

Forces & Motion Science Lesson

Date: October 5th, 2022

<p>Grade: 4th</p> <p>Materials: student copies of workbook page 204, soccer ball, anchor chart, chairs, student volunteers</p> <p>Instructional Strategies:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Direct instruction <input type="checkbox"/> Guided practice <input type="checkbox"/> Socratic Seminar <input type="checkbox"/> Learning Centers <input type="checkbox"/> Lecture <input type="checkbox"/> Other (list) </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Peer teaching/collaboration/cooperative learning <input type="checkbox"/> Visuals/Graphic organizers <input type="checkbox"/> PBL <input type="checkbox"/> Discussion/Debate <input type="checkbox"/> Modeling </td> </tr> </table>	<input type="checkbox"/> Direct instruction <input type="checkbox"/> Guided practice <input type="checkbox"/> Socratic Seminar <input type="checkbox"/> Learning Centers <input type="checkbox"/> Lecture <input type="checkbox"/> Other (list)	<input type="checkbox"/> Peer teaching/collaboration/cooperative learning <input type="checkbox"/> Visuals/Graphic organizers <input type="checkbox"/> PBL <input type="checkbox"/> Discussion/Debate <input type="checkbox"/> Modeling	<p>Subject: Physical Science – Forces and Motion</p> <p>Technology Needed: Samsung TV & computer</p> <p>Guided Practices and Concrete Application:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Large group activity <input type="checkbox"/> Independent activity <input type="checkbox"/> Pairing/collaboration <input type="checkbox"/> Simulations/Scenarios <input type="checkbox"/> Other (list) Explain: </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Hands-on <input type="checkbox"/> Technology integration <input type="checkbox"/> Imitation/Repeat/Mimic </td> </tr> </table>	<input type="checkbox"/> Large group activity <input type="checkbox"/> Independent activity <input type="checkbox"/> Pairing/collaboration <input type="checkbox"/> Simulations/Scenarios <input type="checkbox"/> Other (list) Explain:	<input type="checkbox"/> Hands-on <input type="checkbox"/> Technology integration <input type="checkbox"/> Imitation/Repeat/Mimic
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<p>Standard Performance Standard 4-PS3-1 – Use evidence to construct an explanation relating the speed of an object to the energy of that object.</p> <p>Objective By the end of the lesson, students will be able to distinguish the effects of force and motion on real-world objects.</p> <p>Bloom’s Taxonomy Cognitive Level: Analyze</p>	<p>Universal Design for Learning</p> <p>Below Proficiency: students will have hands-on learning experiences paired with visual examples as they interact with the new science vocabulary. Instructions will be provided in clear formatting for the students with multiple opportunities to ask questions throughout the lesson.</p> <p>Above Proficiency: students will have the opportunity to extend their learning to apply real-world examples of forces and motion. This will serve as an additional opportunity for them to apply their knowledge and thinking in settings other than the classroom.</p> <p>Modalities/Learning Preferences:</p> <ul style="list-style-type: none"> • Visual: students will have an anchor chart to help them organize the new vocabulary terms, as well as visual examples on real-world experiments that demonstrate the forces and motion as they occur in real-time. • Auditory: students will have multiple opportunities to engage in classroom discussion and respond to prompted questions. Instructions for each experiment and the worksheet assignment will be provided verbally before the students begin. • Kinesthetic: students will be engaging in their own physical experiments of the new vocabulary terms for forces and motion. This hands-on approach provides students with real-world examples they can base their beginning information of the content on. • Tactile: students will get to manipulate and engage with materials around the classroom to experience the forces and motions that are being discussed. 				
<p>Classroom Management- (grouping(s), movement/transitions, etc.)</p> <p>-Raising Hands: when participating in class discussions, students will raise their hands to indicate that they would like to contribute to the discussion. They will wait to share their thoughts until they have been called on out of respect for those that are speaking.</p> <p>-Gathering Materials: students will need to locate their student social studies workbook and writing materials when prompted to do so. If they need to move around the room to do so they may, but they should do so in an efficient manner so they can begin working on their task.</p> <p>-Experiment Time: students will be dismissed by table to avoid congestion when coming to the front of the room to view the experiments. Students who cannot move safely around the room will be asked to try their movements again.</p> <p>-Student Volunteers: a reliable student who is demonstrating calm and focused behavior will be chosen to assist the teacher in the experiments. This will be communicated to the class as a means of positive reinforcement.</p> <p>-Independent Work Time: students will have time at the end of the direct instruction to work on their assigned task. When working</p>	<p>Behavior Expectations- (procedures/expectations specific to the lesson, rules and expectations, etc.)</p> <p>-Active Listening: students will employ the following strategies to stay engaged in the partner work and class discussions:</p> <ul style="list-style-type: none"> -Eyes on speaker -Hands and feet to self -Voices off -Ears ready to hear -Asking questions to clarify information -Providing feedback when prompted <p>-Student Experiment Materials: students will be prompted when to retrieve their experiment materials. If students cannot act safely with the materials, they will be asked to sit out of the activity to ensure other student’s safety.</p> <p>-Student Worksheet: students will be given work time to complete their assigned worksheet to demonstrate understanding. If students finish early, they will have an additional enrichment assignment to work on until the work time has been completed.</p>				

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	independently, it is expected that they remain at their seats and are on task, not distracting those around them.
Minutes	Procedures
1 minute	<p>Set-up/Prep before lesson:</p> <ul style="list-style-type: none"> -Collect materials: soccer ball, chair, piece of paper, and put them at the front of the room. -Have anchor chart posted on the front board ready to be filled out. -Students will collect and open their workbooks to page 80-81 when prompted, if needed by the teacher.
2 minutes	<p>Engage: (opening activity/ anticipatory Set – access prior learning / stimulate interest /generate questions, etc.)</p> <ul style="list-style-type: none"> -“4th graders, raise your hand if you have ever been in a tug of war contest?” (Allow students to raise their hands and then ask for them to put their hands down). -“How many of you have ever played catch with a baseball or softball?” (Repeat the same process as above). -“How many of you have ever gone sledding down a snowy hill?” (Repeat the same process as above). -“Thank you for sharing 4th graders. Now, whether you knew it or not, everyone who raised their hands has experienced what scientists call, <i>forces and motion</i>. Today, we are going to have an opportunity to attempt to answer the question: How do forces act? So let’s get started!”
20 minutes	<p>Explain: (teacher-led)</p> <ul style="list-style-type: none"> -“4th graders, I want each of you to stand up at your desk, close enough that you can still reach your chair. If you move too far away, you won’t be able to participate in the experiments, so stay at your spots!” -Once students are standing in their correct positions the teacher will begin with the anchor chart vocabulary and have a chair with her at the front of the room. -“Our essential question is listed for the day in the middle of our anchor chart, how do forces act? We will first start by learning that a <u>force is a push or a pull</u>” (The teacher will write this on the anchor chart). <ul style="list-style-type: none"> -“I want you all to safely try a push for me. (Teacher demonstrates with the chair). This force is a push.” -“Now I want you all to safely try a pull for me. (Teacher demonstrates with the chair). This force is a pull.” -“Very good 4th graders, hands off the chairs now please. When we apply a force to an object, it causes motion. A <u>motion is a change in position.</u>” (The teacher will write this on the anchor chart). <ul style="list-style-type: none"> -“In a moment you will get to push or pull your chair again and notice the motion of the chair. See how it changes its position on the floor? This is called motion.” (Teacher will demonstrate as she speaks). -“Go ahead and safely observe motion with your chairs.” -“Thank you for participating in the experiment safely 4th graders, please have a seat. When I dismiss your table group, I need you all to safely make your way to the front of the room so you can see the carpet.” (Dismiss table groups that are calm and ready to learn). -Once all students have moved to the front of the room, begin the soccer ball demonstration, select a trusted student to aid in the demonstration. -“I can apply force on this soccer ball to create motion, just like we did with our chairs. (Push the soccer ball). <u>The distance our soccer ball moves in a period of time is called speed.</u>” (The teacher will write this on the anchor chart). -“Now, there is another force affecting the movement of the soccer ball. Question: would the soccer ball roll farther on a field of grass or on an ice rink?” (Allow students to respond and generate discussion). -“The right answer is whichever surface has less friction. <u>Friction is a force that acts when two surfaces rub together.</u>” (The teacher will write this on the anchor chart). <ul style="list-style-type: none"> -“Students, I need you to watch me closely. (The teacher will slide her shoe across the carpet, experiencing great friction. The teacher will then put her shoe on a piece of paper and easily slide her shoe across the ground, experiencing less friction). Students, which method was easier to move me foot?” (Allow time for students to respond). -“Exactly, so this means that we know that <u>rough surfaces cause more friction than smooth surfaces.</u>” (The teacher will write this on the anchor chart). -For our last demonstration, I need one volunteer to catch an object for me. (Select a student). -The teacher will then stand on a chair and release a ball from a high height, with the student catching it before it hits the ground, so it does not bounce. -“4th graders, did I apply a force to the soccer ball?” (Students may say yes, so continue to question which force). -“The ball going into motion is actually due to a force called gravity. <u>Gravity is a force that pulls things toward the center of the Earth.</u>” (The teacher will write this on the anchor chart). -The teacher will then demonstrate the greater force applied, the greater the speed and greater the change in motion. (Roll the soccer ball light, slow, and short. Roll the soccer ball hard, fast, and long). -Thank you, 4th graders, for observing our key features of forces and motion. Go ahead and go back to your seats for the last experiment. I will call on a volunteer that is sitting and ready to learn to come up and help me.” -The teacher will then move into the effect of equal or greater motion when applying force to an object. <u>Equal pushing on the chair causes no movement. One greater push or pull on the chair cause motion in that direction.</u> -The teacher will then review the vocabulary terms written on the anchor chart with the students, asking them to give an example of what real-life movement could relate to that term. Add examples to the anchor chart as given.

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10 minutes	<p>Elaborate: (concrete practice/application with relevant learning task -connections from content to real-life experiences)</p> <p>-Now you are going to get the chance to show me what you know based on the experiments we just did.”</p> <p>-The teacher will explain the instructions for the worksheet and expectations for independent student work. There will be a 10 minute timer for students to pace themselves with.</p> <p>-For those that complete the worksheet early, the teacher will have the real-world example problem worksheet for the students to take and complete until the worktime is over.</p> <p>-At the end of the work time, students will hand in all of their materials for the teacher to review.</p>	
1 minute	<p>Closure (wrap up and transition to next activity):</p> <p>-Gather student attention and begin transition to next activity.</p> <p>-“Students, I challenge you to go home tonight and see if you can identify one of the key features that we talked about today. I will have a prize for anyone who can give me a real-world example of forces or motion tomorrow when you get to school!”</p>	
	<p>Formative Assessment: (linked to objective, during learning)</p> <ul style="list-style-type: none"> • Progress monitoring throughout lesson (document of student learning, data collection) <p>-Student Experiments: students will get the chance to physically apply forces and motion. Their participation and understanding of the discussed vocabulary terms will provide visual examples of student understanding. The teacher can view this understanding after each experiment in the lesson.</p> <p>-Force & Motion Quick Check: students will fill out the workbook page 204 to assess their understanding of the forces and motion vocabulary terms at the end of the lesson. This will give the teacher an individual assessment of each student.</p> <p>-Real-World Examples: students who finish early will get the chance to brainstorm as many real-world examples as possible of the vocabulary terms for forces and motion. This will provide the teacher an additional method of assessing student understanding at the beginning of the lesson.</p>	<p>Summative Assessment (linked back to standard, END of learning)</p> <p>-Not applicable for this lesson.</p>
	<p>Teacher Reflection (What went well? What did the students learn? How do you know? What changes would you make?):</p> <p>Students became very invested in this lesson due to the hands-on experiments that allowed them to experience the different vocabulary terms that we were going to discuss today. As soon as I told the class that they were going to be doing experiments, they naturally became very excited, which as good to see because it showed me that they were excited to learn. Before we could do that however, I made sure to remind the students that in order to do the experiments, I had to ensure that they were practicing safety, otherwise we will not be able to conduct the experiments. These expectations were communicated to the students, which I had them all agree to. We discussed what safety looked like for this lesson and to show me that they could handle doing experiments like real-world scientists. Students for the most part did their job when it came to carrying out the experiments throughout the lesson.</p> <p>Introducing each vocabulary word with a corresponding experiment worked excellently for this lesson, as it allowed students to make immediate connections with the vocabulary terms that they were learning. When an experiment was being conducted, I could tell the students were engaged because their eyes were focused on the event taking place, they were not having side conversations, and they all were very excited to respond to a prompt or question about the experiment. I added an extra layer of classroom management to this lesson, since this group is particularly high-energy. I asked for volunteers for each of the experiments and made the students aware that I would be looking for students who were calm and showed me that they were ready to learn. Students were very motivated to be on their best behavior because they all wanted to be a volunteer for an experiment. I was very glad that I included this in my lesson because it allowed me to help manage the behaviors that the students were prone to do often.</p> <p>Once the students moved onto independent work time, I realized that I could have structured their vocabulary assignment as more of a whole group worktime. A few of the students had asked me to read out the questions to them while they were working. I realized that this could be helpful for other students as well, so I adjusted and read the questions aloud to the class. Those that wanted to listen and follow along could and those that did not want to be read to could work ahead. While switching instructional approaches for this portion of the lesson worked well for the students that needed the extra support, the students who finished early were ready to move on far before others. I had their next activity ready for them but was still reading aloud some of the questions to the students who were on the first activity. This created a little bit of confusion for the students who were ready to move on. If I were to teach this lesson again, I would start the vocabulary activity by reading off each question to the students as a whole and then having them answer each one independently as we moved along. After this, I could introduce the real-world application activity for the students to work on with the remainder of their time. This would have given more structure to the students who needed it initially while also allowing every student to feel occupied during the flow of the lesson.</p>	