Do the Twist…(Learning about Screws)
2nd and 3rd Grade
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<u>Benchmark and SLC#</u>:
> SLC 10: Explain the operation of a simple mechanical device.
> SLC 6: Evaluate a simple procedure to carry out an exploration.

<u>Objectives</u>:
To help students discover that the screw is just a twisted incline plane. Students will discover how to turn a screw to make it screw into an object. In addition, the students can apply what they know about incline planes to make and test a prediction about how the spacing of the threads on a screw changes the effort needed to use the screw.

<u>Materials</u>:
<u>Day 1</u>:
- ❑ Wood blocks, with 2 holes drilled (1 block for each group)
- ❑ 2 different sized bolts for each group
- ❑ Nuts (one for each sized bolt)
- ❑ Glue

<u>Day 2</u>:
- ❑ Soap bars (1 for each group)
- ❑ 2 screws with the same head type, different thread spacing
- ❑ Paper
- ❑ Marker
- ❑ Pencils – 2 for each group
- ❑ Tape

<u>Set Up</u>:
<u>Day 1</u>: Drill 2 holes in each wood block, each hole big enough so that the bolts do not catch when put into the holes. Glue the largest nut over the biggest hole, and the smaller nut over the small hole.

<u>Day 2</u>: Cut the paper into 2 triangles, one long and not steep, the other one short and steep, enough for each group to have a pair. Mark the hypotenuse (the long end) of the triangles with a marker on both sides.

<u>Initial Demonstration</u>:
> Twist a screw into a block of wood in front of the students. Twist the screw back out.

<u>Target Observations</u>:
- The screw was twisted into the wood
- Sawdust came out of where the screw was twisted in

- The screw was twisted out of the wood
- There is a hole where the screw was twisted in

Target Model:
-Screws can twist into things.

Procedure:
Ask the students to test how screws twist into things. Give the students the wood blocks and a bolt and ask them to find out how the screw twists in and out.

Discussion/summary:
Discuss the results of the groups. Did everyone agree? Summarize the results in a rule: Righty tighty, lefty loosey; i.e. turn right to "tighten" or twist the screw down, and turn left to "loosen" or twist the screw up. Do we need to revise our statement of what screws can do?

Revised Model:
Screws can twist into things. Twist the small screw right if you want it to go down, left if you want it to go up.

Procedure:
Ask the students if they think that this is the same for any sized screw? How can you test that? Give the students the other size screw and ask them to test their guess.

Discussion/Summary:
Discuss the results of the students. Did everyone agree? If all sizes are the same, what can we now say for our statement of screws?

Revised Model:
Screws can twist into things. Twist any screw right if you want it to go down, left if you want it to go up.

Procedure:
This next activity is designed to help students understand that a screw is just an incline plane, with the same properties.

Demonstration:
Pass out the paper triangles to the students, staggering it so that every other student has a different sized one. Have the students wrap the triangle around a long pencil by placing the short end of the triangle on the pencil and rolling. Tape the ends so that they don't fall off.

Target Observations:
- The wrapped triangle looks like a screw
- The flat triangle has lines closer together than the steep triangle

- The triangle is just a thin incline plane

Target Model:

Screws can twist into things. Twist any screw right if you want it to go down, left if you want it to go up. <u>A twisted incline plane is a screw. A flat incline plane has its "lines" closer together than a steep incline plane when twisted into a screw.</u>

Procedure:

Ask the students to make a prediction about which screw will be easier to twist into something, based on what they know about incline planes. Give the students the soap and the two different sized screws and ask them to test this.

Discussion/Summary:

Which screw twisted easier into the soap? Why do you think so? Was our prediction correct? Do we have to change our model now?

Revised Model:

Screws can twist into things. Twist any screw right if you want it to go down, left if you want it to go up. A twisted incline plane is a screw. A flat incline plane has its "lines" closer together than a steep incline plane when twisted into a screw. <u>A screw with its lines close together (a flat incline plane) is easier to twist into something than a screw with its lines far apart (a steep incline plane).</u>