

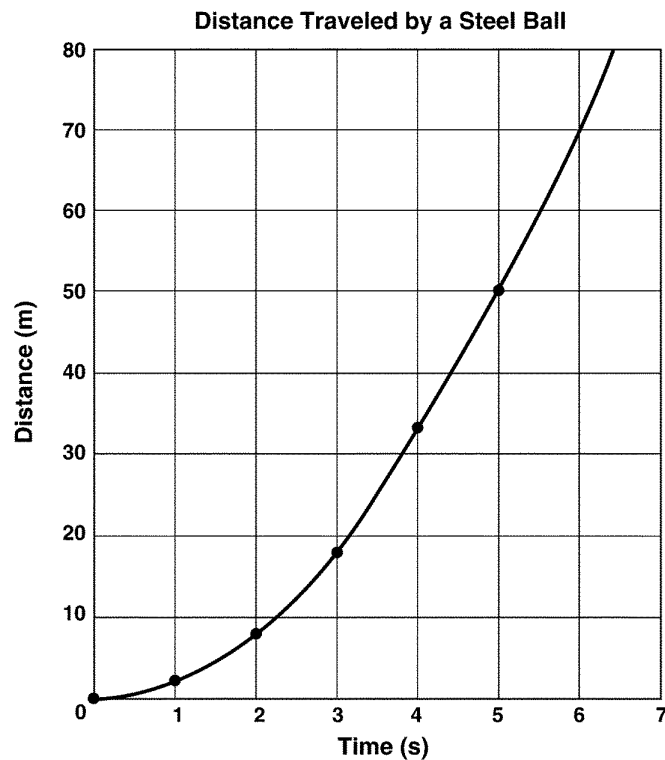
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Conceptual Physics: \_\_\_\_\_  
Date: \_\_\_\_\_

Unit I  
Introduction to Conceptual Physics  
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## Unit I Study Guide

### Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.



**Figure 1-1**

- \_\_\_\_ 1. What type of graph is represented by Figure 1-1?
- a. bar graph
  - b. line graph
  - c. circle graph
  - d. none of the above
- \_\_\_\_ 2. What is a system of knowledge and the methods used to find that knowledge?
- a. science
  - b. technology
  - c. measurement
  - d. curiosity
- \_\_\_\_ 3. How are science and technology related?
- a. Technology is a branch of natural science.
  - b. Science is a branch of technology.
  - c. Advances in science may lead to advances in technology and vice versa.
  - d. Science and technology are not related.
- \_\_\_\_ 4. Which of the following is NOT a branch of natural science?
- a. life science
  - b. Earth and space science
  - c. physical science
  - d. social science

- \_\_\_\_ 5. How does Earth science overlap with life science?
- Earth science involves the study of Earth's rocks.
  - Earth science involves the study of systems that may include living organisms.
  - Earth science involves the study of the composition of matter.
  - Earth science does not overlap with life science.
- \_\_\_\_ 6. Which of the following is NOT one of the main ideas of physical science?
- The universe is very old and very large.
  - Forces cause changes in motion.
  - Energy can be transferred from one form to another, but it can never be destroyed.
  - One of the main branches of natural science is biology.
- \_\_\_\_ 7. What are the building blocks of all matter?
- |           |                                 |
|-----------|---------------------------------|
| a. forces | c. magnetic fields              |
| b. atoms  | d. kinetic and potential energy |
- \_\_\_\_ 8. In which step of the scientific method is information obtained through the senses?
- |                        |                          |
|------------------------|--------------------------|
| a. drawing conclusions | c. analyzing data        |
| b. making observations | d. revising a hypothesis |
- \_\_\_\_ 9. What happens when the data in an investigation do not support the original hypothesis?
- The scientist gives up and starts an investigation on a new topic.
  - The data must be incorrect and are thrown out.
  - The hypothesis is revised.
  - The data are altered so that they support the original hypothesis.
- \_\_\_\_ 10. What is a statement that summarizes a pattern found in nature?
- |                     |                        |
|---------------------|------------------------|
| a. a scientific law | c. a scientific theory |
| b. a fact           | d. a hypothesis        |
- \_\_\_\_ 11. Which of the following statements is true about scientific theories?
- Scientific theories become scientific laws.
  - Scientific theories are never proven.
  - Scientific theories become hypotheses.
  - Scientific theories summarize patterns found in nature.
- \_\_\_\_ 12. What is a physical or mental representation of an object or an event?
- |                 |                     |
|-----------------|---------------------|
| a. a theory     | c. a model          |
| b. a hypothesis | d. a scientific law |
- \_\_\_\_ 13. Why are scientific models important?
- They prove scientific theories.
  - They help visualize things that are very complex, very large, or very small.
  - They make it harder to understand things.
  - They never change.
- \_\_\_\_ 14. What is the most important safety rule?
- Never work with chemicals.
  - Always use unbreakable glassware.
  - Always follow your teacher's instructions and textbook directions exactly.
  - Never do experiments that involve flames or hot objects.

\_\_\_\_ 15. Which of the following is an example of a safe laboratory procedure?

- a. tying back long hair and loose clothing
- b. eating or drinking from laboratory glassware
- c. touching hot objects with your bare hands
- d. testing an odor by directly inhaling the vapor

\_\_\_\_ 16. How is 0.00069 written in scientific notation?

- a.  $69 \times 10^{-5}$
- b.  $6.9 \times 10^4$
- c.  $0.69 \times 10^{-3}$
- d.  $6.9 \times 10^{-4}$

\_\_\_\_ 17. Which of the following conversion factors would you use to change 18 kilometers to meters?

- a. 1000 m/1 km
- b. 1 km/1000 m
- c. 100 m/1 km
- d. 1 km/100 m

\_\_\_\_ 18. What are 6 centimeters equal to?

- a. 600 meters
- b.  $\frac{6}{10}$  of a millimeter
- c. 60 millimeters
- d. 600 millimeters

\_\_\_\_ 19. There are 1660 megawatts of wind-generated electricity produced globally every year. This amount is equivalent to

- a. 1,660,000 watts
- b. 1,660,000 kilowatts
- c. 16,600,000 watts
- d. 166,000 kilowatts

\_\_\_\_ 20. Timers at a swim meet used four different clocks to time an event. Which recorded time is the most precise?

- a. 55 s
- b. 55.2 s
- c. 55.25 s
- d. 55.254 s

\_\_\_\_ 21. Which of the following clocks offers the most precision?

- a. a clock with only one hand to measure the hour
- b. a clock with only one hand to measure the minutes
- c. a clock with a hand to measure the hour and a hand to measure the minutes
- d. a clock with a hand to measure the hour, a hand to measure the minutes, and a hand to measure the seconds

\_\_\_\_ 22. On the Celsius scale, at what temperature does water boil?

- a.  $0^\circ$
- b.  $212^\circ$
- c.  $100^\circ$
- d.  $32^\circ$

\_\_\_\_ 23. Approximately how many kelvins are equal to  $60^\circ\text{F}$ ?

- a. 333
- b. 323
- c. 413
- d. 289

\_\_\_\_ 24. The type of graph used to show how a part of something relates to the whole is which of the following?

- a. circle graph
- b. bar graph
- c. line graph
- d. direct proportion

\_\_\_\_ 25. What is the relationship in which the ratio of the manipulated variable and the responding variable is constant?

- a. inverse proportion
- b. direct proportion
- c. slope
- d. interdependent

- \_\_\_\_ 26. How do scientists communicate the results of investigations?
- by publishing articles in scientific journals
  - by giving talks at scientific conferences
  - by exchanging e-mails
  - all of the above
- \_\_\_\_ 27. How do scientists who speak different languages make their data understandable to one another?
- They all use different systems of measurement.
  - They all use SI.
  - They communicate through a universal translator.
  - They all must speak French.
- \_\_\_\_ 28. What is a peer review?
- a process in which only close friends of a scientist review the scientist's work
  - a process in which scientists examine other scientists' work
  - a process in which scientists copy other scientists' work
  - a process in which scientists keep their work secret
- \_\_\_\_ 29. Why are peer reviews important?
- Scientists receive questions and criticism from their peers.
  - Data are checked for accuracy.
  - Scientists receive comments and suggestions from other scientists.
  - All of the above
- \_\_\_\_ 30. If the relationship between the manipulated variable and the responding variable is a direct proportion, what will a line graph of this relationship look like?
- a straight line
  - a curved line
  - a jagged line
  - none of the above

### Completion

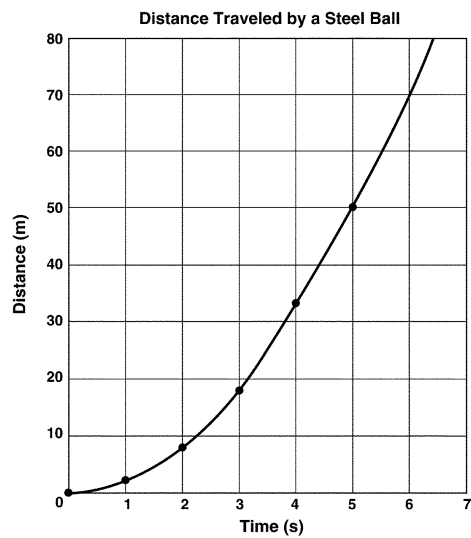
*Complete each sentence or statement.*

31. The SI base unit of temperature is the \_\_\_\_\_.
32. A measurement must include both a number and a(an) \_\_\_\_\_.
33. An experiment in which only one variable, the manipulated variable, is changed at a time is called a(an) \_\_\_\_\_.
34. An organized plan for gathering, organizing, and communicating information is called a(an) \_\_\_\_\_.
35. A(An) \_\_\_\_\_ is a way of organizing data that is used to show changes that occur in related variables.
36. Computers are an example of a(an) \_\_\_\_\_ that helps people solve problems.
37. The two main areas of physical science are physics and \_\_\_\_\_.
38. Natural science is divided into life science, Earth and space science, and \_\_\_\_\_.
39. The \_\_\_\_\_ is the variable that changes in response to the manipulated variable.
40. A(An) \_\_\_\_\_ is a statement that summarizes a pattern found in nature.
41. A(An) \_\_\_\_\_ explains a pattern found in nature.

42. A flight simulator that helps astronauts prepare for a shuttle launch is an example of a(an) \_\_\_\_\_.
43. Because lab activities can involve hazardous materials, it is always important to read and understand any \_\_\_\_\_ that must be followed.
44. A(An) \_\_\_\_\_ makes it easier to understand things that are too small, too large, or too hard to observe directly.
45. In scientific notation,  $(6.2 \times 10^4) \times (3.3 \times 10^2)$  equals \_\_\_\_\_.
46. The measurement 0.059 seconds equals \_\_\_\_\_ milliseconds.
47. \_\_\_\_\_ is the closeness of a measurement to the actual value being measured.
48. A temperature of 34°F is equal to \_\_\_\_\_ kelvins.
49. In an experiment, if doubling the manipulated variable results in a doubling of the responding variable, the relationship between the variables is a(an) \_\_\_\_\_.
50. The three values 10.714 m, 12.821 m, and 13.646 m have the same number of \_\_\_\_\_.

### Short Answer

51. What is the single most important laboratory safety rule?
52. Why do scientists speak at conferences and write articles in scientific journals?
53. What is a peer review?
54. What are the major branches of natural science?
55. What is a hypothesis?
56. What is a scientific theory?
57. Why do scientists use models?
58. When a number in a measurement is converted from kilometers to meters, does the number get larger or smaller?
59. How many significant figures will the answer to the calculation  $65.25 \times 37.4$  have?
60. What is the temperature at which water freezes, expressed in Fahrenheit, Celsius, and kelvins?
61. Explain how technology and science are related.
62. What type of graph would be the best to use to compare the levels of lead contamination in six water wells?
63. What is the relationship between two variables if the product of the variables is constant?
64. The study of an organism that lived 10 million years ago would most likely fall under which two branches of natural science?
65. Describe a main idea of physical science that deals with space and time.

**Essay****Figure 1-1**

66. Figure 1-1 shows how a steel ball moved during an experiment. Average speed is calculated by dividing total distance by time. Did the steel ball speed up, slow down, or remain at the same speed throughout the experiment?
67. What is the difference between a scientific law and a scientific theory?
68. Describe some of the main ideas of physical science.
69. Describe a possible order of steps of a scientific method used in an investigation.
70. Explain how peer reviews are important in either supporting a hypothesis or revising a hypothesis.

## Other

## USING SCIENCE SKILLS

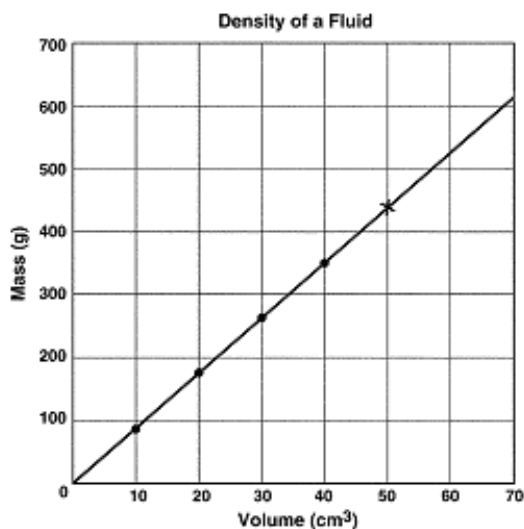


Figure 1-2

71. **Analyzing Data** What is the slope of the line shown in Figure 1-2?
72. **Controlling Variables** In Figure 1-2, what is the responding variable?
73. **Analyzing Data** In Figure 1-2, what is the relationship between mass and volume?
74. **Using Tables and Graphs** In Figure 1-2, what quantity does the slope represent?
75. **Analyzing Data** What unit should be used when expressing the slope of the line in Figure 1-2?

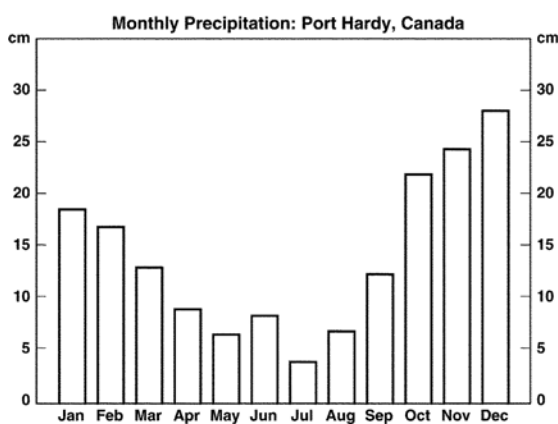


Figure 1-3

76. **Using Tables and Graphs** What measurements are compared in Figure 1-3?
77. **Analyzing Data** In Figure 1-3, which month had the highest amount of precipitation?
78. **Inferring** Why might the data in Figure 1-3 be important to share with a scientist studying agriculture in Port Hardy?
79. **Using Tables and Graphs** Use Figure 1-3 to determine the approximate total annual precipitation.
80. **Analyzing Data** In Figure 1-3, how many meters of precipitation were recorded during May?