

GARDEN PATH MEASUREMENT

OBJECTIVE

In this lesson students will explore how to measure length and why it is useful. They will use their prior knowledge exploring length in Lesson 1 to learn how to measure length by lining units end-to-end. Students will use their problem solving skills to help an inchworm find the shortest path to safety.

Students will be able to:

- Make longer than, shorter than comparisons
- Observe that an object doesn't change size just because it is moved (conservation, transitivity)
- Measure length by lining units end-to-end (nonstandard measurement units)
- Explain why measuring length is useful

MATERIALS

- String (or straw)
- Timer
- Poster board or long piece of cardboard with two garden paths on it (for mini lesson); painters tape (optional)
- Inchworm cutouts (set of 10-15 per pair)
- Student garden path worksheet
- Create Your Own Garden path worksheet (extension)
- Measuring end-to-end anchor chart (or projector display)
- Inch by Inch book by Leo Lionni
- Vocabulary cards (with pictures)

TEACHER PREP

1. Cut a piece of string for students to compare object size
2. Prepare a poster board with three garden paths. The paths can be drawn or you can use painters tape. Make the paths distinct enough from each other so that it is not immediately clear which path is longer (see student worksheet for examples, but create different garden paths to model with). Use whole numbers that could be measured with the inchworm. Label the paths A, B, C.
3. Precut inchworm cutouts (10-15 inchworms per pair)

VOCABULARY

- length
- measurement
- end-to-end
- longer
- shorter

GUIDING QUESTIONS

1. What is length?
2. How can we measure length?
3. What strategy did you use to know where to place your inchworm to make sure you measured the length of the path correctly?
4. What other objects could you use to measure the length of the path?

LESSON HIGHLIGHTS

- **Warm-up:** find 3 objects that are longer than a piece of pre-cut string
- **Mini-lesson:** read *Inch by Inch* by Leo Lionni. Model measuring the length of one garden path end-to-end using the inchworm cut out. Have students practice with the teacher how to measure the length of the other garden path
- **Group Work/Content Practice:** students work in pairs, measuring to find which is the shorter garden path
- **Share:** students present their findings to the class.

WARM-UP (5 MINUTES)

Gather students at the whole-class meeting space and inform them that they will play a quick scavenger hunt game. Show students a piece of pre-cut string. Ask students to take a really good look at the size of the string. Then ask them to close their eyes to picture it in their mind. Ask students if they can picture the string. Then inform students that to succeed in the first round of this scavenger hunt, the class needs to find three objects that are *longer* than the string. The objects should be something that will be safe for the student to carry back to the meeting space.

ELL SUPPORT

Model with an object that is longer than the string so that students have a visual connection to the definition of *longer*. Then choose an object that is shorter than the string to help develop the definition of *shorter*.

Explain that you will call on student volunteers to find the objects. Volunteers can ask a peer for help but they won't be able to compare the objects to the string until after the timer goes off.

Call on student volunteers and then set a 1-minute timer. Allow students to find the objects until the timer runs out (give verbal checkpoints of the time left if necessary).

If the class beats the timer, congratulate them on their success. If the class doesn't beat the timer, let them know that they will get a chance to play the game another time.

After the items have been found, compare the size of each object to the string. Use words like *shorter* and *longer* to describe the length of the objects relative to the string and encourage students to use these terms (gently correcting students who may say *bigger* or *smaller* to describe the length).

If time allows, try a second round where students have to find an object that is *shorter* than the string.

MINI-LESSON (15 MINUTES)

Inform students that knowing how to measure length can be useful when playing games like the one they just played and it can be useful in other situations too.

Review Vocabulary: length, measurement

Display measurement vocabulary card for discussion.

ELL SUPPORT

Consider looking up how to say length and measurement in the languages of your English Language Learners. You can also reach out to families of English Language Learners to share with you and their child the ways to say length and measurement in the child's native language. Use this newfound information as a way to preteach the vocabulary words for this lesson.

Ask students:

- But what is length? (Distance. How far from end to end or from one point to another something is. Or: How long or short something is)
- What is measurement? (A number that shows the size or amount of something.)

Tell students that you will read them a story about an inchworm that finds a special use for measuring length.

Read aloud Leo Lionni's *Inch by Inch*.

Ask a couple of students to share examples of some things the inchworm measured (bird tail, toucan's beak etc). Then reveal the garden paths that you have created. Explain to students that the inchworm needs help escaping some *hungry* birds!

The inchworm needs to find which is the shortest path to get home everyday.

But which is the shortest path? Path A, B, or C? Ask students to estimate which path they think will be shortest (answers will vary). Then ask students how they can know for sure which is the shortest path (they need to measure).

Display for students the inchworm cutouts. Ask students how they can use the inchworm cutouts to measure the garden paths.

Model: Explain to students that in order to know exactly how long something is, they need to make sure to measure length by lining up end-to-end. That way they know they have covered every part of the path. Show students how to measure the mini-lesson garden path by carefully lining up the inchworms end-to-end.

Talk through the process of:

- Carefully making sure your inchworm is at the start of the path
- Lining up inchworms carefully
- Stopping at the end
- Counting the inchworms
- Recording your answer

Guided Practice: After modeling with the first garden path, ask students to help you measure the second and third garden paths. Go through the steps of measuring end-to-end, using the anchor chart as necessary and be sure to prompt students to use the unit, inchworms. For example: this path is 5 inchworms long.

Close the mini-lesson by informing students that they will now get a chance to help their inchworms find their way home.

ELL SUPPORT

Provide students with the measuring end-to-end anchor chart or have this chart clearly visible. Encourage all students to reference the chart during Group Work/Content Practice.

GROUP WORK - CONTENT PRACTICE (15 MINUTES)

Pair students to work together on the garden path worksheet. Hand each pair a baggie with inchworm cutouts.

Assessment Questions:

While students are working, the teacher should circulate to support students' understanding and application of today's lesson. The teacher can use this time to also informally assess which students are using the correct words to describe length (longer, shorter) and which students are using end-to-end measurement. Some supporting questions can be:

- Which path is longer? Which path is shorter? How do you know?
- How long is this path?
- How does measuring end-to-end help you know which is the longest?
- What strategy did you use to know where to place your inchworm to make sure you measured the length of the path correctly?
- What other objects could you use to measure the length of the path?
- How could you measure the length of my pencil using the inchworm?

Differentiation:

Support

- Preteach the lesson vocabulary words.
- You can review the words using the picture cards and modeling from the lesson and/or you can translate the words for English Language Learners who may need this support.
- Use larger size worksheets and cutouts for students who may struggle manipulating the inchworm cutouts.
- Laminate the inchworms and worksheet and have students use sticky tack or Velcro to stick the inchworms down when they line them up.

- Draw markers to indicate where students should start and stop using a green flag and a red stop sign.
- Provide a personal checklist for students to reference when following the steps.
- Offer students a worksheet with only two garden paths or ask students to measure only two paths.
- Meet with small groups to practice how to measure end-to-end or to reteach the lesson as necessary

Extensions

Ask students to:

- Create new garden paths for the inchworm. Have a partner measure the new paths.
- Create a garden path that is the same length as one of the garden paths in the worksheet but that looks different.
- Use a different object to measure the three garden paths. Is the shortest path still the shortest when measuring with the new object? Why do you think that is?
- A square has four equal sides. Design a garden path that is in the shape of a square.
- Use your inchworm to measure other items in the classroom (pencils, crayons, math cubes, a book etc)

SHARE (5 MINUTES)

Allow time for students to share their findings. Some question to ask:

- Which garden path is the shortest for the inch worm to take? How do you know?
- Which garden path is the longest for the inch worm to take? How do you know?
- What else could we use to measure the length of the garden path?
- Why is measuring length useful? What are some other things we can measure the length of?

CCSS MATH

CCSS.MATH.CONTENT.K.MD.A.1 - Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

CCSS.MATH.CONTENT.K.MD.A.2 - Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.

MATH PRACTICE STANDARDS

CCSS.MATH.PRACTICE.MP1 - Make sense of problems and persevere in solving them.

CCSS.MATH.PRACTICE.MP2 - Reason abstractly and quantitatively.

CCSS.MATH.PRACTICE.MP5 - Use appropriate tools strategically.

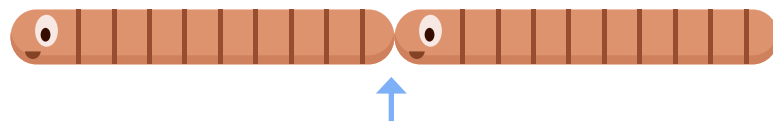
CCSS.MATH.PRACTICE.MP6 - Attend to precision.

MEASURING END-TO-END

1. Make sure your inchworm is at the start of the path



2. Line up inchworms carefully



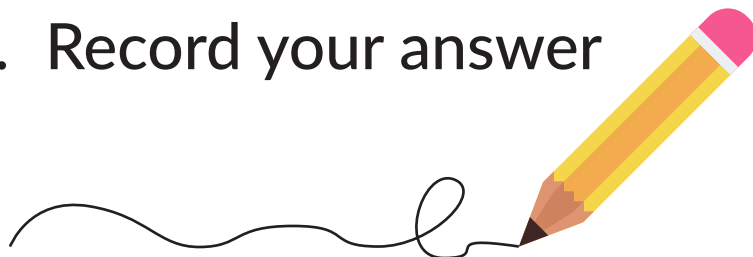
3. Stop at the end



4. Count the inchworms



5. Record your answer

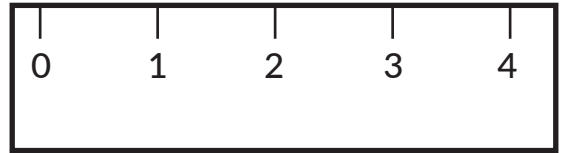


VOCAB CARDS

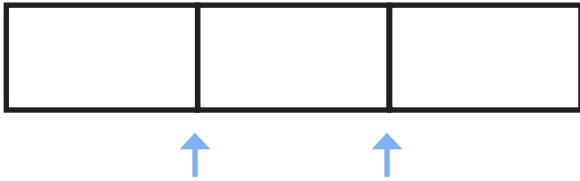
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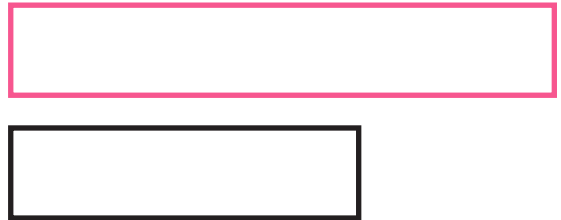
MEASUREMENT



END-TO-END



LONGER



SHORTER

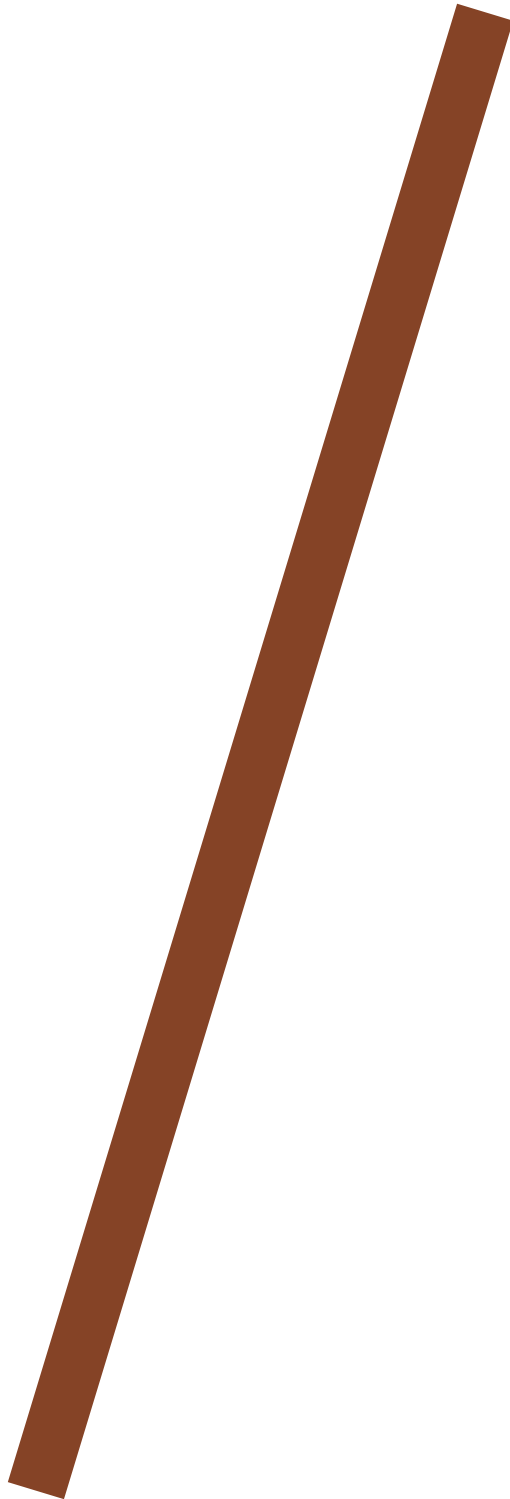


GARDEN PATH WORKSHEET

A. _____



B. _____



C. _____

