

Chapter 1 Answers

1.1 Section Review

1. The length of the millipede is 9.7 centimeters or 97 millimeters. The measurement can also be converted to meters by sliding the decimal two places to the left of the centimeter measurement. This would make the millipede 0.097 meters.
2. Area is calculated length \times width; therefore, $64 \times 64 = 4,116$ square meters or 4,116 m².
3. 24,000 cm³. 24 L.
4. There are 40 grams of salt in one liter of the solution.

1.2 Section Review

1. A hypothesis is an educated guess or a prediction of the results of an experiment. A hypothesis is sometimes written showing a cause and effect or as an "if... then" statement. For example, "If I do my homework and study for the test, then I will make good grades."

Some possible hypotheses may be:

Since plants use light energy from the sun to make their own food, plants near a window will grow toward the sunlight to absorb their required energy to grow.

"If a plant is placed by a window, it will grow toward the window to get the sunlight energy it needs to make its own food and grow".

"If one plant is placed near a window and another plant is placed in a dark room with no window, the plant near the window will grow and lean toward the light while the plant in the dark room will not grow and thrive near as well".

2. Many students were absent today because the flu is going around.
B is the best answer because it includes a possible reason why many students were absent.
3. The hypothesis, "Many students were absent today because the flu is going around" could be tested by conducting a survey inquiring how many students missed school because of being sick with the flu. Data could be collected from the office clerk who receives the notes for excused absences. Students could also conduct a student-to-student survey by asking students why they were

absent or if they had the flu. Quantitative data collected in this way would either verify or disqualify the hypothesis.

4. The illustrated experiment has three set-ups testing the effects of two types of fertilizers along with a control using no fertilizer.

- a. The experimental variable is the type of fertilizer.
- b. The control variables include the same type of plants used in the investigation, using equal volumes of water on all plants, and the set-up with no fertilizer application.
- c. A possible hypothesis could be, "Super Grow plant food will cause the plant(s) to grow the tallest since it has the most nutrients available".

1.3 Section Review

1. A graph is data in picture form or a visual of the data. The three types of graphs include: line, bar, and pie.
2. A pie graph is used to illustrate parts of a whole based on 100% of the parts. For example, a pie graph could be used to show how much time in a day is used completing different tasks. Since 24 hours are in one day, the total hours in the pie graph needs to add up to 24 to make up 100% of the hours of the day.

Another pie graph students could make would be the composition of element in the earth's crust which include: Oxygen - 46%, Silicon - 28%, Aluminum - 8%, Iron - 6%, Calcium - 4%, Sodium - 2%, Magnesium - 2%, Potassium - 2%, Titanium - 1%, Other elements - 1% (Notice percentages add up to 100%)

Students could also make a pie graph showing how their spend money they get from a job or from their allowance. They need to account for anything they may be saving their money for like a game, a bike, books, clothes, church offering, or a pet. The graph should make students aware of how they currently budget their money and help them to understand ways they could save their money for their future. They could make a revised pie graph showing improvements in ways they could save and not waste money on things they do not need.

3. Once data is collected, steps to making a graph include:

Step 1. Determine the independent variable, which goes on the x-axis and the dependent variable on the y-axis.

Step 2. Make a scale so the range of data values fit onto the graph and label the axis according to the information on the data being plotted.



- Creating a hypothesis or educated guess: The brain can change itself based on circumstances and conditions.
 - Conducting an experiment to prove or disprove the hypothesis- a control group (not blindfolded) and an experimental group (blindfolded) are both taught Braille by the same instructor, for the same amount of time, and in the same physical environment.
 - Collecting data using tools: the MRI scans the brain to determine activity levels
 - Drawing conclusions: the "vision" portion of the brain adapted by using different "pathways". The brain is able to change based on circumstances and conditions.
3. To begin the scientific process, scientists ask important questions. These questions drive all research and impact experimental design. Meaningful questions determine who will benefit from research and how. These questions also help scientists improve technology.

Activity

- Use a magnet to see if the objects are attracted to it; Use an X ray device.
- Lifting the box and shaking it led to my hypothesis. Different experiments I conducted included shaking the box, smelling the box to see if the objects had an odor, turning the box in different directions (up/down, side/side). My experiments led to different conclusions. When my peers reviewed my ideas, they either agreed or disagreed with my conclusions.

Chapter 1 Assessment

Vocabulary

Section 1.1

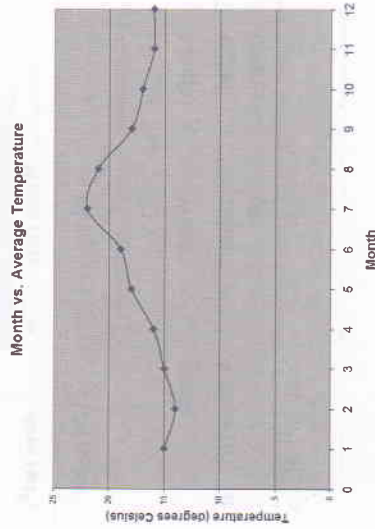
- measurement
- unit
- length
- volume
- mass

Section 1.2

Step 3. Plot the data.

Step 4. Determine a title of the graph and double check scale on x and y axis and the plotted points.

The independent variable would place "the month" on the x-axis and the dependent variable, "temperature" on the y-axis.



- The "A" graph shows an inverse relationship. As the independent variable increases, the dependent variable decrease as shown by the downward slope of the line.
- The "B" graph shows a direct relationship. Both variables increase resulting in an upward slope of the graph.
- On the "C" graph, there is no relationship among the plotted variables since they are random and chaotic in their placement on the graph.

Connection

- The role of a scientist is to understand and explain the world around us. Scientists study cause and effect through experiments. They use experimental findings to create technology to improve our lives.
- The blindfold study includes the major steps of the scientific method:
 - Forming meaningful questions: What happens to the brain when someone can no longer see? Who learns Braille better - the blindfolded or non-blindfolded?

like the proportions of gases in our atmosphere. The pie graph will show the different elements and their percentages, totaling to 100 percent.

Math and Writing Skills

Section 1.1

1. Area = Length \times Width

(Units must be the same, and answer will be in square miles)

Length (mi)	\times	Width (mi)	=	Area (mi ²)
12	\times	10	=	120 miles ²

Concepts

Section 1.1

1. d. Fahrenheit

2. a. read the mark at eye level and at the bottom of the meniscus.
3. b. weighs more than an organism with less mass.

Section 1.2

4. d. The data may be useful, but further testing and redesign of the experiment may be needed.
5. c. repeat the experiment several times to verify the results.
6. A hypothesis is a prediction or educated guess as to how an experiment will turn out. The hypothesis should be stated in such a way that it answers the question that will be answered at the completion of the investigation. Theories are developed after repeated observations and experiments gain the same results time after time. Theories also attempt to explain observations. In simple terms, a hypothesis is stated prior to experimentation and a theory is developed after experimentation has taken place.

Section 1.3

7. A graph is used to view data in picture form. The three types of graphs include: bar, line and pie. A bar graph is used when comparing data. An example of when a bar graph can be used may be to view the number of students who earn A's, B's, C's, D's, or F's in a class. A line graph shows a continuous change that is taking place over a period of time. For instance, if tap water is heated, a line graph is made to document the change in temperature as the water heats. A pie graph illustrates parts of a whole. A pie graph represents 100% of a group. A pie graph is used to show information

Volume	=	Length	\times	Width	\times	Depth
Length (mi)	\times	Width (mi)	\times	Depth (ft)	=	Volume (ft ³) or Volume (mi ³)
12	\times	10	\times	12	=	4.0×10^{10} ft ³ or 0.27 mi ³

2. 12 grams of salt in 2 liters of solution

1 liter = 1000 mL

- 12 grams of salt in 2 liters of solution = 6 grams of salt in 1 liter of solution
- 6 grams of salt in 1000 mL = 6 parts per thousand or 6 ppt

0.5 grams of sugar in 1 liter of solution

1 liter = 1000 mL

- 0.5 grams of sugar in 1000 mL of solution = 0.5 parts per thousand or 0.5 ppt

Section 1.2

3. The scientist cannot say that St. John's wort causes the skin rash. There is strong evidence to support such a hypothesis, but not conclusive. The rash could be caused by the rubbing action or other contamination. The botanist wanted to know if the St. John's wort caused a skin rash. Does this mean by mere proximity or direct contact? The experiment conducted uses direct contact as rubbing on the bare skin of ten volunteers. A new experiment could be done with the volunteers being in the same room with the St. John's wort, not in direct contact.

