret shape filled?) and the shapes that correspond to the answer no. Repeat the same exercise:

1. Find the biggest pattern
2. Ask the next question
3. Subdivide your shapes to prepare for the next question.


We now have an **algorithm** to be able to create an efficient decision tree. Can you tell me what the steps of the algorithm are in this case (1. Find the biggest pattern, 2. Ask the next question,

3. Subdivide the shapes into groups, 4. Repeat 1,2 3 in each branch until you only have 1 shape left)

3. Student Assessment

Distribute the Student Activity 2: Build your own tree and ask the students to draw their decision tree for the set of shapes on this Activity.

4. Wrap Up and Reflections



 Reflection Points:
<ul style="list-style-type: none"> • What was easy in this exercise, what was hard? • If we build the wrong decision tree, could it be possible that we never guess a secret shape? • What is good about being able to build a decision tree? • By using our Decomposition, Pattern Recognition, Abstraction (removing questions that are not useful) and Algorithm (Decision tree), we have used what we call “Computational Thinking” which is a way to solve problems, not only to guess a card but to do many things in life, even fixing a car. Let’s watch this video: What is Computational Thinking


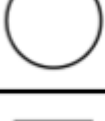



Appendix A

Yes/No questions using images

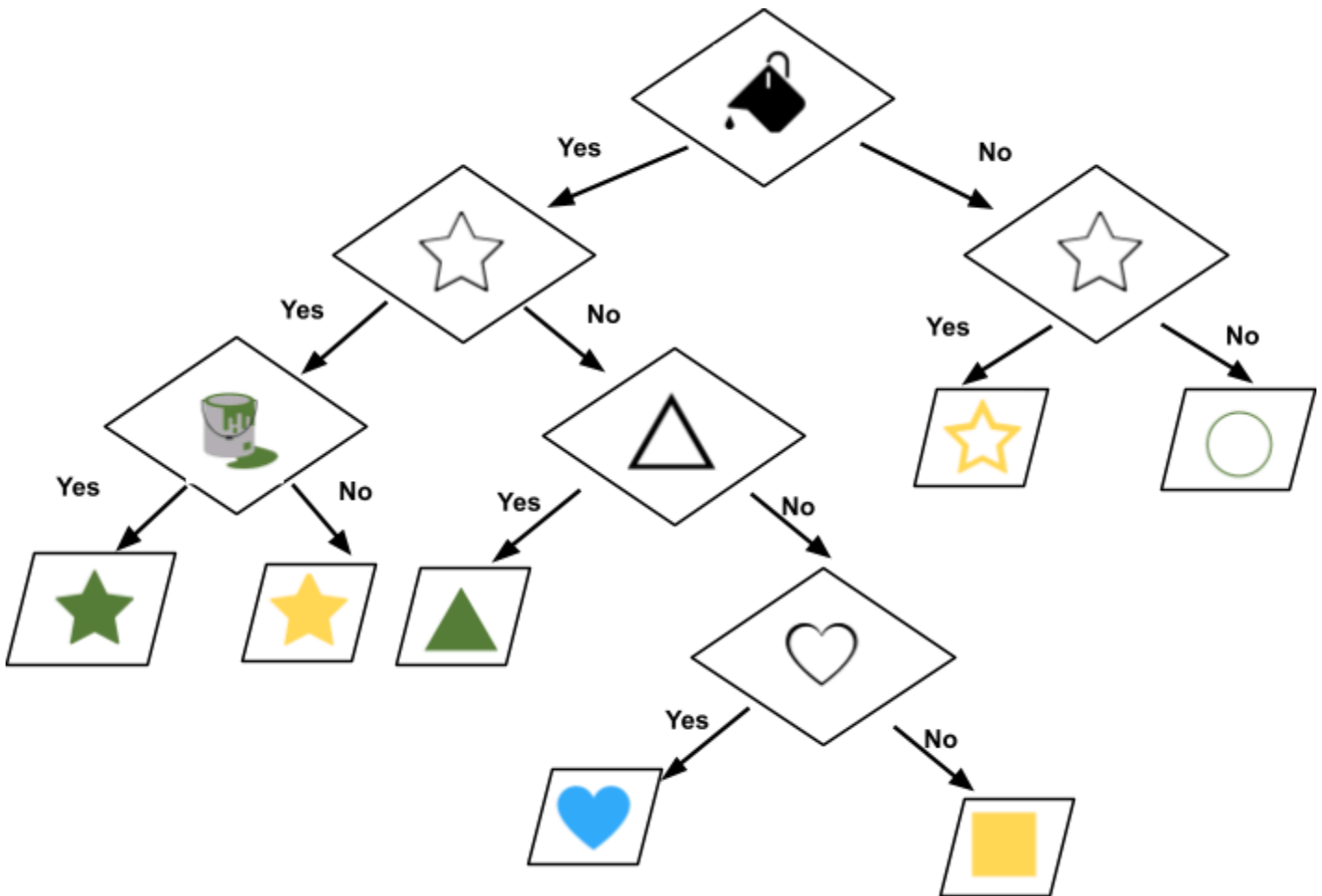
(cut out for each group of students)
 Students can use the sentences or the images

	Is the shape green ?
	Is the shape black ?
	Is the shape orange ?
	Is the shape blue ?
	Is the shape yellow ?
	Is the shape red ?

	Is the shape outlined?
	Is the shape filled?

	Is the shape a star?
	Is the shape a circle?
	Is the shape a square?
	Is the shape a heart?
	Is the shape a triangle?

Student Activity: Walk the Tree



Student Assessment



Look at the 4 shapes above. Circle below the 1st question you should ask to guess a mystery shape chosen from the 4 shapes



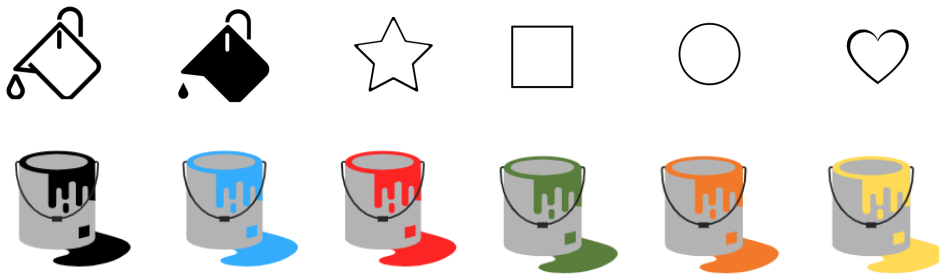
Look at the 4 squares above. Circle the number of Yes/No questions you will need to ask to find a mystery shape out of these 4?

1 2 3 4

3. Create your own decision tree for the set of shapes below:



Cut out the images corresponding to Yes/No questions and glue them into your tree.



Your tree

