

TEKS Cluster: Data Analysis

2.10 Data analysis. The student applies mathematical process standards to organize data to make it useful for interpreting information and solving problems.

Representation of Data

Supporting Standards

- 2.10(A) 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
- 2.10(B) organize a collection of data with up to four categories using pictographs and bar graphs with intervals of one or more

Interpretation of Data

Readiness Standards

- 2.10(C) write and solve one-step word problems involving addition or subtraction using data represented within pictographs and bar graphs with intervals of one

Supporting Standards

- 2.10(D) draw conclusions and make predictions from information in a graph

2.10(A) **2.10 Data analysis.** The student applies mathematical process standards to organize data to make it useful for interpreting information and solving problems. The student is expected to:
(A) 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

Role in Concept Development

Supports

- 3.8(A) summarize a data set with multiple categories using a frequency table, dot plot, pictograph, or bar graph with scaled intervals
- 2.10(C) write and solve one-step word problems involving addition or subtraction using data represented within pictographs and bar graphs with intervals of one

Connection/
Relevance

Understanding that the length of the bar graph or the number of pictures in a pictograph represents the number of data points for a given category supports a student in accurately solving addition/subtraction problems and summarization of data.

When to Teach



Before/Prerequisite to 3.8(A), 2.10(C)

Instructional
Implications

According to 2.10, students organize data (e.g., results of a poll of second grade students' favorite color) in a bar graph or pictograph. As students begin organizing the data, they need to understand the difference between category (e.g., red, green, blue, etc.) and data points (e.g., number of students that selected a particular category). The length of bar graph or the number of pictures in a pictograph identifies the number of data points for a particular category.

Learning from
Mistakes

- Students may make the following mistakes:
- Misinterpreting pictographs by comparing the size of pictures instead of quantity of data (see example at right)

Horses	
Rabbits	

Stimulus

Word Problem	Verbal Description	Chart/Table	Graph
Equation/Expression	Manipulatives	Diagram/Image	Number Line
Base Ten Blocks	Measurement Tool	Formula	Geometric Figures

Academic Vocabulary

bar graph
category
pictograph

2.10(B)

2.10 Data analysis. The student applies mathematical process standards to organize data to make it useful for interpreting information and solving problems. The student is expected to:

(B) organize a collection of data with up to four categories using pictographs and bar graphs with intervals of one or more

Role in Concept Development

Supports

- 3.8(A) summarize a data set with multiple categories using a frequency table, dot plot, pictograph, or bar graph with scaled intervals
- 2.10(C) write and solve one-step word problems involving addition or subtraction using data represented within pictographs and bar graphs with intervals of one

Connection/
Relevance

Having students collect, sort, and organize their own data allows students to be able understand how to solve various problems based on the data. Understanding how to create and interpret data using pictographs and bar graphs will evolve into the use of frequency tables and dot plots in future grades.

When to Teach

Before/Prerequisite to 3.8(A), 2.10(C)

Instructional
Implications

It is imperative for students to generate a question before a unit of study on data (e.g., What type of flowers grow in my Grandmother’s garden?). Instruction should encourage students to extend beyond two categories (e.g., roses, carnations, and daffodils), yet restrict the sorting to within four categories (e.g., sorting by the different color of flowers may yield too many categories). Students are then to collect their own data as this will make more of a personal connection when interpreting the data. Students will organize their data through the use of a pictograph (one picture/icon represents one or more than one piece of data) or bar graph (using intervals of one or more). Ensure that students title and label their models/representations.

Learning from
Mistakes

- Students may make the following mistakes:
- Misrepresenting data on pictographs in which each picture represents a value other than one
 - Misrepresenting data on bar graphs that have scaled intervals

Stimulus

Word Problem	Verbal Description	Chart/Table	Graph
Equation/ Expression	Manipulatives	Diagram/Image	Number Line
Base Ten Blocks	Measurement Tool	Formula	Geometric Figures

Academic Vocabulary

bar graph
category
data/information
graph title
interval/scale
label
legend (key)
pictograph

TEKS Scaffold

TEKS	Student Expectation
3.8(B)	solve one- and two-step problems using categorical data represented with a frequency table, dot plot, pictograph, or bar graph with scaled intervals (S)

2.10(C) **2.10 Data analysis.** The student applies mathematical process standards to organize data to make it useful for interpreting information and solving problems. The student is expected to:

(C) write and solve one-step word problems involving addition and subtraction using data represented within pictographs and bar graphs with intervals of one

1.8(C)	draw conclusions and generate and answer questions using information from picture and bar-type graphs (R)
K.8(C)	draw conclusions from real-object and picture graphs (R)

Stimulus

Word Problem	Verbal Description	Chart/Table	Graph
Equation/Expression	Manipulatives	Diagram/Image	Number Line
Base Ten Blocks	Measurement Tool	Formula	Geometric Figures

Content Builder (see Appendix for Tree Diagram)

- Write one-step word problems using addition with:
 - pictographs
 - bar graphs
- Solve one-step word problems using addition with:
 - pictographs
 - bar graphs
- Write one-step word problems using subtraction with:
 - pictographs
 - bar graphs
- Solve one-step word problems using subtraction with:
 - pictographs
 - bar graphs

Instructional Implications

As students organize their data into pictographs and/or bar graphs [see 2.10(B)], instruction should then lead students to creating their own questions (e.g., How many more daffodils did my grandmother have in her garden than roses? How many roses and carnations are there in Grandma’s garden?). Designing appropriate questions that relate to the data is an informal way to assess whether students understand the information represented in the graphs. Students could then exchange their graphs and ask fellow classmates to answer their self-generated questions. Note that while students must organize data with interval graphs of one or more [2.10(B)], the writing and solving of problems is limited to graphs with intervals of one only [2.10(C)].

Learning from Mistakes

Students may make the following mistakes:

- Misinterpreting pictographs in which each picture represents a value other than one
- When representing the same set of data on the two types of graphs, interpreting the data as different because they are represented with different graphs
- When representing the same set of data vertically and horizontally, interpreting the data as different because of the difference in the visual representations
- Applying the use of “key words” instead of understanding the context of the problem

Academic Vocabulary

bar graph
 joining/separating/comparing
 pictograph

2.10 Data analysis. The student applies mathematical process standards to organize data to make it useful for interpreting information and solving problems. The student is expected to:

(D) draw conclusions and make predictions from information in a graph

Role in Concept Development

Supports 2.10(C) write and solve one-step word problems involving addition or subtraction using data represented within pictographs and bar graphs with intervals of one

Connection/Relevance Drawing conclusions and making predictions from information in a graph allows students to write and solve associated word problems more effectively.

When to Teach With 2.10(C)

Instructional Implications As students have collected their own data and organized it into graphs [see 2.10(B)], they are able to draw more logical conclusions and make more educated predictions. Students are better able to articulate the type of information when it is personal. Students naturally give factual responses (e.g., my grandmother has 18 daffodils, 4 roses, and 16 carnations in her garden; she really loves flowers) and inferential responses (e.g., roses must not grow very well in that type of soil as it was the fewest number of flowers grown).

Learning from Mistakes Students may make the following mistakes:

- Misinterpreting pictographs in which each picture represents a value other than one
- Misreading bar graphs that have scaled intervals
- When representing the same set of data on the two types of graphs, interpreting the data as different because they are represented with different graphs
- Applying the use of “key words” instead of understanding the context of the problem
- Confusing the context of joining (addition) and separating/comparing (subtraction)

Stimulus

Word Problem	Verbal Description	Chart/Table	Graph
Equation/Expression	Manipulatives	Diagram/Image	Number Line
Base Ten Blocks	Measurement Tool	Formula	Geometric Figures

Academic Vocabulary

Math	Social Studies
bar graph comparative language (more than/less than/equal to) frequency table pictograph	categorizing compare and contrast interpret main idea predict print material sequencing visual material



Social Studies Connection: Interpretation of Data

Student Expectations

2.15(B) interpret oral, visual, and print material by sequencing, categorizing, identifying the main idea, predicting, comparing, and contrasting (P)

Instructional Implications

Use social studies topics (voting patterns, counts of community services, or public officials, etc.) to interpret data from local newspapers and other media. Compare public opinion polls and discuss how data can be used to communicate a message.