Cue - Codeblocks

Coding Tool	Cue
Cross-curricular	Math, Science

Big Ideas

Science

- Structures have a purpose
- The form of a structure is dependent on its function
- The interaction between structures and forces is predictable

Math

- Mathematical Process
- Number Sense - operational sense (bisecting)
- Measurement - area, real-life application of measurement
- Geometry & Spatial Sense - angles, lines, bisectors, properties

Specific Expectations

Science

- **1.1** evaluate the importance for individuals, society, the economy, and the environment of factors that should be considered in designing and building structures and devices to meet specific needs (e.g., function; efficiency; ease of use; user preferences; aesthetics; cost; intended lifespan; effect on the environment; safety, health, legal requirements)
- **2.6** use appropriate science and technology vocabulary
- **3.1** classify structures as solid structures (e.g., dams), frame structures (e.g., goal posts), or shell structures (e.g., airplane wings)
- **3.4** distinguish between external forces (e.g., wind, gravity, earthquakes) and internal forces (tension, compression, shear, and torsion) acting on a structure

Math

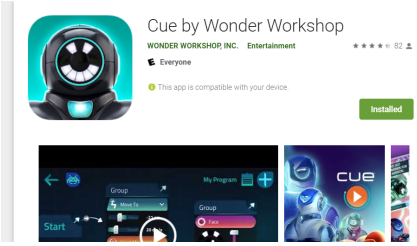
- Geometry & Spatial Sense
  -
- Measurement
  - solve problems that require conversion of units of area
- Geometry & Spatial Sense
  - plotting points
  - identify, perform, and describe dilatations
  - create an analyze designs

Description

This lesson builds on the first two explorations by using block-coding with a Cue bot (intermediate/senior grades). Provide the same list of guidelines as in other lessons, and allow students to explore movement using the appropriate app (must have access to a tablet/personal device/Chromebook). Students will engage in a Knowledge Build at the end to consolidate shared learning from the past 2 lessons (e.g., provocation: what type of structure is an Ozobot? What are the benefits of Colour-Coding and Block Coding?). This will lead into discussion of their final task: build a structure which withstands an external force (wind, earthquake) and/or an internal force (tension, compression, shear, torsion). These forces will be replicated through a block-coded Cue robot. Examples may be: a bridge which the Cue must travel across (internal force - compression AND/OR external force - earthquake); a goalpost (internal force - tension AND/OR external force - wind).

Materials

- Cue
- Cue app
- 50+ minute period
- Handouts
  - Lesson 3 - Teacher Cue Block Coding Information
  - Lesson 1 & 2 Coding Goals
- Knowledge Building Scaffolds: pg.42



Computational Thinking Skills

Iterative Thinking
- students will be tinkering & exploring a basic form of coding

Logic & Evaluation
- how to operate the tools

Algorithm
- making steps and rules to complete specific functions

Decomposition
- focusing on one aspect at a time

Debugging
- finding and fixing

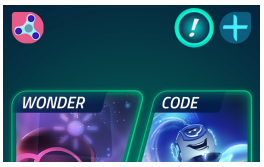
Abstraction
- adding in additional functions/features (e.g., lights, sounds) when completing the task

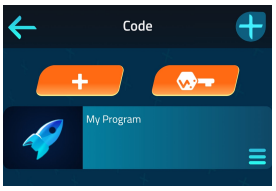
Introduction

- Discussion
  - review previous lesson on block-coding
  - modification/accommodation: review anchor charts ahead of time
  - importance of giving detailed instructions
- Review activity
  - using the same guidelines as the previous lesson (reflex, 65°, bisect, shell, solid, frame, 25cm^2), block-code the Cue to fulfil each task
- Review purpose of the lesson
  - to block-code a structure that has a specific purpose
- Build success criteria together prior to beginning, as well as during their build (e.g., working document)
  - terminology used
  - factors and considerations kept in mind

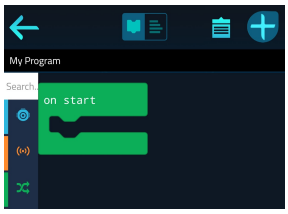
- use of computational skills

Action





- Groups of 2, 3 max
  - circulate to prompt or guide learners if needed
- Tips
  - make sure the Cue is calibrated
  - see images to guide how to get into block-coding with Cue (select 'code', then '+' for a new program, commands are on the left)
- Goals
  - students will create algorithms, block-coding Cue movement to create specific angles, bisector(s), structures (shell, frame, solid), show area of 25cm^2; combine these movements together rather than independent



- Connection
  - pause for informal discussion; what do you notice? Are you finding this easier or harder to navigate? How come? What algorithms are you creating?
  - circulate to have conversations specific to coding: how have you been debugging? What algorithm works best to find the area?

Consolidation/Extension

- Thumbs Up/Down/Side - how well did you understand how to block-code? (add on other questions appropriate for your specific class)
- Quick discussion about prior knowledge going in, and what they understand now
- Examples of a force the Cue may perform
  - load crossing a bridge
  - drive through a goal post (act as a soccer ball / hockey puck)
  - earthquake - fast movements back and forth
- Examples of Internal forces the structure may undergo
  - load crossing a bridge - compression, tension
  - drive through a goal post (act as a soccer ball / hockey puck) - tension, torsion
  - earthquake - fast movements back and forth - compression
- Review Take Home
  - Remember - think about a structure to create which is important to you - may be something modified or adjusted that already exists, or something completely new (e.g., bridge, building, goal post, etc)
  - this structure must perform a function (e.g., has a force acting on it, supports a load, etc.)

- materials - will have 2 periods to build - may bring in your own materials, or let teacher know what needs to be supplied
    - examples: popsicle sticks, hot glue, jinx-wood, snap cubes, blocks, newspaper, duct tape, masking tape

Assessment

- anecdotal from their exploration
    - learning skills
    - computational thinking
- based on the co-created success criteria
    - descriptive feedback given to each student for lesson 2's creation

Additional Resources / Information

- Provide a double block for students to code the Cue to perform the force
    - rotate groups through building the structure and coding
- Further extensions
    - structure must be able to undergo a variety of forces
        - randomly choose a group's coded Cue to interact with another's structure
- Teacher Curriculum through WonderWorkshop
    - free sign in: https://portal.makewonder.com/#/curriculum/appliedrobotics
- Websites
    - Knowledge Building Scaffolds
        - http://thelearningexchange.ca/wp-content/uploads/2017/04/Knowledge-Building-Booklet-Accessible-1.pdf