

**Makerspace Project CODE/MOE/UOIT**

**Lesson Plan : Grade 5 Mathematics : Measurement & Data Management**

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| **Big Ideas:**   * Measurement: length and time * Data Management: create a chart with data from experiments   **Curriculum Overall Expectations:**  **Measurement :**   * Estimate, measure and record lengths greater than 1 metre using standard units (metre, decametre, hectometre, kilometre) * Estimate and measure intervals of time, to the nearest second, using various tools (for example: a watch, a chronometer) * Use equal and different representations of units of measure of time   **Data Management :**   * Record primary and secondary information using a chart or correlation table, and make, by hand, or using a computer, a double bar graph * Interpret information from correlation tables or charts or in a double bar graph, have discussions, and make conclusions | |
| **Learning Goals:**  “We are learning to…”   * Demonstrate that there is a relationship between time, distance and speed * Measure fast speeds with standard units of measure * Use division to compare relations * Create a code for the Sphero | **Success criteria:**  “We will have success when…”   * We understand the relation between time, distance, and speed * We can measure the distance that our Sphero has travelled |
| **Lesson Overview:** Students will create a computer program that will move a Sphero at a constant speed for a certain amount of time. They will measure the distance travelled and will use division to compare their obtained measurements. They will also code their Sphero so that it moves back to where it started. | |
| **Materials and technology to be used :**   * iPad * SPRK Lightning Lab app * Sphero * Masking tape * Measuring tape * Google Sheets | |
| **Accommodations/Modifications:**   * Mixed ability grouping * The use of a calculator * Environment – this task requires a space with a lot of surface area, no obstacles * A checklist of tasks to be completed | |
| **MINDS ON:** | |
| **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?**   * Introduce Spheros (how they work, how to code them, how to target an area, changing time/speed/distance) * Review how to measure in metres and centimetres, and review the relationship between different units of measure * Information (data) will be collected using Google Forms. Students will fill-out a worksheet that explains their results for each activity/task. The worksheet will have a QR code that students can scan with the iPad. Photos and videos will show what they learned (how successful they were with each task) * Have a discussion with students regarding their observations, as well as the relationship between speed, distance, and time. If one decreases what happens to the other? If one measurement increases, what will happen to the other? * Students are in mixed-ability groups of 2-3 members. | |
| **ACTION:** | |
| **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?**  All data is collected using Google Forms. The worksheet is made-up of the same steps for each lesson. The questions are all the same.  **Lesson 1: Time and Distance** Program 1 : Move with 20% speed for 3 seconds then stop.   * Put a piece of tape on the floor and start Program 1. * Measure the distance travelled.   Program 2 : Move with 20% speed for 6 seconds, direction 0   * Start the program on a piece of tape. * Measure the distance travelled.   Program 3 : Move with 20% speed for 9 seconds, direction 0   * Start the program on a piece of tape. * Measure the distance travelled.   Calculations :   * Divide answer for Program #2 by Program #1 * Divide answer for Program #3 by Program #1   Ask students what they notice. They should realize that when the Sphero travels at a certain speed, it can go 2 times faster and 2 times further. If it goes 3 times faster, it will go 3 times further.  **Lesson 2 – Speed and Distance**  Program 1 : Move with 20% speed for 3 seconds then stop   * Put a piece of tape on the floor and start program 1 * Measure the distance travelled   Program 2: move with 40% speed for 3 seconds, direction 0   * Start the program on the tape * Measure the distance travelled   Program 3 : move with 60% speed for 3 seconds, direction 0   * Start the program on the tape * Measure the distance travelled   Calculations :   * Divide answer for Program #2 by Program #1 * Divide answer for Program #3 by Program #1   Ask students what they notice. They should realize that when the Sphero travels at a certain speed, it can go 2 times faster and 2 times further. If it goes 3 times faster, it will go 3 times further.  **Lesson 3 : Challenge**  Program 1**:** Move with 40% speed for 5 seconds. Next, ‘’stop’’ and add a ‘’delay’’ for 3 seconds. Below the delay block, add a ‘’move’’ block with a speed of 20% and a direction of 180 degrees. For the duration, students add a number that they think will bring Sphero back to the beginning. Students continue to adjust the duration until they have succeeded in moving Sphero to where it is supposed to go. | |
| **CONSOLIDATION: Reflection and Connection** | |
| **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?**  Questions:   * What did you notice between time and speed, time and distance, and distance and speed? * Where do we see these relationships in our daily life?   Presentations :   * Choose students that have a variety of observations and those who can explain their reasoning clearly. Choose one group with different answers to illustrate the point that measurements have to be precise or else the all consecutive answers will be different. | |