

**CODE/MOE/UOIT Makerspaces Project--Lesson Planning Template**

**School Board: GECDSB**

**Grade(s): 1**

**Subject(s): Mathematics**

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| **BIG IDEAS:**   * Applying developing problem-solving strategies as they pose and solve problems and conduct investigations, to help deepen their mathematical understanding. * Applying developing reasoning skills (e.g., pattern recognition, classification) to make and investigate conjectures. * Communicating mathematical thinking orally, visually, and in writing, using everyday language, a developing mathematical vocabulary, and a variety of representations.   **Curriculum Expectations:**  **OVERALL:**   * Estimate, measure, and describe length, area, mass, capacity, time, and temperature, using non-standard units of the same size. * Compare, describe, and order objects, using attributes measured in non-standard units.   **SPECIFIC:**   * Demonstrate an understanding of the use of non-standard units of the same size (e.g., straws, index cards) for measuring. * Estimate, measure (i.e., by placing non- standard units repeatedly, without overlaps or gaps), and record lengths, heights, and distances. | |
| **Learning Goals:**  We are learning to use square tiles to design a track that Dash can be programmed to move through. | **Success Criteria:**  We will be successful when:   1. We can determine the number of square tiles Dash moves in on forward movement. 2. We can use the measurement on one forward movement to design a track for Dash. 3. Our track has at least two turns. 4. We can program our Dash to move through our track, staying in between our track lines. 5. We can communicate how we designed our track including how we chose the measurements for each side of the track. |
| **Lesson Overview:**  **The groups will be using their knowledge of non-standard units of measure to create a track for the Dash robot. After creating the track, students will use the Blockly Jr. app to code the robot to successfully move through the track.** | |
| **Materials and Technology:**  **- Masking tape**  **- Square tiles**  **- Dash Robots**  **- iPads**  **- Blockly Jr. App**  **- Chart Paper and Markers** | |
| **Student Accommodations/Modifications:**  -Carefully planned group assignments  -Use of visual coding program (Blockly)  -Visual representations of instructions  -Small-group instruction for groups who are experiencing a challenge that is impeding their ability to discover the learning.  -Choice in difficulty of track.  -Use of concrete manipulations (square tiles) | **Lesson will be differentiated by:**   * **Content, specifically:** * **Process, specifically:** * Teacher assistance when needed throughout the process. * **Product, specifically:** * Choice in track design * **Environment, specifically:** * Provide different areas of the room and within the school to complete this assignment if a quiet or separate work area is needed. |
| **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.**  As a whole group, the lesson will begin by asking students what they already know about the Dash robot. Students can share their previous experience with coding the Dash. Students will then be asked to predict how far they think the Dash will move in one forward movement block. They will show their estimates using their hands. After estimating, the teacher introduces the non-standard unit of measure used in this lesson, the square tile. The teacher will program the Dash to move one forward movement and show the students what this looks like. Students will be asked to estimate how many square tiles the Dash moved. In groups of 4, students will work on determining the actual number of square tiles the Dash moves in one forward block and then in two forward blocks. Students will come back to the whole class meeting area to discuss the learning.  **What key questions will you ask?**  What do you know about the Dash robot?  How far do you think the Dash will move in one forward coding block?  How many square tiles do you think the Dash will move in one forward coding block?  How many squares tiles do you think the Dash will move in two forward coding blocks?  **How will you gather diagnostic or formative data about the students’ current levels of understanding?**   * Anecdotal observations of student conversations and actions while working in groups. Written, video and photo evidence.   **How will students be grouped? How will materials be distributed?**  Students will be grouped in groups of four with one team member demonstrating proficiency with coding the Dash in previous lessons. Materials will be organized in bins for students to take to their work area. | |
| **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.**  After engaging in the Minds On, students will have enough knowledge of the Dash measurements to begin to create a track for Dash. Students will use the square tiles to create lengths of tracks that the Dash can be accurately coded to complete. The track will be tested and adjusted depending on the results of the testing.  **What misconceptions or difficulties do you think they might experience?**   * Identifying each square tile as a unit of measure and understanding that the tiles must be placed repeatedly without overlapping or leaving gaps. * Although students engaged in the Minds On to determine the length of one forward movement, their focus may turn to only designing the track without keeping the original measurements in mind. * The Dash can move in a diagonal or forward direction depending on how it is placed before the program is run. Students may struggle to determine how to get their Dash to go straight. * Figuring out the measurements for a turn in the track. * Teamwork and sharing of the coding. Students are very eager to use the technology and waiting for a turn or ending a turn can be difficult. * Possible app or wi-fi issues   **How will they demonstrate their understanding of the concept?**  Students will demonstrate their understanding of using non-standard units of measure by designing a track with length measures that match the measurement of one forward unit or a multiple of that measure. Students will use language of the curriculum in their conversations with peers.  H**ow will you gather your assessment data (e.g., checklist, anecdotal records)?**  Checklist of success criteria  Anecdotal records  Video and photo evidence  **What extension activities will you provide?**   1. Create two tracks for Dash to complete. Predict which track will take the longest for Dash to finish. Explain the thinking behind your prediction. Test your prediction. 2. Code Dash to move through your track starting at the finish and ending at the start. Will you be able to successfully code your Dash to complete the track in reverse? Why or why not? | |
| **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)?**  Groups can choose to share their tracks or not share their tracks. Of the groups who do choose to share, make note of the continuum of learning evident in the different tracks. Have students share how they designed their tracks, starting with the least effective and moving towards the most effective. Students will explain how they used to square tiles to design their track and how they determined where to put the turns. Students will share how they used to manipulatives and how they coded their Dash robot.  **What key questions will you ask during the debriefing?**   * How did the square tiles help you plan your track? * How did you decide the measurement of each length of your track? * How did you know which coding blocks to use? * What was difficult about this activity? * What were you successful at today? | |