



Intentional Planning Sheet – Knocking Down Object at End of 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 design a ramp structure that, when a marble is rolled down, it will knock down an object at the end. 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?

Can you knock down an object at the bottom of a ramp?

Children will learn about stability of structures while building ramps and the concept of force as an object (specifically a brick here) is or is not knocked down.

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?

Children had previously completed an Home → School Sheet. From this, we were able to obtain information and extend conversation about materials that homes were made out of, where ramps are around us and how many levels were in our homes.

What prior knowledge or skills are needed?

- *Ability to make comparisons between different materials*
- *Understanding of weight - heavy and light*

Variables:

Weight of objects, incline/slope of ramp, speed of the marble/ball, the potential energy of the moving object

Materials: (e.g. visuals, charts, book, song, manipulatives)

Sample bricks/wood/stucco, balancing scale, ramps of various sizes and lengths, various size/weight marbles and balls

How would you introduce the lesson (whole group)? Be sure not to give away the answer!

☐ open ended ☐ guided ☒ structured

1. *Conduct a demonstration for children that includes: introducing materials, incline and weight.*
2. *Allow children the opportunity to feel and explore the different materials.*
3. *Make a connection to The Three Little Pigs story.*

What type of investigation would you set up in a learning center after the introduction (small group)?

☐ open ended ☒ guided ☐ structured

- *First allow children to explore on their own, providing lighter objects to give children “success” and gain knowledge and experience.*
- *Provide children a brick to knock over next. Ask them to make predictions as to how they will get it to knock over.*

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

- *Which material is heavier and which is lighter?*
- *How can you get the marble to go faster?*
- *How does the angle of the ramp effect the marble?*
- *How do the materials feel?*
- *Where is the brick less stable?*
- *Which type of block will fall with the least force?*

How would you assess understanding?

- *Listen to the responses children provide to us when asked various questions*
- *Observe children’s play and how they adapt what they are doing to accomplish the challenge*
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Potential extensions? (**connect – deepen – extend**)

- *Explore ramps with different surfaces and their effect on speed*
- *Continue exploring materials used to build houses*
- *How is a brick made?*
- *Continue to explore blocks and ramps – can you get a marble to roll into a cup?*

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