Title: Collecting data and organize into picture, line plot, or bar graph.

Grade: 3

PA Core Standard: CC.2.4.3.A.4   Represent and interpret data using tally charts, tables, pictographs, line plots, and bar graphs.

PA Connector:		Collect data and organize into picture, line plot, or bar graph.

Strand: Measurement Data and Probability	**Family:** Represent and Interpret Data

Progress Indicator: *E.DPS.1g Collecting data and representing data (e.g., bar graphs, frequency tables, line plots)*

Big Idea(s):
- Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.
- Data can be modeled and used to make inferences.

Essential Question(s):
- How can data be organized and represented to provide insight into the relationship between quantities?
- How does the type of data influence the choice of display?

Foundational Knowledge:
- Identify data set based on a single attribute (e.g., pencils vs. markers).
- Identify data set with more or less (e.g., this bar represents a set with more).
- Organize the data into a picture or bar graph using objects that represent one piece of data (may have number symbols).
- Properly label graph (e.g., axes on bar graph).
- Identify data set with some number (e.g., bar graph representing 5 pencils).
- Transfer data from one representation to another (ex. tally to bar graph)

Key Vocabulary, Concepts and Symbols:
- Identify a pictograph and bar graph.
- Concept: information can be represented in scaled pictures, graphs, tables, charts, plots
- Vocabulary: Compare, data, horizontal, vertical, axis, bar graph, tally chart, pictograph, line plot

Suggested Instructional Strategies:
- Elements of a task analysis
    - Determine data to be represented
    - What information should be collected
    - Create categories
    - Decide on source of data
    - Collect data based on categories
    - Count data sets
    - Organize data
    - Determine format to represent data (ie table, chart, graph, line plot)
- Determine if data is collected on one or more attributes (ie which category is largest and how many more in category A than B)

Supports and Scaffolds Considerations:

- Template (e.g., graphic organizer) or structure for collecting and organizing data
- Velcro/magnetic numbers on a graph
- Assistive Technology (e.g., interactive whiteboard or other software, calculator , communication device)
- Grid paper/raised grid paper to construct graph
- Pre-made graphs
- Visual support representing the steps of the process

Key Word Search:

data, bar graph, tally chart, pictograph, line plot

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- Visual support representing the steps of the process

Key Word Search:

data, bar graph, tally chart, pictograph, line plot

Title: Measuring area of rectangles by counting squares, tiling, or using addition

Grade: 3

PA Core Standard: CC.2.4.3.A.5 Determine the area of a rectangle and apply the concept to multiplication and to addition.

PA Connector:		Measure area of rectangles by counting squares, tiling, or using addition.

Strand: Measurement, Data and Probability	**Family:** Measuring Using Tools

Progress Indicator: *E.ME.1d Describing and demonstrating: unit attributes, iterating, tiling, identical units, number line intervals, standardization, proportionality, additivity, and origin*

Big Idea(s): Measurement attributes can be quantified and estimated using customary and non-customary units of measure.

Essential Question(s): In what ways are the mathematical attributes of objects or processes measured, calculated, and/or interpreted?

Foundational Knowledge:

- Count up to 20 objects using skip counting (repeated addition) in relation to the rectangle. (For example, a 3x5 rectangle's tiles can be counted by 3's or by 5's.) Model the repeated addition on a number line.
- Identify the area on a surface (e.g., piece of paper).
- Recognize that area can be determined by covering a rectangular area with square tiles that have no gaps or overlaps.
- Use square tiles to cover a rectangle.
- Count the number of tiles to determine the area.
- Decompose rectangles within a rectilinear figure.
- Select the numeric symbol that represents the number of squares used to find area of a figure.
- Count to find the area of a rectangle when given a picture or array.

Key Vocabulary, Concepts and Symbols:

- Understand the following concepts and vocabulary: area, rectangle, array

Suggested Instructional Strategies:

- Model-Lead-Test*
- Use Least Intrusive Prompts (e.g., "Put a tile on like this…")*
    - Teacher does the tiling. Student counts as tiles are taken off. Student may use an electronic counter.
- After tiling a rectangle, arrange the squares along a number line to help reinforce counting with a number line. Consider "chunking" the tiles in groups based on either the length or the width of the rectangle to practice skip counting and prepare students for multiplication.
- Overlay rectangular pieces on a rectilinear figure so that students can see the decomposition of the figure.

Supports and Scaffolds Considerations :

- 1 inch tiles
- 1 inch tiles that are numbered
- Raised grid with numbered squares
- Raised frame and raised grid
- Hand tally counter or software that counts
- Assistive Technology (e.g., interactive whiteboard or other software, calculator , communication device)
- Counting sheet that allows students to mark the tiles that have been counted

Key Word Search:
Rectangle, area, tiling, array

Title: Solving problems involving conversions of standard measurement units when finding area, volume, time lapse, or mass	
Grade: 5	
PA Core Standard: CC.2.4.5.A.1 Solve problems using conversions within a given measurement system.	
PA Connector:	Solve problems involving conversions of standard measurement units when finding area, volume, time lapse, or mass.

Strand: Measurement Data and Probability	**Family:** Scaling and Unit Conversions

Progress Indicator: *M.ME.2a Selecting and applying appropriate standard units, tools,and level of precision in real-world measurment problems (e.g., area, surface area, volume, rate)*
Big Idea(s): Measurement attributes can be quantified and estimated using customary and non-customary units of measure.
Essential Question(s): In what ways are the mathematical attributes of objects or processes measured, calculated, and/or interpreted?
Foundational Knowledge: • Match like units of measurement within a measurement system (e.g., hours to minutes, inches to feet). • Use various strategies to add, subtract, multiply, and divide. • Use a pictorial representation of a ratio to make conversions. • Understand that converting to a bigger unit will give a smaller number and converting to a smaller unit will give a bigger number. (3 feet = 1 yard; yards are a larger unit of measure than feet)
Key Vocabulary, Concepts and Symbols: • Understand the following concepts and vocabulary: volume, area, time, conversion, mass, vocabulary within the context of the problem
Suggested Instructional Strategies: • Task analysis for problem solving • Model-Lead-Test* • Least-to-Most prompts* • Provide a calendar. The teacher says there are seven days in one week and counts out each day (1-7) and points to the calendar. Say, "Show me one week." Say, "There are seven days in one week for a ratio of 7:1 (days: week). So, how many days are in three weeks?" "If you have to write two book reports per week, how many book reports will you write in four weeks?" • Students may use measuring strips to convert between measurements. For example, when given the problem *"The bookshelf is 2 yards long. There are 3 feet in one yard. How many feet is the bookshelf altogether?"* students can line up 1 foot strips along the bookcase to determine that there are 6 feet in 2 yards.

Supports and Scaffolds Considerations:

- Calendar
- Assistive Technology (e.g., interactive whiteboard or other software, calculator , communication device)
- Counters and graphic representation of ratios and fractions
- Worksheet with partially completed formula
- Balance or scale
- Clock
- Counting tiles
- Cups and gallon containers to measure volume

Key Word Search:

volume, area, time, conversion, mass

Title: Converting standard measurements of length		
Grade: 5		
PA Core Standard: CC.2.4.5.A.1 Solve problems using conversions within a given measurement system.		
PA Connector:		Convert standard measurements of length.
Strand: Measurement Data and Probability	**Family:** Scaling and Unit Conversions	
Progress Indicator: *M.ME.1b Recognizing relationships among units and using proportional reasoning to convert measurements from one unit to another within the same system*		
Big Idea(s): Measurement attributes can be quantified and estimated using customary and non-customary units of measure.		
Essential Question(s): In what ways are the mathematical attributes of objects or processes measured, calculated, and/or interpreted?		
Foundational Knowledge: - Recognize that in the same system, I can measure the same object with 2 different units (e.g., I can measure the height of a desk in both inches and feet). - Use a pictorial representation of a ratio to make conversions. - Understand that converting to a bigger unit will give a smaller number and converting to a smaller unit will give a bigger number. (3 feet = 1 yard; yards are a larger unit of measure than feet)		
Key Vocabulary, Concepts and Symbols: - Understand the following concepts and vocabulary: conversion, inch, foot, yard - Understand standard units and abbreviations (e.g., feet=ft)		
Suggested Instructional Strategies: - Multiple exemplar training (e.g., "This is an inch, this is an inch…this is not an inch, show me an inch.")* - Task analysis steps to convert from inches to feet using a table - Teach student to use proportions (e.g., 12:1, 12 inches = 1 foot) to convert the same measurement from one unit to another. - Measure length using one inch increments (how many) and one foot increments (how many). - Have students place the U.S. unit cards/representations in order from smallest to largest.		
Supports and Scaffolds Considerations - Conversion table, adapted or un-adapted measuring tools - Assistive Technology (e.g., interactive whiteboard or other software, calculator , communication device) - Counting blocks or manipulatives - Counting mechanism (e.g., number line) - Match measuring tool to unit (e.g., "Identify the tool to measure inches.") - Rulers with limited measurement (e.g., only 1 inch and ½ inch tabs)		
Key Word Search: conversion, inch, foot, yard, proportion		