

# ROBO HAND

## ELEMENTARY SCHOOL LEVEL 1

Leonardo da Vinci is one of history's most notable scholars. Among other interests, he studied human anatomy. Through his artwork, Leonardo detailed the human muscular and skeletal systems. His paintings have had a lasting impression on the medical community as well as the art world. The anatomy of our cardboard hand will help us learn about the anatomy of the human body.

### EDUCATIONAL STANDARDS:

#### NGSS CONNECTION:

**1-LS1-1.** Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.\*

#### COMMON CORE CONNECTION:

##### ELA/Literacy

**W.1.7** Participate in shared research and writing projects (e.g., explore a number of how-to books on a topic and use them to write a sequence of instructions).

#### DOK:

Level 3: Strategic Thinking

Level 4: Extended Thinking

### MATERIALS NEEDED:

- ☐ Straws
- ☐ Zip ties
- ☐ Cardboard
- ☐ Markers
- ☐ Hot glue gun



### DIRECTIONS:

1. Trace the shape of your hand onto the cardboard, then cut out the shape.

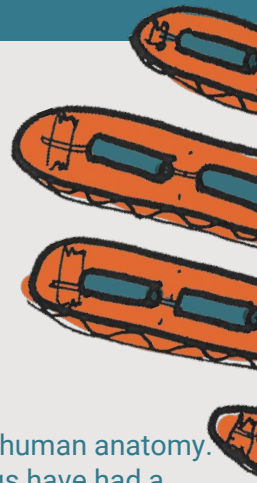
2. Cut knuckle slits into the straws, mimicking the position of your own knuckles.
3. Lay the straws with the knuckles facing upward, on the fingers of the cardboard hand.
4. Run the zip ties through the straws with the square connection end at the wrist part of the hand.
5. Glue the zip ties to the fingertips after they're put through the straw.
6. Let the glue dry, then pull on the bottom of the zip tie line. The finger will curl up, bending at the knuckle, looking very much like a human hand.

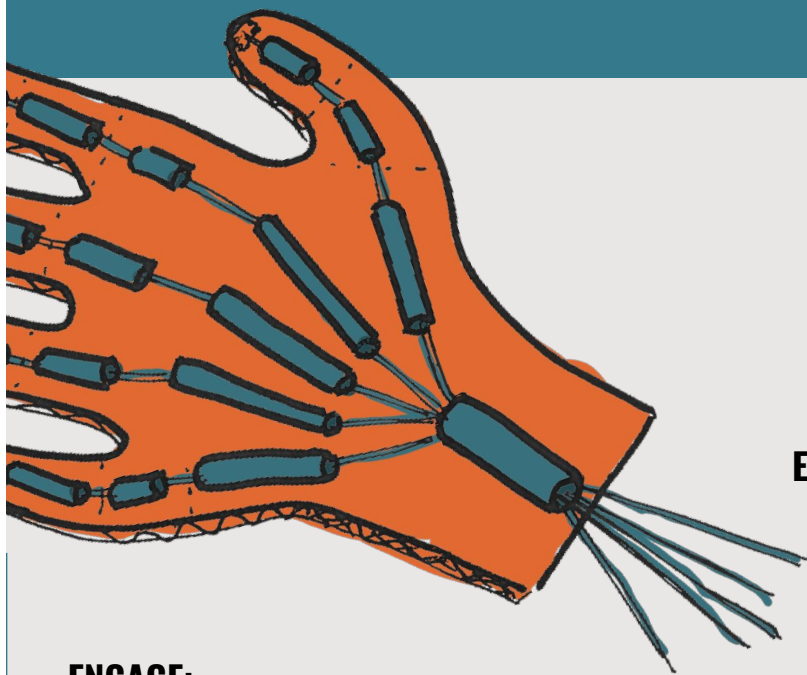
### OBJECTIVE:

Students will be able to use the human hand to explore the anatomy and function. Also, the chance to compare hands to the front feet of other animals.

### ESSENTIAL QUESTIONS:

- How does the human hand function?
- How does the hand help humans?





### ENGAGE:

1. Ask students what kind of things they can do with their hands?
2. Have students act out things they can do with their hands
  - a. Safety and defense (blocking, holding on)
  - b. Eating
  - c. Constructing (building, drawing, writing)
  - d. Communicating (pointing, waving, sign language)

### EXPLORE:

1. Construct the robo hand project with students
2. Students take time to familiarize themselves with the anatomy of the hand
  - a. How it bends
  - b. Number of fingers, function of the thumb
  - c. What happens when they lose the use of a finger?

### EXPLAIN:

1. Discuss the human hand and other animals
  - a. Do other animals have hands?
  - b. How are they different? How are they similar?
2. Read a few books on animals
  - a. Ask students about their hands
  - b. What if they don't have hands?
  - c. How might they solve the problems we use our hands for?
    - i. Safety and defense (blocking, holding on)
    - ii. Eating
    - iii. Constructing (building, drawing, writing)
    - iv. Communicating (pointing, waving, sign language)
3. Discuss various animals and their evolved traits
  - a. Tongues, shells, beaks, claws, trunk etc.

### ELABORATE:

1. Students pick one problem we solve with our hands
2. Use a variety of materials to create a device to mimic an animal completing the task
  - a. Example could be creating an elephant trunk to grab and eat
  - b. A turtle shell to defend from predators
3. Evaluate
  - a. Design
  - b. Functionality
  - c. Reasoning and comprehension of task