SNOHOMISH REGIONAL FIRE & RESCUE

Mechanical Advantage

Lesson Title: Mechanical Advantage **Grade Level:** 2nd-5th

Purpose: Teach age appropriate skills for fire and life safety while teaching to statewide learning standards.

Materials Needed (Optional):

- Rope for knots

Standards:

Next Generation Science Standards:

Science:

PS2.A: Forces and Motion

Pushes and pulls can have different strengths and directions.

Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.

PS2.B: Types of Interactions

When objects touch or collide, they push on one another and can change motion.

PS3.C: Relationship Between Energy and Forces

A bigger push or pull makes things speed up or slow down more quickly. *(secondary)*

Washington State Health and PE Standards

Health:

H1.Sa1.Ka Identify safety hazards in the home.

Objectives: The students will demonstrate understanding of:

- Simple Machines
- Building Collapse Rescue
- Trench Rescue
- Rope Rescue
- Prevention

Safety:

- Hazards in the Home
- Situational Awareness

Vocabulary:

- **Mechanical Advantage-** is the use of simple machines to make you a lot stronger than normal.
- **Simple Machines-** are basic mechanical devices that make work easier
- **Levers-**A lever is a plank or beam that is free to rotate on a pivot.
- **Pulley-** A Pulley is small fixed wheel or a group of such wheels with a rope or chain in a grooved rim that is used to lift something up.

Time: 35-45 minutes for presentation and demonstration.

Instructional Content:

Use this bulleted list to guide you and keep you on track and meeting all objectives for lesson. Everyone has their own style for teaching, the most important thing is the make it fun and engaging for the kids.

- **Warm up Activities:** (5-7 Minutes)
  - **Mini KWL:**
    - Ask students to individually make a mini KWL chart about simple machines.
      - K-What do you already know about Simple Machines?
      - W-What do I want to know about Simples Machines and Mechanical Advantage?
  - **Bell Ringer:**
    - Mechanical Advantage Bell Ringer
      - Have students complete the top portion of the Mechanical Advantage Bell Ringer.
  - **Entrance Ticket:**
    - Ask students to try to define:
      Mechanical Advantage, Simple Machines, Levers, Pulley
- **Video:**
  - Follow the link:
    - http://www.snofire7.org/preparedness_education/home_education_lessons/index.cfm?video_id=14&omo=1_1
  - Watch Video:
    - Run time: 25:17
  - Have students fill out the worksheet as they watch.

- **Closure Activities:** (5-7 Minutes)
  - **Mechanical Advantage Bell Ringer:**
    - Have students complete the exit ticket activity on the Mechanical Advantage Bell Ringer.
      - **Exit Ticket:** On the bell ringer activity at the top of the first page, see if you wrote the correct term under the correct picture. If not, write the correct term under the lines. Did you match the real example of a simple machine to the correct image on the top line? If not, draw a line in a different color to the correct picture.
  - **Exit Ticket:**
    - Ask students to use what they learned to add more detail to the definitions they wrote at the beginning of class for the following words:
      - Mechanical Advantage, Simple Machines, Levers, Pulley
  - **Mini KWL:**
    - Ask students to finish the last column for the KWL chart about simple machines.
    - L-What did you learn?

Homework and Enrichment Activities:

- Hazards in the Home-Homework
- Home Hazards Checklist
- Knot Tying Challenge-Homework
- Simple Machines Scavenger Hunt

Handouts:

- Mechanical Advantage Bell Ringer
- KWL Chart

NAME: _____ DATE: _____

SCORE: _____

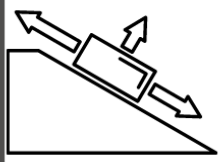
MECHANICAL ADVANTAGE
BELL RINGER

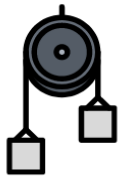
Directions: Answer the following questions before watching the video. If you don't know the answer, use your best guess:

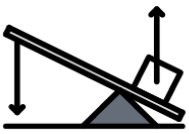
Use the word bank to write the matching term below each image. Then, match the real life example with the top image.

Word Bank

Wedge | Inclined Plane | Screw | Pulley | Wheel & Axle | Lever

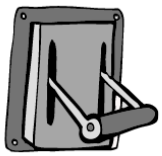


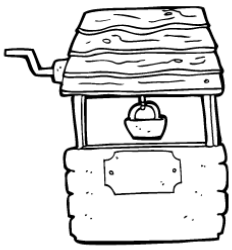












Directions: While watching the video, fill in the blanks and answer the questions:

Vocabulary:

A_____refers to something that is a basic mechanical device that makes work easier.

List 2 types of simple machines:

1.
2.

What does the tech rescue team do?

_____

_____

Vocabulary:

The use of simple machines to make you stronger than normal is _____.

Hypothesis for the Incline Experiment: I think...

_____

_____

Trench rescues use a lot of _____ in the form of shovels to help save people.

Rope rescues use a lot of _____ to lift people and heavy objects out of hard-to-reach places.

Hypothesis for Pulley Experiment: I think...

_____

_____

_____

What kinds of simple machines do you use everyday to make work easier? Try to list three.

_____

_____

_____

What can you do to prevent hazards in your home?

_____

_____

_____

_____

Exit Ticket: On the bell ringer activity at the top of the first page, see if you wrote the correct terms under the correct picture. If not, write the correct term under the lines. Did you match the real example of a simple machine to the correct image on the top line? If not, draw a line in a different color to the correct picture.

MINI KWL CHART

NAME OF STUDENT:

SUBJECT:

LESSON:

WHAT I KNOW:

WHAT I WANT TO KNOW:

WHAT I LEARNED: