

brackitz®

U2 L1a
V2.3

LESSONS

LET'S MOVE IT!

WHEELS & AXELS



★ Lesson 1: LETS MOVE IT! ★

Students are introduced to a need for mechanical advantage by considering the problem of moving items without wheels.



Objectives: Students will explore the idea of work, effort, and moving items. This lesson will lead them to ask, "How can we do this work more easily?"

Vocabulary used in this activity: work, effort, challenge, lift, move, force, muscles, frame, box, easy/easier, hard/harder

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: 35-40 minutes

Resources/optional reading: Move it! Motion, Forces, and You by Adrienne Mason or Motion: Push, Pull, Fast, and Slow by Darlene Stille.

Materials and Supplies: String, paper, pencils/crayons, books or something heavy, Brackitz planks (1x1 and 1x2 lengths), 3 and 4-way hubs, as well as 1-way pivoting hubs. No tires, axle-splines, or lock washers.

Set-up and Preparation: Prepare trays of Brackitz building materials so that they are 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.

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35-45 minutes

Whole Class - What is Work?



10 minutes

"Sometimes when we lift, hold, or move things, we can feel the work it takes to move things. Where do we feel it? Can you guess? (Students may not be sure, that's ok.) Let's try it: I'm going to hand you one book and we'll pass it around our circle/group." Pause while book is passed and comes back to you. "Was that hard to lift and move? (No!) But what if it were 5 books?" Now, pass 5 books and wait for them to come back to you. "Did that feel heavier? Where did you feel it? (Hands/fingers, arm muscles) Moving something from one place to another is WORK. Today we're going to think about how much work we have to do to move things."

Instructor Notes and Tips

You may read the suggested books, **Move it!** and/or **Motion** before or after this lesson to help students prime the idea of motion requiring work.

Help students with words to describe where and how they feel the work by asking questions and making suggestions to aid their participation. Does something feel tense, sore, or shaky? Is it a muscle in their hands or arms?

Group Exploration - Feel the work



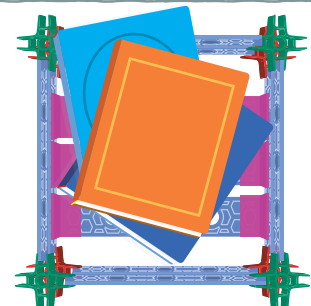
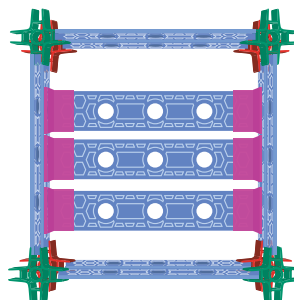
10 minutes

Feel the work! "When we lift or move something, we are applying FORCE to get work done. The force comes from us: from our muscles. We're going to carry these books around the classroom - everyone gets a turn.

Now, did you feel the work in your body? Did you feel it during both ways of moving the items? Did you feel it in different places?"

Create start and stop spots for each group, so that they can line up for this exercise, or have a course clearly marked. You may also want plastic shopping bags to wrap around the items to bundle them together.

Each student's turn moving the items should take 30 seconds to 1 minute; "feeling the work" should take 6-7 minutes.





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Group Challenge - Carts & Wheels



15 minutes

(Show the picture of a cart) "In this picture, someone is using a cart to move more items with less work. Look at your Brackitz pieces - do we have what we need to make a cart? (No.) What's missing? (Wheels!) You're right, **no wheels on the cart today**. But let's build a frame or box that could contain the things we want to move using Brackitz."

Pass out trays of planks and connectors (but no wheels and axles) that are already prepared for groups. This is a chance for students to begin building. Watch to make sure groups are able to share tasks and ideas functionally.

If your books are too heavy or wide for student-made Brackitz frames, consider using blocks or other toys.

Reflection



5 minutes

"Let's each take 30 seconds to use our frame to carry these items through the course. What's happening when we try to get over and around these challenges and obstacles? (frames falling apart, items falling out and tipping over, frames/boxes of items getting stuck) I wonder if we can make this less frustrating in the next lesson?"

Prepare some obstacles in the "course" before students are ready to test their designs. This could be speed bumps under the rug, non-smooth "hills" of items, or classroom "boulders" made of toys, blocks, and other items.

CHALLENGE ADVANCED STUDENTS

In the group exploration, you may have students practice different ways to move these heavy books. Try it two or three ways:

1. In your group carry these items 3 "laps" around the classroom.
2. Tie a string around these items and try to pull them across the classroom.
3. Stand and hold books for a minute.

SIMPLIFY FOR YOUNGER GROUPS

In discussion, ask: "Have you ever had to hold or lift something that was too heavy for you? What was it? How did it feel?" This is a way of helping students identify that they did work.

In the group challenge, have students focus only on building an "open box" or a rectangle. Explicitly talk about it as, "a box with no top" and "a box is open on top so we can put books in." You may limit teams to the 4-way hub so that they can only build a cart with 90 degree angles.

Name _____

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Student Worksheet



Today we carried books to move them. Is there an easier way?
Draw it or write a sentence about it:

Count how many Brackitz pieces you used today: _____

Name

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You made a frame or box to hold the books - draw it here.

