Elementary

Answer Key for Building the Fastest Car (second–third grade)

This handout provides sample responses to support discussions following video observations on how children engage in engineering and how educators use the M^5 Early STEAM Approach to support children's engineering experiences and problem-solving.



Video:
Building the Fastest Car (second–third grade)

Building the Fastest Car (second–third grade) – Audio Descriptive Version

Slide 24: Discuss: Engineering in Action

In what ways do children use engineering skills (for example, identifying problems, planning solutions, and testing and refining solutions)?

Possible Responses

- Children explore the problem of how to build the fastest car. They grapple with the placement of the wheels, the weight they add to the car, and other design features of their cars that affect the speed with which it rolls.
- Children plan solutions for how to build a fast car by exploring the materials and discussing design possibilities together.
- Children test solutions by releasing their cars down ramps. They refine their builds after noticing the way their cars roll. For example, one car was not rolling straight so the children adjusted the position of the wheels.

What other domains do children use to support their engineering process (for example, science, math, approaches to learning, language)?

Possible Responses

- Early math skills: Children use spatial thinking skills as they attend to the position and orientation of the materials as they build.
- Social and emotional skills: Children engage in collaboration as they build their cars collaboratively.
- Approaches to learning: Children demonstrate persistence as they continue trying to build their cars and facing challenges along the way. For example, one group grappled with the problem of how to connect the wheels.

Slide 31: Discuss: Supporting Children to Use Engineering Skills

Mutual Learning

In what ways is the educator responsive to children's abilities, interests, or lived experiences?

Possible Responses

- The educator connects building a fast car to a prior experience children had investigating ramps and rollers. Children were able to apply what they learned from an earlier experience to the design of their cars.
- The educator notices when children are having difficulty. For example, she notices when one group is having trouble connecting their wheels and supports them to identify the problem and find a solution.

Meaningful Investigations

In what ways does the educator offer meaningful investigations?

Possible Responses

- The educator supports children to engage in engineering cars that will roll fast.
- The educator connects the way children build cars with their previous experiences exploring ramps and rollers (for example, experimenting with how weight affects the distance a roller will travel down a ramp).
- The educator also organizes this engineering experience within the context of a friendly competition, which can add meaning and motivation for some children.
- The educator also makes this experience playful. The children enjoy racing their cars and show excitement and engagement throughout.

Materials and Learning Environment

In what ways does the educator provide materials and a learning environment that supports children to engage in engineering?

Possible Responses

- The educator provides ample open space for the children to build and race their cars.
- The educator also provides ramps of identical slope to allow for a fair test across all of the different vehicles.
- The educator provides similar materials for each child to build. By restricting the materials, she encourages children to build their cars in a way that will allow them to be successful yet also allows space for children to create unique designs.
- The educator provides tools (for example, scissors and tape) that the children can use independently to build their cars.

Mindful Vocabulary and Discourse

In what ways does the educator support children's science vocabulary related to their building of bug homes?

Possible Responses

- The educator encourages children to collaborate and discuss their designs with each other.
- The educator also supports children to explain changes they might make to their car to each other.
- The educator uses questions to encourage children to identify and solve problems. For example, the educator asks, "What is missing?" "What is the difference between here and here?" "Do you want it to roll straight?"

Multiple Representations

In what ways does the educator provide different ways for children to build insect homes?

Possible Responses

- In this experience, the educator encouraged children to plan by verbally discussing plans with each other. The educator could offer children different ways to plan, including drawing or writing.
- Other ways the educator might offer multiple representations include:
  - offering different materials for children to use in their designs (for example, bottles, old CDs, cardboard boxes, and other recycled materials)
  - challenging children to build vehicles for different purposes (for example, carrying weight, traveling the farthest, or traveling the slowest)
  - exploring different ways to power their cars (for example, wind power or using rubber bands to power their cars)

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