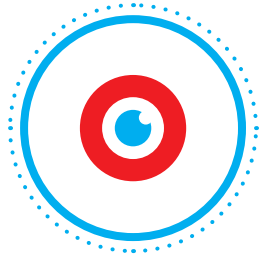


# ROBOT POWER!

Robots have a part for every job!  
They can perform lots of amazing tasks.



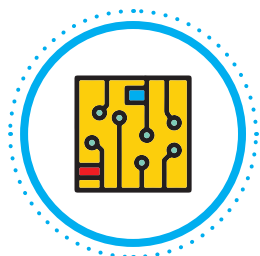
## CAMERA

It can record video in tiny spaces, underwater, even inside your body!



## SENSOR

It senses light and sound (like your eyes and ears do!).



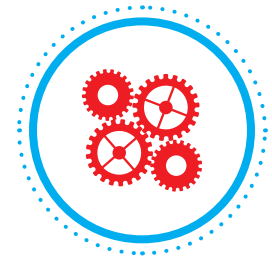
## CONTROLLER

The robot's "brain" helps it follow commands.



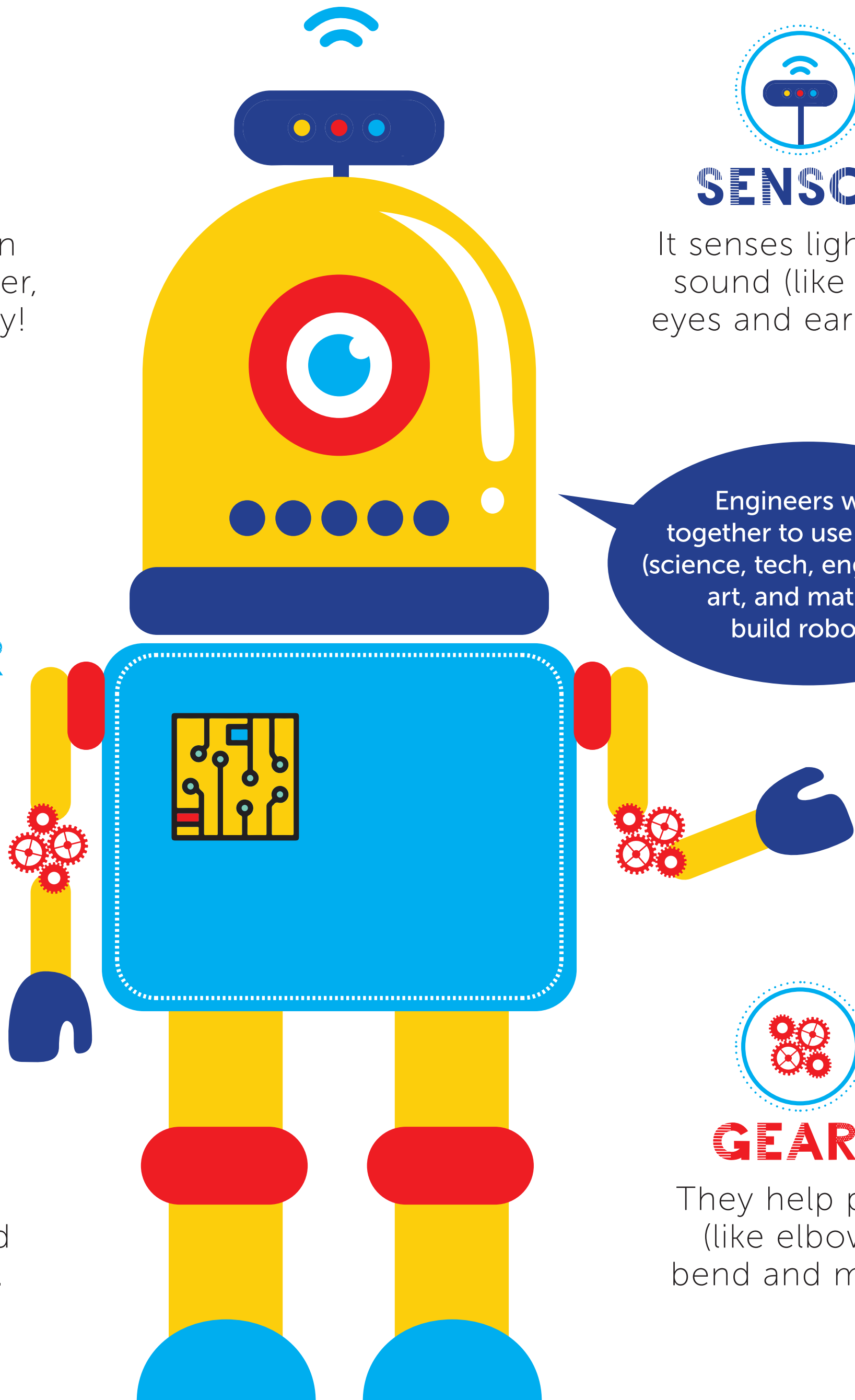
## PINCERS

They can grip things, lift them, and move them around.



## GEARS

They help parts (like elbows) bend and move.



# Robot Design Challenge

Teach students about the engineering design process with a fun robot costume project.

## Objective

Students will engage with the engineering process and solve real-world math problems, plus use communication skills to interact with fellow classmates.

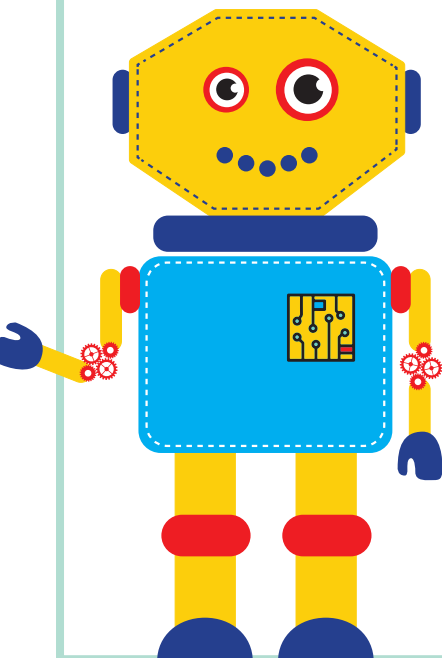
## Time

**Part A:** 40 minutes

**Part B:** 90 minutes (broken into work periods as your classroom schedule allows)

## Materials

- Design a Costume! activity sheet
- All About Me activity sheet
- Rulers, measuring tapes
- Materials for building, such as cardboard, fabric, tape, chenille straws, split brass fasteners
- Graph paper (optional)



## PART A

**1 Initiate** a classroom discussion about robots and their “superpowers.” Explain all the things robots can do, like lift heavy things, visit the bottom of the ocean, and fit into tiny spaces. Ask students which robotic superpowers they would love to have and why.

**2 Distribute** the Design a Costume! activity sheet. Introduce and define the classroom challenge (for item 1 on the activity sheet):

- Design a robot costume that represents you, your interests, and your superpowers.
- Use classroom and recyclable materials to build a design that you can move in.

**3 Review** the steps on the sheet and ask students if they can recognize the engineering design process. Then hand out the All About Me activity sheet and have students reflect on their qualities.

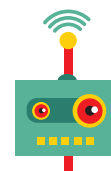
**4 Return** students to the Design a Costume! activity sheet and have them complete the Imagine and Plan sections. Direct them to measure, record, and calculate widths, lengths, and areas for materials and pieces they’ll create. Have them list the materials they will use to build their robot costumes.

## PART B

**1 Have** students complete the Create, Test, and Improve sections of the activity sheet. Circulate to help and encourage them to try on their costumes frequently to evaluate the fit and moveability and make improvements. Let them know that if something isn’t working at first, that’s OK. It’s part of the process. Prompt them to consider swapping materials if the structure isn’t supporting the function. (Tip: Try chenille straws to create bendable elbow joints.)

**2 Invite** students to put on their costumes and mingle at a Robot Party. Get them chatting with these conversation starters:

- How does your design represent you?
- What is your favorite feature and why?
- My favorite part of your costume is \_\_\_\_\_ because \_\_\_\_\_.



## BRAIN BREAK

*Let students channel their inner robots by giving them commands to follow: power down (bend forward), power up (raise arms up), short-circuit (freeze in place), reboot.*

Name \_\_\_\_\_

# ALL ABOUT ME

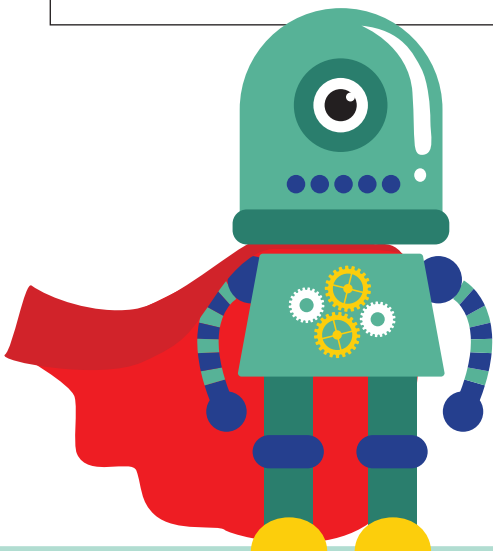
Your robot costume should reflect what makes you unique. Brainstorm with this planner.

**My favorite hobbies**

**My best qualities**

**Three fun facts about me**

**My dream superpowers**



Name \_\_\_\_\_

# DESIGN A COSTUME!

Follow the steps in the checklist to plan and create your own personal robot.

## 1. DEFINE

What is your challenge?

---



---

## 2. RESEARCH

Fill in the All About Me activity sheet to brainstorm costume ideas.

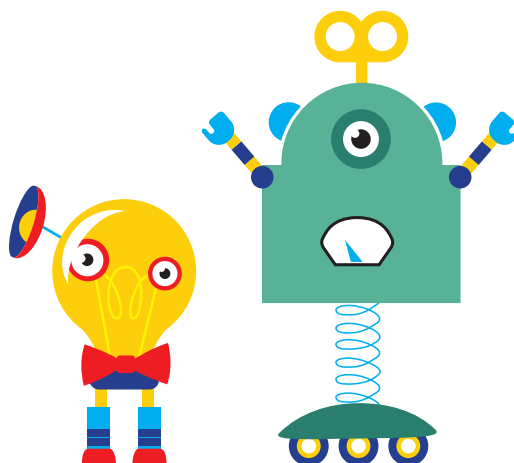
## 3. IMAGINE

Get creative! Use the back of this page to sketch awesome ideas for your costume.

## 4. PLAN

What materials will make your ideas real? Think of materials that fit your needs (like stretchy fabric to go over your knees so you can bend them).

Materials list	How many or how much?



## 5. CREATE

Time to build! Create your costume.

## 6. TEST

Try on your costume as you build it. What is working well?

---

What isn't working well?

---

## 7. IMPROVE

How can you improve your costume?

---

Now do it!

# The Basics of Coding

Explore what makes robots and humans different with a fun exercise that lets students “code” their robot.

## Objective

Students will use algorithmic thinking to create instructions for an everyday task, solve problems with new solutions, and analyze different outcomes.

## Time

Part A: 30 minutes

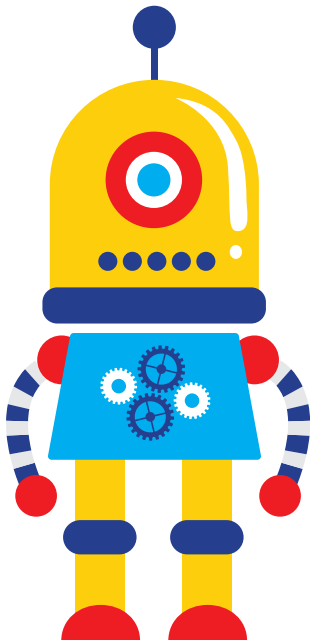
Part B: 60 minutes prep time  
30 minutes performance time

## Materials

- Code Your Robot activity sheet
- Act It Out! activity sheet

## ELA Connections

Read an excerpt from the Amelia Bedelia series to demonstrate how she follows commands very literally. Point out that she, like a robot, does not infer.



## PART A

**1 Lead** a discussion about robots. What sets robots apart from other machines? From humans? Explain that robots are programmed to perform tasks using code.

**2 Prompt** students to explain the terms *programmed* (told to follow instructions) and *code* (the set of instructions to follow) in their own words.

**3 Create** code together that a robot might follow in one of your classroom routines. For example, to fill in a worksheet, the robot would a) place a sheet of paper flat on their desk, b) pick up a pencil, c) place the pencil tip onto the paper, d) move their hand to begin writing the first letter of their name, etc.

**4 Point out** that robots cannot make assumptions or infer meaning like humans can. Therefore, instructions must be clear, ordered, and complete. Point to places in your class-generated code in which a robot might encounter an error and “crash.” (E.g., if you don’t tell the robot to place a sheet of paper on the desk first, he’ll end up writing directly on the desk!) Work to *debug* (identify and remove errors from) your code.

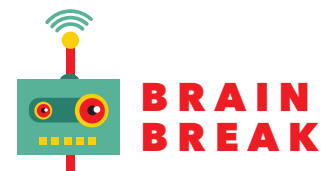
**5 Return** to the concept of debugging. Facilitate a discussion about making mistakes as an essential part of learning—and not something that students should feel ashamed about. Identifying and fixing those mistakes is an important skill.

**6 Distribute** the Code Your Robot activity sheet. Pair up students and have them take turns writing and debugging code for their robot partner.

## PART B

**1 Hand out** the Act It Out! activity sheet. Direct students to work in small groups to create and practice a skit.

**2 Have** groups perform their skits. Ask audience members to identify which parts of the “code” caused the robot to follow directions incorrectly.



Pretend your whiteboard is a touchscreen, and every time you tap it with your finger (in coding lingo that’s called an “event”), students respond by doing one jumping jack.

Name \_\_\_\_\_

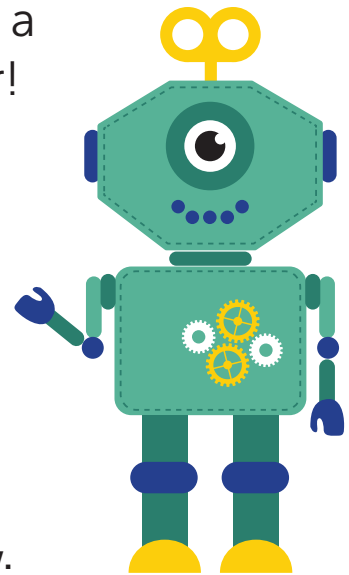
# CODE YOUR ROBOT

Program your robot partner to complete a task. Test the code and debug it together!

## **CIRCLE THE TASK YOU WANT YOUR PARTNER TO COMPLETE**

- Sit down at their desk
- Take a book from a shelf
- Put a piece of paper into a binder or folder
- Move to the front of the room
- Take their lunch out of their backpack

**Use a pencil to write the code for your robot to follow.**



---

---

---

---

---

---

---

---

---

---

Now test it out. Remember that if something seems wrong, you should go back and tweak your coding instructions.

Name \_\_\_\_\_



# ACT IT OUT!

Create and perform a skit about a robot who makes funny mistakes because it is programmed wrong.

## **CIRCLE ONE TOPIC FOR YOUR SKIT**

- It's the first day of school and the robot doesn't know anyone in class.
- Everyone is playing soccer at recess and the robot wants to join the game.
- The robot feels lonely because it doesn't have anyone to eat lunch with.

### **Our Robot Skit**

.....

OK, it's re-code time! Flip the page over and write a debugged program so that your robot can perform its tasks the correct way.