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FOUR WHEELS!

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LESSONS

WHEELS & AXELS

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Pre-K
teacher plan

Lesson 5: FOUR WHEELS!

This lesson leads students to add a fourth wheel as they continue to experiment with mechanical advantage, transportation, and designing with constraints and criteria.

Objectives: As students add a fourth wheel, new design choices are available. At the end of this lesson, students will design vehicles that are more related to their everyday experiences, and consider the mechanical and design advantages of four wheels.

Vocabulary used in this activity: prediction, vehicles, advantage, benefit, stability, balance, mechanical advantage, request, specific, constraint

Standards

NY State Pre-K Foundation for Common Core	Approaches to Learning - Actively/confidently engages in play as a means of exploration and learning; actively engages in problem solving; approaches tasks, activities and problems with creativity, imagination, and/or willingness to try new experiences or activities.
NY State Pre-K Foundation for Common Core	Foundations to Technology - Describes types of materials and how they're used - creates structures to determine which do/don't work. Explores and uses various types of tools appropriately. Expresses an understanding of how technology affects them in daily life, and how it can be used to solve problems - identifies examples of technology used in daily life.
NY State Pre-K Foundation for Common Core	Social Development - Exhibits self-confidence by attempting new tasks independent of prompting or reinforcement, displays accomplishment, contentment, and acknowledgement when completing a task or solving a problem by himself/herself.
NY State Pre-K Foundation for Common Core	Math - Analyzes, compares, and sorts objects; describes them using correct vocabulary; creates and builds shapes from components. Counting and cardinality - counts sequence; compares numbers.
NY State Pre-K Foundation for Common Core	Communication, Literacy, Writing - Participates in small or large group activities for storytelling. Asks questions, makes comparisons to words and concepts already known, begins to identify relevant and irrelevant information, understands and follows spoken directions, exhibits curiosity and interest in learning new vocabulary. With prompting and support, uses a combination of drawing, dictating, or writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.
ECERS-R	**Language-Reasoning:** Books and pictures, Encouraging children to communicate Using language to develop reasoning skills **Activities**: Fine Motor, Art, Math/Numbers | **Program Structure**: Group time

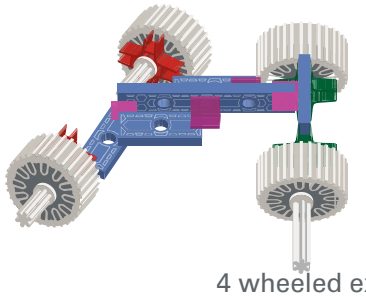
Time needed: 35-45 minutes

Materials and Supplies: Preserved three-wheeled vehicles from the previous lesson, Gingerbread friend, paper, pencils/crayons, Brackitz planks (1x1 and 1x2) and 3 and 4-way hubs, as well 1-way pivoting hubs. Give out exactly four tires, axle-splines, and eight lock washers to each group.

Resources/optional reading: Richard Scarry's Cars and Trucks and Things That Go and Gail Gibbons' Transportation: How People Get Around

Set-up and Preparation: Prepare trays of building materials ready to be handed out; help students cooperatively form groups of 2-3 to work together.

Background Knowledge: Prior to this lesson, students do not need special background knowledge. Introducing students to the Gingerbread friend from Unit 1 can help them keep a user in mind who will use their designs.



4 wheeled example

brackitz connecting imaginations

Lesson 5: FOUR WHEELS!

35-45 minutes

Whole Class -Vehicles with Four Wheels — 10 minutes

Pointing to the number line, "We had 0 wheels, then 1, then 2, then 3, so what number is next? 4! Yes, 4 wheels today. Good counting and predicting. Who can think of vehicles with 4 wheels?"

Instructor Notes and Tips

Four wheels is VERY common - help students contribute.

"What do you know that has four wheels?"
Examples:

- Cars
- Trucks
- Busses (ignore for now that many have added wheels)
- Golf carts
- Tractors
- Wagons
- Construction vehicles
- Batmobile

You may find pictures of common four-wheeled vehicles so that if students name them, you can show a picture of their contribution to other students.

Group Exploration - 3 vs 4 — 10 minutes

"Make a plan for a four-wheeled design. Can you draw it? Where will the wheels go?"

At this point, it may be wise not to show students pictures from this lesson or the recommended books - they are apt to design as close to the picture as they can, rather than coming up with their own ideas. Four wheels is very common, so the brainstorm may provide enough real-world examples to get them thinking.

Asking, "Where will/can Gingerbread use this vehicle?" is a way of helping students design something to meet the task objectives.

Lesson 5: FOUR WHEELS!

Group Challenge - 4 wheels

15 minutes

"Build a vehicle design with EXACTLY four wheels as the design constraint. Where will Gingerbread use it?"

This is a chance for students to begin building. Watch to make sure groups are able to share tasks and ideas functionally. Having trays with prepared Brackitz pieces and exactly two wheels and axles will help.

Students may elect to redesign their previous three-wheeled vehicles to create the space for a fourth wheel.

Reflection

5 minutes

"Can each group show us their four-wheeled design. Tell us about it.

1. How will Gingerbread use it?

2. Is it like a four-wheeled vehicle you've been in?"

Encourage groups to share briefly and to praise other groups' designs, or ask questions.

CHALLENGE ADVANCED STUDENTS

In discussion, ask students to consider if vehicles are more useful if they have an even number of wheels or an odd number of wheels.

In the group exploration, ask, "Can Gingerbread use this vehicle everywhere? Where would this work best? Where would this not work? Why not?"

In the group challenge, ask, "How will we know if it's a vehicle that's good for our Gingerbread friend?" (right size, is useful, is safe/stable)

SIMPLIFY FOR YOUNGER GROUPS

In discussion, ask, "Who came to school today in a car or bus? How many wheels brought you here on those vehicles?" Help them count. You may also want to revisit the suggested books so that students have pictures from the pages to help them brainstorm four-wheeled vehicles.

In the group challenge, encourage most groups to make a car and get it rolling with four wheels. Give hands-on help to use wheels, axles, and Brackitz together.

Name _____

Lesson 5: FOUR WHEELS!

Student Worksheet

Draw your four-wheeled design here:

Where do you think our Gingerbread friend will use it most?
Draw that place here.

Count how many Brackitz pieces you used today: _____

Count how many wheels you got to use in building today: _____

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connecting imaginations