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LESSONS

HOW BIG?

in 3 Dimensions

4th & 5th grade
teacher plan

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Lesson 2: HOW BIG in 3 Dimensions?

Students continue practicing spatial thinking and vocabulary as they reconsider the figure from Lesson 1, now understanding the third dimension and using Brackitz unit planks to measure height, width, and depth.

Objectives:

Students explore 2-D vs. 3-D objects and compare to understand size and dimensions. "I can decide how big something is by describing height, length, and width." "I can use units to make size decisions and to estimate."

Vocabulary used in this activity:

dimension, measurement, length, height, width, 2-D (2 dimensions), 3-D (3 dimensions)

Standards

ECERS-R	**Language-Reasoning:** Books and pictures, Encouraging children to communicate, Using language to develop reasoning skills | **Activities:** Fine Motor, Art, Math/Numbers
NGSS	3-5 ETS1, ETS1.A, ETS1.B
CCSS-Math	Practice.MP2, Practice.MP5, Practice.MP7, Content.4.MD.A, Content.4.MD.A.1, Content.5.MD.A, Content.5.MD.A.1, Content.4.OA.A.2
CCSS-ELA	Literacy RI.5.5, Literacy RL 5.4, Literacy SL.4.1

Time needed: 35-40 minutes

Materials and Supplies:

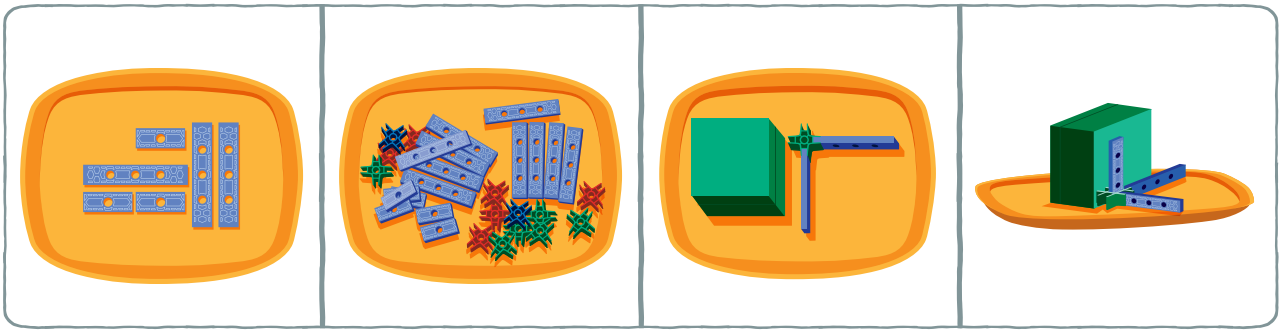
Creature drawings from Lesson 1, 3-D figure(s) with some depth made out of dough or cardboard, paper that approximate the creature's three dimensions, pencils/crayons, Brackitz planks and 4-way connectors, Optional:cookie or playdough to make more tactile figures, tracing paper.

Setup and preparation:

Have trays, drawings for each kid or group, with the same number of planks and connectors for each group of 2-3; help students cooperatively form groups of 2-3 to work together.

Background knowledge:

Students who worked with the 2-D cutouts will better understand size and be able to expand their comprehension to the third-dimension.



Lesson 2: HOW BIG in 3 Dimensions?

35-40 minutes

Whole Class 10 minutes

Showing the work from Lesson 1 (fill in the blank sentences, box, recorded dimensions) remind students, "Remember our small friend? S/he's pretty small, especially compared to us. Who remembers how big s/he is? How can we more specifically describe his/her size? What are words we used to talk about size accurately?"

"What are items we compared and contrasted our small friend to?"

"Can you describe places our friend can go/fit into that we cannot?"

Instructor Notes and Tips

Engage class in remembering what we learned about this figure's size including:

- Comparing to common objects - bigger than _____, smaller than _____
- Reference the figure's size in height and width
- Measuring height and width
- Using Brackitz pieces

Help students remember that building a frame or rectangle was one way to know how tall and wide the figure was. If a rectangle was too short, we needed a longer Brackitz plank to make it possible to fit the figure inside.

Specifically use the words height, width, and two-dimensions (2-D) as you discuss this with the whole group.

Group Exploration 5-10 minutes

"When we draw on paper, we draw in only two dimensions - usually HOW TALL and HOW WIDE. Each of these (Tall or Wide) is one dimension. How we see things in pictures and on TV is 2-D dimensions - usually tall and wide, again. In real life, there's a third measurement in real life. Look at this box. When I hold this plank next to it, it's one plank wide, and one plank tall but what other way do we need to measure? (How long/deep!) It's only___ deep. I can use one of these 4-way connectors to make something that has a similar three dimensional size to this box. "

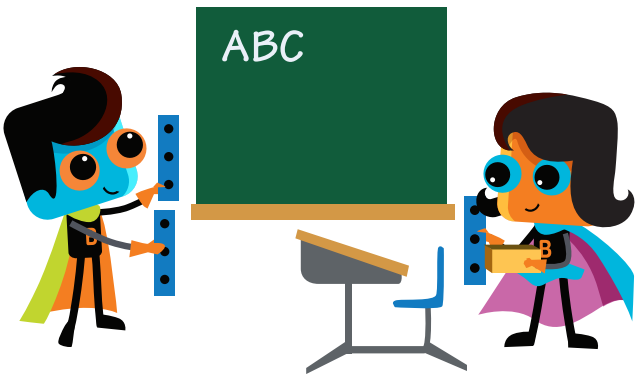
"What else in our classroom has three dimensions?" (Everything! Desk, books, cubbies, etc.)

"In your groups, measure three objects with three dimensions. Use rulers, and then use Brackitz planks to measure!"

"What's the measurement unit to Brackitz conversion? How many inches/cms to a Plank?"

In discussion, use actual Brackitz planks to hold up alongside your box.

If students are struggling to measure things that have irregular shapes, suggest things that have more rectilinear shape like: Books, bookcases, cubbies, storage bins, tables.



Lesson 2: HOW BIG in 3 Dimensions?

Group Challenge — 15 minutes

(Holding 3-D model) "Here is an object that has similar dimensions to our friend. I have this figure that shows height, width AND the third dimension of depth! If I asked you to build a 3-D home or container, what can you use to estimate the size we'll need?" (Previous lesson's frame, box, unit conversion from measuring the figure and knowing length and width) "Good, write down your estimates in two units: inches/cm and Brackitz planks. Then build."

Once building is well underway, "Were your estimates right? Did you need to adjust? Once you think you have the right size, record your height, width, and depth in Brackitz planks, and then measure with a ruler and record that data."

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. You can try monitoring sharing in the group, or have a timer to help systematize sharing.

Group Reflection — 5 minutes

(Teacher brings whole class back together and aggregates from small group builds.) "How were your estimates? Did any groups need to make adjustments? Tell us about it."

And, "We need to be sure we all know how big our creature 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.

Make sure that before you conclude there is some consensus of how BIG the creature is in **all three dimensions**. Record somewhere that you and students can reference for future class building challenges - how TALL (Hold up plank, and indicate using holes until class agrees. Repeat this question and group answer/consensus building for WIDTH and DEPTH.)

Using planks as a unit of measurement will help students continually refer to these dimensions.

CHALLENGE ADVANCED STUDENTS

In discussion, ask students to consider adjectives they would use to describe their creature's size. Ask them to consider creative ways of describing this small size - comparison, adjectives, etc. If they had to use prepositions such as "under" and "through" to describe where this small creature can go and fit, what sentences could they make?

In the challenge section of the lesson, Challenge students to think of the benefits/drawbacks that a container that is not square/rectangle could offer!

Expansion step: Have students calculate the volume of the box/container for their creature friend.

SIMPLIFY FOR YOUNGER GROUPS

In discussion, set up a chart specifically seeking for students to remember dimensional information:

Height - measurement - Brackitz plank

Width- measurement - Brackitz plank

In the group exploration, set up specific items for students to measure. You can do this as stations or as tags around the classroom. Have students measure a table, a book, a storage bin, etc. This allows you to set up more regular shaped objects for students to practice measuring and recording 3 dimensions.

Lesson 1: HOW BIG in 2 Dimensions?

Our gingerbread friend:

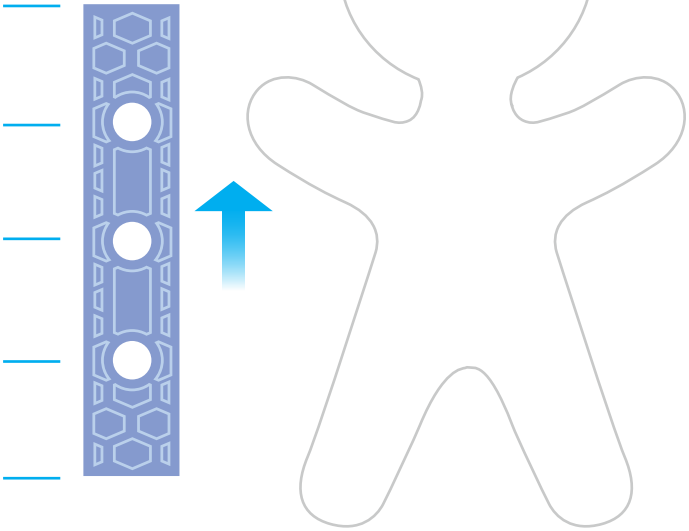
Lesson 2: HOW BIG in 3 Dimensions?

Student Worksheet

Compare

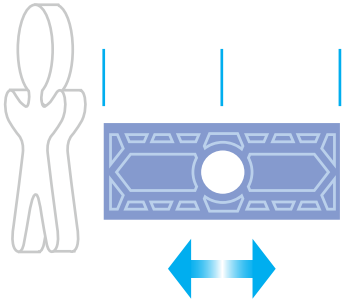
How tall is our Gingerbread friend?

_____



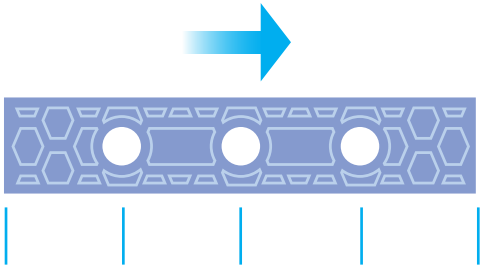
How deep is our Gingerbread friend?

_____



How wide is our Gingerbread friend?

_____



★ What is something you measured in your class that has three dimensions?

_____

Lesson 2: HOW BIG in 3 Dimensions?

Student Worksheet

Units and dimensions:

You built a house for our friend. Record estimates and measurements in two units

	Length	Height	Depth
Your Estimate			
Measurements (in or cm)			
Brackitz planks			

Were your estimates right? If you changed them - why?

Can you draw what the home you built looks like?

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connecting imaginations