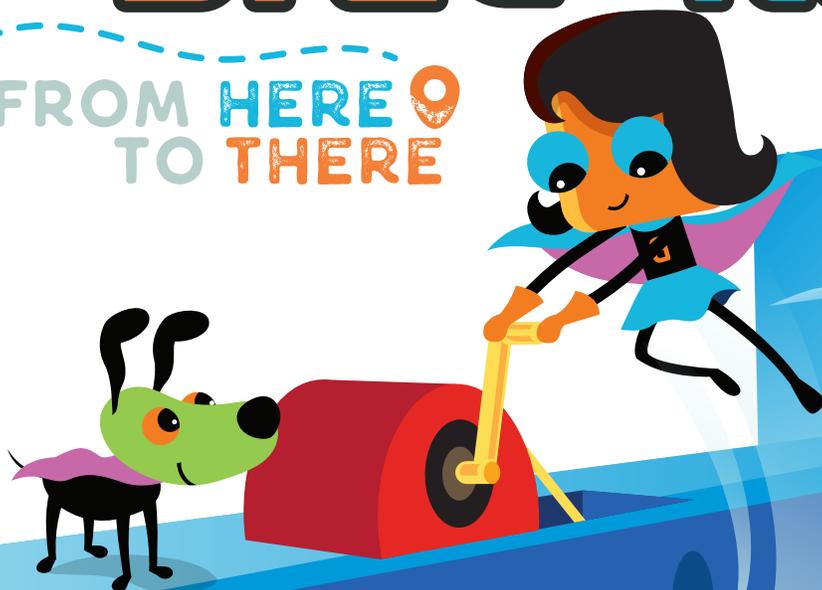


brackitz®

U3 L5
V2.3

FROM HERE 
TO THERE



LESSONS

PULLEYS & CRANKS



★ Lesson 5: FROM HERE TO THERE ★

Students practice using pulleys to move things “across” rather than “up and down.”



Objectives:

Students will apply what they understand about pulleys to move something in a different direction, continuing to learn about this simple machine.

Vocabulary used in this activity:

out, across, over, to the side, horizontally, situation, solve/solution, simple machine, pulley, design, cargo

Sandards

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

NGSS **K-2nd Engineering Design:** K-2-ETS1-2 Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
K-2-ETS1-1 Ask questions, make observations, gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

CCSS-Math K Practice.MP5, K Practice. MP7, 1. MD.A.1, 1.MD.A.2, 1. MP8, 1.MP5

CCSS-ELA SL.K.1, SL.K.1.A, SL.K.1.B, SL.K.5, SL.K.6, SL.1.1, SL.1.1.A, SL.1.1.B, SL.1.5, L.1.1i, CCRA.L.6, L.1.5c

Time needed: 35-40 minutes

Materials and Supplies: Gingerbread friend, paper, pencils/crayons, two simulated castles or castle towers (boxes or shelves.) Each group will need a tray of Brackitz planks, 3 and 4 way hubs, 1-way pivoting hubs, and access to the pulley, crank, string, cup, and pulley-wheel connectors.

Resources/Optional Reading: Review books previously mentioned in unit, if needed.

Set-up and Preparation: 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 in Unit 1 and transportation and simple machines in Unit 2 can be very helpful.



★ Lesson 5: FROM HERE TO THERE

35-40 minutes

Whole Class

10 minutes



“If our Gingerbread friend was still staying in the castle, but had discovered another friend in a castle nearby, could pulleys help them send notes, share toys, or visit each other? How can pulleys help?” (Students are likely to mention cranes, elevators, and drawbridges since this is what they’ve practiced.) “Those are all ways to move up and down. What if I said we had a limitation, or a constraint, that we couldn’t move up and down but had to move between castles another way? How could pulleys help then? Can we brainstorm while we look at these model castles?”

Instructor Notes and Tips

It may be hard for students to break out of the “up and down” motion they’ve used with the pulley so often in this unit. Ask them to fold a piece of paper and to imagine it’s a note they want to share with the student next to them. Tell students to hold the note and touch their toes by bending “down.” Ask them to extend their arms to make them taller by reaching “up.” “Can you pass the note this way? What way would you have to reach to pass the note?” Practice the vocabulary and direction at the same time, while reaching and passing notes: **out, across, over, to the side, and horizontally.**

Group Exploration

10 minutes



“How could the pulley be used to reach **ACROSS** from one castle to another? Can you draw it?”

Help students understand that they are rotating a pulley line from **UP** and **DOWN** to side to side, or **ACROSS**. Practice these words with directional hand motions, or even rotating the student’s design drawings.

Lesson 5: FROM HERE TO THERE

Group Challenge

15 minutes



“Ok, now build your pulley to help pass notes or move Gingerbread from the taller tower to the shorter tower.”

Students may need some help to rotate their pulley from vertical to horizontal.

Reflection

5 minutes



“What ways could we make our pulleys move across FASTER? Is faster always better? When is slower better?”

Help students understand that weight and moving things from higher to lower will increase speed. This is good if users like height and speed, but slower can be better if their are safety concerns or delicate cargo.

CHALLENGE ADVANCED STUDENTS

In the group exploration and group challenge, you may allow students to consider either a zip line, gravity, or a manual traverse line to move things across or a manual traverse line where they push or pull the cup across. “Which will work best if they are moving heavy toys? Which will work best if the towers are the same height? Which will work best if one tower is taller than the other?”

SIMPLIFY FOR YOUNGER GROUPS

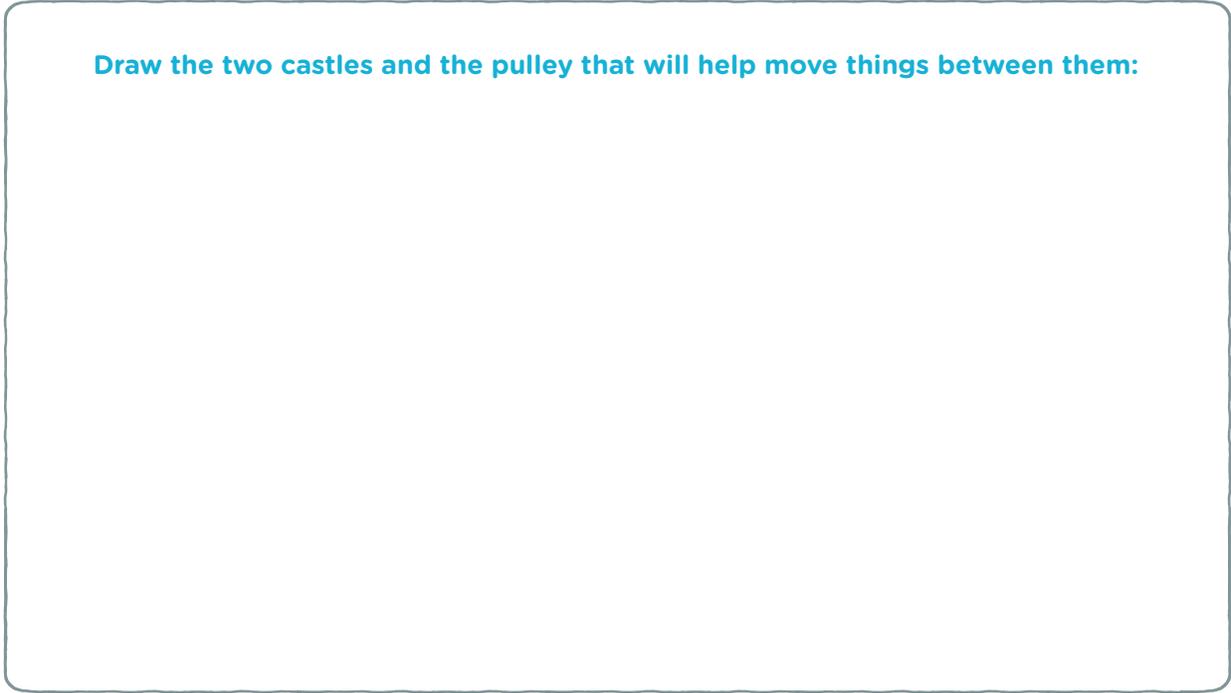
If building a zip line or traverse trolley is too complex for your students, you may build it for them and have it run between two castle towers. In this case, ask students to come up with the backstory. “Who needs to move things ACROSS and in which direction? What makes sense based on how you built it? What explains why Gingerbread and his/her friend need this pulley between the towers and how will they use it?”

Name _____

★ Lesson 5: FROM HERE TO THERE ★

Student Worksheet

Draw the two castles and the pulley that will help move things between them:



Here is a canyon. There aren't enough building supplies to make a bridge, but we have a pulley and crank. Can we move a note across?

