Math, Grade 2, Unit 7: Data Analysis (~10 days)

Unit Overview

This unit bundles student expectations that address organizing and representing data using bar graphs and pictographs with intervals of one or more, drawing conclusions, making predictions, and writing and solving addition and subtraction problems using information in graphs. According to the Texas Education Agency, TEKS Mathematical Process Standards for Grade 2, including application, a problem-solving model, tools and techniques, communication, representations, relationships, and justifications, should be integrated (when applicable) with content knowledge and skills so that students are prepared to use mathematics in everyday life, society, and the workplace.

Prior to this Unit

In Grade 1, students collected, sorted, and organized data in up to three categories and used data to create picture graphs and bar-type graphs. They drew conclusions and generated and answered questions using information from picture graphs and bar-type graphs. Students also skip counted by twos, fives, and tens to determine the total number of objects in a set. In Grade 2 Unit 06, students generated and solved problem situations involving addition and subtraction within 1,000.

During this Unit

Students demonstrate prior understanding of the process and purpose of data collection. Students transition data representations from bar-type graphs to bar graphs and from picture graphs to pictographs. A bar graph is a graphical representation to organize data that uses solid bars that do not touch each other to show the frequency (number of times) that each category occurs. Each bar represents a category and each bar within the bar graph is independent from the other bars. Students determine the total frequency of each category, the length of each bar, by associating the end of each bar to the scale marked interval of the axis. Frequency values may be interval values on the axis or in-between interval values on the axis. A pictograph is a graphical representation to organize data that uses a picture or symbol, where each picture or symbol represents one or more than one unit of data, to show the frequency (number of times) that each category occurs. In a pictograph, the value of each picture or symbol is defined by the pictograph key. Students use skip counting or repeated addition to determine the frequency, the total value of all pictures (or symbols), including partial pictures (or partial symbols), within each category. Both vertical and horizontal orientations of bar graphs and pictographs with up to four categories and intervals of one, two, five, or ten are experienced during this unit. Students summarize the factual data and inferential data (existing data used to make predictions about future data) in bar graphs and pictographs to draw conclusions and make predictions. Students also generate and solve one-step word problems based on the information in bar graphs and pictographs with intervals of one.

To learn more about this unit, reference the Mathematics Grade 2 Overview.

After this Unit

In Grade 3, students will summarize data sets with multiple categories using frequency tables, dot plots, pictographs, or bar graphs with scaled intervals. Dot plots and frequency tables will be introduced as new forms of data representation.

Unit Vocabulary

- **Bar graph** – a graphical representation to organize data that uses solid bars that do not touch each other and a scaled axis to show the frequency (number of times) that each category occurs
- **Categorical data** – data that represents the attributes of a group of people, events, or objects
- **Data** – information that is collected about people, events, or objects
- **Factual data** – actual quantities represented in a graph used to interpret data, draw conclusions, and make comparisons
- **Graph** – a visual representation of the relationships between data collected
- **Pictograph** – a graphical representation to organize data that uses a picture or symbol, where each picture or symbol may represent one or more than one unit of data, to show the frequency (number of times) that each category occurs

Related Vocabulary

- axis/axes
- category
- comparative language
- conclusion
- frequency
- horizontal
- interval
- key
- label
- prediction
- scale of the axis
- symbols
- title
- unit of data
- vertical

Overarching Understandings and Questions

- Mathematics Grade 2 Unit 07 PA 01 from TCMPC

Standard(s): 2.1A, 2.1B, 2.1C, 2.1D, 2.1E, 2.1F, 2.1G, 2.10A, 2.10B, 2.10C, 2.10D, ELPS.c.1A, ELPS.c.2D, ELPS.c.3D, ELPS.c.3H, ELPS.c.4F, ELPS.c.5B, ELPS.c.5E

Data representations display the counts (frequencies) or measures of data values in an organized, visual format so that the data can be interpreted efficiently.

- What are the parts of a …
  - pictograph?
  - bar graph?
- How do the title and category labels describe the data being represented in a …
  - pictograph?
  - bar graph?
- What is the relationship between the data counts and the …
  - pictures in a pictograph?
  - bars in a bar graph?
  - intervals in bar graphs or pictographs?
- How are numbers and counting used when …
  - constructing graphs?
  - scaling graphs?
  - drawing conclusions?
  - answering questions?
- What types of …
  - conclusions can be drawn
  - predictions can be made
  - questions can be answered
  - … using data in a graph?
- How does a graph aid in the ability to efficiently …
  - draw conclusions
  - answer questions
  - make predictions
  - … about the data?
- What is the purpose of an organized, visual format and how does it aid in the ability to efficiently draw conclusions, make predictions, and solve problems?

Different data displays of the same data may appear different because of their unique display characteristics but the representations are equivalent in counts (frequencies) or measures of data

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values.
- How are bar graphs and pictographs alike and different?
- Why is it important to be able to use different display representations if they are equivalent in counts or data values?

Aligned Resources

Student Expectations	Engagement Ideas from Google Drive	Aligned External Resources
Vocabulary* Strategies** ● A to Z Chart (Activity | How to use) from Teacher Toolkit ● Frayer Model (Activity | How to use) from Teacher Toolkit ***Sample PBL Resources ● Everybody on the Move from Texas Performance Standards Project		
***2.10** Data analysis. The student applies mathematical process standards to organize data to make it useful for interpreting information and solving problems.*		
***2.10A** Explain that the length of a bar in a bar graph or the number of pictures in a pictograph represents the number of data points for a given category.*	● Creating a Bar Graph ● Creating a Pictograph ● Graphing Skittles ● Graphing Birthdays ● Use Data to Create Graphs ● Graphing Written Reflection	Videos: ● Creating a Bar Graph from Khan Academy ● Bar Graphs from Second Grade from Youtube ● Picture Graphs from Second Grade from Youtube Resources: ● Creating Bar Graphs from Reading Rockets ● Create Bar Graphs from IXL ● Constructing Bar Graphs from Math Goodies ● Pictographs from Math Is Fun ● Bar Graphs and Picture Graphs from Number Rock Discovery Education: (membership required for access) ● Bar Graph ● Pictograph ● Pictographs Activity
***2.10B** Organize a collection of data with up to four categories using pictographs and bar graphs with intervals of one or more.*		
***2.10C** Write and solve one-step word problems involving addition or subtraction using data represented within pictographs and bar graphs with intervals of one.*	● Favorite Animals Graph and Questions ● Favorite Colors Graph and Questions ● Favorite Sports Graph and Questions ● Tic Tac Graph Game ● Exit ticket (Activity | How to use) from Teacher Toolkit	Videos: ● Pictograph Word Problems from YouTube Resource ● Reading Bar Graphs from I Know It ● Creating and Reading Graphs from K5 Learning ● Drawing conclusions and making predictions from graphs from Math4Texas ● Data Analysis Activities from Soft Schools ● Grade 2 Reading Bar Graphs from Woot Math ● 20 Graphing Activities for Kids that Really Raise the Bar from We Are Teachers
***2.10D** Draw conclusions and make predictions from information in a graph.*		
Directly Taught **2.1** Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding.		
***2.1A** Apply mathematics to problems arising in everyday life, society, and the workplace* ***2.1B** Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.* ***2.1C** Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, and number sense as appropriate, to solve problems.* ***2.1D** Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, ~~graphs~~, and language as appropriate.* ***2.1E** Create and use representations to organize, record, and communicate mathematical ideas.* ***2.1F** Analyze mathematical relationships to connect and communicate mathematical ideas.* ***2.1G** Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.*		