

Levers and Pulleys	Grade 2 Structures and Mechanisms	
<h2 style="margin: 0;">Levers and Pulleys</h2>	Safety Notes	Be careful not to drop the weights or large book.
<p>Description</p> <p>Let's learn about simple machines! In this hands on lesson we will explore how levers and pulleys work. We will make our own lever and pulley systems to experiment with them and see how they can be used to make work easier.</p>		
<p>Materials</p> <ul style="list-style-type: none"> ● Tennis Ball (or other light weight ball/material) ● Small weight (rock, tennis ball, small toy, block) ● Ruler ● Marker ● Masking Tape ● String ● Rolling Pin ● Large Book 		
<p>Science Background</p> <p>Levers and pulleys are both simple machines used to help reduce the work and force needed to move and object. In physics, work is defined as moving something a distance with a force. You could show work with a tennis ball by rolling the ball across the table (pushing would be the force, across the table would be the distance) or by throwing it up in the air (throwing it is the force, the space the ball was thrown is the distance). This may not feel like very much work because a tennis ball is not very heavy but pretend this was a bowling ball? Could you throw a bowling ball high in the air? Would it take a lot of work to lift a bowling ball?</p> <p>We can use simple machines to decrease the amount of work we have to do to lift or move an object.</p>		
<p>Activity Procedure</p> <p><u>Levers</u></p> <p>Let's start by making a lever.</p> <ol style="list-style-type: none"> 1) Tape a marker to the table; this will be the fulcrum of the lever. The fulcrum is the point of balance in the lever, located between the force we will apply and the weight. 2) Place the ruler over top of the marker, start with the marker in the middle of your ruler. This is your basic lever. 3) Attach a weight to one side of the ruler with tape. 		

- 4) Apply a force to the other side (push the ruler down) take note of how much work you need to do to move the weight.
- 5) Move the lever so the fulcrum is closer and farther away from the weight,, do at least 3 different fulcrum positions and record what you are doing in question 1 on the handout.
- 6) Once you are done experimenting, fill out questions 1-3 on the handout.

Pulleys

A pulley is a wheel with a grooved rim which a cord or string can pass through and is typically used to lift up heavy weights by pulling on the string opposite to the weight

- 1) Pick out a large weight that you could attach to one end of your string. A textbook works well for this.
- 2) Try to lift the weight as high as you safely can. Note of how much work you had to do to lift the heavy object.
- 3) Tie the weight to one end of the string and try to lift the weight by pulling the string straight up.
- 4) Have a helper hold a rolling pin out in front of them with two hands. Pass the free end of the string over the rolling pin then pull on it to lift the weight. Was it easier this time?
- 5) Try to think of a pulley that you have seen or used before and complete questions 4-5 on the handout.

Debrief

Look around your home and community and see if you can find examples of pulleys, levers or other simple machines.

Handout

1. Draw where you placed the fulcrum and weight on your lever for each trial. The fulcrum is what the lever rests and pivots on, like the middle of a sea-saw.

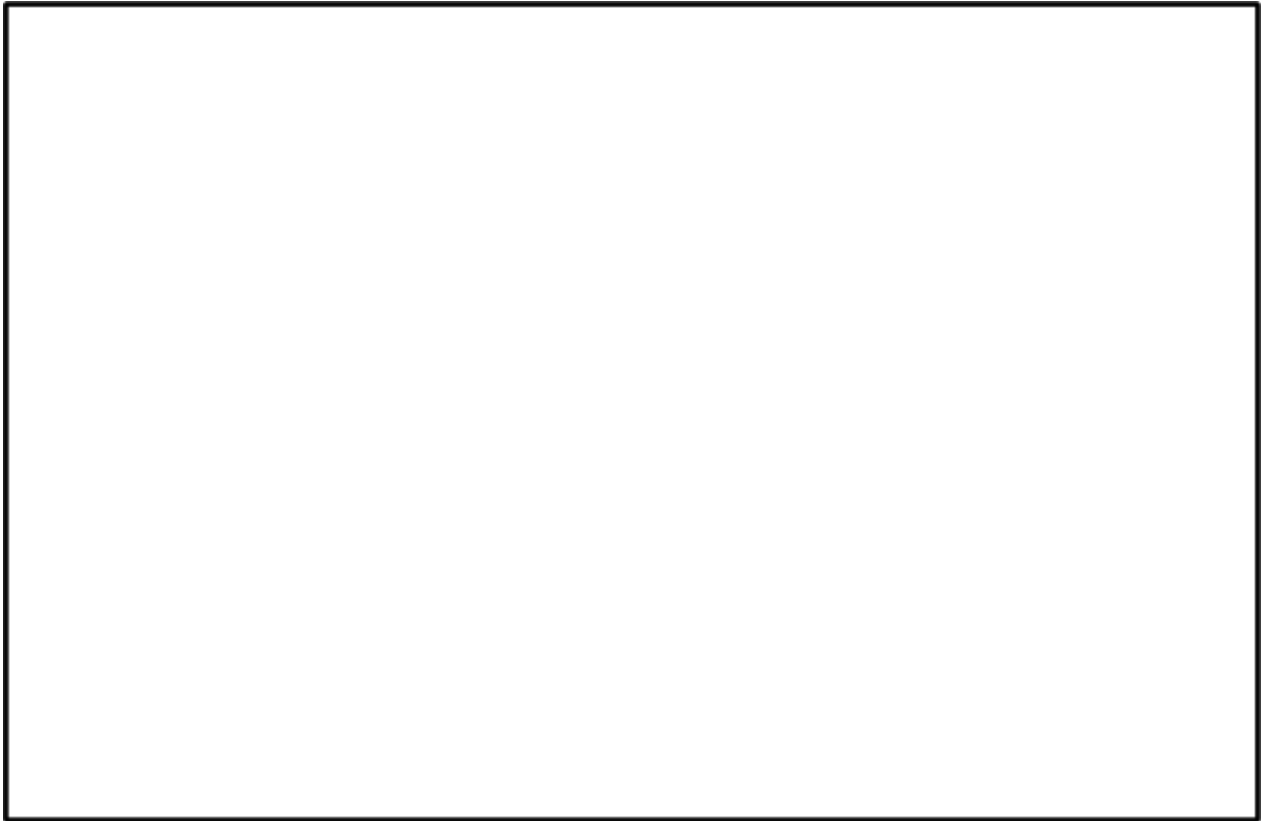


2. Which trial required the least amount of work?

3. Write or draw an example of a lever you have seen or used before.

4. Was it easier to lift the weight with or without the pulley?

5. Write or draw an example of a pulley you have seen before.



Handout Answers

1. Draw where you placed the fulcrum and weight on your lever for each trial. The fulcrum is what the lever rests and pivots on, like the middle of a sea-saw.



2. Which trial required the least amount of work?
Trial 2 when the fulcrum was closer to the weight.

3. Write or draw an example of a lever you have seen or used before.

Examples students could write or draw:

- Wheelbarrow
- Cee-saw
- Scissors
- Shovel
- Hockey stick

4. Was it easier to lift the weight with or without the pulley?
With the pulley

5. Write or draw an example of a pulley you have seen before.

Examples students could write or draw:

- Tow truck
- Crane
- Flag pole mechanism
- Work out equipment
- A well and bucket