



GRADE 1 SUPPLEMENT

Set D8 Measurement: Length in Standard Units

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Skills & Concepts

- ★ compare objects according to length
- ★ estimate the length of an object to the nearest inch
- ★ measure objects with one-inch tile
- ★ measure objects with a standard ruler to the nearest inch

Bridges in Mathematics Grade 1 Supplement

Set D8 Measurement: Length in Standard Units

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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 D8 ★ Activity 1



ACTIVITY

Shorter, Longer, or the Same Length?

Overview

Students compare pairs of paper strips according to length. Then they work in pairs to find things around the room that are shorter than, longer than, and the same length as special “measuring strips” you will give them. This simple comparing activity serves as an introduction to measuring length in standard units.

Skills & Concepts

- ★ compare objects according to length

You'll Need

- ★ Shorter, Longer, or the Same? (page D8.5, class set)
- ★ 1" construction paper strips in several different colors (see Advance Preparation)
- ★ 1" × 12" red construction paper strips (1 strip for every 2 students)
- ★ manila envelope
- ★ 7 index cards and a wide-tipped felt marker

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Advance Preparation Cut two 1" by 8" strips of construction paper, one in blue and the other in white. Cut 6 more strips of construction paper in the following lengths and colors: 1" × 5" (black), 1" × 6" (yellow), 1" × 7" (green), 1" × 9" (orange), 1" × 11" (brown), and 1" × 12" (purple). Place the 6 strips in a manila envelope, but leave the two 1" × 8" strips out where you can access them easily.

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Instructions for Shorter, Longer, or the Same Length?

1. Gather children to your discussion area and ask them to sit in a circle. When they are seated, explain that over the next few days you are going to do some activities that involve measuring length. Then take a few minutes to find out what your students already know about length. Here are some questions you might ask:

- What does the word *length* mean?
- Why do people measure length?
- What are some of the tools people use to measure length?

2. Next, explain that in order to measure length, you have to know how to *compare* the length of two objects. As the children watch, drop the two 8-inch strips of paper in the middle of the circle at a good distance from one another. Ask the students to point to the strip they think is longer, and then ask them to help you find out for sure. What do you need to do to compare these two lengths?

Students *Hold them up together.*

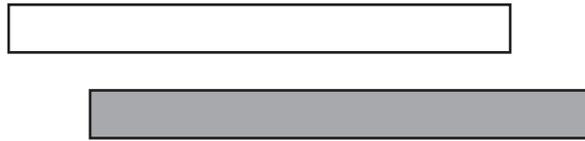
Put them down on the floor right together so you can see.

I can just tell. It's the white one!

3. Use their suggestions to compare the two strips of paper. Don't match the ends of the two strips unless the children tell you to do so. If they don't correct you, press the issue.

Activity 1 Shorter, Longer, or the Same Length? (cont.)

Teacher *You told me to put the strips side by side on the floor. Can we tell which is longer now?*

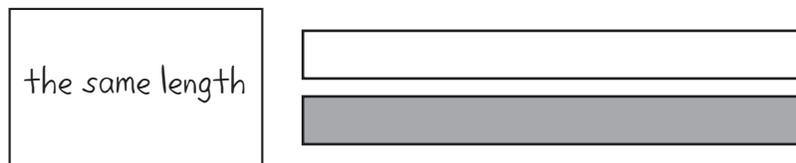


Students *The white one!*

No, the blue one! You can see it's longer because it sticks out more!

You have to make them the same at the end or you can't tell.

4. Align the two strips correctly and ask students to compare the length now. Which is longer? Write a label on an index card and place it beside the pair of strips.



5. Now show students the envelope of paper strips you have prepared. Invite a helper to pull one from the envelope and lay it out in the middle of the circle.

6. Ask a different helper to pull a second strip from the envelope and hold it up. Have students guess whether it is longer than, shorter than, or the same length as the one on the floor. How can they find out for sure?

Students *Put them together on the floor.*

Make sure they're even at the end.

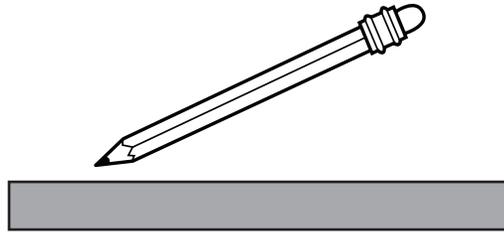
I can already tell that the brown one is longer.

7. After the 2 lengths have been compared, write a label for each on an index card and have 2 helpers set the labels where they belong.



8. Repeat steps 5–7 until the class has compared and labeled all the paper strips in the envelope.

9. Gather up all the lengths and put them back in the envelope as helpers gather the labels for you. Then hold up one of the 1" × 12" red strips you have prepared for this activity, along with a pencil. How do the lengths of these two objects compare? Give students a few moments to pair-share observations, and then call on a few volunteers to share their thinking with the class.

Activity 1 Shorter, Longer, or the Same Length? (cont.)

Students *I think the red paper is longer.*

It looks like the pencil is shorter, but you have to put them together at the ends to be sure.

You have to turn them both the same way and make sure they're even.

I can tell that the paper is longer already.

10. Follow students' instructions to compare the lengths of the pencil and the red strip. Then ask them to look around the room. Can they see anything else that looks shorter than the red strip? Longer than the red strip? The same length as the red strip? Explain that in a few minutes, they are going work in pairs to be length detectives. You will give each pair a red measuring strip just like yours and two record sheets, one for each partner. Show the children a copy of the record sheet. Read it to them and model the steps several times (locate an object, compare its length with the length of the red strip, record the name of the object in the appropriate box).

Set D8 Measurement: Length in Standard Units Blacklines Run a class set

NAME Ms. Lane DATE Dec. 8

Shorter, Longer, or the Same?

1 Find things that are longer than, shorter than, and the same length as your measuring strip. Record at least 4 different things in each box.

a Here are some things that are *shorter than* my measuring strip.

A Pencil 

My Thumb 

b Here are some things that are *longer than* my measuring strip.

A Big Book 



c Here are some things that are *the same length* as my measuring strip.

My Water Bottle 



11. When students understand what to do, have them each find a partner. Then give each pair a red paper strip and 2 record sheets, and send them out to work.

Activity 1 Shorter, Longer, or the Same Length? (cont.)

12. Ask students to turn in their red strips along with their record sheets when they are finished. You will need the red strips for the next activity, as well as the multi-colored strips in the manila envelope.

Extensions

- After you have taught the next activity in this set, make the envelope of paper strips and the labels available during Work Places so pairs of students can repeat the comparing activity independently.
- Challenge students to place the entire collection of strips in order from shortest to longest.
- Make extra copies of the record sheet available, along with a few of the red measuring strips, so interested students can repeat the activity on their own. You might also make “measuring strips” in several different lengths (10”, 15”, and 18”) available.

NAME _____

DATE _____

Shorter, Longer, or the Same?

1 Find things that are longer than, shorter than, and the same length as your measuring strip. Record at least 4 different things in each box.

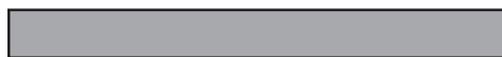
a Here are some things that are *shorter than* my measuring strip.



b Here are some things that are *longer than* my measuring strip.



c Here are some things that are *the same length* as my measuring strip.



Set D8 ★ Activity 2



ACTIVITY

Measuring with Tile

Overview

Students transition from comparing lengths directly to measuring lengths with square inch tile in this activity.

Skills & Concepts

- ★ estimate the length of an object to the nearest inch
- ★ measure objects with one-inch tile

You'll Need

- ★ Estimating & Measuring Length with Tile (page D8.11, class set)
- ★ envelope of multi-colored paper strips from Set D8, Activity 1
- ★ 1" × 12" red construction paper measuring strips from Set D8, Activity 1
- ★ square inch tile (each student pair will need about 25 tile)
- ★ a new, unsharpened pencil

Instructions for Measuring with Tile

1. Gather children to your discussion area and ask them to sit in a circle. When they are seated, explain that they are going to do some more measuring today. Place one of the red measuring strips in the center of the circle. Then invite a volunteer to pull one of the colored paper strips from the envelope and hold it up. Ask the children to point to the strip they think is longer, and then have the student place the strip from the envelope beside the red measuring strip to confirm students' predictions.



Students *The red one is way longer than the orange one.
I knew it!
I could tell by looking, even before we put them together.*

2. Now ask the children *how much* longer the red strip is than the other strip. Give them a few moments to pair-share, and then call on volunteers to share their ideas with the class.

Tessa *The red one is longer.*

Teacher *Right, but how much longer is the red strip than the orange strip?*

Students *It's just a little longer, like if the orange one was just a little more, they would match. Get the really short piece out of the envelope. If you hook that onto the orange one, it might be as long as the red one.*

If you cut the red one right here, you could make it the same as the orange one. Put them real close together. Then you can see how much longer the red one is.

Activity 2 Measuring with Tile (cont.)

3. After children have had minute or two to wrestle with the question, suggest that they use the tile to help solve the problem.

Teacher *It's really hard to tell exactly how much longer the red strip is unless we have a way to measure the strips. Let's use our tile to help. I'm going to line up the tile right next to the red strip so we can see exactly how long it is. Help me count, okay?*

Students *1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12.*



Students *The red strip is the same as 12 tiles.*

I bet the orange one is maybe 5 or 7 tiles long.

Let's measure it!

4. Work with input from the class to measure the second strip with tile. Then pose the question again: exactly how much longer is the red strip than the other strip?



Students *The red one is 12 longer!*

No, it's only 3 tiles longer. You can see that the red one has 3 extra tiles, see right here?

Nine, 10, 11, 12 – yep, the red one is 3 longer.

5. Talk with students about the fact that when you compare two objects, you can see which one is longer and which one is shorter. But if you use units, such as tile, to measure the objects, you can tell *how* long they are. Measuring with units also provides a way to identify *how much longer* one object is than another.

6. Work with students' help to clear away the strips and tile. Then set a new, unsharpened pencil in the middle of the circle. How many tile long do the children think it is? Give students a few moments to pair-share. Then set the red strip next to the pencil. Give students a few more moments to pair-share, and call on volunteers to share their ideas with the class.



Students *It's shorter than the red paper!*

I think it's about maybe 6 or 7 tiles long because the paper is 12 tiles long.

It must be shorter than 12.

Let's measure it and find out!

Activity 2 Measuring with Tile (cont.)

7. Call on a volunteer to set tile beside the pencil as the class counts along.



Students 1, 2, 3, 4, 5, 6, 7, 8.
 The pencil isn't quite that long.
 Take 1 of the tiles off!

Spencer But if I do that, it's not enough tiles, see?



Teacher Sometimes when you measure things, it doesn't come out exactly. Would you say the pencil is closer to 7 or 8 tiles long?

Students 8!
 No, 7!
 It's like 7 and a half. It's right between!

8. Tell the students that they are going to measure some things around the room now. Show them a copy of the work sheet and read the instructions to them.

Set D8 Measurement: Length in Standard Units Blacklines Run a class set

NAME _____ DATE _____

Estimating & Measuring Length with Tile

1 Use your red measuring strip to help estimate the length of each of the objects below. Then measure it with tile to find out how long it really is and write the answer.

Object	Estimate (in tile)	Actual Length (in tile)
a Your Shoe 		
b A Big Book 		
c Your Desk 		
d A Crayon 		
e Your Hand 		
f The Seat of Your Chair 		

Activity 2 Measuring with Tile (cont.)

9. Model the activity by removing one of your shoes and setting it in the middle of the circle. Put a red measuring strip beside it, and ask children to think privately about how many tile long they think the shoe is. Then call on volunteers to share their estimates.



Students *Your shoe is almost as long as the red paper!
It might be 12 tiles long.
It looks a little shorter, so I think maybe 9 or 10 tiles.*

Teacher *I think it's about 11 tiles long, so that's what I'm going to write in the first box. What do I have to do now?*

Students *Measure it with the tiles!
Measure it, and write the real answer.
I think it's going to be 11 tiles!*

10. When children understand what to do, have them each find a partner. Give each pair of students a record sheet and a red measuring strip. Have a volunteer set baskets of tile on the tables so children can access them easily, or give each pair about 25 tile in a small container. Circulate to talk with students and give assistance as they are working.

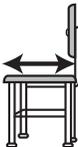
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Note *Although students are expected to measure to the nearest tile, some children may want to be a little more precise. If so, show them how to write one half ($\frac{1}{2}$), and encourage them to use the fraction as needed.*
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NAME _____

DATE _____

Estimating & Measuring Length with Tile

1 Use your red measuring strip to help estimate the length of each of the objects below. Then measure it with tile to find out how long it really is and write the answer.

Object	Estimate (in tile)	Actual Length (in tile)
a Your Shoe 		
b A Big Book 		
c Your Desk 		
d A Crayon 		
e Your Hand 		
f The Seat of Your Chair 		

Set D8 ★ Activity 3



ACTIVITY

Introducing Rulers

Overview

In this activity, students measure short lengths with square inch tile and rulers.

Skills & Concepts

- ★ estimate the length of an object to the nearest inch
- ★ measure objects with one-inch tile and with a standard ruler to the nearest inch

You'll Need

- ★ Estimating & Measuring Length in Inches (page D8.17, class set)
- ★ one 1" × 12" red construction paper strip
- ★ 1" × 6" blue construction paper strips (1 for each pair of students)
- ★ square inch tile (each student pair will need about 25 tile)
- ★ 12-inch rulers (1 for each pair of students, see Note)
- ★ several calculators

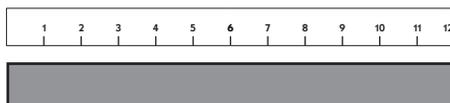
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Note Simple rulers marked only in inches, half inches, and possibly quarter inches, are better for this introductory lesson than rulers marked with eighth and sixteenth inches along one edge and centimeters along the other. Also, this activity and the next will be easier for students if there is not a gap between the beginning of the ruler and the starting point of the first inch. If you don't have simple primary rulers, consider using the blackline on page D8.16 to make a set out of cardstock for your class. While you only need a half-class set of rulers today, each student will need a ruler for the next activity in this set.

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Instructions for Introducing Rulers

1. Gather children to your discussion area and ask them to sit in a circle. When they are seated, show them one of the rulers, and explain that people use this tool to help measure length. Set the ruler in the center of the circle beside one of the red measuring strips. Give students a few moments to pair-share observations, and then ask volunteers to share their ideas with the class.



Students *The red paper and the ruler are the same!
That ruler must be the same as 12 tiles.
I can see it has numbers up to 12 on it.
Can we try measuring it with tiles?*

Activity 3 Introducing Rulers (cont.)

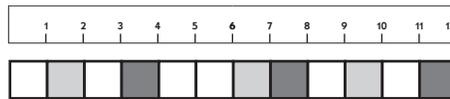
2. Give each pair of students a ruler so they can examine it more closely. Ask them to share observations about it, and then call on volunteers to share with the class.

Students *It has numbers on it.*

It goes up to 12.

My big brother has a ruler like this, but his ruler has more lines on it.

3. Set several baskets of tile in the discussion area, or give each pair of students about 25 tile in a small container. Ask the students to measure the ruler with tile. When they have lined up tile alongside the ruler, invite volunteers to share observations with the class. What do they notice about the tile and the ruler?



Students *We were right. It takes 12 tiles to measure the ruler.*

The ruler is the same as 12 tiles lined up.

There is one tile for every number.

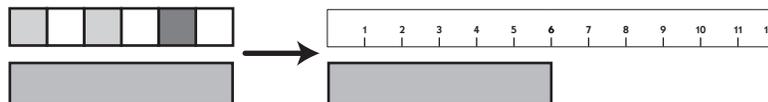
The tiles go 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and so does the ruler.

The ruler has numbers on it, but the tiles don't. You have to count them.

No you don't! You can see how many tiles there are by looking at the numbers on the ruler.

4. Now explain to the children that the ruler is marked off in units called *inches*. The ruler is 12 inches long, and each of the tiles is 1 inch long. Today, they are going to measure some more things around the room with the tile and their rulers.

5. Hold up one of the 6" blue construction paper strips. Ask students to estimate its length. Record their ideas on the board. Then give each pair of students one of the 6" strips. Have them place tile end-to-end to measure the length of their strip. Then have them measure the same strip with their ruler. Discuss the results.



Students *The blue paper was 6 both times. Six tiles, and then up to 6 on the ruler.*

Yep, it took 6 tiles first. Then with the ruler, it goes up to the 6.

Those tiles are 1 inch, so 6 of them is like 6 inches.

The ruler is kind of like having tiles stuck together.

The marks on the ruler are like the tiles.

Activity 3 Introducing Rulers (cont.)

6. Show students a copy of today's worksheet, Estimating & Measuring Length in Inches. Read the instructions on the sheet to the class. Then borrow a pencil from a student and model the steps: estimate how many inches long the pencil is, measure it with tile, and then measure it again with the ruler. Discuss the results with the students.

- Was your estimate perfect?
- Is it okay to make an estimate that doesn't match the real measure?
- Did the pencil turn out to be the same length in tile and in inches?
- Why or why not?

7. When students understand what to do, give each pair two record sheets and send them out to work with their tile and ruler. Emphasize that they need to work together to estimate and measure the length of the objects, but each partner is responsible for filling in his or her own record sheet.

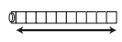
Set D8 Measurement: Length in Standard Units Blacklines Run a class set

NAME _____ DATE _____

Estimating & Measuring Length in Inches

1 Use square inch tiles and your ruler to estimate and measure length in inches.

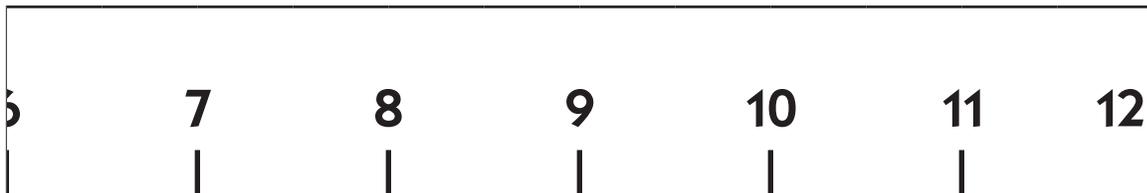
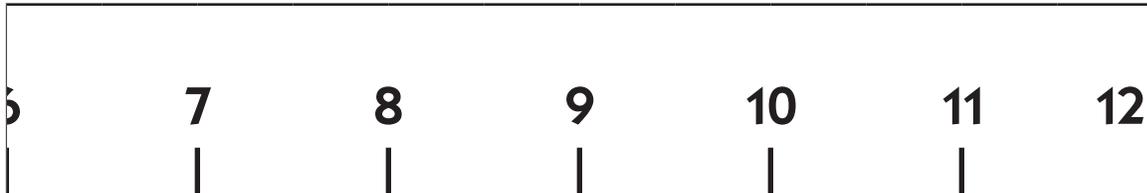
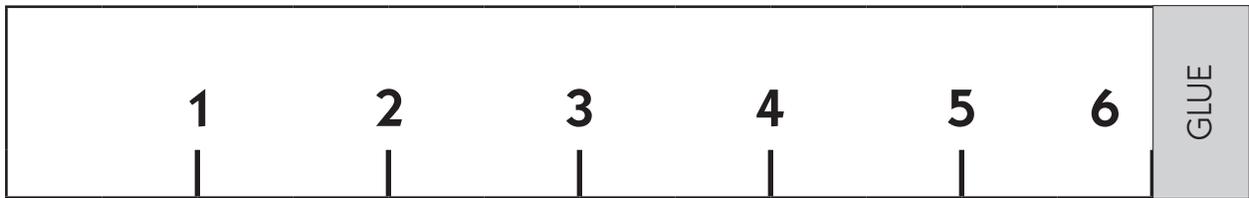
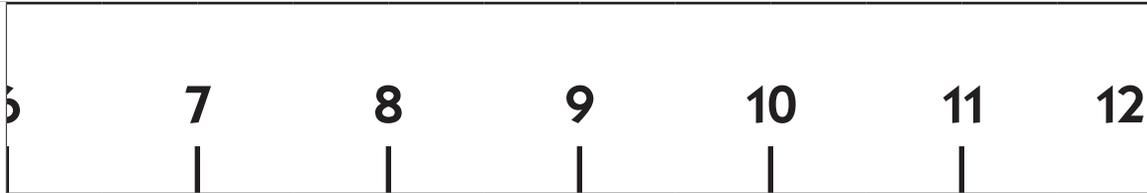
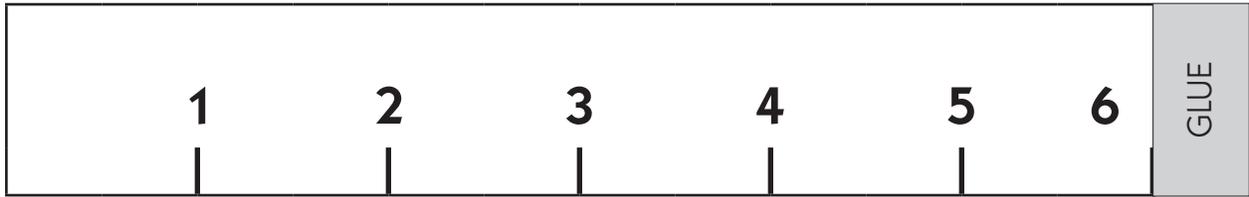
- Write down your estimate. How many inches long do you think it is?
- Measure the length with tiles.
- Measure it again with your ruler.

Object	My Estimate	Length in Tiles	Length in Inches
a Pencil 	_____ inches	_____ tiles	_____ inches
b Piece of Paper 	_____ inches	_____ tiles	_____ inches
c Book 	_____ inches	_____ tiles	_____ inches
d A Calculator 	_____ inches	_____ tiles	_____ inches
e Your Hand Span 	_____ inches	_____ tiles	_____ inches
f 10 Unifix Cubes 	_____ inches	_____ tiles	_____ inches
g You Choose _____	_____ inches	_____ tiles	_____ inches

Note Having students measure the same objects twice, once with tile and once with their rulers, will help them make a smoother transition from measuring by lining up and counting concrete objects, to using a ruler, which is more efficient, but also more abstract.

Set D8 Measurement: Length in Standard Units Blacklines Run a single copy on paper, and check to be sure the marks on the rulers are exactly 1 inch apart. If they are not, adjust the copy machine to reduce or enlarge slightly, as needed. Once the settings are correct, run a third of a class set on cardstock. Cut the pieces apart and glue together to form a class set of rulers.

Primary Rulers



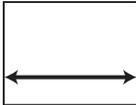
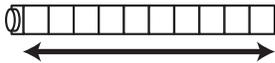
NAME _____

DATE _____

Estimating & Measuring Length in Inches

1 Use square inch tiles and your ruler to estimate and measure length in inches.

- Write down your estimate. How many inches long do you think it is?
- Measure the length with tiles.
- Measure it again with your ruler.

Object	My Estimate	Length in Tiles	Length in Inches
a Pencil 	_____ inches	_____ tiles	_____ inches
b Piece of Paper 	_____ inches	_____ tiles	_____ inches
c Book 	_____ inches	_____ tiles	_____ inches
d A Calculator 	_____ inches	_____ tiles	_____ inches
e Your Hand Span 	_____ inches	_____ tiles	_____ inches
f 10 Unifix Cubes 	_____ inches	_____ tiles	_____ inches
g You Choose _____	_____ inches	_____ tiles	_____ inches

Set D8 ★ Activity 4



ACTIVITY

Frog Playgrounds

Overview

Today, students apply their measuring skills as they work in pairs to create playgrounds for tiny plastic frogs.

Skills & Concepts

- ★ measure objects to the nearest inch with a standard ruler

You'll Need

- ★ 1 piece of chart paper (see Advance Preparation)
- ★ 1" × 12" brown construction paper strips (3 for each pair of students, plus extra)
- ★ 5" × 5" blue construction paper squares (1 for each pair of students)
- ★ 12" × 18" green construction paper (1 sheet for each pair of students)
- ★ square inch tile (each student pair will need about 25 tile)
- ★ 12-inch rulers (class set)
- ★ bucket of frogs (each pair of students will need 2 frogs)
- ★ polydrons, pattern blocks, and Unifix cubes (see Advance preparation)
- ★ glue sticks, scissors, pencils, and crayons
- ★ a digital camera (optional, but highly recommended)

Instructions for Frog Playgrounds

1. Gather children to your discussion area and ask them to sit in a circle. When they are seated, let them know that they are going to use their measuring skills to build a playground today. Show them a piece of 12" × 18" green construction paper, some brown paper strips, and one of the tiny plastic frogs. Explain that the green paper is a piece of land for the frog's new playground, and you are going to use the brown paper strips to make paths on the playground.

2. Draw children's attention to the playground instructions poster you have prepared. Read the instructions together, and explain that they will work in partners to build their playgrounds. The first thing they are all going to do is cut the paper strips to the required lengths for the playground paths. Show them how to use the ruler, a pencil, and a pair of scissors to measure, mark off, cut, and label the first length: 8 inches. (Take the opportunity to tell students that the mark beside each length on the poster stands for inches. People use this symbol because it is quicker and easier than writing out the whole word.)

Advance Preparation Divide each set of manipulatives into several baskets so that children will have easy access to them as they are building their playgrounds. Write a brief list of project instructions (shown below) on the piece of chart paper. Post near your discussion area.

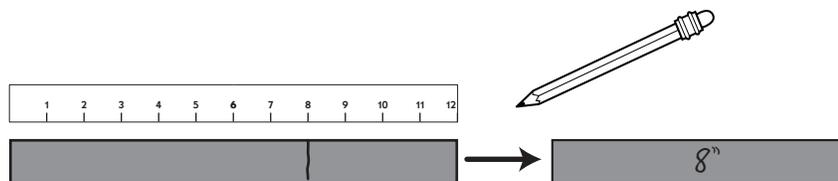
Playground Instructions

1. Cut paper strips to these lengths:

8"	7"	6"	6"	5"	4"
----	----	----	----	----	----

2. Use the strips to make a path on the playground.
3. Put a pond on your playground.
4. Build 3 or 4 play structures out of cubes, polydrons, and pattern blocks.
5. Make sure none of the structures are higher than 5 inches.

Activity 4 Frog Playgrounds (cont.)



3. Before you reach for the next 12-inch strip, ask students to think about the length of paper left over from the strip you just cut. Might this leftover piece be one of the lengths they need? Give them a few moments to pair-share, and then ask volunteers to share their thinking with the class.

Students *The leftover piece is really short.*

It doesn't look long enough for a path.

It says we need one piece that's only 4 inches.

4 inches is pretty short.

That whole strip was 12 inches, right? We just cut off 8 inches. 12 take away 8 is 4, so I think that other piece is 4 inches.

4. Work with input from the students to measure the leftover piece. When they discover that it is 4 inches long, label it accordingly. Repeat this process with another 12" strip, first measuring, marking, cutting and labeling a length of 7" and then measuring the left over piece to see if it, too, is one of the lengths you need.

5. When students understand what to do, assign or let them choose partners, and return to their seats. Have them get out their pencils, rulers, and scissors, as you place a handful of brown strips on each table or cluster of desks. Remind them that each pair is going to work together to build one playground, so they need to help each other measure, cut, and label one set of paper strips. Circulate to give assistance as needed.

6. When most of the pairs have finished cutting their set of strips, reconvene the group in the discussion area. Demonstrate how to use a set of cut strips to create a path through the playground. There are lots of ways to do this, but the path has to lead into the playground on one side and out of the playground on the other side. Let the children know that they have to use all the pieces they just cut, but they can cut extras if they need them.

As you experiment with your path layout, show children how to cut a simple pond shape out of the 5-inch square of blue construction paper. Once you have placed the pathways and pond where you want them, glue them down. Remind children that they want to leave plenty of space for play structures.

Teacher *Okay, I've used 5 of my pieces to make a path that starts at one side of the playground and goes to the other, and I have my pond put in. I think I'll use my last path piece to make a little diving board into the pond. When you lay out your path and pond, do you have to copy the way I did it?*

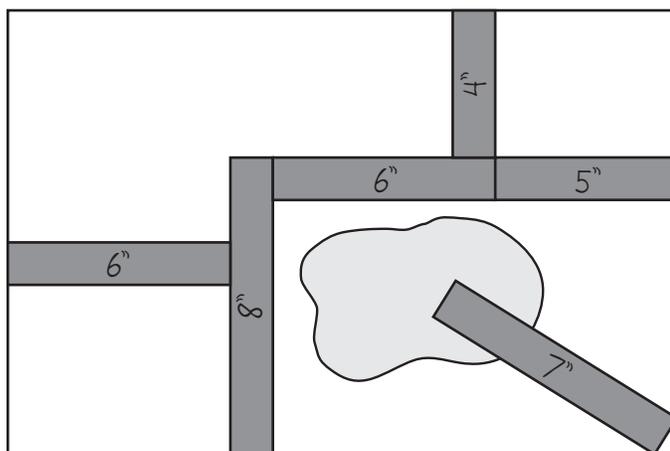
Students *No! I'm going to do it way different.*

I'm going to make a place for a slide and a sand box in my park.

I'm going to make a diving board like Teacher's.

Activity 4 Frog Playgrounds (cont.)

Teacher You might have to move things around lots of times before you find an arrangement you like. When you have the paths and pond where you want them, glue them down, and then you can start building your play structures. How many structures do you need to build? That's right, 3 or 4. What's the height limit? Yep, 5 inches. That means none of the structures can be taller than 5 inches, and you have to measure them with your ruler to make sure. We don't want our frogs to get hurt jumping off structures that are too high for them.



7. When students understand what to do, give each pair a piece of green $12'' \times 18''$ construction paper, a piece of blue $5'' \times 5''$ construction paper, several 12-inch long brown strips and let them go to work. Circulate around the room to give each student a plastic frog, and to offer baskets of polydrons, pattern blocks, and Unifix cubes as students need them. Provide encouragement and assistance as needed.

8. Chances are, most of your students will get very involved in their playgrounds, and it may be challenging to bring the activity to a close. Here are some things that may help:

- Let students know how much time they have to work, and give them plenty of advance warning as the work period is drawing to a close.
- Take a digital photo of each playground as children finish it. Plan to display these on your class web site, or print out copies to post on the classroom wall, along with a brief explanation of the mathematics involved.
- Let children keep the playgrounds on their desks for the rest of the day. You may want to have them write about the experience during language arts block the following day.
- Have children put their names on the back of their playground mats, and keep them at school for a week or two to use during free time. Some students may enjoy building new structures on the mat several different times.
- Let students know that they will have many more opportunities to practice their measuring skills later in the year when you do the Penguins unit from the Bridges core program.

