

# Guess Who? AI Explained | Teaching Guide

---

## Overview

**Guess Who? AI Explained** is a paper and pencil partner activity that uses a mashup of the nostalgic board game, Guess Who, and the guessing game, 20 questions to explain how AI and machine learning works.

## Teaching Guide Sections

1. Setup
2. Activity Instructions
  - a. Background Lesson
  - b. 20 Questions | class activity
  - c. Guess Who v1 | partner activity
  - d. How to Improve | individual activity
  - e. Guess Who v2 | partner activity
3. Wrap Up
4. Materials
5. Extra Resources

## Vocabulary

- **AI (Artificial Intelligence)** - Computer software that has been programmed to make leaps of logic resembling human thought. They are programmed to recognize patterns and make decisions based on lots of data.
- **Algorithm** - A process, or a set of rules that act as instructions for software. Usually, it's used to solve a specific problem.

- **Machine learning** - When given input, a computer program gives output, then updates its algorithm to be more accurate through feedback given by the user, usually marking the output as correct or incorrect. Like positive and negative reinforcement, over time, it makes less mistakes, seeming to “learn.”
- 

## Setup

### **Requirements:**

- a. Computer (for teacher)
- b. Whiteboard and Marker (for teacher)
- c. Notepaper (one per student)
- d. Index card (one per student)
- e. Pencil (one per student)

Each student should have a pencil before starting.

For the sections involving playing Guess Who, the teacher should use the whiteboard and marker. In both versions of Guess Who, each student will need an index card, and for improving in between, each student needs a sheet of notebook paper. It can be more efficient to hand them all out beforehand.

---

## Activity Instructions

### 1. Background / Discussion

This is a short introduction given by the teacher / presenter to the students about what the activity is, and what they are supposed to do. It starts with the presenter asking if anyone has heard of AI and what they think of when they hear it. Then, a bit of background information is given on AI, using Chat-GPT and Akinator as examples.

## Provided Questions & Answers:

- Raise your hand if you've heard of AI before?
  - When you hear the words AI you might think, "Robots taking over the world," and that they can think like humans. That's what movies and TV shows say.
  - But in reality, AI is actually just *artificial* intelligence. It is not smart on its own, it just seems like it. It's like how some foods are made with artificial sugars, like sweet-n-low. It's not real sugar, but it seems like it.
  - Computer scientists write programs, called AI, to recognize patterns and make decisions based on lots of data.
- Has anyone ever played Guess Who?
  - Guess Who is a game you can play where you and a friend try to guess the person that the other is thinking of, and you can only ask yes or no questions.
  - We are going to be doing something similar today. First we are going to play a game of twenty questions. If you look at the board...

## 2. 20 Questions with the Whole Class

First, the teacher leads the class in a round of 20 questions. Here's how it works. The teacher will state the category and come up with an item from that category, person, place, or thing (Example: cheeseburger). Then, the class will take turns to ask yes or no questions to guess what the teacher selected.

## 3. Guess Who (Version 1)

The teacher will hand out two index cards and one sheet of notebook paper to each student. The students should also have pencils to write with. The class will split into pairs of two. Once that is done, the pairs decide who will be "it" first, and who will be guessing.

Have the one who is “it” think of a person, place or thing, without saying it out loud. You can do either of these to help guide students:

- Pick a category and write it on the whiteboard. Some examples of categories to use are: people from history, things in your house, animals, and food.
- Use the print-out guess who sheets in the Materials section of this guide. Students pick a character from the sheet, and the other person has the same sheet, and must ask questions to figure out who it is, like “Do they have curly hair?”

Once the student has thought of something, have them write it down on an index card, to ensure they don’t forget or change it in the middle of the game. The students will also keep a tally of how many questions it takes for the guesser to figure it out, making one tally after each question. After playing, have the pairs switch roles, staying with the same partner, and repeat.

#### 4. How to Improve?

After playing once in each role, a class discussion is held, socratic seminar style, where the students talk about how many questions it took them to get to the answer, why it was hard, and which questions helped them a lot and were the best to ask.

Then, everyone writes down key questions they think they should ask next time they play, on their notebook paper. The teacher should write on the whiteboard the number of questions it took the guessers to figure out the answer, and get an average.

## 5. Guess Who (version 2)

Have the students switch partners. Using the same category as before, but thinking of something different, students will play 20 questions again. They should use a new index card, writing down their mystery word, and keeping a tally of the number of questions.

The teacher should tell the students to use their notes and questions on the notebook paper to help them guess. After playing once, have the players switch roles, staying with the same partner, and repeat.

## 6. Wrap Up

Now that the students have played a few times, the teacher writes down the average number of questions for the second part. The class should compare the average number of questions it took this time with the average number of questions it took last time. Did the average go down?

It is expected to go down, since the first round was practice, and in the second round they had some experience. The teacher should then talk about machine learning and how AI actually “learns.”

### **Provided Questions & Answers:**

- Why do you guys think you guessed faster this time?
  - Because you learned! That’s exactly what AI does. The machines just do lots of practice like you guys, and they get better every time.

And that’s the end of the activity!

---

# Materials

[Option: Guess Who. Each student should get the same sheets. ]





# Guess Who?



BLASTEROID



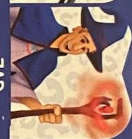
BEAST TAMER



INCREDIBUG



SHADOW NINJA



ZAP



DR. ION



ROBO-JOE



STUPENDOUS



ERIC EAGLE



MR. MIST



SPYSIGHT



GEODE



ATLANTIA



RUMBLER



SPYSIGHT



GEODE



ICE LIGHT



THUNDERSHOCK



SAM SPARK



SWAPSHIFT



MADAME VINE



ULTRASONIC



ERIC EAGLE



MR. MIST



WHOOSH



SIR STRETCH



GLANCE



SAFEGUARD



ZAP



BEAST TAMER



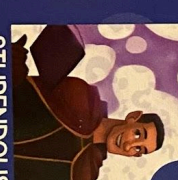
INCREDIBUG



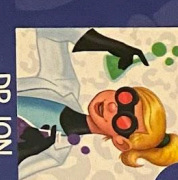
SHADOW NINJA



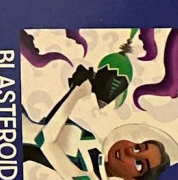
ROBO-JOE



STUPENDOUS



DR. ION



BLASTEROID

---

## Extra Resources

About the 20 Questions website... (<http://www.20q.net/>)

### How 20Q Learns

#### 20Q Fast Facts

- 20Q is a neural network-based artificial intelligence.
- 20Q's opinions are based on games it has played. We do not program the knowledge, nor would we want to.
- You can teach the game the correct answers by playing the same, and similar, objects several times in a row.
- Contradictions with the 20Q A.I. are not bad, they indicate that different people have different views; 20Q will often guess correctly, even with several contradictions.
- **20Q learns from every game played, so, Play Again!**

#### How does 20Q read my mind?

The 20Q A.I. is a neural network-based artificial intelligence; it learns by repetition. When people play objects that the A.I. already knows, it adjusts the weightings within the neural network. If 20Q performs poorly with a particular object and you play that object multiple times, you will see the A.I. learn and get better at guessing that object. It may also help to play similar objects to reinforce the differences between objects.

#### The 20Q A.I. was created by people like you.

Starting from a small seed knowledgebase, we encourage players to submit new target objects and new questions. Then, we carefully check each new object to ensure that it is unique and appropriate for the game. Once the target object or question has been checked, it becomes part of the online game. The only knowledge it has is derived from the initial game (or games); we do not alter this information. This process usually takes a couple of days. If you have suggested a new object, try it a few days later. If your object has been accepted, you can start teaching the A.I. about your object. If your object was not accepted, suggest it again; if we see an object in the queue multiple times, it gets higher priority. The original 20Q "Animal, Vegetable, Mineral" game is not currently accepting new objects or questions.

#### Contradictions?

Sometimes you will not agree with the conclusions of the 20Q A.I. and it will tell you that there are contradictions. This does not mean that "we" think you are wrong, it just means that other players have answered that question differently. They may have answered questions incorrectly, or they may have a different point of view. If you feel 20Q is incorrect, the only way to change it is to play several games, thinking of the same object. When 20Q tells you about a contradiction, it is just letting you know that it is correcting its neural-net.

#### What is Spontaneous Knowledge

The 20Q A.I. has the ability to learn beyond what it is taught. We call this "*Spontaneous Knowledge*," or 20Q is thinking about the game you just finished and drawing conclusions from similar objects. Some conclusions seem obvious, others can be quite insightful and spooky. Younger neural networks and newer objects produce the best spontaneous knowledge.