Western Engineering Outreach

Pasta Pods

Grade 3-5

Meet Today's ENG HERO!

J.T. Wood – Associate Professor and Associate Dean, Undergraduate Studies with Western Engineering

Dr. Wood received his Bachelor and Master's Degrees in Mechanical Engineering from the University of Waterloo and his PhD in Materials Science and Engineering from McMaster University. Following a one-year Post-doctoral Fellowship at McMaster University, continuing his research on strengthening mechanisms in high electrical conductivity alloys. Since Joining the Faculty of Engineering at Western in 1999, Dr. Wood's field of research has primarily been on Lightweight Structural Materials with a particular focus on process-structure-property relationships for die-cast magnesium alloys and polymer composite materials.

To learn more about Dr. Wood visit: https://www.eng.uwo.ca/mechanical/faculty/wood_j/index.html

Learning Goal:

- Students will learn about simple machines using breakable materials.
- Curriculum Connections: Grade 3 - Forces causing Movement. Grade 4 - Pulleys and Gears.

Materials Needed:

- different shapes of pasta - be sure to have some that could act as wheels
- hot glue
- tape
- white glue
- paper
- pen

Engineering and Science Connections:

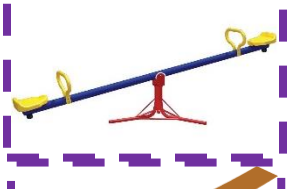
Today, we will learn about simple machines and how they help us by making it easier to move, push and pull heavy items.

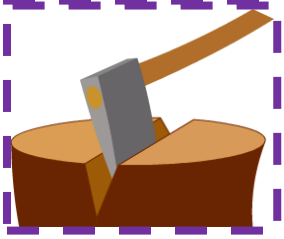
What are simple machines?

- A simple machine is a mechanical device that changes the direction or magnitude of a force. In general, they can be defined as the simplest mechanisms that use mechanical advantage to multiply force.
- Mechanical Advantage: is the amount of help you can get by using a simple machine
- For example: A person applying a force of 30 lbs (13.5 kg) on a simple machine, may be able o move an object that weighs 180 lbs (81 kg), due to the mechanical advantage.
- A complex machine is a machine that is made of a combination of 2 or more simple machines. Such as a Bicycle.

What are the different types of simple machines?

1. **Screw**: When you wrap an inclined plane around a cylinder, its sharp edge becomes another simple tool: a screw. If you put a metal screw beside a ramp, it may be hard to see similarities, but a screw is just another kind of inclined plane. For example: A lightbulb.
2. **Pulley**: Instead of an axle, a wheel could also rotate a rope, cord, or belt. This variation of the wheel and axle is the pulley. In a pulley, a cord wraps around a wheel. As the wheel rotates, the cord moves in either direction. Attach a hook to the cord, and now you can use the wheel's rotation to raise and lower objects, making work easier. For example: A tow truck.
3. **Lever**: Any tool that pries something loose is a lever. Levers can also lift objects. A lever is an arm that "pivots" (or turns) against a fulcrum (the point or support on which a lever pivots). For example: A see-saw.
4. **Wedge**: Instead of using the smooth side of the inclined plane to make work easier, you can also use the pointed edges to do other kinds of work. When you use the edge to push things apart, this movable inclined plane is called a wedge. For example: An axe.
5. **Inclined Plane**: A flat surface (or plane) that is slanted, or inclined, so it can help move objects across distances. For example: A ramp.
6. **Wheel and Axle**: Makes work easier by moving objects across distances. The wheel turns with the axle causing movement. For example: A wheelbarrow.





Video Recommendation: *Simple Machines*

https://www.youtube.com/watch?v=ByLXZCP4ixc

PASTA PODS

Challenge:

- You will need to build a car completely out of pasta
- The wheels need to be moving as you will be racing to get points.
- Once done building your car, test it on different kinds of surfaces such as carpets, tiles, wood, etc.
- While testing your car, keep track of your points using the points system below.

Scoring:

- Mark a start and finish point (about 3 meters in between).
- Push your car as many times to get it to the finish line.
- But every time you push it or touch it you will lose points.

Touches/Pushes	Score
1	100
2-3	80
4-5	60
5 or more	40

- Play it 10 times, try to record the surface type, and number of touches every round.
- Calculate your score by adding up all 10 scores you got.

Simple Example:

What Did You Learn?

- What are the 6 types of simple machines?
- Was it easier to move your car or the carpet or on tiles? Why?
- How does adding more pasta to your pod affect its speed?

Future Learning

- Now that you learned about simple machines. Look around your house for items to build a complex machine. Such as a crane. Which types of simple machine does your machine consist of? What does it accomplish? Does it make lifting objects easier or harder?

Share your creations!

We would love to see what you made. Email as at discover@uwo.ca or tag us on social media.

Instagram: @westernueng
Twitter: @westernueng
Facebook: @westernueng

Thanks for discovering with us!