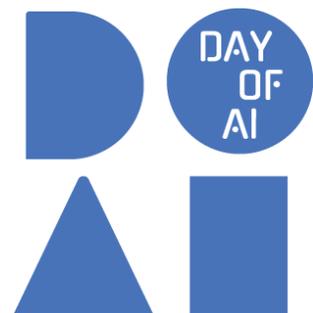


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# What is Artificial Intelligence?

Grade 2-7 Activity Write Up



# What is Artificial Intelligence?

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Prior to using this activity or parts thereof, you agree and understand that:

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## About Actua

Actua is creating a Canada where every child has the skills and confidence they need to achieve their full potential. As a leading science, technology, engineering and mathematics (STEM) outreach organization, Actua includes over 40 universities and colleges, engaging 500,000 youth in 600 communities each year. For 25 years, Actua has focused on identifying and removing the barriers for entry into STEM and now have national programs dedicated to engaging Indigenous youth, girls and young women, Black youth, those facing economic barriers and youth in Northern and remote communities. For more information, please visit us online at [www.actua.ca](http://www.actua.ca) and on social media: Instagram, LinkedIn, Facebook and YouTube! For more information, please visit us online at [www.actua.ca](http://www.actua.ca) and on social media: [Instagram](#), [Facebook](#), [LinkedIn](#), [TikTok](#) and [YouTube](#)!



# What is Artificial Intelligence?

## Activity Summary

In this activity, participants will learn what algorithms are and how they help machines follow step-by-step instructions to complete tasks. Through engaging, unplugged activities, they'll also be introduced to Artificial Intelligence (AI), spot examples of AI in the world around them, and imagine their own AI-powered robot to better understand how AI works.

Developed by Actua, 2025.

Delivery Environment	Activity Duration	Intended Audience	Tech
In-Person	75 minutes	Grades 2-7 (Ages 7-14)	<b>Facilitators should have access to a laptop, projector, speakers, and a screen or blank wall to project onto.</b> <ul style="list-style-type: none"><li>• Projector</li><li>• Speaker</li><li>• Screen/Blank Wall</li><li>• Laptops/Tablets</li></ul>

## Achievement Goals

### Learning Goals

Following this activity, participants will:

- **Understand** that an algorithm is a series of coded steps.
- **Recognize** how AI is used in everyday tools and technology.
- **Describe** how AI can process data to perform different tasks.



## Success Criteria

Following this activity, participants can express:

- **I can explain** how many everyday routines are algorithms and involve a series of steps.
- **I can identify** examples of AI in my daily life.
- **I can explain** how AI can take in information and act based on what it learns or senses.

## Logistics (Timing, Group Sizing, Materials)

Section Title	Time	Group Size	Materials
<b>Opening Hook</b>	10 minutes	<i>Whole Group</i>	<b>Facilitators</b> <ul style="list-style-type: none"><li>• What is Artificial Intelligence? 2-7 - Activity Slide Deck (<i>Appendix C</i>)</li></ul>
<b>Section 1: All About Intelligence</b>	15 minutes	<i>Whole Group</i>	<b>Facilitators</b> <ul style="list-style-type: none"><li>• What is Artificial Intelligence? 2-7 - Activity Slide Deck (<i>Appendix C</i>)</li><li>•  AI 101: Building the Basics (Minecraft Education, 2:15s)</li></ul>
<b>Section 2: Can You Crack It?</b>	20 minutes	<i>Whole Group</i>	<b>Facilitators</b> <ul style="list-style-type: none"><li>• What is Artificial Intelligence? 2-7 - Activity Slide Deck (<i>Appendix C</i>)</li><li>• Password Guide (<i>Appendix C</i>)</li><li>• Tape</li></ul>
<b>Section 3: Build an AI Robot</b>	20 minutes	<i>Individual</i>	<b>Facilitators</b> <ul style="list-style-type: none"><li>• What is Artificial Intelligence? 2-7 - Activity Slide Deck (<i>Appendix C</i>)</li></ul>



Section Title	Time	Group Size	Materials
			<b>Per Individual</b> <ul style="list-style-type: none"> <li>• My AI Robot Blueprint (<i>Appendix C</i>)</li> <li>• Writing Utensil</li> </ul>
<b>Reflection &amp; Debrief</b>	10 minutes	<i>Whole Group</i>	<b>Per Individual</b> <ul style="list-style-type: none"> <li>• My AI Robot Blueprint (<i>Appendix C</i>)</li> </ul>

## Safety Considerations

Safety considerations have been provided below to support safety during this activity, however they are not necessarily comprehensive. It is important that you review the activity and your delivery environment to determine any additional safety considerations that you should be implementing for the delivery of these activities.

### Slips, Trips and Falls

- Only allow one participant at a time to work through the code grid.
- Encourage participants not to rush. The activity is meant to be quickly paced and have participants moving through, but it is not a race.

### Emotional Safety

- Facilitators should understand that participants have different lived experiences and prior knowledge about AI safety, AI, and digital citizenship. This activity may involve or lead to discussions of sensitive topics, such as ethical implications of AI. Facilitators should encourage open, respectful discussions and acknowledge all perspectives. Facilitators should always keep the participants' emotional safety in mind in these discussions, and defer to training from their institution and training received.



## Curriculum Links

This activity aligns with these components found in the [UNESCO AI Competency Framework for Students](#):

### **Human-Centered Mindset: Human Agency**

- Learners are expected to be able to recognize that AI is human-led and that the decisions of the AI creators influence how AI systems impact human rights, human-AI interaction, and their own lives and societies (p. 29-30).

### **AI Techniques and Applications: AI Foundations**

- Learners are expected to develop basic knowledge, understanding and skills on AI, particularly with respect to data and algorithms, and understand the importance of the interdisciplinary foundational knowledge required for gradually deepening understanding of data and algorithms. They should also be able to connect conceptual knowledge on AI with their activities in society and daily life, concretizing a human-centred mindset and ethical principles through an understanding of how AI works and how AI interacts with humans (p. 32-34).

This activity can be connected to the following subject areas:

### **Science**

- Understanding the role of science and technology in society and daily life.
- Investigating systems with specific inputs, processes, and outputs.
- Applying the design processes to develop solutions to problems.

### **Mathematics**

- Identifying and describing patterns in a variety of contexts, including real-life routines.
- Determining pattern rules and using them to make and justify predictions.
- Collecting, organizing, and interpreting qualitative and quantitative data.



## Community Connections

**Community connections** are suggestions from Actua, grounded in our approach, on how facilitators can adapt the activity to reflect the strengths, interests, and priorities of the community where or with whom it is delivered. Consider the following guiding questions to adapt the activity in meaningful ways:

- **Consult with community:** Are there local organizations, Knowledge Keepers, or community members who could contribute insight or context to this topic?
- **Draw on youth experience:** How can you give participants opportunities to share, reflect on, and apply how this learning is relevant to them or their community? Invite participants to identify what knowledge, who, and where they already learn from.
- **Integrate local examples:** How can you tailor this activity to local or regional interests, industries, or community priorities (e.g. land and environment, health, technologies)?

## Activity Procedure

### To Do in Advance

SECTION	PREPARATION
General	<ul style="list-style-type: none"><li>• <b>Think ahead and be ready to adapt:</b><ul style="list-style-type: none"><li>○ Determine your <b>delivery method</b> and leverage ideas from the delivery recommendations and adaptations sections.</li><li>○ While <b>estimated times</b> are provided, it will be helpful to think about how much time you would like to spend on different activities and discussions.</li><li>○ While <b>group sizes</b> (individual, pairs, groups) are suggested, many activities are flexible for whatever will work in your classroom.</li></ul></li></ul>



SECTION	PREPARATION
	<ul style="list-style-type: none"> <li>● <b>Prepare for the content:</b> <ul style="list-style-type: none"> <li>○ Have <b>answers in mind</b> to share with participants for the various reflection questions asked.</li> <li>○ Examine the provided materials to determine if they are <b>suitable</b> for your participants.</li> </ul> </li> <li>● <b>Equipment:</b> <ul style="list-style-type: none"> <li>○ Ensure device, screen and projector are set up.</li> </ul> </li> </ul>
<b>Section 2: Can You Crack It?</b>	<ul style="list-style-type: none"> <li>● Using the Password Guide (<i>Appendix C</i>), draw an example 4x4 grid with a few patterns of increasing difficulty.</li> </ul>
<b>Section 3: Build an AI Robot</b>	<ul style="list-style-type: none"> <li>● Prepare printed copies of the My AI Robot Blueprint - Activity Page (<i>Appendix C</i>) and have a sample ready to guide participants.</li> </ul>
<b>Reflection and Debrief</b>	<ul style="list-style-type: none"> <li>● Ensure there is enough room for participants to move around comfortably as they take a gallery walk to view each other's AI robot designs.</li> </ul>

**Opening Hook**

1. Display the What is Artificial Intelligence? 2-7 - Activity Slide Deck (*Appendix C*). Let participants know that we're going to explore how computers can use information and follow instructions to do things.
2. Ask participants: "What information do you notice or use every day to help you make choices?"
  - a. Possible responses: colours of traffic lights, the weather or temperature, ingredients for a meal, sounds around you (e.g. alarms or music), messages or notifications, what is happening in a game or video.
3. Explain to participants that just like you notice things in your day to understand what's happening and make decisions, computers also need





data they have (i.e. the numbers, pictures, words, or sounds) to decide what actions to take. Without algorithms, computers wouldn't know how to work or solve problems. Some examples include:

- a. Playing a Game: When you press a button, the computer decides what happens next and shows it on the screen.
  - b. Understanding What You Say to It: The computer listens to your voice, figures out the words, and turns them into text or actions.
  - c. Playing a Video: The computer follows steps to load the video, play the pictures in order, and play sound.
9. Showcase growing a plant as an example of a routine activity. The steps have been intentionally mixed up to help participants learn about debugging. Ask participants if they noticed anything incorrect with the series of steps displayed or reenacted. Ask them to explain their reasoning and have the class discuss the correct order of steps
- a. Ask them to explain their reasoning and have the class discuss the correct order of steps:

Example: Growing a Plant (Unordered)	Example: Growing a Plant (Ordered)
<ol style="list-style-type: none"> <li>1. Add water into the pot</li> <li>2. Place pot in the sunlight</li> <li>3. Plant the seed into the pot</li> <li>4. Let the plant grow</li> </ol>	<ol style="list-style-type: none"> <li>1. Plant the seed into the pot</li> <li>2. Add water into the pot</li> <li>3. Place pot in the sunlight</li> <li>4. Let the plant grow</li> </ol>

- b. After discussing the correct order of steps, explain that sometimes, when we give instructions (whether for our routines or for computers) the steps might be out of order or have mistakes. This can cause problems or stop things from working properly.
- c. **Debugging** is what we do when we find and fix these mistakes in the steps or instructions. Just like when you helped fix the order of growing a plant, computer programmers debug their code (algorithms for computers) to make sure the computer follows the right step.



## Section 1: All About Intelligence

1. Ask participants: "What comes to mind when you think of the word 'artificial'?"
  - a. Explain that **artificial** means something that people make, instead of it growing or happening on its own in nature.
2. Share the slide showing the different examples of what is artificial (made by people) and natural (happens on its own):
  - a. Polar Bear
    - i. The toy bear is artificial because it's made from fabric and stuffing.
    - ii. The real polar bear is natural because it lives in the wild and was not made by people.
  - b. Vanilla
    - i. Artificial vanilla is made by people in a lab. Point out the product label that says "artificial" to help make the connection.
    - ii. Natural vanilla comes from a plant.
3. Ask participants: "Are computers natural?"
  - a. No. They are made by people. Humans give computers algorithms so they can perform tasks.
4. Ask participants: "What comes to mind when you think of the word 'intelligence'?"
  - a. Explain that **intelligence** means being able to learn, solve problems, and understand things. It's about remembering information, making good decisions, and finding ways to fix or improve things.
  - b. People can become more intelligent by practicing skills such as reading, playing, or asking questions.
  - c. Machines can also act intelligent when they're given data (information), patterns, and instructions to follow.
5. Connect these two ideas together to explain **Artificial Intelligence (AI)**
  - a. Artificial Intelligence (or AI) refers to algorithms created by people that help machines act smart, they can learn, solve problems, and make decisions. These algorithms teach computers to use the data they have,





3. In this activity, participants will work together as an AI trying to figure out the correct sequence (the passcode) to open a safe.

a. Inside the safe are passwords needed to save the world - so it's extremely important our "AI" learns the code as fast as possible! We'll see how our AI learns through feedback.

4. Our AI learning process will follow these rules:

a. Each box represents a button on a security pin pad. We need to discover a **six-digit password**, so only six (6) boxes will give us a "correct" response.

6	5	4	
		3	2
			1

X

b. The six correct boxes are all **connected** — either **up, down, left, or right**. (No diagonal connections allowed.). Once a participant finds a correct box, the next step in the password will be **only one box away** in a connected direction.

c. Have participants gather around the grid and ask one participant to volunteer to stand behind the starting **X**. One at a time, they step onto a box they believe is part of the password (like pressing a key on a pinpad). Use feedback after each guess to help our "AI" learn and improve its path.

d. **Note:** An example password pattern is shown on the previous page.

5. Choose **one password** from the Password Guide – Activity Page (*Appendix C*). This will be the hidden "correct" password.

a. As each participant steps onto a box:

i. If it's **correct**: Say "Ding ding! That's a correct part of the sequence. Our AI is learning!"

ii. If it's **incorrect**: Say "Errr! That's not the next step. Our AI received data that this path is wrong."

b. Participants gathered around should pay close attention - every attempt is training data (or information) for our AI (the whole group!). The goal is to remember the correct sequence of "dings" so the AI can build the full password together.

c. Each participant keeps stepping through the grid, receiving feedback for each step, until they get an incorrect guess ("Errr!").



- i. Encourage another participant to go through the grid, starting behind **X**. The participant hops through the known correct portion of the password (based on previous "dings") and then tries to guess the next unknown step.
- ii. This shows our AI building on prior knowledge. This is meant to be fast-paced and participants should cycle through quickly.

### Section 3: Build an AI Robot

1. Ask participants: "What do you know about robots? Can they think on their own? Do they have a brain?"
  - a. Robots have computers for brains! These computers control how they move and work, similar to how our brain controls our body. These computers follow detailed instructions written in special languages (called **code**).
  - b. Some robots can recognize patterns and improve how they work by updating their instructions based on new information. This ability is called **machine learning**, which is part of artificial intelligence (AI).
  - c. Some examples of robots include robot vacuum cleaners, drones, robotic arms used in factories, and robots designed for exploring places like the Arctic or deep underwater
2. Explain that people use their brains and senses to explore and understand the world around them.
  - a. Ask participants: "How do you think machines like robots and computers sense their environment if they don't have brains or senses like us?"
  - b. Introduce the idea that machines such as robots have **sensors**: tools that help them detect what's around them, similar to our five senses (sight, hearing, touch, smell, taste).
  - c. Just as *our* senses send information to *our* brain to help us understand the world, sensors send information to a machine's computer so it can respond.







## Delivery Adaptations

How might you adapt the time, space, materials, group sizes, or instructions to make this activity more approachable or more challenging? **Modifications** are ways to make the activity more accessible, **extensions** are ways to make the activity last longer or more challenging.

### Modifications

#### GENERAL

- Each part of this activity can be delivered as a short, 10–20 minute session, spread out over multiple days / class sessions.

#### OPENING HOOK

- Show the following videos to participants to explain algorithms and debugging:
  - [BBC Learning - What Is An Algorithm](#) (BBC Learning, 1:07s)
  - [BBC Learning - What Are Computer Bugs](#) (BBC Learning, 0:51s)

#### SECTION 1: ALL ABOUT INTELLIGENCE

- If time is limited, choose 2 to 4 examples of different tools and technologies to discuss whether they are AI or not.

#### SECTION 3: BUILD AN AI ROBOT

- Provide pre-made robot templates for participants who prefer coloring and labeling rather than freehand drawing.
- Let participants work in pairs or small groups to design a robot together.



## Extensions

### SECTION 1: ALL ABOUT INTELLIGENCE

- Present pairs of similar tools (one with AI and one without) and have participants spot the differences. Examples include:
  - Traditional and smart thermostats
  - Regular and robot vacuum cleaners
  - Manual and Self Driving Cars

### SECTION 2: CAN YOU CRACK IT?

- Repeat with patterns of increasing difficulty if there is time.
- Allow the next step in a password to be a diagonally-adjacent box.

### SECTION 3: BUILD AN AI ROBOT

- Instead of drawing, have participants build their robot using craft materials, toy building blocks, or modeling clay.
  - Ask participants to explain or add more features such as how their robot learns from its environment or improves over time.
  - Have participants act out their robot's tasks, simulating sensors and AI learning by responding to commands or environmental "changes."
- Open and use the [Bee-Bot emulator](http://beebot.terrapinlogo.com) ([beebot.terrapinlogo.com](http://beebot.terrapinlogo.com)). Explain that the robot needs clear and specific instructions using the arrow buttons.
  - As a class, review each button and what it does. Practice giving directions together, and discuss how AI and robots use sensors, data, and instructions to make decisions—just like programming the Bee-Bot.
  - Ask students to imagine if Bee-Bot could "see", "hear", and learn from its surroundings like a real AI. Discuss questions such as:
    - What senses would Bee-Bot need?
    - What kinds of things would it learn from?
    - How could it improve and get better at its tasks over time?



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## Appendices

### Appendix A: Career & Mentor Connections

#### AI/MACHINE LEARNING ENGINEER

- Builds and trains artificial intelligence systems that can learn from data to make predictions or perform complex actions. They support the machine learning researcher.

#### COMPUTER PROGRAMMER

- Computer programmers write, modify, and test code and scripts in a variety of programming languages that allow computer software and applications to function properly.

#### MACHINE LEARNING RESEARCHER / DATA SCIENTIST

- Machine learning researchers or data scientists clean and interpret data while building models using a combination of that data and machine learning algorithms.



## Appendix B: Background Information

### DATA AND DATASETS

Data comes in many forms, including numbers, images, words, and other types of information. They provide insights about individuals, groups, and the world around us. It is a key resource for understanding patterns, making decisions, and predicting outcomes. Specifically, data can be used to:

- Identify correlations and trends that might not be obvious at first glance.
- Develop a deeper understanding of complex systems and behaviors.
- Inform decisions in real time or future planning.
- Make decisions based on past patterns or observed information.

Datasets are also essentials for creating algorithms, which are sets of instructions or rules that a computer follows to solve problems or make decisions. By analyzing and learning from data, algorithms can help humans understand and act on information more effectively.

Some applications of how data drives algorithms include:

- **Traffic and navigation apps:** Analyzing road and traffic patterns to suggest the fastest routes.
- **Outer space and weather systems:** Studying patterns to predict astronomical events or weather changes.
- **Shopping and media recommendations:** Using purchase and viewing history to suggest products or content that people may like.
- **Healthcare and diagnostics:** Analyzing medical data to identify health risks, suggest treatments, or support research.

### COMPUTATIONAL THINKING AND ALGORITHMS

As is described by its name, computational thinking is an approach and a way of thinking. It is structured and systematic and therefore lends itself well to computer science. However, computational thinking is useful beyond computer science as an



approach to learning and problem solving. The four stages of computational thinking are:

- **Decomposition:** Breaking down the information into manageable parts.
- **Pattern Recognition:** What is the data doing?
- **Abstraction:** Identifying the rules that dictate the observed patterns.
- **Algorithm Design:** Developing the steps to solve the problem.

An **algorithm** is a set of steps to be taken in order to complete a task. Think of it like a recipe: a set of precise steps that, if followed correctly, will lead to a desired outcome, whether it's baking a cake or sorting a list of names.

In computer science, these are created with a programming language (a language that a computer can understand) in order to input commands and write complex programs. They are the logical blueprints that tell computers how to do things. Algorithms make up our search engines (like Google), our GPS systems, the video games we play and even control our homes.

## **ARTIFICIAL INTELLIGENCE**

**Artificial intelligence (AI)** is a branch of Computer Science that deals with a machine's ability to simulate intelligent behaviour. This includes cognitive functions we associate with human minds, such as perceiving, reasoning, learning, and adapting.

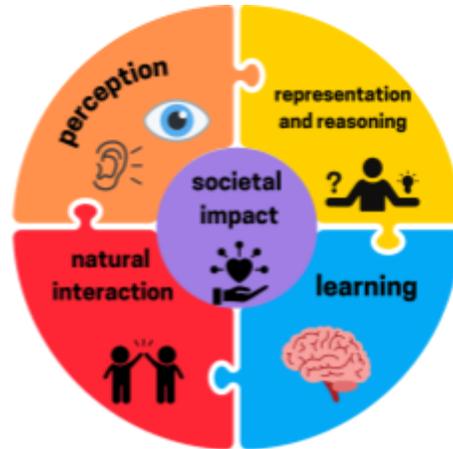
AI is becoming increasingly vital in our lives. From digital assistants, GPS navigation, and autonomous vehicles to tools like Siri/Google Home and generative AI tools (e.g., OpenAI's Chat GPT), its impact on our daily lives is growing. AI plays a crucial role in various aspects of work, enhancing efficiency, and taking on hazardous or monotonous tasks. As AI applications grow, discussions on AI ethics and responsible practices are increasingly important.



## AI and How it Senses the World

For a machine or devices to be artificially intelligent, it can usually do some or all of these five things:

1. **Perceive:** How does AI notice things around it?
  - a. Machines such as robots can “see” or “hear” their surroundings using special tools called **sensors**. Similar to how our eyes help us see and ears help us hear. These sensors help the robot understand what’s happening nearby.
2. **Reason:** How does AI decide what to do or how to react?
  - a. Machines keep a mental picture of the world around them. This helps them understand the situation and make decisions, much like how you remember where you put your belongings so you can find them later.
3. **Learn:** How does AI acquire new knowledge?
  - a. Machines learn by analyzing data, similar to how we get information from books or listening to others. The more data they receive, the better they become at understanding and solving problems.
4. **Interact:** How does the AI communicate or respond to its environment?
  - a. Machines use different kinds of knowledge to engage naturally with people and surroundings. This involves understanding context, recognizing cues, and responding appropriately - similar to how humans adapt their communication depending on the situation.
5. **Impact:** How does AI affect individuals and society?
  - a. AI can influence society in many ways, both positive and negative. It’s important to consider the ethical and social consequences of AI technologies, including how they shape behaviors, decisions, and everyday life.



Day of AI. (2024). What is AI?: Ages 8-11 - Teacher Slides. [dayofai.org/curriculum/basic-ai-literacy/](https://dayofai.org/curriculum/basic-ai-literacy/)

## **Self-Driving Vehicles**

Self-driving vehicles, also known as autonomous vehicles, are cars that can navigate and operate without human intervention. They use a combination of sensors, algorithms, and computer systems to understand their surroundings, make decisions, and control their movements. These vehicles can analyze the road, traffic, pedestrians, and obstacles in real-time, allowing them to safely drive, steer, accelerate, and brake on their own.

At present, there are no fully autonomous vehicles; however, there are vehicles with varying degrees of self-automation. While in its early stages, self-driving technology is gaining interest to improve road safety, reduce accidents caused by human error, and potentially make transportation more efficient and convenient.

## **ETHICS AND AI**

Artificial intelligence offers powerful tools and new possibilities. As these systems learn from data, make decisions, and shape our world, it is important to consider their ethical impacts.

Actua has developed a resource (*Appendix C*) to support facilitators in leading discussions with youth about ethics and responsible AI use. Facilitators are encouraged to engage youth in meaningful conversations that empower them to think critically about how AI is designed, used, and experienced in the world around them. This resource emphasizes human agency and responsibility, supports values-based reflection, and creates space for curiosity, dialogue, and informed decision-making as digital citizens.



## Appendix C: Additional Resources

### GENERAL

Activity Slide Deck

- [What is Artificial Intelligence? 2-7 - Activity Slide Deck](#)
  - **Note:** This link will automatically download to your device.

Supporting Resource

- [AI in Context: Responsibility and Ethics in Artificial Intelligence](#)

### OPENING HOOK

Supporting Resource(s):

-  BBC Learning - What Is An Algorithm
-  BBC Learning - What Are Computer Bugs

### SECTION 1: ALL ABOUT INTELLIGENCE

Video(s):

-  AI 101: Building the Basics

### SECTION 2: CAN YOU CRACK IT?

Activity Page(s)

- Password Guide (refer below)

### SECTION 3: BUILD AN AI ROBOT

Activity Page(s)

- My AI Robot Blueprint (refer below)



# What is Artificial Intelligence?

## Password Guide

Select one password grid as the “ground-truth” password or draw an example 4x4 grid with a few patterns of increasing difficulty.

6	5	4	
		3	2
			1

**X**

		6	
	4	5	
	3	2	1

**X**

	6		
	5		
	4	3	2
			1

**X**


**X**


**X**

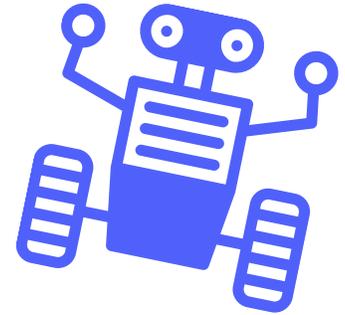

**X**

# What is Artificial Intelligence?

## My AI Robot Blueprint

Draw your AI robot invention in the space below.

- Make sure it has at least **one sensor** (like eyes, ears, or something that helps it notice the world).
- Label the parts of your robot and what they do



A large, empty rounded rectangular box with a dark blue border, intended for drawing and labeling a robot invention.