

# Gr. 3 – Understanding Matter and Energy

## *Forces Causing Movement*

### Up and Down Dino

**Specific Expectations:**

2.1 Follow established safety procedures during science and technology investigations.

2.2 Investigate forces that cause an object to start moving, stop moving, or change direction.

2.3 Conduct investigations to determine the effects of increasing or decreasing the amount of force applied to an object.

2.4 Use technological problem-solving skills, and knowledge acquired from previous investigations, to design and build devices that use forces to create controlled movement.

3.1 Identify a force as a push or pull that causes an object to move.

3.2 Identify different kinds of forces.

3.3 Describe how different forces applied to an object at rest can cause the object to start, stop, attract, repel, or change direction.

3.4 Explain how forces are exerted through direct contact or through interaction at a distance.

**Big Idea (for lesson):**

Students will build and observe the motion of a pendulum, describing the motion and the forces behind it.

**Accommodations:**

- Increase time
- Visual Aids
- Manipulatives
- Chunking
- Step-by-Step
- Scaffolding
- Copy of Notes
- Student Grouping

**Differentiated Instruction:**

- Content: Use demo to show the content as you offer verbal descriptions.
- Process: Have students work in pairs and support each other if physical impediments exist.
- Product: Students may show their final product in pairs, and communicate their findings either verbally, visually, or through written means.
- Other: \_\_\_\_\_

**Bloom's Taxonomy:**

- Knowledge
- Comprehension
- Application
- Analysis
- Synthesis
- Evaluation

**Multiple Intelligence:**

- Verbal/Linguistic
- Logical/Mathematical
- Visual/Spatial
- Bodily/Kinesthetic
- Naturalist
- Musical/Rhythmic
- Interpersonal

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Intrapersonal

### Delivering The Lesson:

Portion & Timing	Grouping:			Introduction:	Materials
<b>Minds On:</b> 10 mins	W <input checked="" type="checkbox"/>	S <input type="checkbox"/>	I <input type="checkbox"/>	<p>Teacher can do a demonstration to introduce pendulums to students. Structure this as a Predict, Observe, Explain demonstration, if desired.</p> <p>Hold the pendulum tight and up to your face, and have students predict what will happen if you let go. As an alternative, the video can also be shown.</p> <p>-Ask students why the results are different if you push the weight? (<i>Answer: You add more force to the system than just provided by gravity... You are putting energy into the object so it swings higher.</i>)</p> <p>-What forces are causing this motion? (<i>Answer: the force of gravity and the tension of the rope.</i>)</p>	<p>Up &amp; Down Dino – Wrecking Ball Science – Swinging Bowling Ball – Cool Science Experiment. mp4</p> <p>String Weight Somewhere to tie pendulum</p>
<b>Action:</b> 20 mins	W <input checked="" type="checkbox"/>	S <input checked="" type="checkbox"/>	I <input checked="" type="checkbox"/>	<p>Have students build their own Up &amp; Down Dinos according to the instructions on the handout.</p> <p>Teacher can circulate and ask questions of the different groups:</p> <p>-How is this Dino similar to the pendulum we saw before? (<i>Answer: the nut acts as a pendulum to make the head go up and down.</i>)</p> <p>-Can you think of other forces that can do work like the pendulum does? For example, the force of the wind turning a windmill?</p> <p>-Why do you think the pendulum slows down? How does air “get in the way”? (<i>Answer: Air gets in the way of the motion of the swing.</i>) If students have trouble visualizing air resistance/friction, show them a picture of a parachutist or demonstrate how a big garbage bag makes running more difficult.</p>	<p>Up &amp; Down Dino Handout (Materials listed)</p>

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<p><b>Consolidate:</b> <b>10 mins</b></p>	<p>W <input checked="" type="checkbox"/></p>	<p>S <input type="checkbox"/></p>	<p>I <input type="checkbox"/></p>	<p>Now that students have been exposed to pendulums and the force of gravity, try to see if they can explain this pendulum trick. Specific instructions can be found at <a href="http://www.stevespanglerscience.com/lab/experiments/magic-pendulum">http://www.stevespanglerscience.com/lab/experiments/magic-pendulum</a>, or the video can be watched if preferred.</p> <p>Ask students if this is a true pendulum, and direct them back to the definition on their handout if necessary.</p> <p>-Ask students which end of the pendulum is heavier? (<i>Answer: the one with multiple hex nuts.</i>)</p> <p>-Does a normal pendulum pick up speed? Why does this one? (<i>Answer: not unless pushed, and this one does because the heavier end starts to fall quickly to the ground.</i>)</p> <p>-Try hitting a normal pendulum to make it go faster. What do you notice? (<i>Answer: the amplitude, or distance that each swing achieves from the centre point, increases.</i>)</p> <p>-When the heavy end speeds up, what happens to the light end? (<i>Answer: it tries to swing like a pendulum still, but its amplitude is increased so much that it makes a number of full swings.</i>)</p>	<p>Up &amp; Down Dino – Pendulum Catch – Sick Science! #013.mp4</p>
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