

LESSON #2 - GRAVITY FORCE, AIR PRESSURE

Student Objectives and Activities

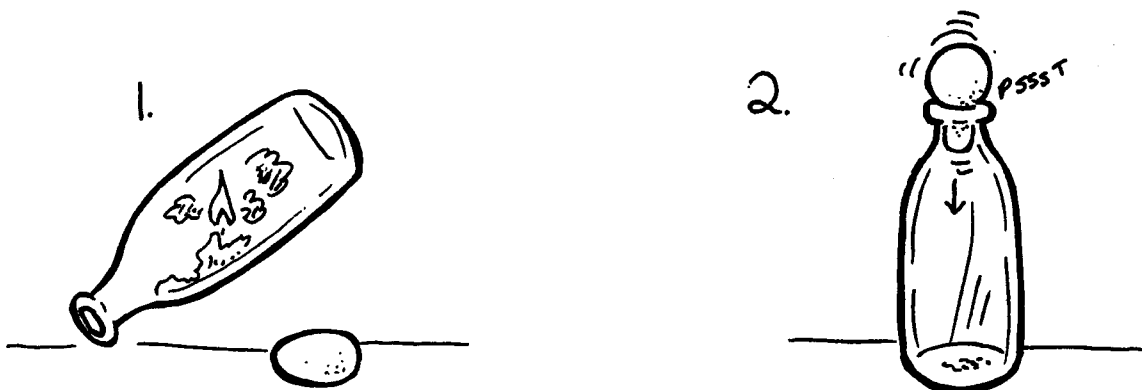
- In this lesson, students understand how the force of gravity “pulls” on an object. They learn how to calculate the gravity force (in Newtons) by multiplying the mass by 9.8.
- Students understand how the mass of air pushing down on a person can create air pressure.
- Students complete notes on the two topics and a related worksheet, “Gravity Force And Air Pressure”.

Suggested Teaching Strategies

- Begin by asking students to explain the question, “If the earth is spinning, what keeps the people (and anything else that is not nailed to the ground) from flying off?” Students will know that the pull or force of gravity is the correct answer. Then, ask students the more difficult question, “What causes gravity?” (An object’s mass is what determines the force of gravity with large masses having more gravity.)
- A simple activity that shows what it would feel like without gravity, is to have students push outwards with their arms at their sides for one minute. Students are amazed at how their arms “float” upward, simulating what it would be like without gravity.



- Complete the notes and go through the example, which calculates the force of gravity if its mass is known.
- In regards to air pressure, begin with a fascinating demonstration of how to get a hard-boiled egg into a bottle without breaking the egg. (Don’t forget to peel off the shell.)
- Simply drop a lit match or burning piece of paper into the glass bottle and hold the bottle briefly upside down. Quickly set the bottle down with the freshly shelled-egg on the mouth of the bottle. Air pressure will push the egg into the bottle as a vacuum is created inside the bottle.





HEAR YE! HEAR YE!

To all engineers in the Kingdom of DONUTLEVER:

His and Her ROYAL HIGHNESS, The KING AND QUEEN OF THE KINGDOM OF DONUTLEVER do hereby announce this official contest to build a catapult that will be used to batter down the castle walls of the evil and vile BLACK KNIGHT.

Instructions and Rules as follows:

- 1) Use scissors to cut the cup as shown
- 2) Make three holes in the cup as shown
- 3) Attach the spoon to the wooden dowel with the small elastic
- 4) Use tape to secure one end of the large elastic to the end of the spoon
- 5) Put the other end of the elastic through the hole near the bottom of the cup
- 6) Place the small piece of popsicle stick through the elastic to keep it from slipping back through
- 7) Place the dowel in the holes and you are finished
- 8) Practice aiming the catapult. The distance will be 3 meters
- 9) Increase tension on the elastic by turning the popsicle stick
- 10) Three and only three attempts will be made to destroy the castle of the Black Knight with one point awarded for each block of the castle wall that is knocked out of place and five points awarded for knocking over the Black Knight himself.



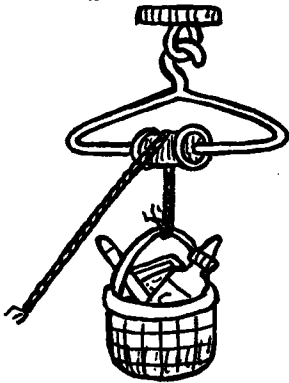
Good Luck!

HOMWORK FOR TEACHER - GUIDELINES

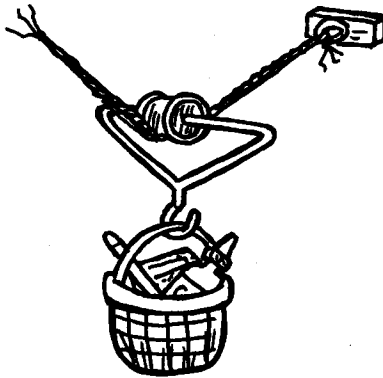
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Instructions:

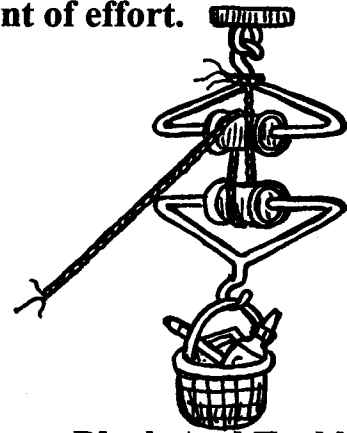
- 1) Your job is to devise an experiment for your teacher that will help the teacher understand the three types of pulley set-ups shown below. Your experiment should have a way of helping the teacher learn which pulley set-up moves the load with the least (and most) amount of effort.



Single Fixed Pulley

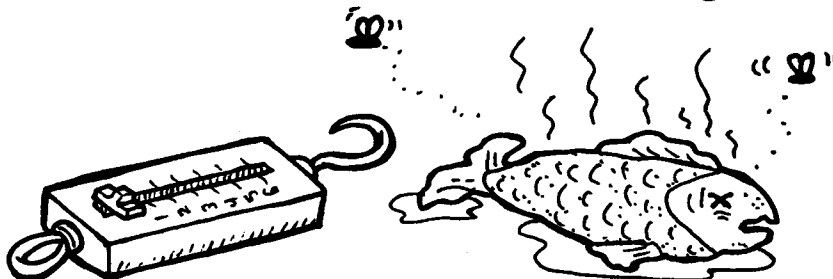


Moveable Pulley



Block And Tackle

- 2) Your experiment should ask the teacher to explain what the purpose of the experiment is.
- 3) Your experiment should have instructions on how to set up the apparatus and how it should be used. (A diagram might be useful.)
- 4) Your experiment should describe some way of testing which setup requires the most and least effort. (A scale to weigh fish might come in handy.)



* NOTE: PLEASE DO NOT USE A REAL FISH IN YOUR EXPERIMENT

- 5) Your experiment should ask the teacher questions about the experiment and what was learned. (Don't make the questions too easy or too difficult.)
- 6) Your experiment should fit onto a one page worksheet.