

## A Magnified Inch: Taking a Closer Look – Grade 3, Level 3

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### Lesson Overview

In this lesson, students will work in partners and groups to explore measurement in inches, half-inches, and quarter-inches to create line plots. Students will have the opportunity to make connections to measurement in our real world through personal experiences and literature. Multiple opportunities are included in this lesson to communicate new learnings through writing and oral presentations.

### Alignment

#### **Standard/Indicator Addressed**

**Math (3.MDA.4)** Generate data by measuring length to the nearest inch, half-inch and quarter-inch and organize the data in a line plot using a horizontal scale marked off in appropriate units.

#### **Standards for Mathematical Practice**

A mathematically literate student can:

1. Reason both contextually and abstractly.
  - a. Make sense of quantities and their relationships in mathematical and real-world situations.
  - b. Describe a given situation using multiple mathematical representations.
2. Connect mathematical ideas and real-world situations through modeling.
  - a. Identify relevant quantities and develop a model to describe their relationships.
  - b. Interpret mathematical models in the context of the situation.
  - c. Make assumptions and estimates to simplify complicated situations.
3. Use a variety of mathematical tools effectively and strategically.
  - a. Select and use appropriate tools when solving a mathematical problem.
4. Communicate mathematically and approach mathematical situations with precision.
  - a. Express numerical answers with the degree of precision appropriate for the context of a situation.
  - b. Represent numbers in an appropriate form according to the context of the situation.
  - c. Use appropriate units, scales, and labels.

## Connections

### **Disciplinary Literacy Strategies (for Purposeful Reading, Meaningful Writing, and Productive Dialogue)**

Read Aloud  
Frayer Model  
Exit Ticket  
Elbow Partners

## **Computational Thinking**

*Computational thinking (CT) is a problem-solving process that includes (but is not limited to) the following **characteristics**:*

- Logically organizing and analyzing data
- Representing data through abstractions such as models and simulations
- Generalizing and transferring this problem solving process to a wide variety of problems

*These skills are supported and enhanced by a number of dispositions or attitudes that are essential dimensions of CT. These **dispositions or attitudes** include:*

- Confidence in dealing with complexity
- Persistence in working with difficult problems
- The ability to deal with open ended problems
- The ability to communicate and work with others to achieve a common goal or solution

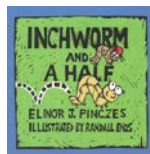
## Lesson Plan

**Time Required** – (Two 60 minute Class Periods)

**Disciplinary Vocabulary** – analyze, classify, collect, data , half-inch, interpret, key, line plot, organize, scaled, quarter-inch, unit, precise, closest to, nearest, horizontal scale

### **Materials Needed:**

- 1 Frayer model per student/ Large Chart of Frayer Model or handout under docucam
- Suggested Read Aloud: Inchworm And A Half by Elinor J. Pinczes



- Tape measures or 12 inch rulers per pair
- Roll of cash register tape marked with sizes 1-12 including fourths and halves for class line plot

- 1 sheet of cardstock per student
- scissors
- transparent tape
- bag of yarn cut for each group of 4 students to the following lengths:  
2in, 3 ½in., 4in, 5 ¼ in, 6 ¾ in, 10 ½ and 10 ¾ in.
- timer per group
- chart paper
- crayons

**Formative Assessment Strategies:** Student Dialogue, Teacher Observation, Frayer Model, Recorded Data, Class Line Plot, Group Line Plot, Exit Ticket

**Computational Thinking:** As students explore these measurement opportunities they build confidence, develop persistence in solving open ended problems that are relative to life, and construct charts and line plots to represent data collected. Students develop an understanding of the need to communicate their thinking.

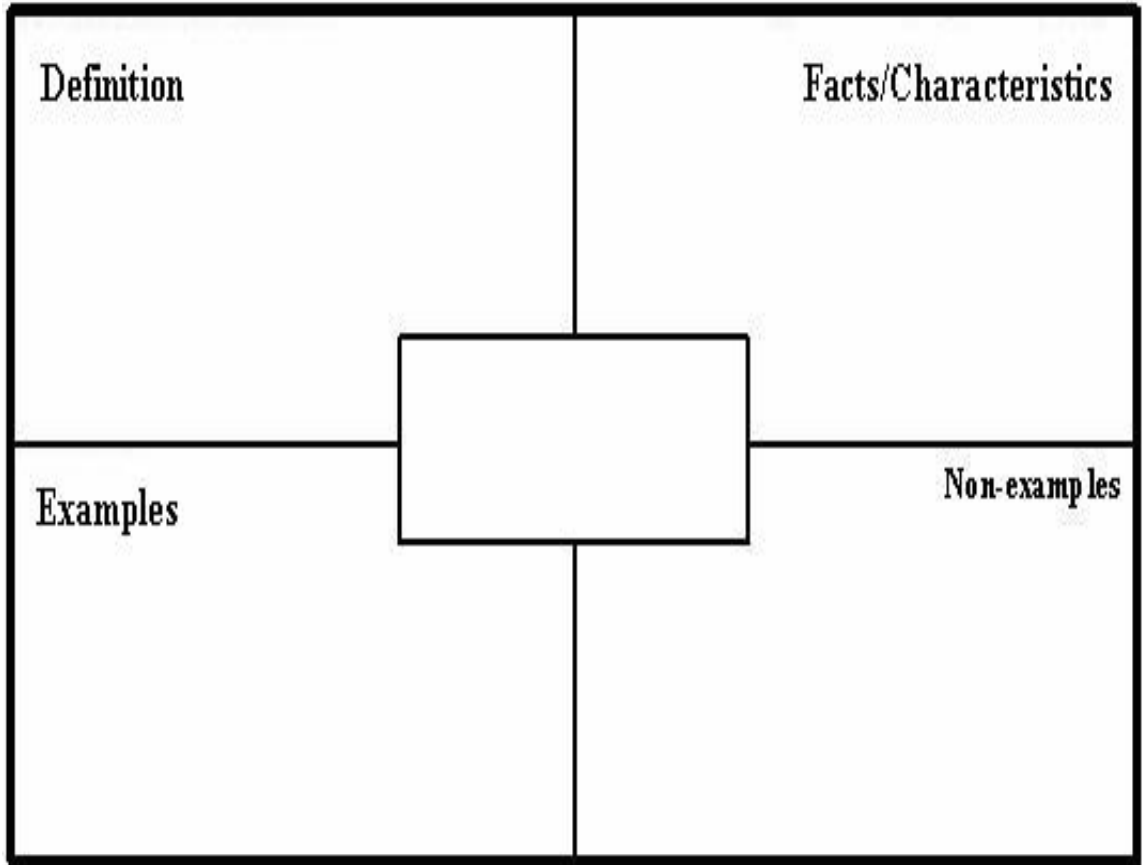
**Misconceptions:**

Students often misunderstand the numbers on hash marks as representing the mark rather than the unit or distance between marks. Demonstrate that units are from mark to mark by shading a ruler. Students often line up the item to measure with the end of the ruler rather than the 0. Have students compare two rulers to show examples of rulers with white space before the zero and rulers that begin at the end.

**Engage**

- Teacher elicits students knowledge about an inch using the Frayer Model (see below) as a pre-assessment. Question: What is an inch?  
[http://www.s2temsc.org/uploads/1/8/8/7/18873120/frayer\\_model\\_strategy.pdf](http://www.s2temsc.org/uploads/1/8/8/7/18873120/frayer_model_strategy.pdf)
- Teacher records students' thinking on chart as students record their own thinking in their notebooks on the attached "mini" Frayer model.
- Teacher elicits both examples and non examples of an inch.
- Teacher elicits facts/characteristics of an inch.
- Teacher reads aloud: Inchworm And a Half  
[http://www.s2temsc.org/uploads/1/8/8/7/18873120/read\\_aloud\\_strategy.pdf](http://www.s2temsc.org/uploads/1/8/8/7/18873120/read_aloud_strategy.pdf)
- Teacher and students update the Frayer Models with new learning as the content of the literature is discussed.

### The Frayer Model



### Data Chart (one per student)

Partner Names	Nearest Inch	Nearest 1/2 Inch	Nearest 1/4 Inch
1.			
2.			

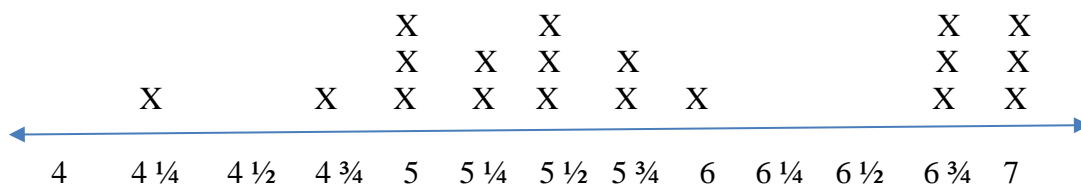
### Explore

- Students work with an elbow partner to trace each others' right foot on cardstock in pencil.

[http://www.s2temsc.org/uploads/1/8/8/7/18873120/motivating\\_and\\_engaging\\_strategies.pdf](http://www.s2temsc.org/uploads/1/8/8/7/18873120/motivating_and_engaging_strategies.pdf)

- Students cut out their footprints. These footprints are each part of the data to be discussed.
- Teacher elicits from students how they could organize their data and selects a method. (Sample data chart below)
- Students measure their footprints to the nearest inch and record data as a whole number in the data chart provided.
- As students question what to do if the print is in between inches, the teacher introduces the concept of  $\frac{1}{2}$  an inch. Teacher asks how many  $\frac{1}{2}$  inches in an inch and explains the rationale for the two representing one whole inch divided into two parts.
- The frayer models are updated to reflect new learning.
- Students record their foot measurement to the nearest  $\frac{1}{2}$  inch in the chart.
- The teacher poses the question what measurement falls between 0 and  $\frac{1}{2}$ ?
- Partners discuss their thinking and share aloud giving each pair a turn.
- The teacher asks how many  $\frac{1}{4}$  are in an inch? Students pair share then share aloud.
- The Frayer Models are updated to reflect new learning.
- Students record their measurements to the nearest  $\frac{1}{4}$  inch in the data chart.
- Teacher discusses with students which measurements are the most precise as well as situations when smaller fractions of  $\frac{1}{2}$  and  $\frac{1}{4}$  are not appropriate.
- Students select the most precise measurement for their for their footprint (to the nearest inch,  $\frac{1}{2}$  inch or  $\frac{1}{4}$  inch) and plot an x on the class line plot
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Title: Footprint Sizes in Third Grade



Key: X =1 footprint size in inches

**Teacher Note:** Discuss horizontal scale, title, numeric labels, key

- Students justify their placement by completing this prompt on their footprint...
  - On the line plot, I recorded \_\_\_\_\_ because \_\_\_\_\_.

- The class analyzes and discusses observations about the data in the class line plot.
- Students share their thinking about their foot measurement in relation to the class and affix their footprint in their notebook for reference later in the year.
- Students analyze the data and construct statements that represent their findings below on a line of learning. Partners pair share then each pair suggest trends to add to a class chart.

### Explain

- Student groups of four are given the following materials and directions:

**Materials:** bag of pre-cut yarn clippings, 12 inch rulers, chart paper, crayons, and job descriptions

<b>Timekeeper:</b> Reminds students to complete each part of the task within a certain amount of time.	<b>Supervisor:</b> Oversees work and workers ensuring products are acceptable and manages cleanup.	<b>Designer:</b> Creates graphics to include charts, lineplots, and images that enhances presentations.	<b>Recorder:</b> Writes information in charts and on line plots. Also records a summary statement of findings with help from the group.
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### Directions:

- Your group members must select a job and read aloud their job description.
  - (2 minutes)
- Complete the task of measuring the pre-cut lengths of yarn and collecting data in a chart. (10 minutes)
- Members should represent the data into a line plot that includes a title and a key for the amount represented. (10 minutes)
- Write 3 summary statements for the data collected and displayed.

### Exit Ticket:

[http://www.s2temsc.org/uploads/1/8/8/7/18873120/exit\\_slips\\_or\\_exit\\_tickets\\_strategy.pdf](http://www.s2temsc.org/uploads/1/8/8/7/18873120/exit_slips_or_exit_tickets_strategy.pdf)

A) Imagine you observe an inch under a magnifying glass. Draw what you see.

B) Draw and describe a line plot that represents fractional measurements to  $\frac{1}{4}$  inch,  $\frac{1}{2}$  inch, and inch in the horizontal scale. Include important characteristics such as a title and key.

**Other information on this indicator(s) can be found in the support documents/resources on the SC State Department website.**

*[www.ed.sc.gov](http://www.ed.sc.gov) (Instruction → Standards and Learning → Mathematics or Science → Support Documents and Resources)*

**Content Area (Disciplinary) Literacy strategies and descriptions can be found on the S2TEM Centers SC website:**

*[s2temsc.org](http://s2temsc.org) (Resources → Disciplinary Literacy Virtual Library → Strategy Warehouse)*

**Computational Thinking Reference:**

*<https://csta.acm.org/Curriculum/sub/CurrFiles/CompThinkingFlyer.pdf>*

*<https://csta.acm.org/Curriculum/sub/CompThinking.html>*

### **Additional Information**

*Level 1 lessons contain a realignment to the 2014 Science and/or the 2015 Mathematics Standards.*

*Level 2 lessons contain Level 1 information and Content Area Literacy and Disciplinary Literacy Strategies.*

*Level 3 lessons contain Level 1 and 2 information and Computational Thinking Connections.*

*Level 4 lessons contain Level 1, 2, and 3 and integration of at least 2 content areas.*