



GRADE 2 SUPPLEMENT

Set D7 Measurement: Transitivity

Includes

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D7.1

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D7.5

Skills & Concepts

★ apply the concept of transitivity to comparing lengths

Bridges in Mathematics Grade 2 Supplement

Set D7 Measurement: Transitivity

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Bridges in Mathematics is a standards-based K–5 curriculum that provides a unique blend of concept development and skills practice in the context of problem solving. It incorporates the Number Corner, a collection of daily skill-building activities for students.

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Set D7 ★ Activity 1



ACTIVITY

The Measuring Stick

Overview

There is a strip of paper marked with 3 big red dots stapled up on one wall, and a second strip of paper marked with 3 big red stars stapled up on another wall. These two strips might be the same length, but then again, one might be longer than the other. They cannot be removed from the wall and compared directly, and you can't really tell by looking. What to do? This activity becomes a Work Place once it has been introduced to the class.

Skills & Concepts

- ★ apply the concept of transitivity to comparing lengths
(*The property of transitivity states that if $a = b$, and $b = c$, then $a = c$, or if $a > b$, and $b > c$, then $a > c$, or if $a < b$, and $b < c$, then $a < c$.)*)

You'll need

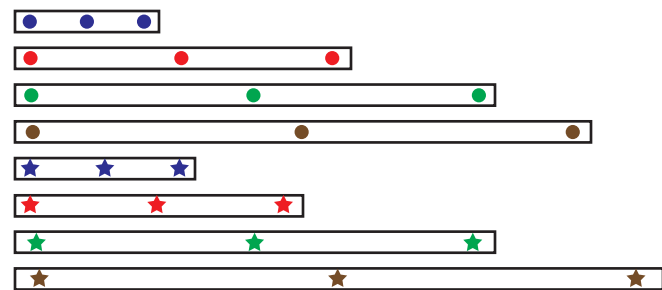
- ★ The Measuring Stick (page D7.4, run a half class set)
- ★ adding machine tape (see Advance Preparation)
- ★ 3 measuring sticks (see Advance Preparation)

Advance Preparation Cut 8 pieces of adding machine tape to the following lengths: 12", 15", 24", 28", 40", 40", 48", 54". Code each strip of paper with the color and shape listed below:

- 12" strip—3 large blue dots
- 15" strip—3 large blue stars
- 24" strip—3 large red stars
- 28" strip—3 large red dots
- 40" strip—3 large green stars
- 40" strip—3 large green dots
- 48" strip—3 large brown dots
- 54" strip—3 large brown stars

Staple the four strips marked with dots on one wall.

Staple the four strips marked with stars somewhere else in the classroom, ideally clear across the room. Make 3 measuring sticks by cutting three 1" x 12" strips of very heavy cardboard or three 12" lengths of wooden dowling. You can also simply cover the markings on three foot-long rulers with blue masking tape.



Instructions for The Measuring Stick

1. Gather children to your discussion circle. Draw their attention to the two sets of paper strips you have stapled in two different locations. Give them a few moments to pair-share their observations, and then call on volunteers to share their thinking with the class. What do they notice about these paper strips?

Students *The ones over there have big dots on them.*

The ones on the other wall have stars.

I like the one with the red stars. Red is my favorite.

Some of them are really long, like that one with the brown dots.

Some are short and some are long.

Activity 1 The Measuring Stick (cont.)

2. Note with students that there is one strip in each set that has been marked with blue shapes, another in each set that has been marked with red shapes, and so on. Then ask children to compare the two strips marked in blue. Do students think the strip marked with blue stars is shorter than, longer than, or the same length as the strip marked with blue dots? Have them pair-share their ideas, and then call on volunteers to share with the group.

Students *I think they're the same.*

I think the one with stars is longer because it has stars on it.

I think the one with dots might be longer because it looks a little bigger.

3. Then ask students how they might find out for sure whether one of the two strips is longer or not. Chances are, some students will suggest taking one of the strips off the wall, carrying it over to the other wall, and comparing the two directly. Let them know that the strips have to stay where they are. Is there some way to compare the lengths without moving them?

4. Give students a chance to discuss some possible strategies, and then show them one of the measuring sticks you have prepared. How might they use this measuring stick to help? Give them a few moments to pair-share ideas. Then call on volunteers to share their thinking, as you carry out their suggestions.

Students *Hold the stick up to the strip with blue dots on it.*

Yeah, so you can see how long it is.

Teacher *Like this?*



Students *Hey, look it's exactly the same.*

I think the one with the stars will be the same too.

I think it's longer.

Can I take the stick over to the one with the stars and try it?



Students *I was right! The star paper is longer!*









Are you sure you put the stick right?

I think the one with the dots is longer because it's the same as the stick.

But the stars one sticks out more than the stick – it must be longer!

5. Now show students a copy of the Measuring Stick record sheet. Explain that sometime over the next few days during Work Places, they will each have a chance to work with a partner to measure the strips for themselves. If, after measuring both of the strips marked with blue shapes, they decide the blue dot strip is longer, they will color the dot blue. If they determine that the blue star strip is longer, they will color the star blue. If two of the strips marked in the same color turn out to be the same length, they will color in both the dot and the star.

Activity 1 The Measuring Stick (cont.)

Set D7 Measurement: Transitivity Blackline Run a half class set and cut in half			
NAME _____		DATE _____	
The Measuring Stick			
Color the shape to show which strip in each pair is longer. If the strips are the same length, color both shapes.			
Blue Dot Strip		Blue Star Strip	
Red Dot Strip		Red Star Strip	
Green Dot Strip		Green Star Strip	
Brown Dot Strip		Brown Star Strip	

6. Let students know where you are placing the record sheets and measuring sticks. You may decide to put them in one of your Work Place tubs, or place them on a small desk or table easily accessible to students during Work Places. There are enough materials for 6 students to do this measuring activity at one time if they work in pairs.

Extension

Some students might enjoy using Unifix cubes or a measuring tape to determine the exact length of each strip, as well as the difference in length between the strips in the blue pair, the red pair, and the brown pair.

NAME _____

DATE _____

The Measuring Stick

Color the shape to show which strip in each pair is longer. If the strips are the same length, color both shapes.

Blue Dot Strip		Blue Star Strip	
Red Dot Strip		Red Star Strip	
Green Dot Strip		Green Star Strip	
Brown Dot Strip		Brown Star Strip	

NAME _____

DATE _____

The Measuring Stick

Color the shape to show which strip in each pair is longer. If the strips are the same length, color both shapes.

Blue Dot Strip		Blue Star Strip	
Red Dot Strip		Red Star Strip	
Green Dot Strip		Green Star Strip	
Brown Dot Strip		Brown Star Strip	

Set D7 ★ Activity 2



ACTIVITY

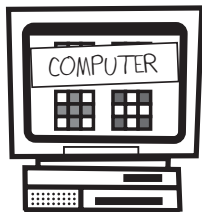
The Packing Box

Overview

Sometimes teachers need to store the things in their classrooms over a break so the custodians can get in to clean. What are some of the things in your room that might fit into the cardboard carton you've brought in for today's activity? Students identify tools that will help them with this measuring job. This activity becomes a Work Place once it has been introduced to the class.

Skills & Concepts

- ★ apply the concept of transitivity to comparing lengths
(*The property of transitivity states that if $a = b$, and $b = c$, then $a = c$, or if $a > b$, and $b > c$, then $a > c$, or if $a < b$, and $b < c$, then $a < c$.)*)



You'll need

- ★ The Packing Box (page D7.7, run a half class set plus a few extra)
- ★ a large cardboard carton with a lid such as a box that holds 10 reams of copy paper
- ★ the 3 measuring sticks from Set D1, Activity 4
- ★ a ball of string
- ★ a pair of scissors
- ★ blue masking tape (see Advance Preparation)

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Advance Preparation Locate 12 objects in your classroom, four of which are too big to fit into the cardboard carton, and eight of which will fit, one at a time rather than all 8 at once, into the carton when the lid is on. Mark each of the objects you have selected with a piece of blue masking tape labeled with the name of the object. Try to choose some objects that are located at a good distance from your discussion circle.

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Instructions for The Packing Box

1. Gather children to your discussion circle. Explain that over the coming break, you may need to pack some of the things in the classroom to get them out of the way so the custodians can do a good job of cleaning. Show students the cardboard carton, and explain that this is one of the boxes you will use if you have to pack some of your things. Can the children spot and name things in the room that would fit into the carton when its lid is on? Can they spot things that would be too big? Give them a few moments to pair-share, and then call on volunteers to share with the group.

Students *You couldn't fit even one of our chairs in that box.
Some the books on our reading shelf would fit.
You could put a bunch of papers in there.
I bet one of our math tubs could fit in there.
The box of pattern blocks—let's put them in there!*

2. Now show students the objects around the room you have marked with blue tape. Explain that you would like the children to identify which of these objects would fit into your packing box, without moving the box from its location or moving any of the objects. Let them know that you'll need to be able to

Activity 2 The Packing Box (cont.)

put the lid on the box; the object has to fit entirely inside the box, though it can be all by itself. It doesn't need to fit in with other objects.

Dani *Why can't we just bring the things over and see if they will fit into the box?*

Teacher *Because I don't want to damage the box moving things in and out of it, and all the things I have marked need to stay where they are. Is there a way you can find out whether or not these things will fit into the box without moving the box or the objects I have marked?*

Students *We could maybe use the measuring sticks.*

I think the measuring sticks are too long for the box when the lid is on.

I think they're not big enough to check the long side of the box.

3. If you have found a copy paper box to use for this activity, it will be about 11 inches wide, 17 inches long, and 9 inches deep. Work with input from the class to compare one of the measuring sticks to each dimension of the box. Is the measuring stick a tool that will be accurate enough to help them find out which of the objects will fit into the box, or do they need to come up with something that will give them a better measure?

4. After some discussion, show students the ball of string. Suggest that when it is their turn to find out which of the objects will fit, they might want to cut a piece of string to match the length of the box. Some might want to cut a second string to match the depth, or mark the measuring stick to match. When they are satisfied that they have, or can make the tools they need, show them a copy of the Packing Box record sheet.

Set D7 Measurement: Transitivity Blackline Run a half class set and cut in half	
NAME _____	DATE _____
The Packing Box	
Write the name of each object you measure and where it belongs on the chart.	
It will fit into the box.	It is too big to fit into the box.

5. Review the sheet with the class. Explain it as needed, and note with the students that there is only room to record 6 objects. If they want to measure all 12 objects, they can use two sheets. If necessary, work with input from the students to model the process of measuring one of the objects and recording the results on the sheet.

6. Let students know where you are placing the record sheets, measuring sticks, and string. You may decide to put these materials in one of your Work Place tubs, or place them on a small desk or table easily accessible to students during Work Places. Place the packing box in a designated location and solicit agreement from the class that no one will move the box, or any of the objects you have marked with blue tape. The challenge is to do the job without moving anything.

NAME _____

DATE _____

The Packing Box

Write the name of each object you measure and where it belongs on the chart.

It will fit into the box.	It is too big to fit into the box.

NAME _____

DATE _____

The Packing Box

Write the name of each object you measure and where it belongs on the chart.

It will fit into the box.	It is too big to fit into the box.

