

**CODE/MOE/UOIT Makerspaces Project**

**Lesson Plan: Grade 2 Science & Mathematics—Structures & Mechanisms**

**Little Bits Steam Student Set: Launching and Addition**

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| **BIG IDEAS:**  **Simple machines help objects to move. (gr. 2)**  **Mechanisms are made up of one or more simple machines. (gr. 2)**  **Science and Technology Overall Curriculum Expectations:**  **\*This lesson addresses many curriculum expectations found in the Understanding Structures and Mechanisms and Understanding Matter and Energy strands of the Ontario Science Curriculum Grade 1-8.**  **Gr. 2: Investigate mechanisms that include simple machines and enable movement**  **\*Gr. 3: Investigate devices that use forces to create controlled movement**  **\*Gr. 8 Investigate a working system and the ways in which components of the system contribute to its desired function**  **\*Gr. 6 Investigate the characteristics of static and current electricity, and construct simple circuits**  **\*Gr. 6 Demonstrate an understanding of the principals of electrical energy and its transformation into and from other forms of energy**  **Mathematics Overall Expectations:**  **Grade 2:**  **Number Sense and Numeration:**  **Solve problems involving the addition and subtraction of one- and two-digit whole numbers,**  **using a variety of strategies.** | |
| **Learning Goals:**  “We are learning to…”  **create a circuit that will move a mechanical arm and launch a ball at a target.** | **Success Criteria:**  “We will be successful when…”  **we have all of the little bits in order and our output will launch the ball at the stacked cup tower.** |
| **Lesson Overview:**  **Students will learn about inputs and outputs and problem solve with the components to make the mechanical arm launch a ball towards the stacked cup tower. Students will then find the sum of the cups that were knocked down.** | |
| **Materials and Technology:**  **Little Bits Steam Student Set**  **Paper Cups**  **Elastics or Masking Tape**  **Philips screwdriver** | |
| **Student Accommodations/Modifications:**   * **working with a partner or in a small group** | **Lesson will be differentiated by:**   * **Process, specifically: direct instruction, partner support, small group with teacher** * **adjusting the numbers on the cups - eg. 1 digit or 4 digit numbers; regrouping or no regrouping required** |
| **MINDS ON: Getting Started** | |
| During this phase, the teacher may:  • 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 students’ current levels of understanding? How will students be grouped? How will materials be distributed?  **Activate prior knowledge by reviewing concepts related to the area of study (eg. Electricity and Electrical Devices or Levers, Pulleys and Gears.**  **Present the challenge to students using a thought provoking question.**  **Explain how the game works and that the person with the greatest sum wins- relate this to accuracy or the launcher**  **Grouping of Students: mixed ability**  **Provide time for groups of students to discuss and plan while referring to the materials available to them.**  **Provide Invention Guide to give an overview of how the Little Bits attach.** | |
| **ACTION: Working on it** | |
| During this phase, the teacher may:  • 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:  • 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 use the Little Bits components to create a circuit that will move a mechanical arm and launch a ball.  Assessment: observations, anecdotals, learning skills checklist, exit slip, performance task | |
| **CONSOLIDATION: Reflecting and Connecting** | |
| During this phase, the teacher may:  • 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:  • 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?  Select students who used successful strategies to share their work.  Select students who overcame obstacles and demonstrated problem solving and collaboration to share their learning. | |