

THE ASTRONAUT
WITH A SONG
FOR THE STARS

The Story of
Dr. Ellen Ochoa

READ ALoud STEM™

The Astronaut with a
song for the stars

Space Shuttle: a spacecraft used
to transport people and cargo
between earth and space.

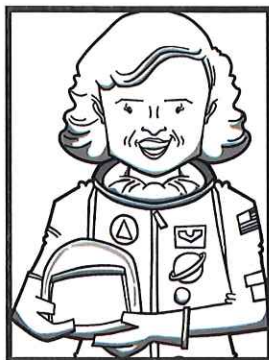
Carly and Adam

Robotic Arm: a type of mechanical
arm designed for grabbing,
holding, and moving objects.

 **Space Station:** a spacecraft that
orbits around earth that astronauts
live on while they gather data and
perform experiments.



Name: _____



Dear Students,

On May 29, 1999 the space shuttle Discovery performed the first docking to the International Space Station. One of the major tasks of the shuttle crew was to transfer more than 1.5 tons of equipment to the inside of the ISS.

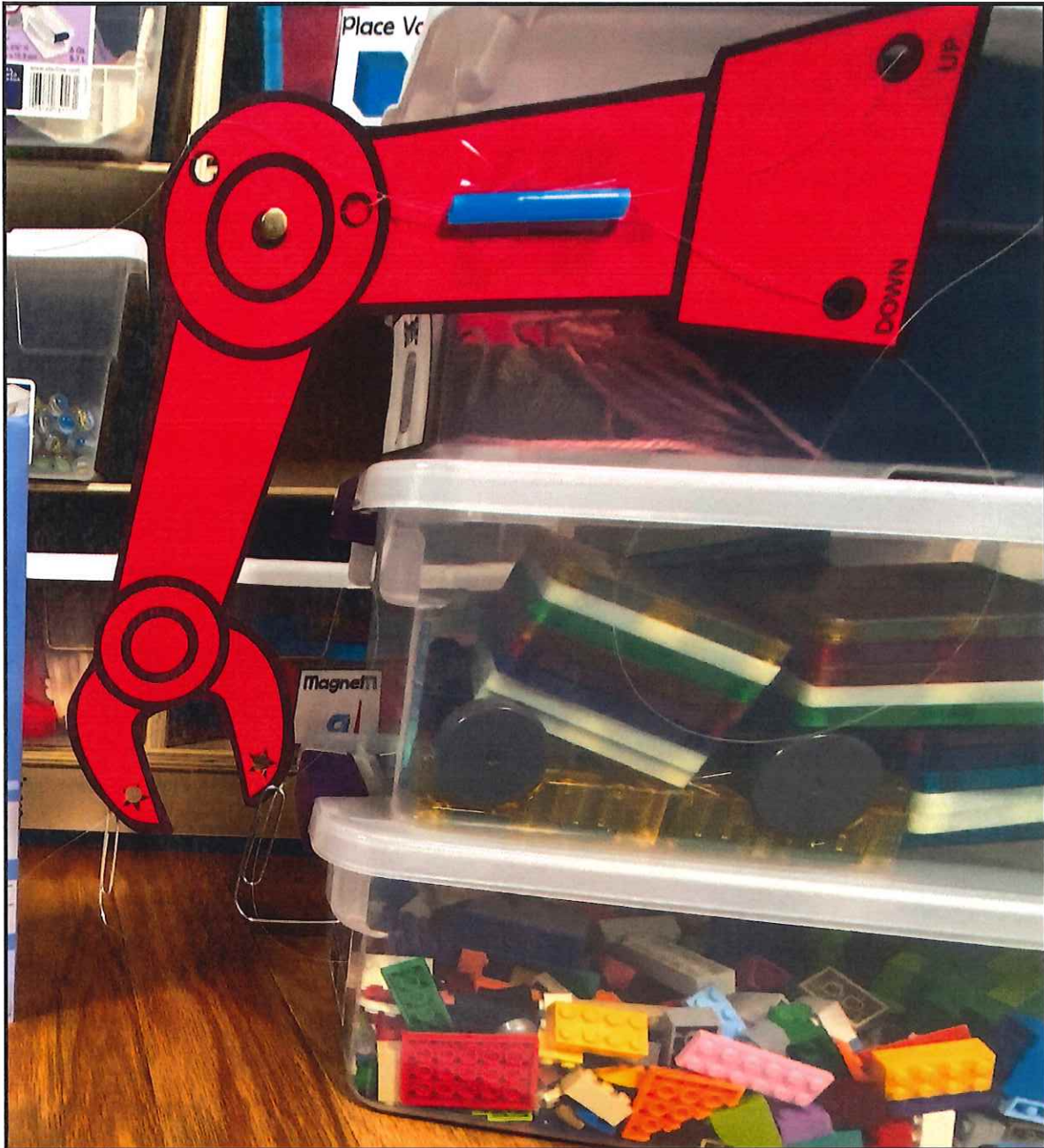
During the mission Dr. Ellen Ochoa used a robotic arm to deliver supplies to the space station. The supplies would later be used by the first astronauts to live on the station.

Can you design a robotic arm that can grab the most supplies at one time? After you design your robotic arm you will test it and make improvements to see if you can increase the amount of supplies that it can pick up.

Materials:	robotic arm cutouts	1 straw
	paper clips	scissors
		hole punch
	string	1 brad
		tape

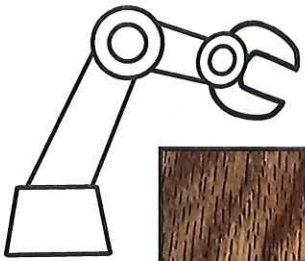
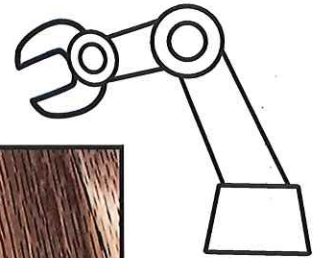
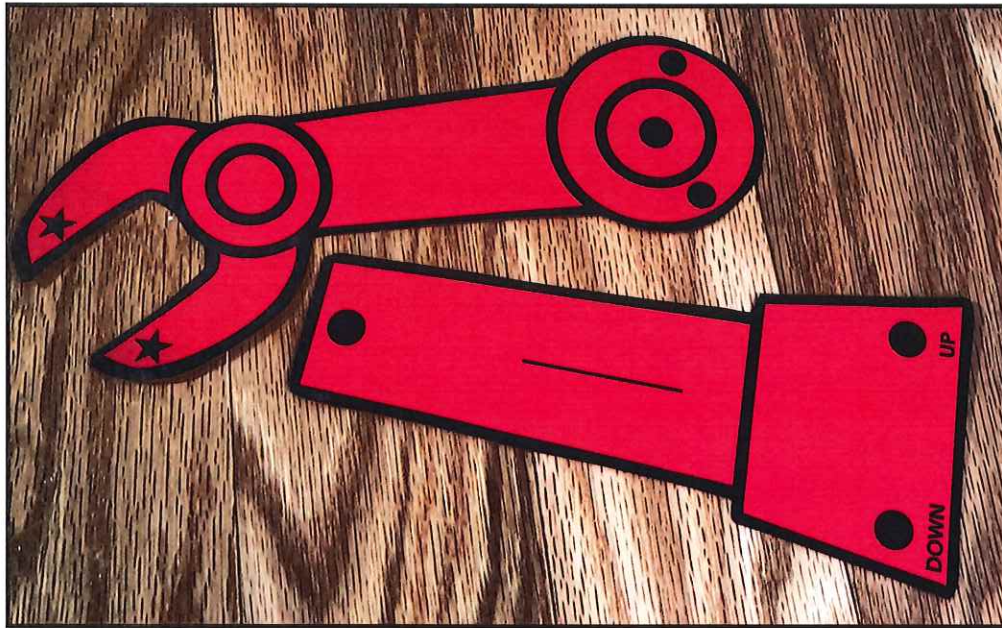
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Teacher Instructions: EXAMPLE

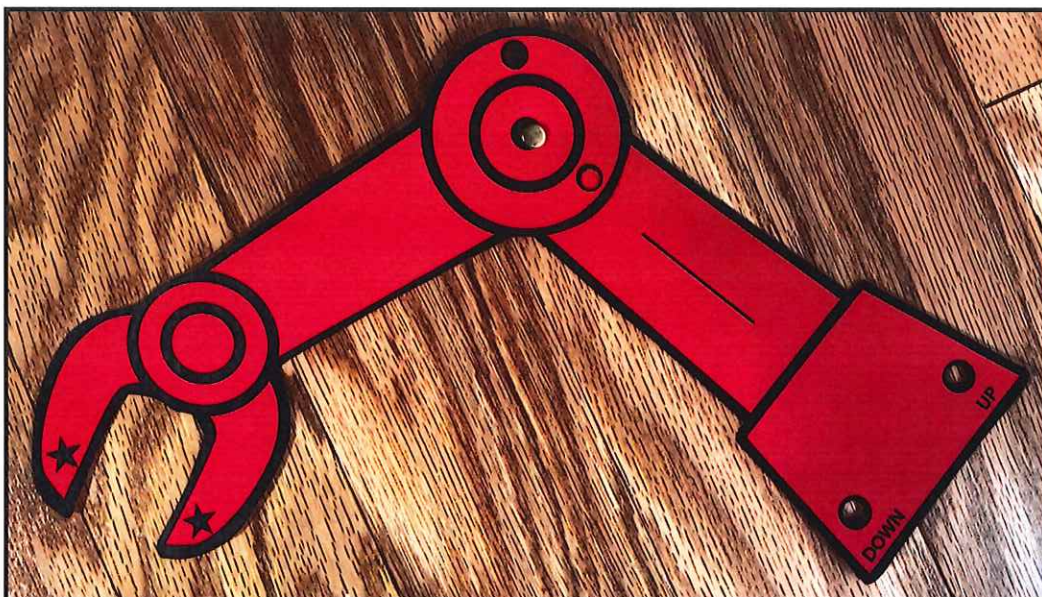


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Assembly Instructions For the Robotic Arm

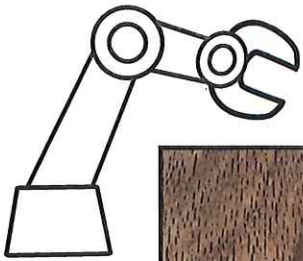
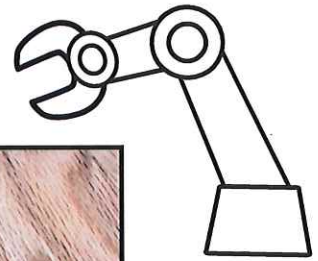
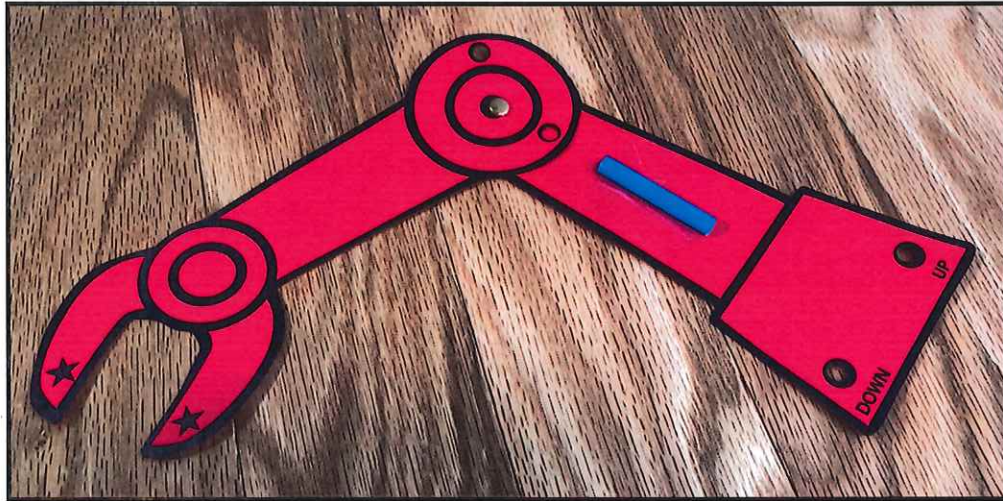


Cut out the robotic arm template and punch a hole in all of the black circles. Attach the two pieces together with a brad.

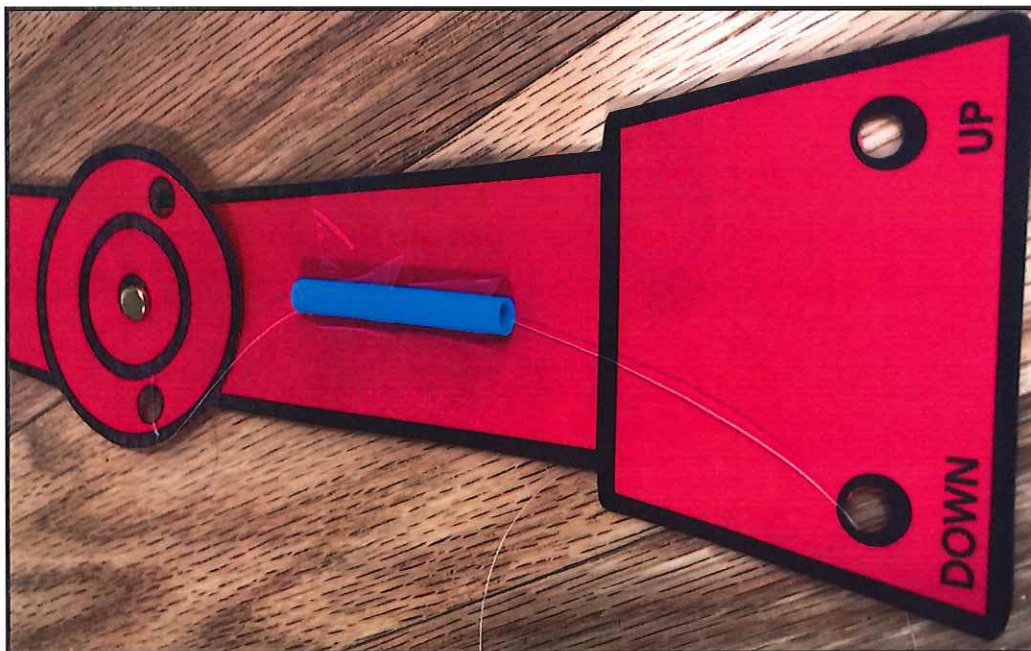


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Assembly Instructions For the Robotic Arm



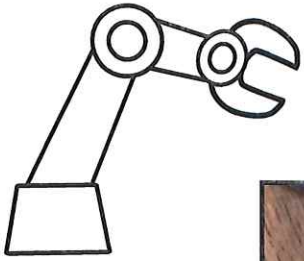
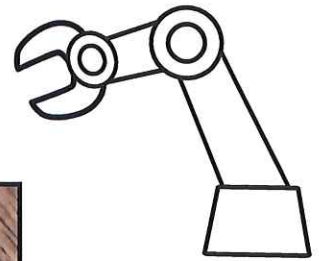
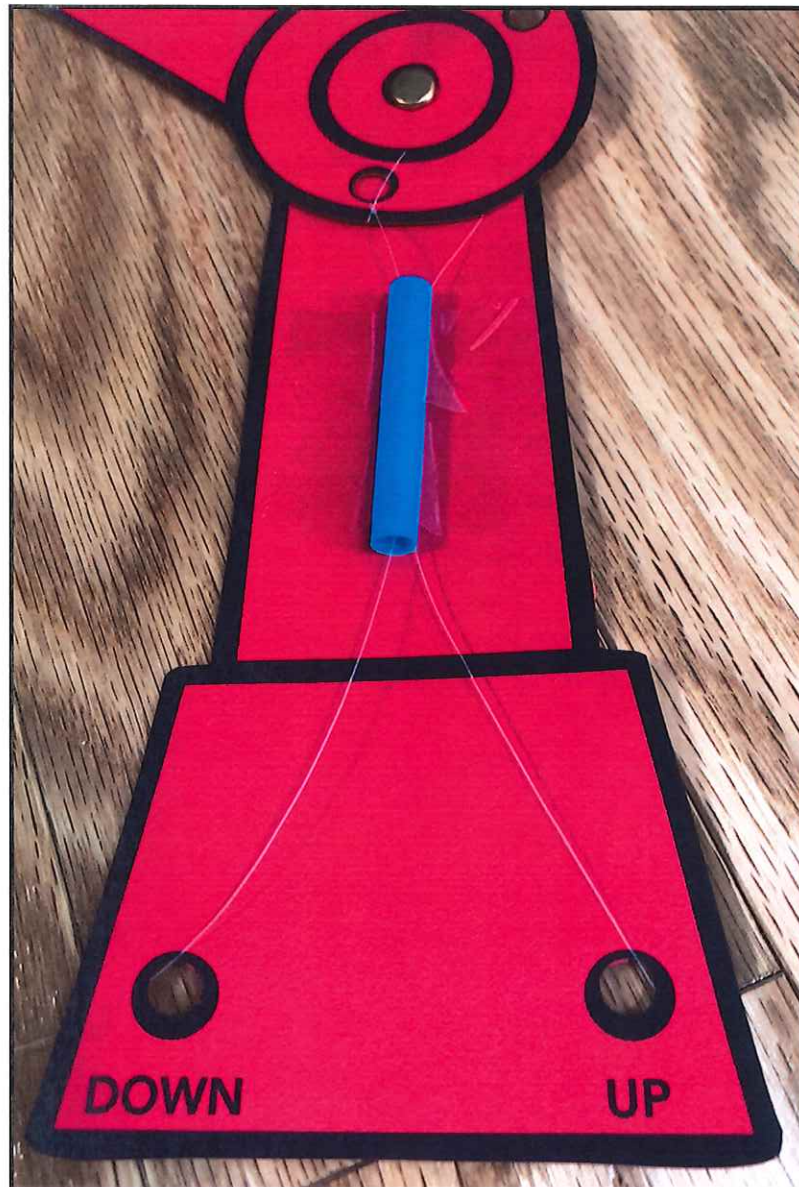
Cut a straw the length of the black line and tape it to the robotic arm template.



Tie a piece of string to the hole on the left side of the brad. Feed the string down into the straw and out the down hole.

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Assembly Instructions For the Robotic Arm



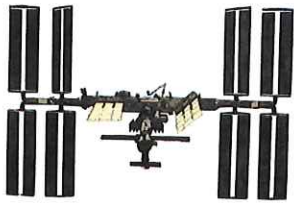
Tie a piece of string to the hole on the right side of the brad.
Feed the string down into the straw and out the up hole.

Vocabulary

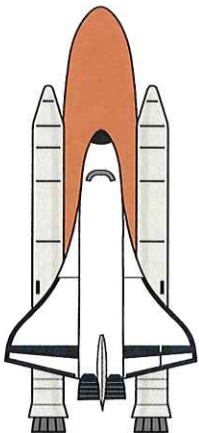
Directions: Use the vocabulary cards to teach the vocabulary words to students.



Robotic Arm: a type of mechanical arm designed for grabbing, holding, and moving objects.



Space Station: a spacecraft that orbits around earth that astronauts live on while they gather data and perform experiments.



Space Shuttle: a spacecraft used to transport people and cargo between earth and space.

Name: _____

ASK



What is the problem you are trying to solve?

IMAGINE



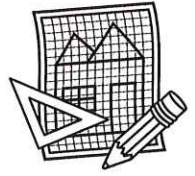
Imagine the best way to solve the problem on your own.
Sketch out your design and brainstorm a list of ideas.

Think about:

- *How will you attach the paper clips to your robotic arm?*
- *How will you position your paper clips so that they pick up the most supplies?*
- *What possible problems could come up during construction?*

Name: _____

PLAN



With your group, sketch out your plan to solve the problem.

A large, empty rectangular box with rounded corners, intended for students to sketch out their plan to solve the problem.

Name: _____

CREATE

Build your robotic arm.



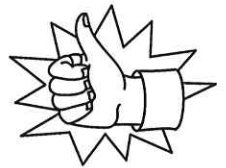
EXPERIMENT

Record how your robotic arm worked during each test as well as any notes to help you make improvements.



IMPROVE

What could you do to improve your design?



Name: _____

Robotic Arm Recording Sheet

Directions: Test your robotic arm. For each test circle how it worked and record how many items it grabbed.

Trial #1:



great



okay



not at all

How many items did it grab? : _____

Notes: _____

Trial #2:



great



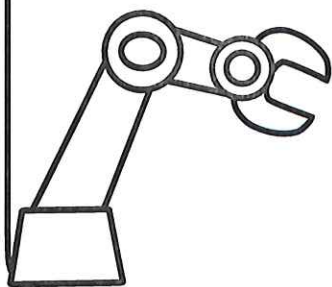
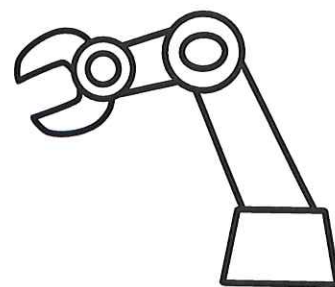
okay



not at all

How many items did it grab? : _____

Notes: _____



Name: _____

Trial #3:



great



okay



not at all

How many items did it grab? : _____

Notes: _____

Trial #4:



great



okay



not at all

How many items did it grab? : _____

Notes: _____

Trial #5:



great



okay



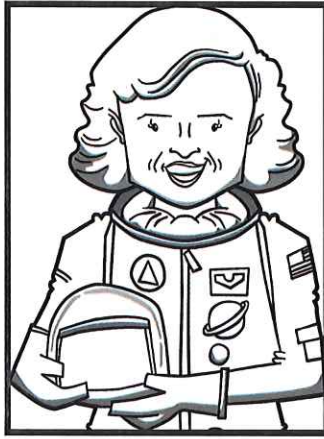
not at all

How many items did it grab? : _____

Notes: _____

Name: _____

All About Dr. Ellen Ochoa



Dr. Ellen Ochoa was born in 1958 in Los Angeles, California. She is known for being the first Latina astronaut and the first Latina director of the Johnson Space Center. In order to accomplish these things, Ochoa had to overcome many difficulties in her life.

Dr. Ochoa worked hard in school. In addition to her studies, she practiced playing the flute. Her hard work paid off as she graduated as valedictorian of her high school class. She went on to study physics at San Diego State University, where she again graduated as valedictorian.

In 1981 Dr. Ellen Ochoa earned a master's degree and in 1985 she earned a doctorate degree in electrical engineering from Stanford University. She had previously been discouraged from becoming an engineer because she was a woman.

Name: _____

In 1985 Dr. Ellen Ochoa applied for the astronaut program. The first time she applied she found out that she was not accepted to the program. However, in 1990, Ochoa was selected by NASA for their astronaut program.

In 1993 she made history as the first Latina astronaut when she worked on the space shuttle Discovery. During her time with NASA, Ochoa completed four space missions and logged over 978 hours in space.