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LESSONS

FREE OUR FRIEND!

CREATIVE POWER
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K & 1st grade
teacher plan

Lesson 3: FREE OUR FRIEND!

Students continue with the Gingerbread character as their building and engineering inspiration. Given an immediate problem to help solve, students have a play-based introduction to solving problems by designing and building devices.

Objectives:

"I can create a 2-D design as a guide for a 3-D design " and "I can create a 3-D design to help solve a problem." Students will demonstrate they can create a Brackitz design to try and solve a problem, practice beginning design process (testing a design) and continue getting familiar with the Brackitz system.

Vocabulary used in this activity:

tool, method, helpful, compromise, careful, design, guide

Standards

NGSS Science and Engineering Practices
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.

CCSS-MATH K.CC.B.4.C, 1.MD.A.2

CCSS-ELA SL.K.1.A, SL.K.5, W.1.8, SL.1.5, SL.1.6

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

Materials and Supplies:

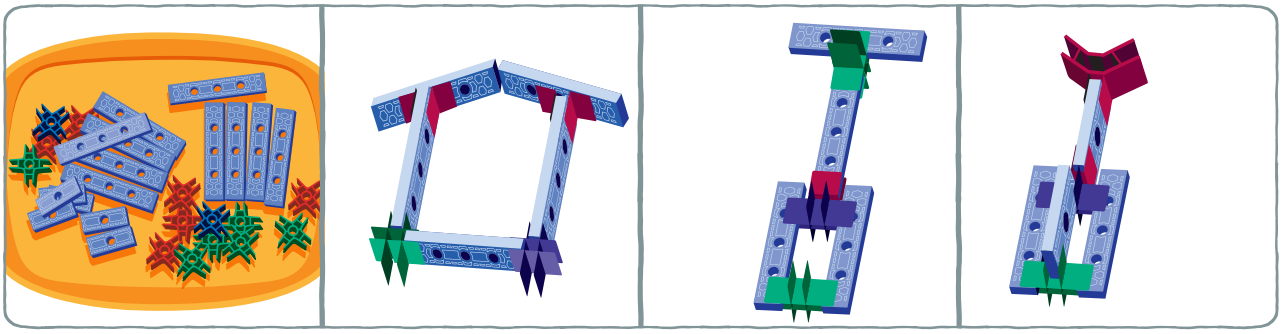
3-D Gingerbread character(s) with some depth made out of dough or cardboard from Lesson Two, box, paper, pencils/crayons, Brackitz planks and 4-way connectors.

Setup and preparation:

Have trays, boxes, or plates ready with the same number of planks and connectors for each group; help students cooperatively form groups of two or three to work together. Find a box or boxes smaller than a shoe box.

Background knowledge:

Prior to this lesson, the only background knowledge students need is to be able to pick things up and grasp them. A reminder of the agreed upon dimensions of our friend will help students build with the friend in mind.



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40-45 minutes

Whole Class 5-10 minutes

Instructor asks, "Who remembers our special gingerbread friend?" (Remind class; especially check and reinforce the agreed upon DIMENSIONS) "You built beautiful homes to keep her/him safe. But what if s/he is ready to get out and explore our classroom? One problem: We have a lot of kids and s/he could be scared if we all crowded around. It would be helpful if we could open her box without touching it. That way we can give her/him space. What are ways to open something without touching it? Let's brainstorm!"

Goal: Have students consider creating and using a tool!

Instructor Notes and Tips

Help students consider real world solutions. Solutions like "Magic" and "Blow the box up" are unrealistic. A good way to hone in to helpful, realistic ideas is to praise something specific about a proposal while raising the next question about it. E.g.

- Magic = "It would be handy and fast if we had magic, because we could be across the room to make our friend happy but magic is hard to come by and we might want to solve this faster."
- Explosion = "that would be exciting, but can we think of a way that won't hurt our friend?"

Group Exploration 15 minutes

Part 1: Can you each think up a tool we could use to open the box without getting close to it? What would it DO? How would it WORK? What would it look like? Draw it so you have a beginning plan. Make your drawing so it is a guide for someone else to use it to build your tool.

Part 2: In your groups, pass your drawing to your neighbor. Let them see what your plan was. Now you're looking at a new drawing too. It takes many engineers to make good solutions. What ideas on someone else's design seem like good ideas? How can you compromise and make one group drawing as a design idea?

Part 1: Visit groups asking for ideas that will meet the goal (engineering criteria) is building something they can safely use from a distance.

Part 2: Help students pass drawings in a circle. Ask them to consider what good ideas another student may have had. Ask - could other these ideas be good? Could both work together? Help students with language like, "Let's try ___ first and then we could try ___ next," as they work towards compromise. Praise collaborations that use ideas from more than one group member; step in if someone is insisting on their own design with no changes or additions from other group members. "Engineers work together and compromise - let's try to see how the ideas could work together so that you can practice engineering."

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Group Challenge 15 minutes

Once your group has agreed on an agreed upon design, you can start building. "I used the pieces from your homes so you could build tools today. But this box could be the gingerbread's home so test your tool on this box as many times as you need to. Does your tool work right away or do you need to keep changing it to make it work better?"

This is a chance for students to begin building with Brackitz. Watch to make sure groups are able to share ideas and Brackitz pieces functionally. It can help to do a hands-on demonstration with groups on using the connector pieces. You can try monitoring sharing in the group, or have a timer to help systematize sharing.

Reflection 5 minutes

(Teacher brings whole class back together and aggregates from small group builds.) "Do all of your special homes fit? What happens if we make it too small?"

And, "We need to be sure we all know how big our Gingerbread friend is, in all three dimensions! Use your Brackitz planks to check that measurement and record it."

Direct students to record these decisions on their worksheets or in design notebooks

Having pre-arranged trays, boxes or plates with the same amounts of Brackitz planks and connectors can save time on organizing tools. You may also wish to have multiple boxes so groups can test without taking turns.

As groups test their tool, keep reminding them to ask, "How will we know if our design worked?"

(Goal: If it can open the box and allow you to be far away without breaking or being unsafe)

CHALLENGE ADVANCED STUDENTS

In discussion, ask: What are some tools that are used to help get something done, but with some distance from what is happening? (tongs, hoses, weed whackers, etc.)

In the challenge/build, scale up by: Introduce systematic testing of the tool. With each test, ask the group to pick one thing to change on their design. This is a more structured and mature approach to design-test-redesign but some students may be able to handle it.

SIMPLIFY FOR YOUNGER GROUPS

In discussion, ask: Have you ever seen someone cooking food? Do they touch it directly or do they use something to move it so that they are safe from heat?

In the group exploration and challenge build: divide these sections into two lessons. Allow students to get detailed with their individual drawings and then spend this lesson on reaching a design compromise. Spend the next lesson building.

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How will we know if the tool worked to help free our friend?
List two or three things that count as success.

1. _____

2. _____

3. _____

How many times did you have to rebuild or redesign your tool? (Circle)

1 2 3 4 5 6 7 8 9+

Draw the tool you made here!