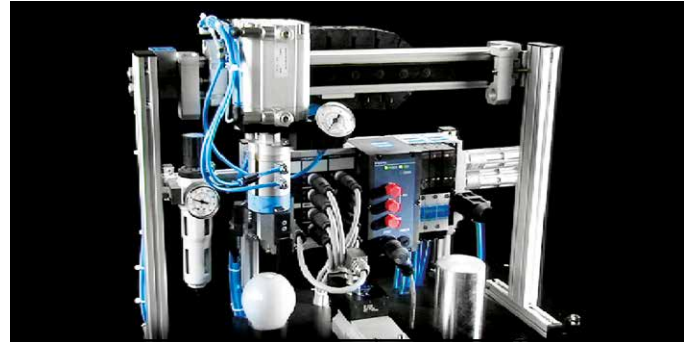


Robot Hand

Name(s): _____

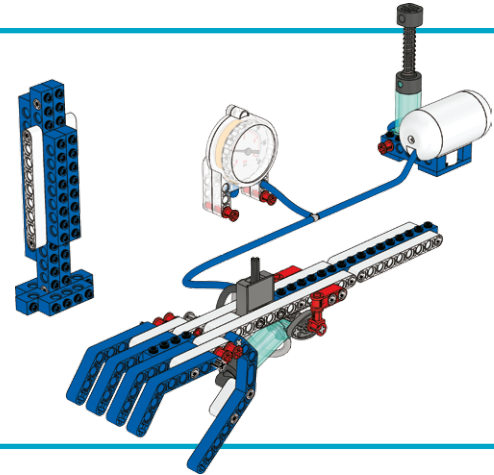
Build the robot hand and investigate what pressure is needed to hold different objects without dropping or crushing them.



Build the Robot Hand and the Carrier

(All of book 2A and book 2B to page 10, step 16)

- Pump air into the system and use the manometer to detect whether there is an air leak.
- Try the valve settings and check all moving parts to ensure that they move freely.
- Then open the hand and empty the air tank.



How good a grip?

The robot hand can pick up the carrier from two different sides – the smooth white side and the studded blue side. Find out how much pressure the robot hand needs to pick up the carrier.

First, predict how much pressure the robot hand needs to lift carrier A.

Record your prediction.

Test how much pressure is needed.

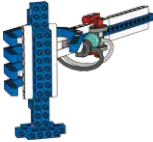
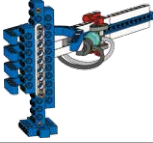
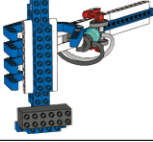
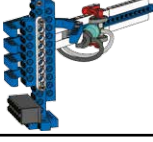
Test several times to make sure your results are consistent.

Record your findings.

Next, follow the same procedure for robot hands B, C, and D.

Test each model several times to make sure your results are consistent.

Record your findings.

	My Prediction	My Findings
A 		
B 		
C 		
D 		

Explain your findings:

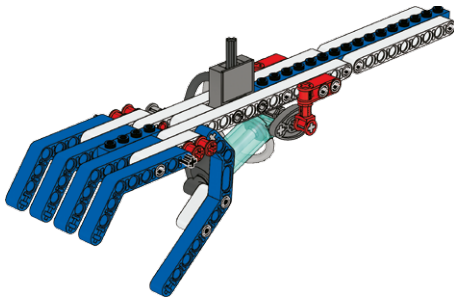
What else can the robot hand hold?



Place a paper or plastic cup on your desk or work area.
 Find a variety of different objects to put in the cup.
 Find out how much pressure is needed for the robot hand to pick up the cup.

First, predict how much pressure the robot hand needs to lift the different objects without damaging them.

Then, test how much pressure is needed.

Test several times to make sure your results are consistent.



	Object	My Prediction	My Findings
A			
B			
C			
D			

Optional: My Amazing Pneumatic _____ !

Invent a new and useful machine that uses the same mechanism as the robot hand but does a different job. Sketch it and explain the three most important features.





Optional: Further Research

Describe some of the industries and jobs for which the robot hand could be used and what some of its limitations may be.

Robot Hand

Name(s): _____

Date: _____

NGSS GOALS	 BRONZE	 SILVER	 GOLD	 PLATINUM
1. Student work related to this Crosscutting Concept: In this project, we invented a new and useful machine that uses the same mechanism as the robot hand but does a different job. We sketched and explained the three most important features.				
Structure and function: The way in which an object is shaped determine many of its properties and functions.	<ul style="list-style-type: none"> We sketched our new machine design. <input type="checkbox"/>	<ul style="list-style-type: none"> We met Bronze. We explained one feature of our machine. <input type="checkbox"/>	<ul style="list-style-type: none"> We met Silver. We explained two more features of our machine. For at least one of our features, we described how its shape affected how it functioned. <input type="checkbox"/>	<ul style="list-style-type: none"> We met Gold. We created and shared our diagram and explanation with classmates. We revised our work and made it more clear for our classmates to understand. <input type="checkbox"/>
2. Student work related to this Practice: In this project, we carefully observed our robot hand lift a cup without damaging it. We used this observation to ask ourselves and our classmates questions about other objects our robot hand could lift.				
Asking questions and defining problems: Ask questions that arise from careful observation of phenomena to seek additional information.	<ul style="list-style-type: none"> We predicted how much pressure our robot hand would need to lift a paper or plastic cup. We measured the pressure needed by our robot hand to lift the cup. <input type="checkbox"/>	<ul style="list-style-type: none"> We met Bronze. We predicted and measured the amount of pressure our robot hand would need to lift a cup with a weight inside. <input type="checkbox"/>	<ul style="list-style-type: none"> We met Silver. We asked our selves and our classmates questions about other objects our robot hand could lift. Our observations and questions helped us pick two more objects to test. <input type="checkbox"/>	<ul style="list-style-type: none"> We met Gold. We asked ourselves and our classmates questions that helped invent a new and useful machine that uses the same mechanism as the robot hand. <input type="checkbox"/>
3. Student work related to this Practice: In this project, we investigated how much pressure was required for our robot hand to pick up the carrier with and without weight from two different sides. We explained our findings on our student worksheet.				
Constructing explanations: Apply scientific ideas and evidence to construct an explanation for real world events.	<ul style="list-style-type: none"> We completed the robot hand grip experiment from page one of our student worksheet. <input type="checkbox"/>	<ul style="list-style-type: none"> We met Bronze. We explained why the robot hand needed more pressure when there was extra weight on the carrier (C and D). <input type="checkbox"/>	<ul style="list-style-type: none"> We met Silver. We explained why the robot hand needed more pressure when it gripped the smooth white side of the carrier. <input type="checkbox"/>	<ul style="list-style-type: none"> We met Gold. We proposed at least one new experiment to test our explanations further (such as more weight or gripping different surfaces). <input type="checkbox"/>
Notes:				