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**CODE/MOE/UOIT Makerspaces Project**

**Lesson Plan: Grade 5 Science:**

**Making a strong and stable structure using Lego blocks**

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| **Big Ideas :**1. Structures and mechanisms throughout our environment have forces that act on and within them. (Overall expectations 1 and 3)
2. Forces that result from natural phenomena have an effect on society and the environment. (Overall expectations 1 and 3)

**Overall Curriculum Expectations :*** Investigate forces that act on structures and mechanisms;
* Identify forces that act on and within structures and mechanisms, and describe the effects of these forces on structures and mechanisms,
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| **Learning Goals :*** Observe the extent of damage caused by natural phenomena, such as earthquakes, tornadoes, etc.
* Build a solid and stable building that can withstand an earthquake, using a seismic simulator built from LEGO® bricks

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 | **Success Criteria :** * Identify forces that act on a structure
* Describe forces that result from natural phenomenon, which could have dire consequences on structures
* Use Lego blocks to make a building
* Use the app Lego Education WeDo 2.0 for coding purposes
* Use trial and error, modifying the structure to improve resistance to external and internal forces
* Communicate results
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| **Lesson Overview:**Over the course of this series of lessons, the student will :* Use the Lego WeDo kit to construct a stable building that is resistant to earthquakes
* Improve the stability of a structure by utilizing a large base
* Use appropriate vocabulary (independent variable, dependent variable, and controlled variable)
* Follow the technological problem-solving skills continuum
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| **Materials and technology to be used:*** Lego WeDo kit
* Ipads
* Laptops
* Coding software from Lego Education
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| **Accommodations/Modifications:** * Form heterogeneous (mixed ability) groups keeping in mind different learning difficulties
* Suggest to students that they try to identify a real-world problem that needs solving
* Allow students to present their results in their own manner
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| **MINDS ON: Getting Started** |
| During this phase, the teacher will:* Provide definitions of the following important vocabulary words: *strategy, make, structure, resistance, external force*
* Ask students the following question: *Which shape is the most stable and which shape is the strongest?*
* Introduce the challenge: Make a structure that is as high as possible using spaghetti. AT the top, there is a marshmallow. Your structure needs to be wind resistant and earthquake proof (we will blow on the tower and shake the table it is on)
* Making conclusions: Discuss how triangular structures are the strongest, and most stable, and how spacers are used to maintain a constant spacing between two other parts of a rectangular structure
 | During this phase, students will:* Work in groups of 4 to complete the “marshmallow challenge”
* Share their discoveries and draw conclusions regarding stability in structures

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| **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?** * Ask students to research extreme external forces resulting from natural hazards/phenomenon obtaining their information from videos, online, and from textbooks
* Introduce the “marshmallow challenge” and ask students: *What shape is the strongest and most stable?*
* Review the technological problem-solving skills continuum
* Students will work in partners that are pre-selected keeping in mind learning difficulties, etc.
* Diagnostic information can be gleaned from this “marshmallow challenge”
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| **ACTION: Working on it** |
| During this phase, the teacher will * Provide students with the necessary material (each group of 2 receives 1 Lego WeDo kit)
* Remind students how to work collaboratively
* Help student groups as needed
* Monitor students as they make their structure
* Take photos and/or videos as students work
 | During this phase, students will :* Make, code, and modify their structure using Lego pieces to improve the building’s resistance to earthquakes and heavy wind
* Use vocabulary from the unit of study and work collaboratively with their partner
* Film a video which serves as a documentary of their progress and put the finished video online
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| **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?** * Conduct different experiments during class time to help students understand different forces
* Reading textbooks and researching online on the topic of internal and external forces
* “Evaluation by triangulation”
* Have conversations with students
* Observe how students work using an observation checklist
* Peer evaluation
* Presentation of structure in front of the class
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| **Consolidation : Reflecting and Connecting** |
| During this phase, the teacher will: * Have students record a video including these key points:\* what I found difficult\* What I found easy\* How I could have improved my structure
 | During this phase, students will :* Record their video
* Present their structure
* Do a self-evaluation and a peer-evaluation
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| 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? All students will present their discoveries (what they learned).Students will show the videos they made, as well as their building, explaining any difficulties encountered along with solutions they came up with. |