

**CODE/MOE/UOIT Makerspaces Project**

**Lesson Plan: Grade 5 Science & Mathematics: Building a Water Slide**

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| **BIG IDEAS:**  Energy can neither be created nor destroyed, but it can be transformed.  **Science and Technology Overall Curriculum Expectations:**  Demonstrate an understanding of the various forms and sources of energy and the ways in which energy can be transformed and conserved.  **Science and Technology Specific Curriculum Expectations:**  2.3 use technological problem-solving skills to design, build, and test a device that transforms one form of energy into another  2.4 use appropriate science and technology vocabulary, including energy, heat, light, sound, electrical, mechanical, and chemical, in oral and written communication  3.5 explain that energy that is apparently “lost” from a system has been transformed into other energy forms (usually heat or sound) that are not useful to the system (e.g., sound from a car’s engine does not help the car move)  **Mathematics Specific Expectations**  – identify and classify acute, right, obtuse, and straight angles  – measure and construct angles up to 90º, using a protractor | |
| **Learning Goals:**  “We are learning to…”  -understand angles.  -differentiate between kinetic and potential energy. | **Success Criteria:**  “We will be successful when…”  -students have created a water slide that holds a marble from top to bottom and has correctly identified angles throughout.  -The video piece will be successful when students have correctly identified when kinetic and potential energies occur in the model. They may also extend their thinking to discuss if any other energy has been lost from a system through friction or sound. |
| **Lesson Overview:**  Students have been challenged to design a new water slide for an amusement park. They will be using different angles to set up their slides for a marble to run through. Students will have to track and record the angle measurements of their slide. They will need to include two acute, two obtuse and two straight angles in their design. They will record their waterslide in use and discuss where the kinetic and potential energy exists in their models. | |
| **Materials and Technology:**   * students may decide on items they would like to use * have a variety of items available for use such as: * magnetic block tracks to use on boards * paper towel rolls * construction paper * masking tape * books or blocks * protractor * ruler * tablets for recording * a technology software that may be used to provide labels to a diagram of the waterslide (google draw) | |
| **Student Accommodations/Modifications:**  -work in partners  -writing components to be done using read/write app  -different sizes of protractors | **Lesson will be differentiated by:**   * **Content, specifically:** * -allow written component to be done orally * **Process, specifically:** * -may need teacher led demonstration * -allow access to online sources * **Product, specifically:** * -reduced size and limited number of angles * **Environment, specifically:** * -try to remove distractions |
| **MINDS ON: Getting Started** | |
| During this phase, the teacher may:  Begin with a discussion:  -has anyone been to a waterpark?  -have you been on a waterslide?  Your challenge: You have been contracted to design a waterslide with acute, obtuse and straight angles. A marble will run the length of the course and demonstrate potential and kinetic energy. You may use a variety of materials to build your waterslide.  -show brainpop on potential and kinetic energy  <https://www.brainpop.com/science/energy/kineticenergy/>  <https://www.brainpop.com/science/energy/potentialenergy/>  -review angles if necessary but they show have an understanding of how to use a protractor prior to this assignment  • activate students’ prior knowledge;  • engage students by posing thought-provoking questions;  • gather diagnostic and/or formative assessment data through observation and questioning;  • discuss and clarify the task(s). | During this phase, students may:  • participate in discussions;  • propose strategies;  • question the teacher and their classmates;  • make connections to and reflect on prior learning. |
| Describe how you will introduce the learning activity to your students. What key questions will you ask? How will you gather diagnostic or formative data about the student's’ current levels of understanding? How will students be grouped? How will materials be distributed?  -brain pop quiz on kinetic and potential energy  -students may work individually or in partners or groups  -provide bins to each working group or individual to get started  -students will have access to tablets or Chromebooks to record their work and create a labeled diagram with angles clearly marked on google draw | |
| **ACTION: Working on it** | |
| During this phase, the teacher may:  -have students begin building their waterslides  -remind them that they will be required to photograph and label their slides with the various angles  -the angles will need to have numeric values as well as a name (ie. 63° acute)  -the will need to create a video explaining the potential and kinetic energy in their models  -throughout the process the teacher will provide verbal feedback  • ask probing questions;  • clarify misconceptions, as needed, by redirecting students through questioning;  • answer students’ questions (but avoid providing a solution to the problem);  • observe and assess;  • encourage students to represent their thinking concretely and/or pictorially;  • encourage students to clarify ideas and to pose questions to other students. | During this phase, students may:  -keep track of the angles and measure them at least twice for accuracy  -practice cooperative talk in a group setting  -create a video of completed waterslide in action discussing the terms kinetic and potential energy  • represent their thinking (using numbers, pictures, words, manipulatives, actions, etc.);  • participate actively in whole group, small group, or independent settings;  • explain their thinking to the teacher and their classmates;  • explore and develop strategies and concepts. |
| Describe the task(s) in which your students will be engaged. What misconceptions or difficulties do you think they might experience? How will they demonstrate their understanding of the concept? How will you gather your assessment data (e.g., checklist, anecdotal records)? What extension activities will you provide?  -students will begin building waterslides  -students will need to be aware of what angles will work most appropriately keeping in mind they must have at least two of each represented in their models  -they may use any materials they chose that have been provided  -a marble must be able to successfully start at the top and work its way to the bottom without falling off  -once the model has been completed students will need to photograph their work and using google draw label the angles of their waterslide  -they will then create a video demonstrating their waterslide and discussing potential and kinetic energy  Extension:  -Use different materials to construct another water slide and see if there are challenges. ie Keva Blocks | |
| **CONSOLIDATION: Reflecting and Connecting** | |
| During this phase, the teacher may:  -ask probing questions:  What happens to an angle measurement when we lower a portion of the slide?  Ask how they demonstrated kinetic and potential energy  • bring students back together to share and analyse strategies;  • encourage students to explain a variety of learning strategies;  • ask students to defend their procedures and justify their answers;  • clarify misunderstandings;  • relate strategies and solutions to similar types of problems in order to help students generalize concepts;  • summarize the discussion and emphasize key points or concepts. | During this phase, students may:  -students should understand the correlation between angle type and its measurement  -students should be able to discuss that the marble at the top of the slope has potential energy, which became kinetic as the marble was dropped  -students will turn in their videos and labels pictorial diagrams using a recording device and google draw  -students will write a summary reporting on their experience of building a waterslide and the difficulties that they experienced  • share their findings;  • use a variety of concrete, pictorial, and numerical representations to demonstrate their understandings;  • justify and explain their thinking;  • reflect on their learning. |
| How will you select the individual students or groups of students who are to share their work with the class (i.e., to demonstrate a variety of strategies, to show different types of representations, to illustrate a key concept)? What key questions will you ask during the debriefing?  -if time permits you may want to have a groups show how their waterslide functions and look at the different kinds of angles they included in their design  -have students view the different waterslides, are they similar or different from their groups waterslide  Time permitting:  -students will write a summary reporting on their experience of building a waterslide and the difficulties that they experienced  Summative assessment of final products may be done using a rubric or checklist. | |