

Answer Key

Machines

What is a Machine?

To perform work, we need to use a pulling or pushing force. This means when we lift a box, push a car, stand up out of bed, or jump up in the air, we are using force. When we jump really high or lift a really heavy box, we say we are really strong. What we should say rather, is that we can produce a lot of force.

Sometimes our muscles cannot produce enough force to push or pull something. When this is the case, we can use a machine to help us. A **machine** is anything that makes a force stronger. A hammer is a machine because it allows us to produce a stronger force on a nail than we would be capable of with our own bodies. Knives and forks are also machines because they magnify the force of our hands by producing more force onto our food. For example, if you tried to cut a steak with your hands, you would struggle. If you use a knife, the force you apply into the knife is magnified onto the steak. When we hit a nail with a hammer, the handle of the hammer increases the force you apply. The longer the hammer, the more magnified the force will be. That is why sledge hammers have long handles.

Simple Machines

Simple machines are the basic mechanical devices that allow us to apply more force. There are 6 types of simple machines: levers, wheels and axles, pulleys, wedges, screws, and inclined planes. To apply an even greater magnitude of force, we can combine simple machines to make **compound machines**. Some examples of compound machines are: cars, bicycles, can openers, and a stapler.

Questions

Use information from the text to support your answer

1. What is a machine? Why do we need them?

A machine is anything that makes a force stronger. We need them to perform certain work that requires more force than we are capable of producing.

2. When people say they are really strong, they are really saying what?

They can produce a lot of force.

3. What is a simple machine? When have you used a simple machine?

A device with no moving parts that aims to magnify force through a mechanical advantage.

4. What is a compound machine? Why do you think we need them?

When we apply a smaller input force, we generate a larger output force by using the mechanical advantage of a machine. We need them to complete work we would not be able to do without our force being magnified.

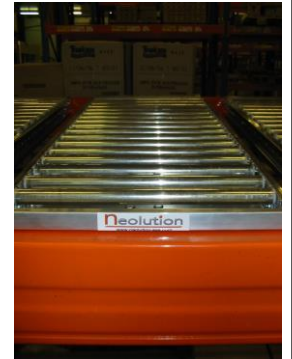
What is a Roller?

What is a Roller?

A roller is a long cylinder shaped object that can be used to help move heavy loads. You need many rollers to work together to move a heavy load. The roller was invented before the wheel. Rollers have a length longer than their width, while a wheel has a much shorter length.

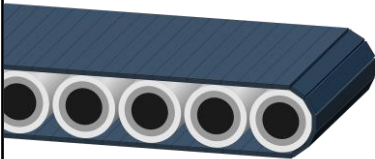
The First Rollers

Rollers were first used thousands of years ago by the Ancient Egyptians to move large stones for their pyramids. They used tree logs as rollers. They would set the large stone on the tree logs and then pull the stone. The stone would roll on top of the logs, but the logs wouldn't move. They would need to move the log at the back to the front so they could keep rolling the stone over the logs. That's a lot of work!



How We Use Rollers Today

Conveyor belts in grocery stores use rollers to move packages easily. Imagine sliding a box across a flat surface. The box wouldn't slide very far because of the friction between the box and the surface. But if you slide the box along rollers, the rollers would spin, allowing the box to slide to the next roller. This means the box will keep travelling on the rollers until it has run out of momentum, or until the end of the rollers.



Questions

Use information from the text to support your answer

1. What are rollers? Who first used them?

Rollers are long cylinder shaped objects that can be used to move heavy loads. They were first used by the Ancient Egyptians to move heavy stones. They would slide the stones across logs that would roll on the ground.

2. Why do we need rollers? Which force do rollers help against?

Rollers reduce the force of friction because the rollers spin and the objects rolls over top of the spinning roller. We need rollers to move loads across a distance.

Making Connections

What does the reading remind you of in your life?

Answers will vary