

Hidden Ducks: Describing and Interpreting Data

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Math Objective

Children learn about data that can be recorded in numbers. Children learn about data points, data sets, range, mean, mode, and median. They plot data on a number line, chart, or table. Children draw conclusions from data sets and solve real-world problems.

iMath Discover Activity

In this activity, children use number cubes to create a set of numbers. Next, they find the mean and create a hands-on model of it. Children then find the range, mode and median.

► Objectives

Children will:

- create numbers and add sums.
- make a hands-on model of the mean.
- use an algorithm to find the calculated mean of the data.
- find the range.
- learn the median.
- discover the mode.
- order numbers from the least to the greatest.

Materials

- 3 number cubes
- counters, various colors
- paper
- pencil

Lesson Plan

Before Reading

Investigation

Ask children to look at the picture on pp. 4–5. Read the text. Ask: *Have you attended camp? Have you camped out overnight? Have you set up a tent in your house or apartment? Describe what it was like.* Record children’s answers on the board.

Ask: *What are some ways that we record and show data? Why is it necessary to show data in an organized way?* Record children’s answers on the board.

Math Concepts

Connecting to what they know helps children engage in the topic.

Accessing prior knowledge gets children to think about and engage with the topic.

Children go to Math Camp and learn how to record all sorts of data. They discover how to use and analyze the information by finding the mean, the median, the range, and the mode of the data.

During Reading

Investigation

pp. 6–9: Invite a volunteer to read p. 6 and the top of p. 7 aloud. Ask: *What is a data point?* Record children’s answers. Invite a volunteer to order the numbers from p. 6 from least to greatest value on the board. Talk students through the text using the number line. Ask: *What is an outlier?* Ask children to call out seven more two- and three-digit numbers. Have them find the range and median of those numbers and plot them on a number line. Then, read the rest of p. 7 aloud. Ask: *What is the difference between the median and the mean?* Have children answer the questions at the bottom of p. 7. Read p. 8 aloud. Have children find the mode and answer the questions. Read p. 9 aloud. Say: *Let’s create our own tally chart. How many of you have a dog? How many of you have a cat? Do any of you have any other kinds of pets?* Make a tally chart and find the mode.

Math Concepts

Children understand that data are information, usually in the form of numbers. A data point is one piece of information in a data set. Children learn to find the range and order numbers from the least to the greatest value. They understand that the median is the number that falls in the exact middle of a set of data. They also understand that in the case of an even number of data, the median is the average of the two middle values. Children plot data points on a number line. They learn what an outlier is, and they find the mean. They understand that the mean is an average for a set of data. They understand that the mode is the value that occurs most frequently in a set of data. Children use a chart or table to show a set of numbers. They understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

During Reading (continued)

Investigation

pp. 12–14: Read pp. 12–13 aloud. Ask: Do you remember how to find the range? Have children look back at p. 6. Let children work in pairs to order the numbers and find the range and the average number of visitors to the park per week. Children plot the values on a number line. Then, invite a volunteer to draw the problem on the board and show the solutions. Read p. 14 aloud. Ask: *What is the meaning of the word mode? Let's find the word's meaning in an online dictionary. Mode can mean a style of dress or music or describe a mood. In our case, the mode is the most frequent value of a set of data. What is the mode in the problem on p. 14?* (Refer back to p. 8 if necessary.) Have children continue working in pairs to create a number line that shows the data in the table. Invite a volunteer to draw the number line on the board.

pp. 15–18: Before class, hide six rubber ducks with numbers on them somewhere in the classroom. Invite a volunteer read p. 15 aloud. Ask: *What is the answer to the question on this page?* Children work alone using pencil and paper to find the answer. Demonstrate how to work the problem on the board after children have finished their attempt. Present children with a clue so they can find the first rubber duck with the number on it. When they find the duck, record the first number on the board. Read pp. 16–17 aloud. Ask: *What does an anemometer measure?* Encourage children to find the range of temperatures for the 24-hour period. Say: *Remember, find the least and greatest numbers and subtract to find the range.* Read p. 18 aloud. Have children answer the questions on this page.

Math Concepts

Children analyze a table and order the data points from least to the greatest. They find the average and plot values on a number line. Children make comparisons between numbers and draw conclusions. They analyze and evaluate the numbers on a tally table. They find the mode for the data set.

Children understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. Children use division to find an answer using a ratio. Children learn about meteorological tools including a weather vane, a thermometer, and an anemometer. Children determine range and average after analyzing a line graph and a double line graph.

During Reading (continued)

Investigation

pp. 19–21: Invite children to read p. 19 silently. Ask: *What is the outlier in this data set? Do you remember how to find the median? The word median is based on a Latin word that means middle.* Remind children that the median is the number that falls in the exact middle of a set of data. In the case of an even number of data, the median is the average of the two middle values. When children find the answer, give them a clue to find another duck. Record the number from the second duck on the board. Read pp. 20–21 aloud. Invite volunteers to give suggestions on how to solve the problem on p. 21. Record their suggestions and show how to find the answer to the problem.

pp. 22–23: Children read pp. 22–23 silently. They work each problem using pencil and paper. Have them refer back to pp. 6–9 if necessary. Review their work. When children find the answer to the problem, give them a clue to find the third duck. Record the number from the duck on the board.

pp. 24–28: Read pp. 24–26. Let children take turns reading aloud. Have children pair up to work the problems on pp. 26–28. Have pairs present their solutions after an appropriate amount of time.

pp. 29–32: Children continue to work in pairs. Read p. 29 aloud. When children answer the question on that page correctly, reward them with a clue to find another rubber duck. Record the number from the duck. Invite volunteers to read pp. 30–32. Ask: *What is variability? What is range? How do you find the range?* Have pairs answer the questions. Invite them to volunteer answers.

Math Concepts

Children read a rainfall graph, identify any outliers, and find the median in a group of even numbers. They understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. Children use division to find an answer using a ratio.

Children read a table with two data sets. They find the median number for each set and make comparisons. Children analyze a number graph to find the mode for a data set.

Children review the origins of park systems in the United States, Mexico, and Canada. They review a number graph and a table and draw conclusions from the data sets. In another table, children find the mean and identify outliers.

Children read and analyze a histogram and draw conclusions. They learn about the uses of data sets and tables and charts and predict what information can be identified in them. Children are introduced to variability in a data set. They find the range and average, or mean in a data set.

During Reading (continued)

Investigation

pp. 33–34: Children work within the larger group. Read p. 33 aloud. When children answer the question on that page correctly, reward them with a clue to find another rubber duck. Record the number on the duck. Read p. 34 aloud together. Say: *Remember, the mean is an average for a set of data. How many data points does this set of data have? Why is that important? How do you find the average of a set of numbers?* Invite children to solve the problem and tell how they arrived at the answer.

pp. 35–37: Read p. 35 aloud together. Ask: *What is the difference between the mean and the median number? How do you find the mode?* Invite children to solve the problem and tell how they arrived at the answer. Read pp. 36–37 together. Ask: *How do park rangers use math? Can you think of some other ways they might use math?*

pp. 38–40: Read p. 38 aloud together. Have children make a chart that ranks the activities from the most popular to the least. Provide drawing paper and art materials. Have children answer the questions on p. 38 using their chart. Read pp. 39–40 aloud. Ask: *What is a histogram?* Invite children to look the word up in the dictionary and then answer the question on p. 40.

pp. 41–44: Read p. 41 aloud. When children answer the question on that page correctly, reward them with a clue to find another rubber duck. Read p. 42–44 aloud together. Encourage children to discuss different strategies. Have children create ways to help them remember the difference among mean, median, range, and mode.

p. 45: Read p. 45 aloud together. Brainstorm different ideas with children.

Math Concepts

Children read a table and identify the mean, the range, the median, and the mode for a data set. They use a tally table to analyze a set of data and find the mean. They use a table to find the median number and the mode.

Children learn about sampling and how park rangers use math skills in their work with animals.

Children use a tally table to interpret data. They order data from greatest to least and draw conclusions. They use a histogram to analyze data.

Children read a table and find the average using decimals. They review different strategies to find the mean, median, mode, and range in a data set.

Children use creative thinking and mind-mapping to brainstorm ideas for their project.

After Reading

Ask children to restate the key ideas in the book.

Investigation

Have children accompany you on a bird-watching walk. Borrow as many binoculars and bird-identification books as you can, so that children have an opportunity to observe and identify a bird closely. Have children identify, sketch, and keep a tally of the birds they see. Have them find the mean, median, mode, average, and range of the numbers in the tally chart.

Children make a chart of the numbers that were attached to the rubber ducks and recorded on the board. From the information they find by analyzing the numbers, they guess what the numbers represent. Give children three clues if necessary. The numbers might represent attendance over a week or numbers of books read in a library challenge.

Understanding Math

Children use a real-world situation to learn the uses of recording data in a chart or table.

Children use a real-world situation to learn ratio concepts and use ratio reasoning to solve problems.