# K’Nex Construction Challenge

**IN THE K’NEX CONSTRUCTION CHALLENGE WORKSHOP YOUR STUDENTS WILL STEP INTO THE ROLE OF MECHANICAL ENGINEERS AS THEY DESIGN, CONSTRUCT, AND TEST A MACHINE FROM K’NEX BUILDING PIECE. PREPARE YOUR STUDENTS FOR THE WORKSHOP AND THE AMAZING MACHINE EXHIBIT WITH THE FOLLOWING ACTIVITIES EXPLORING SIMPLE MACHINES AND ENGINEERING.**

## Discussion: What is a Machine?

**TIME:** 10-20 minutes

**Goal:** Activate prior knowledge and engage curiosity about machines and engineering.

Invite students to share things they know about machines and record their responses.

- What is a machine?
- What kinds of things do machines do? Why do we use machines?
- How are new machines developed or created?
- What things about machines do students wonder or want to know more about?

Make a list of the class’s questions. Before visiting the museum, encourage each student to choose a question from the list about which they’d like to look for more information during the visit. Save the list of questions and revisit it after the field trip.

Brainstorm as a class about machines students use every day.

- What job does each machine do? How does it make the job easier?
- What parts does the machine have?
- How do the parts work together to perform the task?

## Extensions:

- Challenge students to look for more examples of machines in their environments by keeping a Machine Journal. The journal could record machines they see or use during the course of a day (or multiple days), state what job each machine does, and list any individual parts they can identify. What piece of the job does each part do?

- Ask students to bring in pictures or other examples of machines with a label for each, listing what job it does and any individual parts they can identify. Create a classroom collage or display of machines. In what different ways could the machines be sorted and categorized?

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**NOTE:** These resources, like the workshop, are designed for a wide range of grade levels. Please adapt the activities as necessary to match the capabilities of your students.
Pre-visit Resources

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**PROCEDURE:**

1. Introduce the concepts of simple machines using the images or models. How does each one change the force or direction of motion? Where have students seen examples of these machines? How did they help to accomplish a task, or make a job easier?

2. Invite each student to choose one type of simple machine to research further and challenge them to construct a working model of that machine using everyday household materials. (This could be structured as an in-class activity or as a take-home project.) Provide some examples of types of materials and how they might be used, but encourage students to think creatively about their design and components.

3. The following questions may be helpful in guiding students’ research and construction:
   - What different types are there of this simple machine? What is each used for?
   - How are the types similar and different? What are the advantages and disadvantages of each?
   - What parts does the simple machine have?
   - What shape are the parts? How do they fit together?
   - What everyday objects could be used for each of the parts of the simple machine? How will they be connected?
   - What are some interesting or unusual ways this component is used in larger machines or systems?

4. Optionally, ask students to also create a poster or booklet to accompany the model, providing information about different types of this component and how they are used.

5. Invite students to present their machines to the class individually, or hold a classroom open house in which students can observe and ask questions about one another’s projects.

**MATERIALS:**

- Images or physical models of simple machines (These could be limited to basic machines, or include variations such as cams, screws, and linkages.)
- An assortment of common household materials, provided by you or contributed by students, such as:
  - Cardboard boxes
  - Plastic food containers and lids
  - Chopsticks, toothpicks, and/or popsicle sticks
  - Toilet paper or paper towel tubes
  - Aluminum foil
  - Yarn, twine, or string
  - Tape, staplers, and/or glue

**PROJECT:**

**TIME** 15-30 minutes to introduce the project, plus optional in-class construction time.

**GOAL:** Research the design and function of a simple machine and create an example from everyday materials.

**BUILDING SIMPLE MACHINES**

15-30 minutes to introduce the project, plus optional in-class construction time.

Research the design and function of a simple machine and create an example from everyday materials.
Pre-visit Resources

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**PROJECT:** BUILDING SIMPLE MACHINES

**REFLECTION:**
Encourage students to reflect on their experiences with the design and construction process.

- What parts were most enjoyable or successful? What were some of the challenges?
- If multiple students chose the same simple machine, how were their constructions similar? How were they different?

**EXTENSION:**
Challenge students to design and connect a second, different simple machine to their original constructions.

- How will the two components work together?
- How does each component transmit energy or change the direction of motion? What is the overall change in direction of motion?
- What kind of larger machine, either real or imagined, might include this system of components?