

**Scientific Investigation
Use and Interpret Graphs
Promotion Benchmark 3 Lesson Review
Student Copy**



Vocabulary

Data Table – A place to write down and keep track of data collected during an experiment.

Line Graph – Used to show trends or how data changes over time.

Bar Graph – Useful for showing how many of something there are.

Circle Graph – Best used when the data is in fractional or percentage form.

Trend – The tendency for data to move in a specific direction.

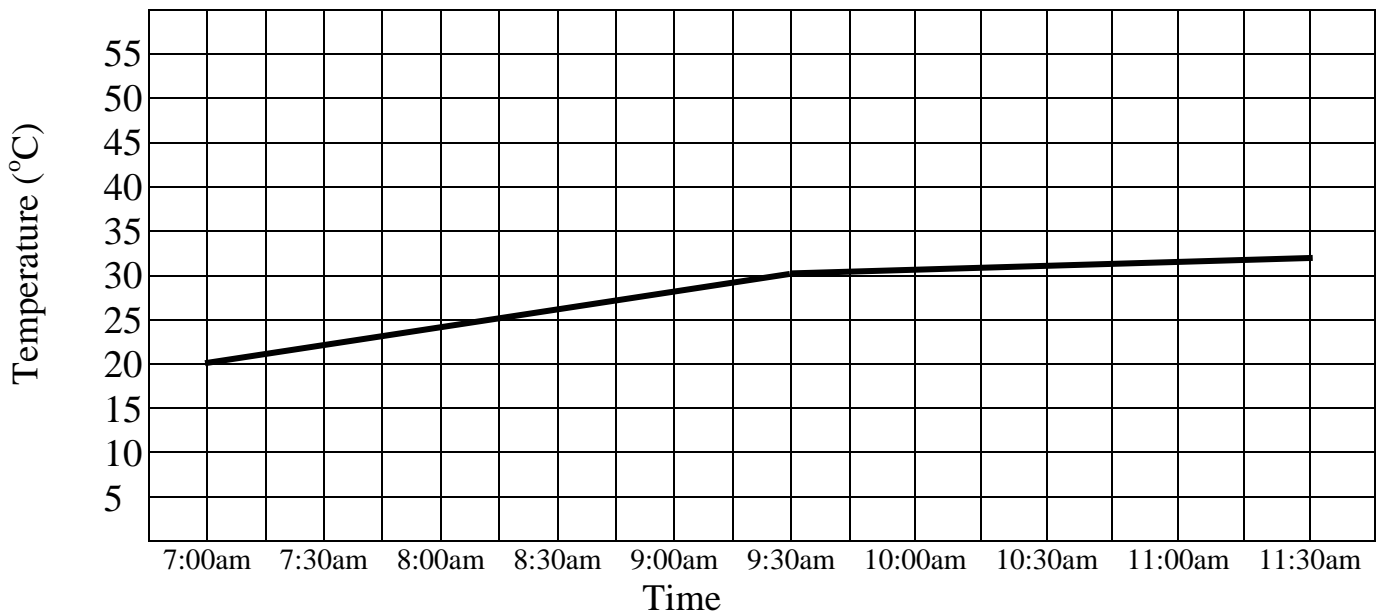
Pattern – The predictable repetition of data.

Review for Promotion Benchmarks 3:
Use an appropriate graph to display data;
identifies patterns and trends in the data

After a scientist completes an experiment, the collected data needs to be analyzed to determine if it supports the hypothesis for the experiment. The best way to analyze this information is with a graph. A graph is a visual display of data. It has been said that a picture is worth 1000 words. This includes the use of graphs. A graph can visually display information to allow the scientist to quickly spot **trends** or **patterns** in the data set that would be difficult to detect using just the data table. Look at the graph of temperature of a classroom shown below.

It is easy to see that the **trend** is for the temperature to increase over the period of time that it is recorded. However, the slope of the line is steeper between 7:00 am and 9:30 am. While the temperature continues to rise for the remainder of the morning, it rises more slowly causing the slope of the line to decrease after 9:30 am.

Temperature of Classroom from 7:00am to 11:30am



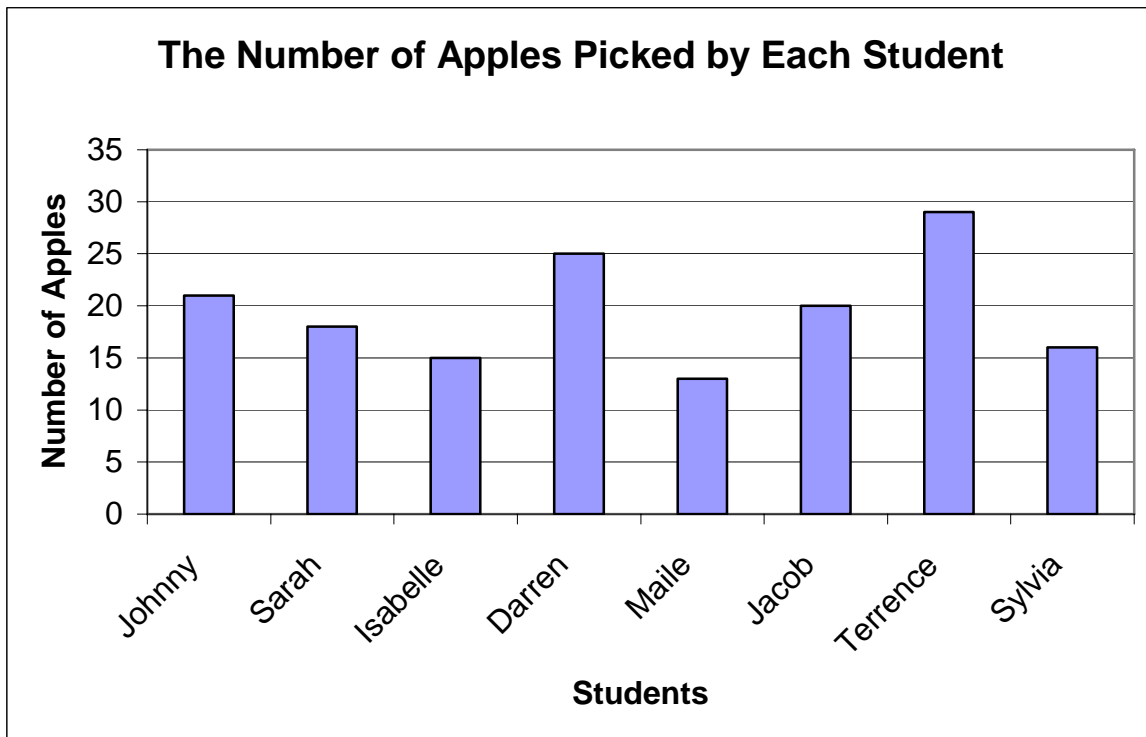
There are several different kinds of graphs that can be used to display data: **bar, line, and circle, or pie, graphs**. It is important to choose the correct graph for displaying data. **The type of graph chosen will depend on the kind of data that has been collected.** Examine the structure and use of each type of graph below.

The graph of temperature data shown on the previous page is an example of a **line graph**. **A line graph is used to show how data changes over time.** Note the following characteristics of a line graph:

- The independent variable, the variable being changed in the experiment, is time, and it is plotted on the horizontal (x) axis. A label (time) is used to describe the data to be displayed along that axis.
- The dependent variable, the variable being measured, is temperature. It is plotted on the vertical (y) axis. A label (temperature) describes the data to be displayed along that axis and defines the unit of measurement ($^{\circ}\text{C}$) used in the experiment.
- Both axes have a defined variable range. The range has been determined for each variable separately.
- Each axis has an evenly divided numeric scale that fits the range of data for each variable. The scale has been divided into intervals that use **MOST** of the available space for the graph.

- Data points have been plotted to match each independent variable with its value of the dependent variable. A line or curve is drawn that best fits the data points plotted.
- The graph is titled to clearly explain what the graph shows.

A bar graph is useful for comparing information by counting. For example, the graph below compares the number of apples picked by different students.



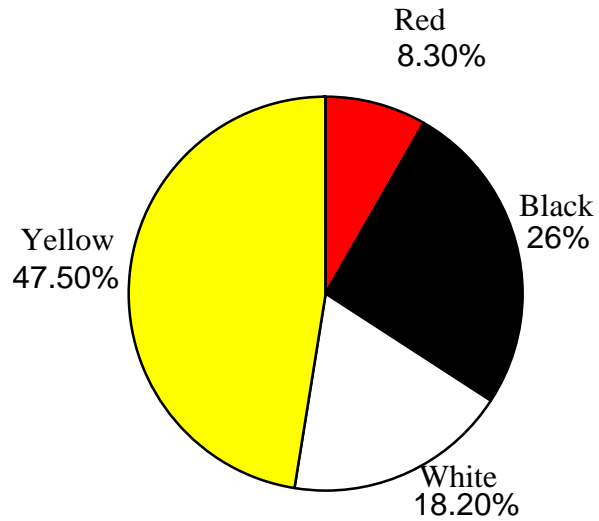
Take note of the following characteristics in the bar graph above:

- The independent variable is the student. It is displayed on the x-axis. A label is used to describe the data to be displayed along that axis.

- The dependent variable is the number of apples picked by each student. It is displayed on the y-axis. A label is used to describe the data to be displayed along that axis.
- The y-axis is divided into equal intervals to display the range of data collected.
- The data for each level of the independent variable, or each student, is displayed on a separate bar that is labeled to allow easy identification of the student to whom the data belongs. Each bar is of equal width, and equal spaces have been left between the bars. The bars do not touch one another. The height of each bar matches the independent variable to the correct value of the dependent variable.
- A title explains the data shown in the graph.

A circle graph, or pie graph, is used to show how a quantity is broken down into the parts that make it up. The circle represents the total quantity. The slices or pieces of the circle represent the parts. Data appearing in a circle graph are usually presented as fractions or percentages. An example of a circle graph is shown on the next page.

Percentage of Colors of Marbles in the Marble Bag



Remember, graphs are tools that display information. The reader must be able to interpret the data to draw his own conclusion. Improperly made graphs can lead to incorrect conclusions. Look for errors in scale, missing data, or use of improper data before drawing a conclusion about the data pictured in a graph.

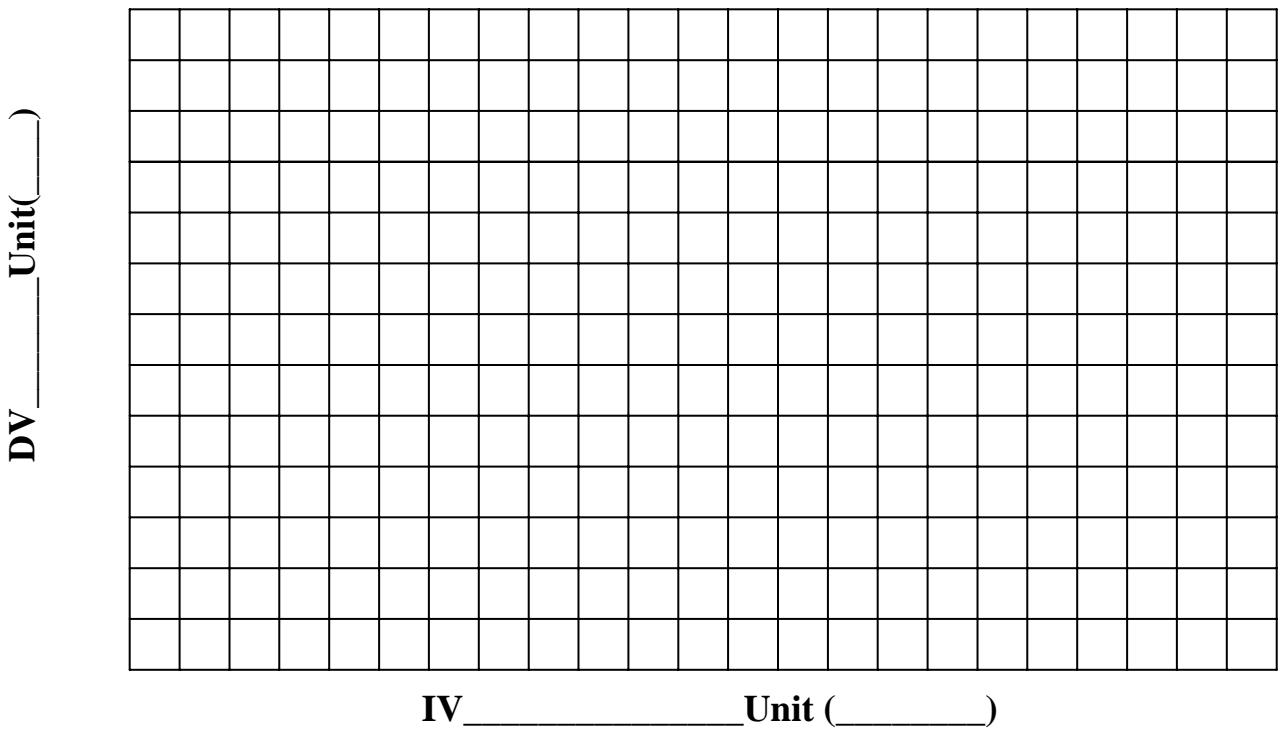
Review for Promotion Benchmark 3

Directions: Fill in the data table and graph the following data.

At 5 minutes, a car was going 30 kilometers per hour (kph); at 10 minutes, the car was going 50 kph; at 15 minutes the car was still going 50 kph; at 20 minutes, the car was going 65 kph; at 25 minutes, the car was going 70 kph; at 30 minutes the car had slowed down to 25 kph.

IV _____ Unit (_____)	DV _____ Unit (_____)

TITLE: _____



Directions: Match the graphing term with its definition.

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|---|-----------------|
| 1. _____ A graph that shows how many of something there are | A. Data Table |
| 2. _____ A visual display of data | B. Line Graph |
| 3. _____ A place to organize the data from an experiment | C. Circle Graph |
| 4. _____ Used to show data that is in percentage form or parts of a whole | D. Graph |
| 5. _____ A type of graph that shows change over time | E. Bar Graph |