DATA AND PROBABILITY

Grade 5

BIG IDEA (1): Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them

	CONCEPT	EXPECTATION	EXAMPLE
A	Formulate questions	Evaluate data collection methods	Problem: Mr. Addemup wants to know what clubs his students belong to. What is the best method for him to collect the information? A. Survey every student that is at the Math Club meeting. B. Survey students who stay after school for track. C. Survey every student at noon recess. D. Survey every student in his class. Answer: D Problem: A teacher brought a large bag of cereal to school. Each student was allowed to take one handful at snack time. The students did not think this was fair because some of them had larger hands than others. What is a fair way of serving the cereal to all students? Answer: *Answers may vary. Examples:* Have one person distribute handfuls to everyone; use a small cup to distribute a cupful to everyone; etc.

CONCEPT	EXPECTATION	EXAMPLE
		TEACHER NOTES: "If students collect their own data, they need to decide whether it is appropriate to conduct a survey or to use observations or measurements. As part of their plan, they often need to refine their question and to consider aspects of data collection such as how to word questions, whom to ask, what and when to observe, what and how to measure, and how to record their data. When they use existing data, they still need to consider and evaluate the ways in which data are collected."[1]

[1] National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (pp. 177–178). Reston, VA: Author.

	CONCEPT	EXPECTATION	EXAMPLE
C	Represent and interpret data	Describe methods to collect, organize and represent categorical and numerical data	Problem: Identify each of the following as categorical (C) or numerical (N) data. 1. Student heights 2. Preferred ways of traveling 3. Favorite candy 4. Number of siblings you have Answers: 1. N 2. C 3. C 4. N Problem: Give an example of categorical data that could be collected in our classroom, and explain why it would be considered categorical data.

DEFINITIONS:

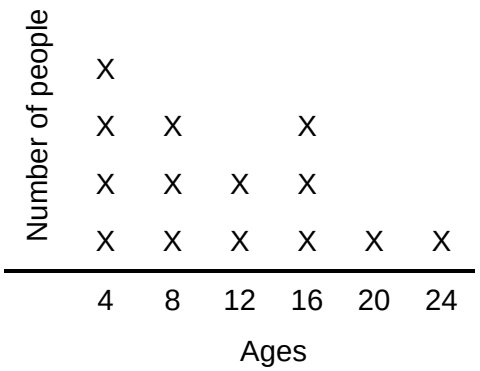
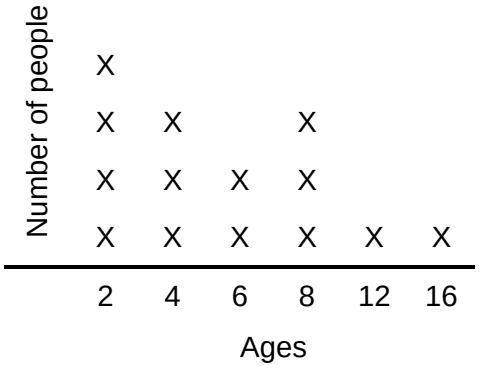
categorical data—data that represent individuals or objects by one or more characteristics or traits they share, such as maleness or femaleness or blue eyes or green eyes. Categorical data are often treated as counts, proportions, or percentages of people or things in them.[2]

numerical data— represent objects or individuals by numbers assigned to certain measurable properties, such as length or age.[3]

[2] *Navigating through data analysis and probability in grades 3–5* (p. 19). (2002). Reston, VA: National Council of Teachers of Mathematics.
[3] *Navigating through data analysis and probability in grades 3–5* (p 19) .(2002). Reston, VA: National Council of Teachers of Mathematics.

CONCEPT	EXPECTATION	EXAMPLE
		Answer: *Answers may vary*. *Examples:* eye color, types of shoes, favorite sport, favorite type of music, hair color, etc. This is an example of categorical data because it represents characteristics or traits we share. TEACHER NOTES: Numerical data include categories such as age, number of students in a class, etc.

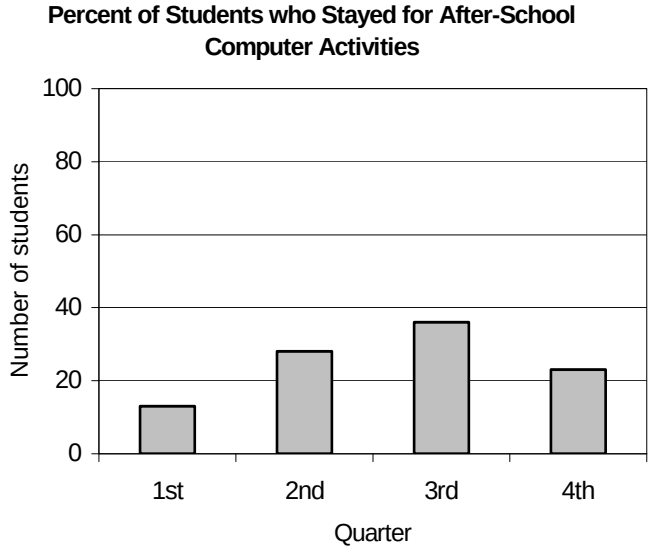
BIG IDEA (2): Select and use appropriate statistical methods to analyze data

CONCEPT	EXPECTATION	EXAMPLE
A Describe and analyze data	Compare related data sets	Problem: The two representations below show the ages of people who had tickets for a carnival ride on two different days. Describe the similarities in the two. 1.  2. 

CONCEPT	EXPECTATION	EXAMPLE
		Answer: They are both line plots. The same number of people is shown on both plots. The youngest riders form the largest age-group on both days.

CONCEPT	EXPECTATION	EXAMPLE
B Compare data representations	Compare different representations of the same data and evaluate how well each representation shows important aspects of the data	Problem: The chart and graph below contain data regarding the number of fifth graders who stayed for after-school computer activities during the school year.

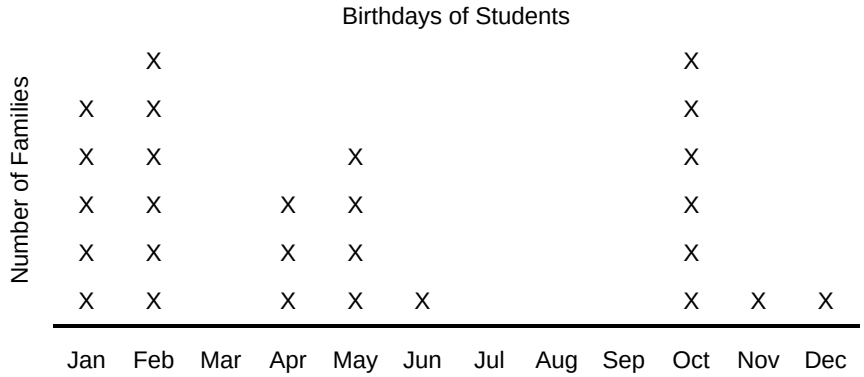
Quarters	Percent of Students Who Stayed for After-School Computer Activities
First Quarter	13%
Second Quarter	28%
Third Quarter	36%
Fourth Quarter	23%



Identify the information that you can find out from the bar graph that you cannot find out from the chart.

CONCEPT	EXPECTATION	EXAMPLE
		Answer: An estimated number of students that stayed each quarter; an estimated total number of students that stayed the whole year; an estimated number of how many more students stayed one quarter than another. TEACHER NOTES: With technology, students can easily examine several representations of the same data. They can use different scales in graphs and discuss how changes in scale clarify or distort various aspects of the data.

BIG IDEA (3): Develop and evaluate inferences and predictions that are based on data

	CONCEPT	EXPECTATION	EXAMPLE
A	Develop and evaluate inferences	Given a set of data make and justify prediction(s)	Problem: The line plot below shows the birthdays of students in a fifth-grade grade classroom. Mr. Brown, the school principal, sends every student in school a birthday card. Since there are no birthdays listed for March, July, August, and September, he thinks he will not need birthday cards for those months. Do you agree or disagree? Explain why.  Answer: Disagree. Even though no fifth-grader in that particular classroom has a birthday during those months, there may be other students in the school who have birthdays during those months.

CONCEPT	EXPECTATION	EXAMPLE
		Problem: The following table shows the number of minutes Jan was able to run without stopping. Based on this data in the table, in what week can she expect to run 16 minutes without stopping? Explain your answer. Answer: The chart shows that Jan was able to run 2 minutes more than the previous week, so she should be able to run 13 minutes in week 5, 15 minutes in week 6, and 17 minutes in week 7, which means she could also run 16 minutes that week.

Week	Minutes Run
1	5
2	7
3	9
4	11

BIG IDEA (4): Understand and apply basic concepts of probability

	CONCEPT	EXPECTATION	EXAMPLE
A	Apply basic concepts of probability	Describe the degree of likelihood of events using words such as certain, equally likely and impossible	Problem: A box contains four red tiles, five green tiles, four blue tiles, and six orange tiles. If you can draw one tile from the box without looking, which of the following statements will be true? A. You are likely to draw a green tile. B. You are as likely to draw a red as a green tile. C. You are as likely to draw a red as a blue tile. D. You are likely to draw a brown tile. Answer: C Problem: The bags below contain the names of all the fifth-grade students in Mr. Conseco's class. Mr. Conseco needs to draw one name from those bags. If the name drawn must have at least three letters, which bag should Mr. Conseco draw from to make certain he draws a name with at least three letters? Explain your answer.

CONCEPT	EXPECTATION	EXAMPLE
		
		Answer: He would need to draw from Bag B because all the names in it have at least three letters. Bag A contains Ty's name which only has two letters. Problem: Some fifth graders are playing a game. Megan's game card is shown below. 27 9 21 51 48 15 12 39 24 33 For each number on her card that matches the statement the teacher reads, she scores five points. Which of the statements below would make it impossible for Megan to score any points? A. Multiples of 5 B. Factors of 36 C. Prime numbers D. Even numbers

CONCEPT	EXPECTATION	EXAMPLE
		Answer: C TEACHER NOTES: Students should begin to learn about probability as a measurement of the likelihood of events. They should explore probability through experiments that have only a few outcomes. For example, they could play games with spinners with certain portions shaded to figure out how likely it is that the spinner will land on a particular shaded region.[4]

[4] National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics* (p. 181). Reston, VA: Author