**Weekly Question**

How does a wheelbarrow make work easier?

Wheelbarrows have been used in almost every culture for thousands of years. People recognized that having a container they could easily lift and move would help them do more work. Wheelbarrows provide mechanical advantage by joining a container with two simple machines. The simple machines are the **lever** and **wheel and axle**.

![Diagram of wheelbarrow with labeled parts: container, lever, wheel and axle.]

Answer the questions.

1. What are the three parts of a wheelbarrow?

2. Which parts of a wheelbarrow are simple machines?

**Talk**

Who uses a wheelbarrow now? Do you think wheelbarrows are used more today or hundreds of years ago? Why do you think that? Tell a partner.
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The handles on a wheelbarrow are examples of a lever. Levers are commonly used to lift a load. A lever sits on a point called the fulcrum. The fulcrum is where the lever pivots, or moves. On the wheelbarrow, the fulcrum is the axle of the wheel. When you push down or pull up on the handle, it pivots, or moves, on the fulcrum to raise or lower the load. The positions of the fulcrum and the load change the lever’s mechanical advantage and the direction of the force.

There are three kinds of levers, depending on the positions of the force, the fulcrum, and the load.

When the fulcrum is between you and the load, pushing down will lift the load and lifting up will lower the load.

When the load is between you and the fulcrum, the load is easier to lift or lower, but the direction of the force does not change.

When you are between the load and the fulcrum, a small movement in force causes the load to move farther.

A. Write a sentence that explains how the lever in a wheelbarrow works.

B. Name four examples of levers that you have seen or used.

1. ____________________________
2. ____________________________
3. ____________________________
4. ____________________________
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A wheel and axle helps you do work by changing a push or a pull into a force that rotates, or spins. With wheelbarrows, it’s much easier to push a load rolling on a wheel than to drag the load along the ground.

A wheel and axle also creates mechanical advantage. When the axle rotates, the wheel moves a greater distance than the axle does. For example, when you ride a bicycle, your foot turns the pedal, which is connected to the axle. The wheel moves more than your foot does. So you contribute less force to move a greater distance than you would move if you walked.

A. Draw arrows pointing to a wheel and axle in each illustration.

B. Write true or false.

1. A wheel and axle can create mechanical advantage. __________

2. In a bicycle, the wheel moves a shorter distance when more force is applied to the pedal. __________

C. In each example below, tell whether the force applied is directed to the wheel or to the axle.

1. a faucet handle ___________ 3. a steering wheel ___________

2. a spinning top ___________ 4. an airplane propeller ___________
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When two or more simple machines are put together, you get a **compound machine**. Compound machines can be basic, such as a wheelbarrow or a can opener, or they can be very complex, such as a car. But even very complicated mechanical tools can be broken down into several simple machines.

Without machines, life and work would be much more difficult. Simple and compound machines make our lives better by saving us time and energy. For thousands of years, people have depended on machines. The world would not be the same without them.

A. Name the simple machines that make up each compound machine.

1. 
2. 
3. 

B. Complete the analogy.

*Simple machine is to compound machine as _____.*

☐ nail is to screw  ☐ wheelbarrow is to car
☐ wheelbarrow is to lever  ☐ lever is to scissors