Name _____ Date_____ Class_____

WORKSHEET 25

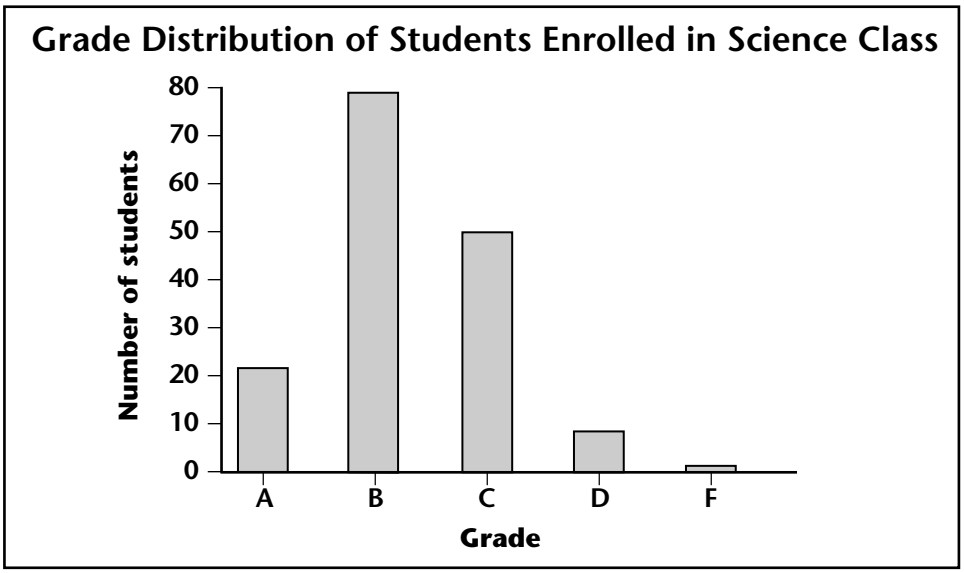
COMMUNICATING SKILLS

Introduction to Graphs

Examine the following table and graph:

Grade Distribution for Students Enrolled in Science Class

Grade	Number of students
A	22
B	79
C	50
D	9
F	2



1. Both of these figures display the same information but in different ways. Which figure is easier to understand? Explain why you think so.

_____

_____

_____

2. If you need to get specific data, such as the exact number of students who earned a B, which figure would you use? Explain your answer.

_____

_____

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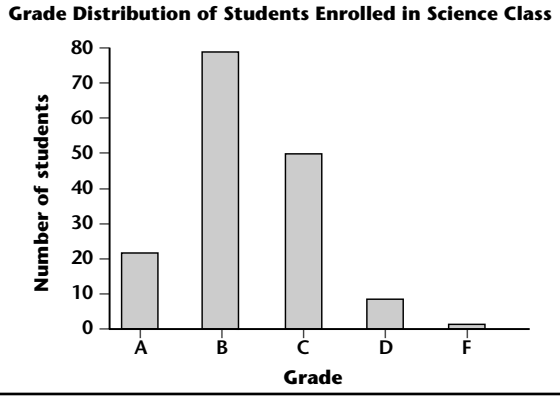
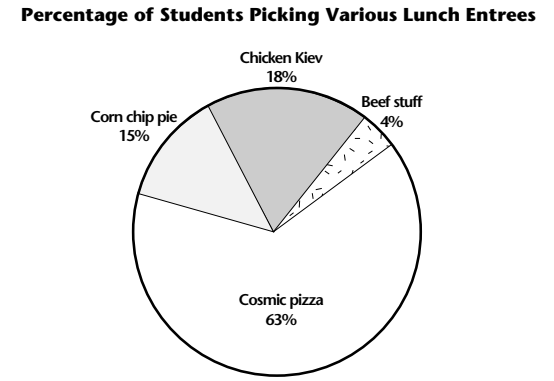
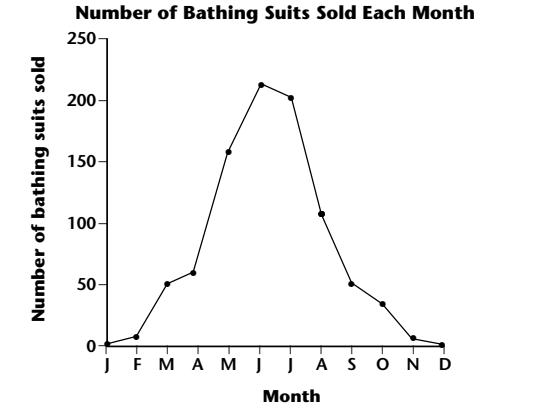
Choosing the Right Graph

Data tables provide an organized way of viewing information, and **graphs** are *pictures* of the information in a data table. Sometimes it is faster and easier to interpret data by looking at a graph. It is important to choose the type of graph that best illustrates your data. The following table summarizes the best uses for three of the most common graphs:

Type of graph	Best use for this graph
Bar graph 	A bar graph is best used for comparing data quickly and easily, such as the grade distribution of students enrolled in science class or the growth of plants in different pots.
Pie graph 	A pie graph is best used for showing percentages, such as the percentage of the student body who picked certain entrees for lunch or the percentage of your allowance that will go toward purchasing various things.
Line graph 	A line graph is best used for looking at changes over time, such as the number of bathing suits sold each month during the year or the change in your sister's height throughout the year.

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Choose the Graph

What graph type do you think best presents each set of data? Explain.

1. The percentage of rabbits preferring various foods

Food	Percentage preferring that food
Skippy's Rabbit Chow	32
Homemade rabbit food	13
Happy Rabbit	10
Joe's Special Food for Rabbits	44
Premium Rabbit Nutrition Diet	1

_____

_____

2. Albert's grades for each month of the school year

Month	Grade in science class
September	98
October	94
November	88
December	78
January	82

Month	Grade in science class
February	83
March	86
April	81
May	97

_____

_____

3. The pH of solutions in experimental test tubes

Test-tube number	pH
1	6.7
2	7.1
3	7.4
4	7.1
5	7.0

_____

_____

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WORKSHEET 26

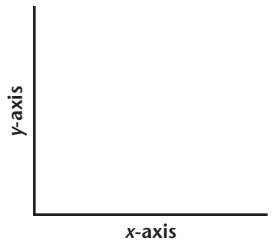
COMMUNICATING SKILLS

Grasping Graphing

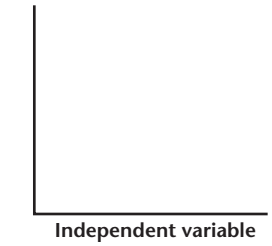
When you bake cookies, you must use the right ingredients to make the cookies turn out right. Graphs are the same way. They require the correct ingredients, or components, to make them readable and understandable.

Bar and Line Graphs

- First, set up your graphs with an *x*-axis and a *y*-axis. The ***x*-axis** is horizontal, and the ***y*-axis** is vertical as shown in the example at right. The axes represent different variables in an experiment.

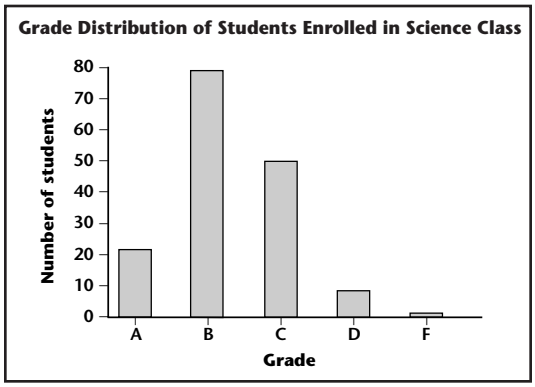


- The *x*-axis represents the independent variable. The **independent variable** is the variable whose values are chosen by the experimenter. For example, the range of grades is the independent variable.



- The *y*-axis represents the dependent variable. The values for the **dependent variable** are determined by the independent variable. If you are grouping students by grades, the number of students in each group **depends** on the grade they get.

- Next choose a **scale** for each of the axes. Select evenly spaced intervals that include all of your data, as shown on the grade-distribution bar graph. When you label the axes, be sure to write the appropriate units where they apply.



- Next, plot your data on the graph. Make sure you double-check your numbers to ensure accuracy.

- Finally, give your graph a title. A **title** tells the reader what he or she is studying. A good title should explain the relationship between the variables. Now your graph is complete!

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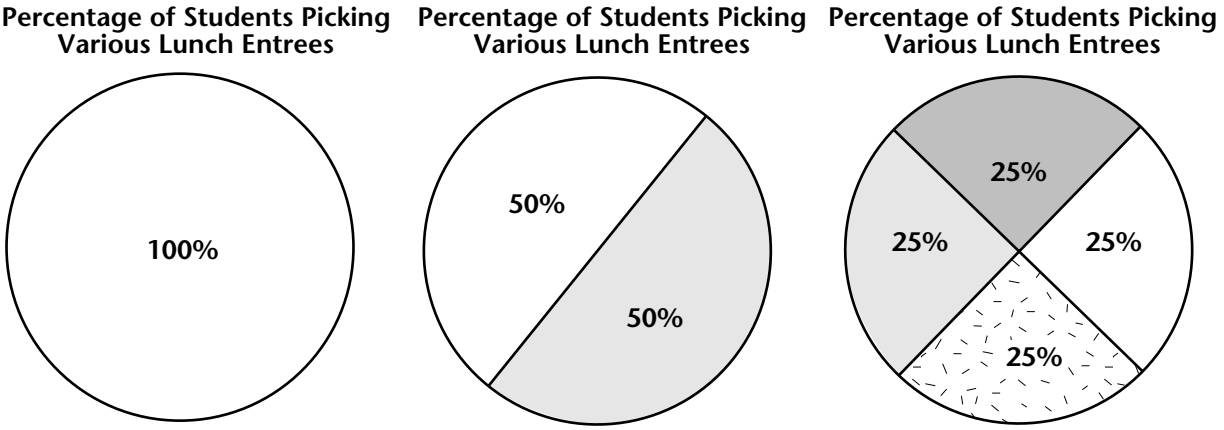
Pie Graphs

When you convert data to show percentages, you can use a pie graph. Pie graphs are shaped like a circle. The size of each "pie slice" is determined by the percentage it will represent. A full pie is equal to 100 percent, half a pie is equal to 50 percent, and so on.

Like bar and line graphs, pie graphs have independent and dependent variables. The independent variable is whatever the pie or slice of pie represents. The dependent variable is the size of the pie slice, the percentage of the whole it represents.



Your Turn

For each table (a) identify the independent and dependent variable, (b) determine the type of graph to use, and (c) provide a title.

1.

Amount of daily sunlight exposure (min)	Average height of plants (cm)
50	14.8
60	14.9
95	15.2
75	15.1
110	16.5
135	17.3
100	16.1
30	11.0

a. _____

b. _____

c. _____

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2.

Student	Number of jelly beans consumed
Anthony	15
Keiko	28
Leigh Ann	58
Adam	22
Katie	12
Juan	17

a. _____

b. _____

c. _____

Give It a Try

Graph the data below in your ScienceLog. Don't forget to do the following:

- Select the appropriate graph type.
- Identify the independent and the dependent variable.
- Choose an appropriate scale.
- Label the axes.
- Give your graph a title.

Amount of fertilizer added to soil (g)	Average height of plants (cm)
5	13.2
10	14.1
15	14.9
20	15.4
25	16.5
30	17.3
35	16.1
40	11.0

Use the graph paper provided to graph this data

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WORKSHEET 27

COMMUNICATING SKILLS

Interpreting Your Data

Imagine that you are at home taking care of your brother's dog, Sparky. At 7 P.M., Sparky starts barking. "He might be hungry," you think to yourself. What are some other reasons that Sparky might bark?

_____

_____

Now suppose that this is the fourth night in a row you've taken care of Sparky. You have noticed that every night at about 7 P.M., Sparky starts barking. "Ah-ha!" you say to yourself, "There is a pattern here!"

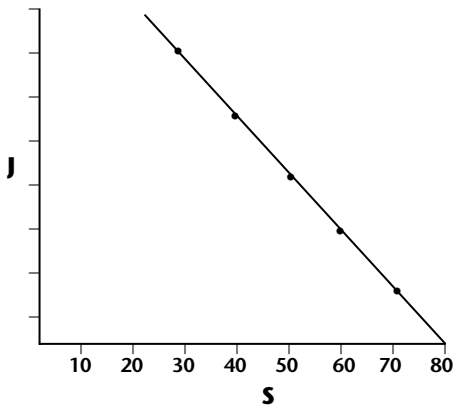
Hidden Patterns

When you collect raw data, patterns are often camouflaged as random numbers. Part of conducting a successful experiment is analyzing your data to find any hidden patterns. Two common data patterns you might see on your graph during an experiment are as follows:

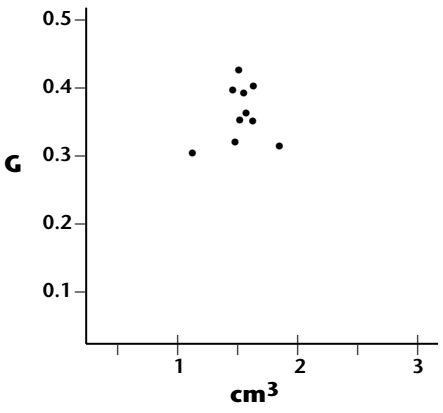
- linear (Your data tend to form a straight line.)
- repeating (Your data cycle repeatedly through the same general points.)

On the graph below, identify the examples of these two patterns.

a.



b.



a. _____

b. _____

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Graph It!

One of the best ways to identify a pattern is to draw a graph. A graph turns random data into a pattern that gives specific information.

Mary tested how fast blocks of clay dry under a bright light. She recorded the time it took different-sized blocks to dry.

Volume of block (cm^3)	27	8	43	125	16	166	64	91
Time to dry (min)	5	3	7	21	4	37	9	14

Graph her data in the space below.

Use the graph paper provided to graph this data

Describe the shape of the pattern that emerges from Mary's data. Mary hypothesized that the drying time for a clay block was **directly proportional** to the block's volume. In other words, her hypothesis predicted that her data would form a straight line. Was her hypothesis correct? Explain your answer.

_____

_____

_____

TROUBLESHOOTING

If you are having trouble telling whether Mary's data form a straight line, try drawing a line from her lowest data point to the highest data point. If her data form a straight line, most of the points should fall on or be very close to the line you just drew.

TRY THIS!

Mary had one additional data point with values of 142 cm^3 and 39 minutes. Because this point was different from her other data points, she decided she had made an error while performing that trial. To understand her thinking, plot that point on your graph above.