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**CODE/MOE/UOIT Makerspaces Project**

**Lesson Plan: BeeBot Addition & Subtraction using a Number Line STEAM Challenge**

**School Board: Limestone District School Board**

**Grade(s): 1**

**Subject(s): Math**

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| **BIG IDEAS:*** In this activity students will be introduced to code by programming, controlling and using directional language to move the BeeBot forward, back, right, left and pause on a teacher constructed number line
* Problem solving, exploration and prediction
* Sequence and order
* Simple addition and subtraction concepts

**Curriculum Expectations:****OVERALL:*** Demonstrate an understanding of magnitude by counting forwards to 100 and backwards from 20
* Solve problems involving the addition and subtraction of single digit whole numbers using a variety of strategies

**SPECIFIC:*** Count forward by 1's, 2's, 5's & 10's to 100 using a variety of tools and strategies
* Solve a variety of problems involving the addition and subtraction of whole numbers to 20 using concrete materials and drawings
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| **Learning Goals:**“We are learning to…” Code our BeeBot to move up and down a number line to help us solve simple addition and subtraction questions. | **Success Criteria:** “We will be successful when…”We are able to describe and present how our BeeBot moved on our number line to solve an addition and subtraction question. We will document our learning using the Book Creator app. |
| **Lesson Overview:****Question posed to students: Can you program your BeeBot to move up and down our number line to help you solve an addition and subtraction question?*** **Divide students into partners**
* **Provide each group with a laminated number line that has been created based on the grid distance the BeeBot travels at a given time**
* **Students are then provided with a simple addition question to solve using the BeeBot, their number line, directional language as well as their iPad to document their learning**
* **Once students have completed a teacher provided addition and a subtraction question please ask them to extend their learning by developing an addition and subtraction question with their partner to solve**
* **Students will then exchange their questions with another group to solve**
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| **Materials and Technology:** * BeeBots
* Addition and subtraction question cards
* Laminated BeeBot number lines to 10
* iPads
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| **Student Accommodations/Modifications:** Students are placed in homogenous partners and are provided with a voice-to-text app (Book Creator) to record their findings and present their final product at the end of the challenge. | **Lesson will be differentiated by:*** **Content, specifically: Content has been created in a way so that all can access material**
* **Process, specifically: Homogenous groupings to help with fine motor issues, voice to text is imbedded in all provided documentation apps**
* **Product, specifically: Differentiated based on individual skills**
* **Environment, specifically: Quiet work space if required**
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| **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.** * **Divide students into partners**
* **Students will have already been taught how to code using the BeeBot; and have been provided with the opportunity to use a number line to solve simple mathematical problems in class**
* **Provide each group with a laminated number line that has been created based on the grid distance the BeeBot travels at a given time**
* **Students are then provided with a simple addition question to solve using the BeeBot, their number line, directional language as well as their iPad to document their learning.**
* **Once students have completed a teacher provided addition and a subtraction question please ask them to extend their learning by developing an addition and subtraction question with their partner to solve**
* **Students will then exchange their questions with another group to solve**
* **Each team will present its code and how it works.**

**What key questions will you ask?** * **On what number should your BeeBot begin at? Why?**
* **How will you program your BeeBot to turn around before moving down the number line to solve subtraction questions?**

**How will you gather diagnostic or formative data about the students’ current levels of understanding?*** **Observations, Student-Teacher Conferencing, Checklist**
* **All data gathered will be saved in a digital portfolio for each individual students using OneNote**
* **Students orally present their process and findings using the documentation feature of choice to the whole class in a sharing circle**
* **Student presentations are blogged on our STEAM room Google Sites Account to be shared out to our broader community members**

 **How will students be grouped? How will materials be distributed?** * **Students will be grouped homogenously**
* **Materials will be distributed to in small, organized containers**
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| **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.** * Students will code their BeeBot to move up and down a number line to help solve simple addition and subtraction questions
* Oral/Visual Presentation at the end of the challenge
* Building and Constructing using coding and a number line
* Problem-solving, collaboration, ingenuity, documentatio**n**

**What misconceptions or difficulties do you think they might experience?** * Effectively coding the BeeBot to turn fully around before traveling down the number line to solve addition problems

**How will they demonstrate their understanding of the concept?*** Students will represent their thinking (using pictures, words, technology, actions, etc.)
* Participate actively in whole group, small group, or independent settings
* Explain their thinking to the teacher and their classmates

**How will you gather your assessment data (e.g., checklist, anecdotal records)?*** **All data gathered will be saved in a digital portfolio for each individual students using OneNote**
* **Students orally present their process and findings using Book Creator to the whole class in a sharing circle**
* **Student presentations are blogged on our STEAM room Google Sites Account to be shared out to our broader community members**

**What extension activities will you provide?** * **Immediately following this STEAM challenge students will participate in a sharing circle and discuss what they have learned with the group; and how it might be helpful when solving larger problems involving bigger numbers**
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| **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)?** * **All students will present using the Book Creator app.**

**What key questions will you ask during the debriefing?** * **What have you learned about how number lines work?**
* **What kind of challenges did you and your partner experience when trying to code the BeeBot up and down the number line?**
* **In my consolidation as an educator I would be looking to create the connection between movement patterns along a grid and not simply numerical addition and subtraction.**
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