

# Scissor Lift

Name(s): \_\_\_\_\_

\_\_\_\_\_

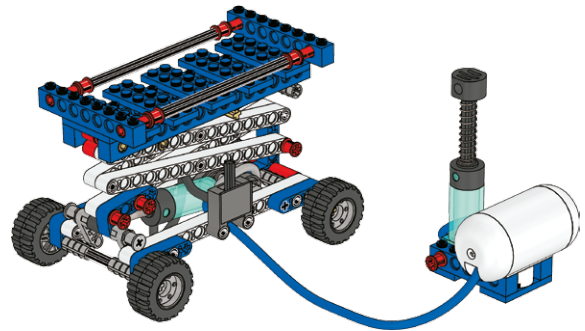


**Build the scissor lift and investigate how its function is influenced by weight and height.**

## Build the Scissor Lift

(All of book 1A and book 1B to page 11, step 15)

- Pump air into the system and make sure the scissor lift rises smoothly.
- Press down on the platform of the raised scissor lift.
- When you let go, the platform should bounce back up again. If not, check for air leaks.
- Then, lower the scissor lift and empty the air tank.



## Going Up?

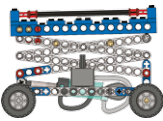
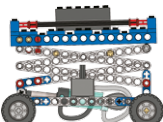
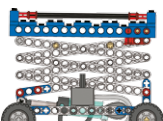
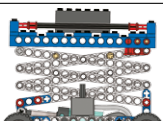
Find out what influence weight and height have on the number of pumps needed to raise the scissor lift to its maximum height.

First, predict how many pumps are needed to raise scissor lift A to its maximum height. Then, test how many pumps are needed.

Test several times to make sure your results are consistent.

Next, follow the same procedure for scissor lifts B, C, and D.

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

|  | My Prediction | My Findings |
|--|---------------|-------------|
| A  |               |             |
| B  |               |             |
| C  |               |             |
| D  |               |             |

**Explain your findings:**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**How much pressure is needed?**

You know how many pumps are needed to raise the scissor lift to its maximum height. Now, add the manometer and find out how much pressure is needed.

First, predict how much pressure is needed to raise scissor lift A to its maximum height.

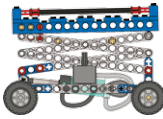
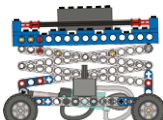
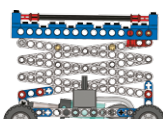
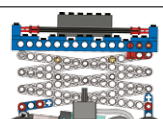
Add the manometer.

Then, test how much pressure is needed.

Test several times to make sure your results are consistent.

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|   | My Prediction | My Findings |
|---|---------------|-------------|
| A<br> |               |             |
| B<br> |               |             |
| C<br> |               |             |
| D<br> |               |             |

**Optional: My Amazing Pneumatic \_\_\_\_\_ !**

Invent a new and useful machine that uses the same mechanism as the scissor lift 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 scissor lift could be used and what some of its limitations may be.

# Scissor Lift

Name(s): \_\_\_\_\_

Date: \_\_\_\_\_

| NGSS GOALS  | <br><b>BRONZE</b>   | <br><b>SILVER</b>  | <br><b>GOLD</b>  | <br><b>PLATINUM</b>  |
|---|--|---|---|---|
| <b>1. Student work related to this Crosscutting Concept:</b><br>In this project, we tested how many pumps were required to lift two different scissor lift designs with and without weight. We explained our findings on our student worksheet. |  |   |   |   |
| <b>Cause and effect - Mechanism and explanation:</b><br><br>Use cause and effect relationships to explain observations in designed systems.   | <ul style="list-style-type: none"> <li>We explained similarities and/or differences in the number of pumps required to lift scissor lift A vs. B.</li> </ul> <input type="checkbox"/>  | <ul style="list-style-type: none"> <li>We met Bronze.</li> <li>We communicated what caused what we observed (the effect).</li> </ul> <input type="checkbox"/> | <ul style="list-style-type: none"> <li>We met Silver.</li> <li>Our cause and effect explanations describe the roles of weight and height in our observations.</li> </ul> <input type="checkbox"/> | <ul style="list-style-type: none"> <li>We met Gold.</li> <li>We identified additional 'effects' (such as force required to pump, time to lift, or loss of pressure) and proposed causes for those effects.</li> </ul> <input type="checkbox"/>            |
| <b>2. Student work related to this Practice:</b><br>In this project, we built a model of a scissor lift to test ideas about how much air is required to lift the mechanism to different heights with different loads.                           |  |   |   |   |
| <b>Developing and using models:</b><br><br>Develop and use a model to test ideas about designed systems including those representing inputs and outputs.  | <ul style="list-style-type: none"> <li>We built our scissor lift model.</li> <li>We pumped air into the system to make sure it moved smoothly.</li> <li>We checked the system for leaks.</li> </ul> <input type="checkbox"/> | <ul style="list-style-type: none"> <li>We met Bronze.</li> <li>We completed our investigation of scissor lifts A and B.</li> </ul> <input type="checkbox"/>   | <ul style="list-style-type: none"> <li>We met Silver.</li> <li>We completed our investigation of scissor lifts C and D.</li> </ul> <input type="checkbox"/>                                       | <ul style="list-style-type: none"> <li>We met Gold.</li> <li>We proposed new design ideas to improve our scissor lift (lift more weight, lift higher, etc.).</li> </ul> <input type="checkbox"/>  |
| <b>3. Student work related to this Practice:</b><br>In this project, we invented a new and useful machine that uses the same mechanism as the scissor lift. We sketched our machine and described its three most important features.            |  |   |   |   |
| <b>Obtaining, evaluating, and communicating information:</b><br><br>Integrate qualitative and/or quantitative information in written text with visual displays to clarify claims and findings.  | <ul style="list-style-type: none"> <li>We sketched our new machine design.</li> </ul> <input type="checkbox"/>   | <ul style="list-style-type: none"> <li>We met Bronze.</li> <li>We explained one feature of our machine.</li> </ul> <input type="checkbox"/>                   | <ul style="list-style-type: none"> <li>We met Silver.</li> <li>We explained two more features of our machine.</li> </ul> <input type="checkbox"/>   | <ul style="list-style-type: none"> <li>We met Gold.</li> <li>We created and shared our diagram and explanation with classmates.</li> <li>We revised our work and made it more clear for our classmates to understand.</li> </ul> <input type="checkbox"/> |
| Notes:  |  |   |   |   |