

# **Robotic Arm Challenge**

NASA sends spacecraft equipped with robotic arms to explore places humans can't yet visit, like Mars and asteroids. These arms are strong and adaptable and are where a lot of work gets done—it's where many of the Mars rovers' tools live.

YOUR CHALLENGE IS TO...

...design and build a Robotic Arm that you can use to lift a pencil box off a table.

1. First, use your lab journal to **IDENTIFY THE PROBLEM AND BRAINSTORM**

- How will you connect the cardboard strips so they pivot efficiently?
- Where will you tape the end of the string so that the “hand” moves the way you want it to?
- How can you use the straws as guides for the string?

2. Second, **DESIGN AND BUILD** your robotic arm

- If the sections don't move freely... Loosen the brass fasteners to reduce friction.
- If the hand doesn't move in the direction it should... Check where you taped the end of the string to the cardboard. Also check that the guides make the string pull in the right direction.

3. Lastly, **TEST, EVALUATE, AND REDESIGN**

Does your arm accomplish the task? Is there something you can change to make it better? Try these other tasks to test your robotic arm:

- Play Kick the Cup. Lay your Robotic Arm flat on the table. Put a paper cup by your arm's “hand.” Pull the string quickly. How far you can kick the cup?
- Pick up a target cup. Add a hook to the end of your Robo Arm. Can you pick up the target cup?
- Play Round Robin. Have a few kids stand around a table. Use the Robotic Arms to pass a cup all the way around. Can you do it faster?