

GRADE 5-CONTENT STANDARD #7
ACTIVITY D
Permission Granted

Representing Data

Introduction

Objective □ Students will be able to choose and construct an appropriate graphic representation for a given set of data.

Context □ Students have had several experiences working with data as well as constructing and interpreting different types of graphs. They are ready to look critically at data sets and determine the best graphic representation for the data.

NCTM Standards Focus

Often students are presented with graphs already constructed and asked to interpret them. Rarely do students at this grade level discuss graphs as communication devices and decide what type of graph best communicates the information that needs to be presented. In this standards-based lesson, students will look at information they need to communicate and try to represent it in three different ways. By making three different types of graphs to display the same information, students will gain a better understanding of the advantages and disadvantages of the different representation of the same data.

Communication Communication is at the heart of this lesson. Students will understand that they are not just making a graph, but that they are using a graphic tool to communicate information.

Reasoning Students will use reasoning skills to determine what they believe to be the best type of graphic representation for a given set of data. They will construct a graph, present it to the class, and explain their reasons (in writing, as well as orally) for choosing to display the data as they did.

Representation Students will create three different representations of the same data. They will look at the different representations and analyze how effectively each representation conveys the given data. This lesson will let students begin to see that some representations do a better job of conveying information than do others.

Teaching Plan

Materials □ Student pages A.177-177a; graph paper; unlined paper; optional materials for making graphs such as colored pencils; examples of bar graphs, pictographs, and line graphs

[Source: [Connect to NCTM Standards 2000-Fifth Grade](#), Creative Publications, Inc., pages 18-23]

A.173

INTRODUCE THE LESSON by showing students examples of a pictograph, a bar graph and a line graph. Ask students to look at the graphs and to describe the information that each graph communicates. The following questions might help focus the discussion:

- *What is the purpose of the graph?*
- *What is the graph maker trying to tell you?*
- *Do you think he or she was successful? Why? Why not?*
- *Did any one thing stand out about the graph?*
- *Would a different type of graph do a better job of communicating the information?*

Focus the discussion on the types of graphs that students looked at. *Do you think this kind of graph is a good one for communicating the message? Why or why not?*

CONTINUE THE LESSON by organizing the class into groups of three. Groups of three work best since each group will make three graphs. Give each student graph paper and a copy of student page A.177. Tell students that they should work each problem, making a pictograph, a bar graph, and a line graph to display the data given in the problems.

Students may find it difficult to construct a particular graph for certain situations, but they should try several ideas before giving up. Doing so will help them understand why some graphs may be better in some situations than others. The sunset and the food data present real challenges for making a pictograph. Because time is a continuous measure, it is a difficult measure to represent as an object. A possible solution might be to have one sun stand for each hour after noon. The lunch data is a bit more easily displayed in a pictograph. Students could have a picture of a lunch tray represent a certain number of meals. The important thing to remember is that not all data sets lend themselves to all kinds of graphs. The key goal of this lesson is to have students begin to recognize what kinds of graphs are best suited for representing a particular set of data.

AS THE STUDENTS MAKE THEIR GRAPHS, circulate and ask them how the type of graph they are making suits the information they are trying to represent. When the groups are finished pull the class together for a discussion of what students

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There are many things that people can do to enhance their points of view when making graphs. This lesson focuses on the types of graphs students may make; however some students may notice that they can manipulate the data within the type of graph to better show their points of view. Depending on the time you have, you may wish to discuss such issues without losing the focus of the lesson—that is, what type of graph best represents a particular data set.

[Source: [Connect to NCTM Standards 2000-Fifth Grade](#), Creative Publications, Inc., pages 18-23]

A.174

discovered. *Do some types of graphs do a better job displaying certain kinds of data? Are there cases when it doesn't make sense to use a particular kind of graph? Are some kinds of data better shown on a particular kind of graph?* You may wish to use the same list of questions that were used to evaluate the graphs in the beginning of the lesson. While there are no definite answers to the questions, students need to back up their choices with solid reasoning.

Possible Student Responses

Problem 1

The sunset information might be best displayed in a line graph since the goal is to show change over time and the line graph will do that. A bar graph with bars close together will also show change over time.

Problem 2

The classroom information could be displayed in either a pictograph or a bar graph. But a pictograph could provide a visual that would attract attention in the newspaper.

Problem 3

The data from the cafeteria study may be best displayed in a bar graph since the goal is to compare information. A pictograph will probably give a less exact picture of the data since there will need to be partial units. The line graph probably does not add anything because there is no trend that is being looked at.

CONTINUE THE DISCUSSION leading students to make generalizations about the usefulness of the different kinds of graphs.

- *What kinds of data are best displayed in a pictograph? In a line graph, in a bar graph?*
- Are there any cases when one kind of graph works as well as another?

If so, why might you choose one over the other?

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There are many things that people can do to enhance their points of view when making graphs. This lesson focuses on the types of graphs students may make; however some students may notice that they can manipulate the data within the type of graph to better show their points of view. Depending on the time you have, you may wish to discuss such issues without losing the focus of the lesson—that is, what type of graph best represents a particular data set.

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If the following points are not brought out in the discussion, present them to the class for their consideration:

- A pictograph is often good for comparing data that is concrete and visual, such as hamburgers sold per day of the week.
- A bar graph is also good for comparing data. Since it uses bars it can focus on the scale of the difference between data points. A bar graph is also useful for conveying information that is not visual or concrete, such as the finish times of five different swimmers in a race.
- A line graph is useful for showing trends, such as the high temperatures for the week.

Student Pages

Student page A.177 provides the three problems that students use in class. The problems provide the basis for discussion about the suitability of certain graphs for a particular set of data. Student page A.177-a gives students a situation and a set of data and asks them to make the appropriate graph and explain why their graph is the best one for displaying the given information.

Assessment

While students worked in groups, you observed them reason and select what they believed to be the best graphic representation of the given data. You assessed their ability to convey their reasoning when presenting to the whole class. You then observed how students could transfer this group experience into one where they were working on their own.

NCTM Standards Summary

In this lesson, students reasoned about how to convey information in the best format, deciding which type of graph would best communicate the given information. They constructed several different graphic representations of the same data and evaluated the results.

[Source: [Connect to NCTM Standards 2000-Fifth Grade](#), Creative Publications, Inc., pages 18-23]

A.176

Answers

Page A.177

Answers will vary.
Suggested answers are given in the lesson.

Page A.177-a

Answers may vary.
Suggested answer: A line graph will do a good job of showing a trend towards the goal.

Representing Data**Solve the problems.**

1. Mimi is doing a report on weather and the change of seasons. She wants to make a graph showing that the sun sets later each day as the days progress from January to June. She has the time of the sunset for the first day of each month.

All times are Central Standard Time	
January	4:30 p.m.
February	5:06 p.m.
March	5:43 p.m.
April	6:19 p.m.
May	6:53 p.m.
June	7:27 p.m.

2. A newspaper is doing an article on the size of schools in the local school district. The reporter wants to make a graph that shows the number of classes in each school. He believes that some of the schools are too large.

School A	28 classrooms
School B	18 classrooms
School C	25 classrooms
School D	12 classrooms
School E	30 classrooms

3. The school cafeteria manager is studying what lunches students like and buy. She needs to make decisions about how many lunches to make and what choices to offer. To begin her study she made a list of lunches sold last week. The manager wants to display the information in a graph.

Item	Lunches Sold
Pizza	65
Fish	24
Chicken	37
Spagetti	49
Hamburgers	86

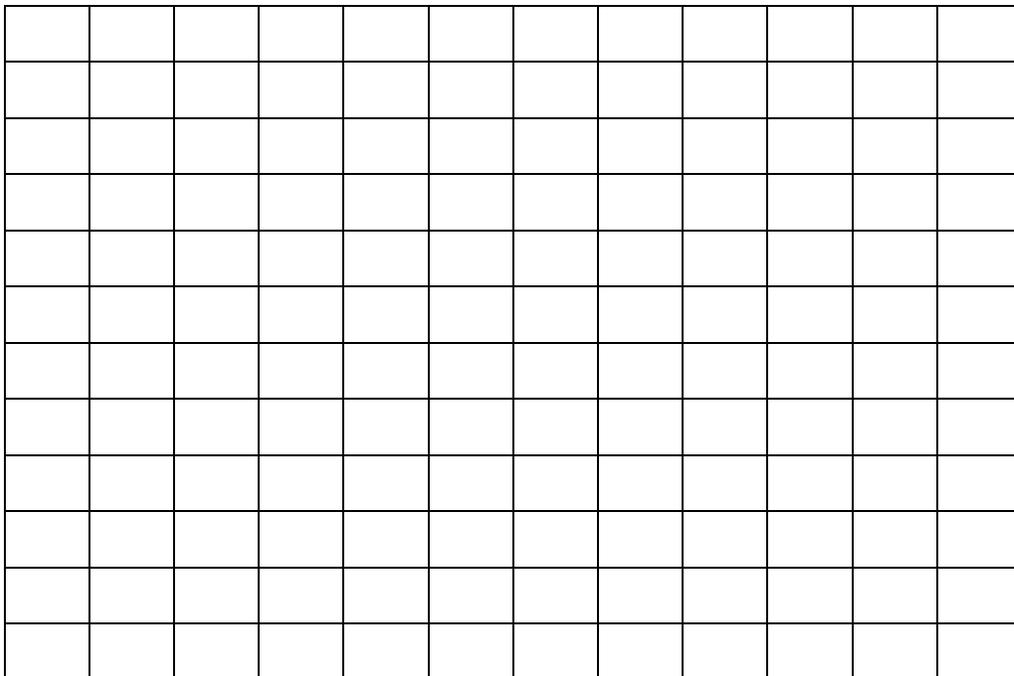
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Representing Data

**Make the graph you believe best communicates the information.
Explain your reasoning.**

∂ You are going on a hiking vacation in the summer. Your goal is to work up to taking a 20-mile hike. Below are the distances you hiked on the last six Saturdays. Make a graph that would convince someone you will be ready to hike 20 miles within the next eight Saturdays.

Saturday	Miles Walked
1	3
2	5
3	5
4	7
5	9
6	10



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A.177-a