MP1-Cubelets

Content Area:	**G&T**
Course(s):	**G&T 4**
Time Period:	**Marking Period 1**
Length:	**MP1**
Status:	**Published**

Activities

1 – Cubelets Open Play

Outline:

Students play with Cubelets naturally:

- Practice group norms.
- Explore Cubelets – how to turn on Battery, how they attach together.

Objectives:

- Students will use their natural curiosity to explore Cubelets.

Assessment:

Teachers look for:

- Student collaboration skills.
- Students noticing black SENSE blocks.

2 – Investigating SENSE & ACT Cubelets
Outline:

- Read aloud Robot Rumpus by Sean Taylor.
- Investigate ACT Cubelets one by one.
- Investigate SENSE Cubelets one by one.

Objectives:

- Students will investigate each ACT and SENSE Cubelet.

Assessment:

Teachers look for:

- Group collaboration skills.

- Students testing each Cubelet in multiple ways.
- Clear explanations of what each Cubelet does.
- Accurate Cubelets vocabulary.

3 – Designing 3- and 4-Block Robots

Outline:

- Build Drive Bot with Distance SENSE.
- Build robots using multiple ACT Cubelets.

Objectives:

- Students will practice flexible thinking by redesigning their robots for different jobs.

Assessment:

Teachers look for:

- Students rotate individual Cubelets within a robot.
- Students switch the order of blocks in their robot.

4 – Investigating THINK Cubelets
Outline:

- Students investigate what happens when they add the red INVERSE Cubelet to their robots.
- Students investigate what happens when they add the green PASSIVE Cubelet to their robots.
- Students write Claim-Evidence-Reasoning Statements.

Objectives:

- Students will apply the scientific method to investigate THINK Cubelets.

Assessment:

Teachers look for:

- Students test THINK Cubelets multiple times with different ACT and SENSE Cubelets.
- Student collaboration skills.
- Students begin to apply THINK Cubelets using “what if” statements.

5 – Investigating Two SENSES
Outline:

- Students investigate robot constructions with two SENSES.
- Students discuss findings from the investigation.

Objectives:

- Students apply their understanding of Cubelets to robots that use 2 SENSE Cubelets.

Assessment:

Teachers look for:

- Students discover two basic rules for multiple SENSES.
- Students continue to ask questions and check their understanding.

6 – Modeling Robots
Outline:

- Students build a variety of robot constructions.
- Students choose at least one to model.
- Students swap scientific drawings and attempt to build the robot that matches the image.

Objectives:

- Students will practice scientific modeling by drawing models of the robots they build.

Assessment:

Teachers look for:

- Students drawing with unique properties in mind.
- Students use words to explain their drawings. (Note: scaffold modeling with this worksheet)

7 – Cubelets Challenges
Outline:

- Read aloud The Most Magnificent Thing by Ashley Spires.
- Teacher gives challenges, students design to meet challenge constraints.
- Students draw models of their designs.

- Students share their responses to the challenges.

Objectives:

- Students will use critical thinking skills to build a specific robot based on a description.

Assessment:

Teachers look for:

- Students understand the description of a robot.
- Students stay on task.
- Students collaborate with peers.

8 & 9 – Cubelets Storytelling, parts 1 & 2
Outline:

- Read aloud The Best Story by Eileen Spinelli.
- Students build robot constructions with their group and choose one to write about
- Draw a picture of their robot IN a story.
- Could be tied to seasons or holidays or special places or imaginations.
- Students plan and draft their story.
- Students share their stories with classmates.

Objectives:

- Students will practice telling stories based on their understanding of how their Cubelet robot SENSEs and ACTs.

Assessment:

Teachers look for:

- Students describe their robot accurately.
- Students tell a story with a beginning, middle, and end.
- Students collaborate with peers.

10 – Paper Coding
Outline:

- Introduce learning target and learning task.
- Students investigate Cubelets robot construction.

- Students investigate using paper plates/cardstock to make a robot walk in a straight line.

Objectives:

- Students will use spatial reasoning and computational thinking skills to use paper as a programming tool for a robot construction.

Assessment:

- Students can explain how their paper coding works, and talk about their design process.

Enduring Understandings

ISTE - The International Society for Technology in Education

1.c. Students explore age-appropriate technologies and begin to transfer their learning to different tools or learning environments.

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4.a. Students engage in a cyclical design process to develop prototypes and reflect on the role that trial and error plays.

4.b. Students use age-appropriate digital and non-digital tools to design something and are aware of the step-by-step process of designing.

4.c. Students engage in a cyclical design process to develop prototypes and reflect on the role that trial and error plays.

4.d. Students demonstrate perseverance when working with open-ended problems.

5.a. With guidance from an educator, students identify a problem and select appropriate technology tools to explore and find solutions.

5.b. With guidance from an educator, students analyze age-appropriate data and look for similarities in order to identify patterns and find solutions.

5.c. Students break down problems into smaller parts, identify key information and propose solutions.

5.d. Students understand and explore basic concepts related to automation, patterns, and algorithmic thinking.

6.b. Students use digital tools to create original works.

7.c. Students perform a variety of roles within a team using age-appropriate technology to complete a project or solve a problem.

7.d. With guidance from an educator, students use age-appropriate technologies to work together to understand problems and suggest solutions.

K12CS - K–12 Computer Science Framework

Culture The development and modification of computing technology is driven by people's needs and wants and can affect groups differently. Computing technologies influence, and are influenced by, cultural practices.

Hardware and Software Hardware and software work together as a system to accomplish tasks, such as sending, receiving, processing, and storing units of information as bits. Bits serve as the basic unit of data in computing systems and can represent a variety of information.

Modularity Programs can be broken down into smaller parts to facilitate their design, implementation, and review. Programs can also be created by incorporating smaller portions of programs that have already been created.

Program Development People develop programs using an iterative process involving design, implementation, and review. Design often involves reusing existing code or remixing other programs within a community. People continuously review whether programs work as expected, and they fix, or debug, parts that do not. Repeating these steps enables people to refine and improve programs.

Algorithms The accuracy of inferences and predictions is related to how realistically data is represented. Many factors influence the accuracy of inferences and predictions, such as the amount and relevance of data collected.

Inference and Models The accuracy of inferences and predictions is related to how realistically data is represented. Many factors influence the accuracy of inferences and predictions, such as the amount and relevance of data collected.

Control Control structures, including loops, event handlers, and conditionals, are used to specify the flow of execution. Conditionals selectively execute or skip instructions under different conditions.

NGSS - Next Generation Science Standards

Asking Questions and Defining Problems - A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world works and which can be empirically tested.

Planning and Carrying Out Investigations - Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters.

Using Mathematics and Computational Thinking - In both science and engineering, mathematics and computation are fundamental tools for representing physical variables and their relationships. They are used for a range of tasks such as constructing simulations; statistically analyzing data; and recognizing, expressing, and applying quantitative relationships.

Developing and Using Models - A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.

3-5-ETS1-2 Generate and compare multiple solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

New Jersey Student Learning Standards

4.MD.B. Represent and interpret data. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.

W.4.3 Write narratives to develop real or imagined experiences or events using narrative technique, descriptive details, and clear event sequences..