KEVA COASTERS

Course Name: STEAM Lab

Unit/Theme: Engineering & Design Thinking

Time Frame (in minutes): 40 Minutes

Grade Level: 3-4

CONTENT AND SKILLS

Learning Objectives:
- Students will work through the iterative thinking process as they design their 'Keva Coaster.'
- Students will communicate and problem solve with their teammates.
- Students will test their prototypes and make improvements.
- Students will self-assess their work based on the outlined success criteria and constraints.

Essential Questions:
- How can I collaborate to create a simple prototype of a roller coaster using Keva Planks?
- How can I collaborate to create iterations to improve the original design?
- What is your reaction when something doesn't work the first time?

Students I can statements . . .
- I can design and build a 'KEVA Coaster'.
- I can rethink my ideas and improve my design.
- I can sense my feelings and manage my feelings positively.
- I can work with a partner to communicate my ideas, compromise, and be supportive to my partner.

How will you meet the needs of SWD and ELL/MLL students?
- Modifications and accommodations according to individualized programs and 504s will be met
- Partner/group work
- Visuals

Content Standards
List all standard indicators (do not need standard statement)

- NGSS 3-PS2-1: Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
- NGSS 3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- NGSS 4-PS3-4: Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

NYS Computer Science and Digital Fluency Standards
List all standards that authentically align

- 4-6.CT.1 Develop a computational model of a system that shows changes in output when there are changes in inputs.
- 4-6.CT.4 Decompose a problem into smaller named tasks, some of which can themselves be decomposed into smaller steps.
- 4-6.CT.6 Compare two or more algorithms and discuss the advantages and disadvantages of each for a specific task.

- 2C.1a. Identify ways to work and play well with others (K-3)
- 2C.2b. Analyze ways to work effectively in groups (4-5)
- 3B.1b. Make positive choices when interacting with classmates. (K-2)
- 3B.2a. Identify and apply the steps of systematic decision making. (4-5)

INSTRUCTIONAL PLAN
List the steps of the lesson, including instructions for the students including how they will construct and practice content knowledge.
Add Standard Indicators next to activity that aligns and highlight them.

**Prior to this lesson, students would have experience building with Keva Planks.

Introduction:
- Show the quote 'This might not work' from the slideshow (linked in resources). Explain to students that today's lesson is a Keva plank build, but it's more than that. We are going to focus on describing what it feels like when something doesn't work the first time. Ask students if they can provide examples of a time when something didn't work the first time in their lives (home/school/sports, etc). Discuss.
- Share 'I Can' statements/Criteria/Constraints from Google Slides (linked in resources).
- Optional: Show clips from *Keva Planks* YouTube video (linked in resources), highlighting features of a 'Keva Coaster' for inspiration.

Student Work Time:
- As you send students off to work with a partner, remind them that it's about the Keva Coaster, but it's also about how we react when something fails. Tell them to take note of how they feel when something doesn't work….. What is the action that they take after something fails? 4-6.CT.1   4-6.CT.4
- As students try and test their prototypes, remind students of the iterative design process (Google Slide #9) …build…play…improve…
- Teacher circulates around the room, documents progress, asks questions, notices failures, discuss feelings and plans to fix/improve/move forward. 4-6.CT.6

Gallery Walk
- Allow time for students to walk around with their own ping pong ball and test the other coaster builds in the room.

Debrief:
- Revisit the "I Can" statements for this lesson (linked in resources). Use photos taken during lesson (or experiences observed) to find evidence that these statements have been met or need more time to develop within the debrief discussion. Specifically highlight photos that show students responding to failure in a positive manner. 4-6.CT.6
- Follow the prompts listed on the debrief Google Slide (linked in resources):
  - What went well? What was fun? What was hard?
  - How was it working with a partner for this challenge?

Although guided by the teacher, students will lead the debrief discussion.

FUTURE READY COMPETENCIES
Check off each competency that students will interact with during this lesson.

- ☑ Collaboration
- ☑ Communication
- ☑ Critical Thinking/Problem Solving
- ☑ Creativity & Innovation

MATERIALS / RESOURCES
Add additional resources needed for this lesson such as instructional technology templates, images, videos, etc. ***Including Instructional Technology Tools***

- Keva Planks
- Ping Pong Balls
- Google Slides
- iPad for documentation
- Optional (YouTube video from *Keva Planks*)