

Skills Worksheet

# Directed Reading B

## Section: Tools and Models in Science (pp. 42–49)

### TOOLS IN SCIENCE

- D** 1. What is a *tool*?
- a. anything with a handle
  - b. anything that gives off energy
  - c. anything that requires electricity
  - d. anything that helps you do a task

- A** 2. Which of the following is NOT something that tools are used for?
- a. to evaluate the importance of science
  - b. to collect data
  - c. to evaluate and analyze data
  - d. to take accurate measurements

3. List four examples of tools used for taking measurements.

- 1. Ruler - length
- 2. graduated cylinder - volume
- 3. balance scale - mass (kg.)
- 4. spring scale - force (in N, Newtons or lbs. pounds)
- 5. thermometer - temperature (celcius, Kelvin)
- 6. cameras = data that can be counted at any time by looking at the picture.

4. List three examples of tools that help you analyze or communicate data.

calculator, computer, Excel, Internet.

### MAKING MEASUREMENTS

5. List two examples of units of measure used many years ago.

cubits - length from elbow to fingertips.  
stones - for weight.

6. A simple and reliable measurements system called the

SI system

is also know as the metric system.

7. Why is changing from one unit to another easy when using the SI system of measurement?

It is based on the decimal system so you can just multiply or divide by a factor of 10.

**Directed Reading B** *continued*

**Match the correct description with the correct term. Write the letter in the space provided.**

c. volume

8. a measure of the size of an object or region in three-dimensional space

a. mass

b. temperature

d. density

9. the ratio of the mass of a substance to the volume of the substance

c. volume

d. density

b. temperature

10. a measure of how hot or cold something is

a. mass

11. a measure of the amount of matter in an object

$D = m/V$   
 $D = \text{density}$   
 $m = \text{mass}$   
 $V = \text{volume}$   
 $D_{\text{water}} = 1 \text{ g/mL}$

**Match the correct description with the correct term. Write the letter in the space provided.**

c. meter

12. the basic SI unit of length

a. kilogram

a. kilogram

13. the basic SI unit of mass

b. liter

b. liter

14. a unit used to express liquid volume

c. meter

d. cubic meter

d. cubic meter

15. a unit used to express the volume of larger solid objects

16. A cubic meter is equal to 1,000 liters.

17. What unit of measure is used to express the volume of smaller objects?

mL = milliliter

18. How is density calculated?

Density = mass/volume  
 first use a balance scale to measure the mass,  
 then use a ruler to measure the volume,  
 then calculate the mass divided by the volume to equal the density.

19. Name three units that are used to measure temperature.

Fahrenheit, Celsius, and Kelvin

**Directed Reading B** *continued*

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**MODELS IN SCIENCE**

- b. a model** 20. What is a pattern, plan, representation, or description designed to show the structure or workings of an object, system, or concept called?
- a. a test
  - b. a model**
  - c. a hypothesis
  - d. a scale

- a. a model** 21. Which of the following uses something familiar to help you understand something that is not familiar?
- a. a model**
  - b. a tool
  - c. data
  - d. a test

22. List the three common types of scientific models.

- 1. Physical model
  - 2. Conceptual model
  - 3. Mathematical model
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23. List three examples of a physical model.

- Model airplanes, dolls, and drawings (blueprints)
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24. What type of model tries to put many ideas together to explain or summarize something?

- Conceptual model
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**Directed Reading B** *continued*

**Match the correct description with the correct type of model. Write the letter in the space provided.**

c. mathematical model

**25.** used to predict the weather

a. conceptual model

a. conceptual model

**26.** used to explain why the universe seems to be expanding

b. physical model

b. physical model

**27.** used to help understand how a real space shuttle blasts off into space

c. mathematical model

**28.** What can happen if a mathematical model contains a wrong value for a single variable?

The mathematical model could make highly inaccurate predictions if it contains a wrong value to one variable.

**29.** What are models often used to represent?

Things that are very small or very large.  
 Things that cannot be seen.  
 Things that are too complex to think of all parameters at once.

**30.** Give one example of a model that is used to learn about things that cannot be seen.

Sound waves cannot be seen, but a coiled spring can represent the sound waves.

**31.** Why is a model always limited in its usefulness?

A model is not exactly the same as the real object or system.

**USING MODELS FOR SCIENTIFIC PROGRESS**

C.

**32.** Which of the following is NOT a way that models are used by scientists?

- a. Models are used to communicate difficult information.
- b. Models can make a molecule easier to visualize.
- c. Models are used to validate inaccurate data.
- d. Models can be used to summarize new information.

d. theory

**33.** A system of ideas that explains many related observations and is supported by a large amount of scientific evidence is called a(n)

- a. model.
- b. law.
- c. variable.
- d. theory.

## Directed Reading B *continued*

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**34.** Why do scientists use models in their search for new information?

Models help to visualize many parts and concepts at one glance.  
This leads the scientist to new angles to look at old problems.  
Looking at these new angles allows them to design new experiments.

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**35.** A descriptive statement or equation that reliably predicts events under certain conditions is called a(n) **law**.

**36.** What may happen when scientists make new observations that seem to show that a theory is wrong?

The scientists will revise the theory or make new theories.

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**37.** Define *law*.

Law - a descriptive statement or equation that reliably predicts events under certain conditions.  
For example, the law of gravity.

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**38.** What does a law tell you, and what does a law not tell you?

A law tells you how things work, it tells what happens.  
A law does not tell why it happens.

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**39.** What law says that the total mass of materials formed during a chemical change is the same as the total mass of the starting materials?

The law of conservation of matter and energy

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