RISE

Intentional Planning Sheet – Make a Marble Roll Up a Ramp

This is a sample of the RISE Intentional Planning sheet that was co-constructed by RISE teachers with the goal of challenging children to determine a way to make a marble roll up a ramp without pushing it with their hands. The Intentional Planning sheet provides guidance in planning an experience and considers key details to assure the experience is rich in STE and HSC.

What is the problem/challenge? What is the learning goal?
How can we get a marble to roll up a ramp without pushing it or throwing it?
Children will learn that it takes force to get a marble to go up.

HSC Information - What do the children know or what relevant experiences have they had? What links can we make from this information to the challenge activity?
The QOTD around "Did you go up a ramp today? Yes/No – Did you go up the ramp or down the ramp?" gave us information as to whether children have experience or understanding around ramps.

What prior knowledge or skills are needed?
How do marbles behave on a ramp?
What are the properties of ramps (stability, incline)?

Variables:	Materials: (e.g. visuals, charts, book, song, manipulatives)
Height of ramp, length of ramp	*Blocks, ramps, marbles*

How would you introduce the lesson (whole group)? Be sure not to give away the answer!
☐ open ended *X* guided ☐ structured
1st – Read the book Rollercoaster.
2nd - The information from the QOTD allowed us to have a discussion around ramps in our environments, sharing our experiences (roller coasters, hills, while riding bikes/scooters, slides) and considering how easy it is to go down a ramp versus up.
3rd – Demonstrate for the children marbles going down one of four ramps beginning with a flat ramp and each one increasing in angle. Invite children to make observations of the demonstration.

What type of investigation would you set up in a learning center after the introduction (small group)?
☐ open ended *X* guided ☐ structured
Provide children with ramps, blocks and marbles, with the challenge of designing a ramp system that gets a marble to move up a ramp.

What questions would you pose to the children? Attention-focusing, Action, Problem-posing, Comparison, Math:

- *What did you notice about how the marble went down each of the ramps?*
- *Why does the marble roll on its own down a ramp but not up? What does it need to go up?*
- *How many blocks did you use to make that ramp?*
- *Which one is the taller?*
- *I noticed the marble keeps falling off of the ramp at the bottom. What can we do to get it to stay on?*

How would you assess understanding?

- *Listen to the answers and explanations that children provide during observations and in response to questions.*
- *Observe how children manipulate the materials to succeed with the challenge and in response to designs that did not work before.*

Potential extensions? (**connect – deepen – extend**)

- *Offer the same challenge but this time with different rolling objects (e.g. cotton balls, ping pong balls, different sized marbles).*
- *Revisit the same challenge with the added challenge of getting 2 marbles to roll down and up the ramps together.*
- *How could you get the marble to turn corners?*
- *Make observations within environment of slopes/inclines around them.*

Circle the frameworks that will be addressed:

Scientific & Engineering Practices

1. Asking questions (science) defining problems (engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing & interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating and communicating information

Crosscutting Concepts

1. Patterns
2. Cause and effect: Mechanism and explanation
3. Scale, proportion, and quantity
4. Systems and system models
5. Energy and matter
6. Structure and function
7. Stability and change

Disciplinary Core Ideas

1. Physical sciences:
2. Life sciences:
3. Earth and space sciences
4. Engineering, Technology and the Applications of Science