

Just the Facts: Physical Science

Fun activities, puzzles, and investigations!



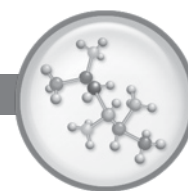
Features:

- Data analysis and investigations that build science proficiency
- Inquiry-based activities
- 90 standards-based physical science activities
- Easy-to-use standards matrix



Just the Facts: Physical Science

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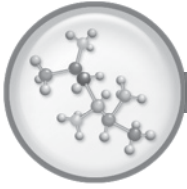


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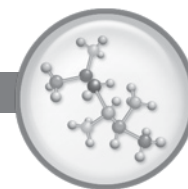
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Just the Facts: Physical Science

INTRODUCTION



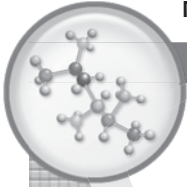
Students are filled with curiosity and wonder about the physical world around them. How far does a magnetic field extend? How fast does sound travel through air? How do different types of materials in a circuit affect the flow of electricity? Students should be provided with opportunities to engage in meaningful inquiry activities that put their questioning and investigating abilities to the test. Before and after these inquiry activities, it is crucial to expose students to the concepts and vocabulary addressed in the activities. *Just the Facts: Physical Science* provides students with an effective means of introducing and reinforcing many of the important concepts, vocabulary terms, and phenomena that they will be observing as they study physical science.

Students begin to realize that energy is an important property of substances and that most changes involve energy transfers. In this book, they will see connections between many of the concepts they have been studying, including phase changes, light, heat, sound, electricity, and magnetism. When studying concepts such as motion and forces, give students concrete experiences on which they will build in their later study of physics. For example, by observing the movement of balls and mechanical objects, students can begin to make quantitative measurements and describe the forces acting on the objects.

In *Just the Facts: Physical Science*, students will be exposed to basic, factual information that will allow them to conduct inquiry investigations, much like the experiments that scientists conduct every day. The worksheets and activities in this book will supplement your daily lessons, and some can be used as stepping-stones to full inquiry experiments that students can develop themselves. The worksheets and activities are aligned with national and state standards. Use the Standards Matrix on pages 6–7 to find which standards each activity covers.

Armed with scientific facts and knowledge, scientists carry on the process of inquiry and discovery to find answers to mysteries such as, why does nature contain only a finite number of elements? Perhaps, one day, it will be one of your students who reveals the truth!





Name: _____ Date: _____

I N T R O D U C T I O N

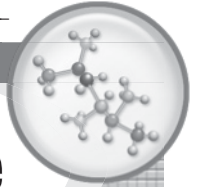
Show What You Know!

K W L C H A R T

DIRECTIONS: Before you begin learning about this topic, complete the first two sections of the **KWL** chart below. Under **K**, list what you already know about the topic. Under **W**, list what you would like to find out about the topic. Once you have studied the topic, come back to the chart and list what you learned under **L**.

TOPIC: _____

K What I Know	W What I Want to Know	L What I Have Learned



Branches of Physical Science

F I L L I N T H E B L A N K S

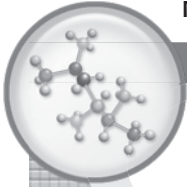
No one scientist could know everything about the physical side of science—there are too many different topics. Scientists who study the way that the physical world works specialize in one specific area, such as atoms or electricity. These scientists go to school for many years to become experts in their fields. They also write reports that are published in scientific journals. What kind of physical scientist might you like to be?

DIRECTIONS: Write each type of physical science in the correct blank below to match the type with its topic.

WORD BANK

- | | | | |
|------------|----------------|----------------|---------------|
| acoustics | aerodynamics | aerostatics | catacoustics |
| chemistry | electrology | electrostatics | hydrodynamics |
| kinematics | magnetics | mechanics | metallography |
| optics | thermodynamics | | |

1. movement of liquids _____
2. echoes or reflected sounds _____
3. magnetism _____
4. flow of air or gas _____
5. air pressure _____
6. heat _____
7. electricity _____
8. sound _____
9. action of force on bodies _____
10. properties of substances _____
11. light _____
12. static electricity _____
13. motion _____
14. structure of metals _____



Name: _____ Date: _____

PHYSICAL PROPERTIES OF MATTER

An Introduction to Matter

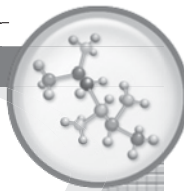
WORD SEARCH

DIRECTIONS: Find the matter vocabulary words in the word search below. Words can be found down, across, and diagonally. Then, on a separate sheet of paper, write sentences for five of the words.

WORD BANK

- | | | | |
|----------|---------|----------|----------|
| atom | boiling | chemical | compound |
| density | element | mass | matter |
| melting | mixture | molecule | physical |
| solution | volume | weight | |

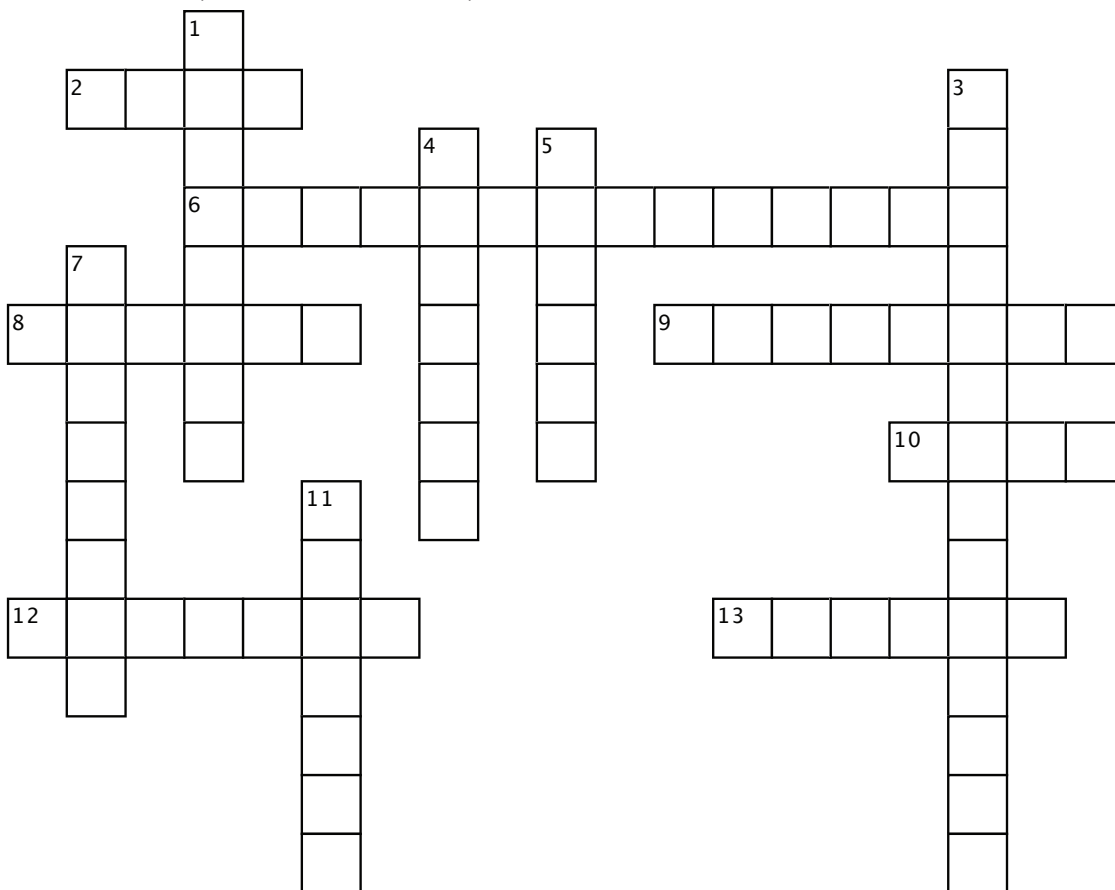
C T O M M J K H Y B V Q C U E X D Z F C
M O L E C U L E Z B R E B G K G L E P P
Y F S Q R M G R Z O A C H S T P W P B D
J U N U E A E K J X T L U D W Z P H A O
S C W H S R M N M U D D W S F C H Y O U
Y H M F C B Z M E E I N E A O B Q S O Q
G E I J L B R A L K L T I N C V V I F J
G M X K W C T S T H Y E Z S S P F C F H
Y I T T K S R S I S R X M Y V I F A E D
N C U U Y Q W Q N C B V O E R H T L Z K
Q A R R Q S E A G I I O Y W N S G Y B C
P L E K T N B L B G H H I O K T C A B K
J E Z B X F O Z R R R C V L G J A T O M
T Y N Y X V O L U M E O V V I Z N Q W C
F I S E K S K R U F Y M Y R C N O W M K
L A R A W Z O C T K X P J Q M V G E A X
E C C J Y Q C V O M Y O Z R T Z G I T P
Z B G A M Y Y R V K A U J V M M I G T K
F S O L U T I O N L E N S P J K W H E P
E B V O X D I P U T M D L D G T D T R W



An Introduction to Matter

CROSSWORD PUZZLE

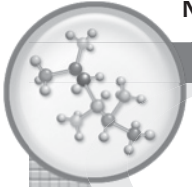
DIRECTIONS: Complete the crossword puzzle.



ACROSS

DOWN

- | | |
|--|--|
| <ul style="list-style-type: none"> 2. the smallest unit of an element 6. a change in a substance that does not change its identity 8. the amount of space that matter occupies 9. a mixture that is mixed very well 10. a measure of how much matter is in an object 12. a substance that cannot be broken down into other substances by chemical or physical means; for example, hydrogen, helium, and carbon 13. a measure of the force of gravity on an object | <ul style="list-style-type: none"> 1. a substance that is made of two or more elements that are chemically combined 3. a change in which one or more substances combine or break apart to form new substances 4. two or more substances that are mixed, but not chemically combined 5. anything that has mass and occupies space 7. a combination of two or more atoms 11. the measurement of how much mass is contained in a given volume |
|--|--|



Name: _____ Date: _____

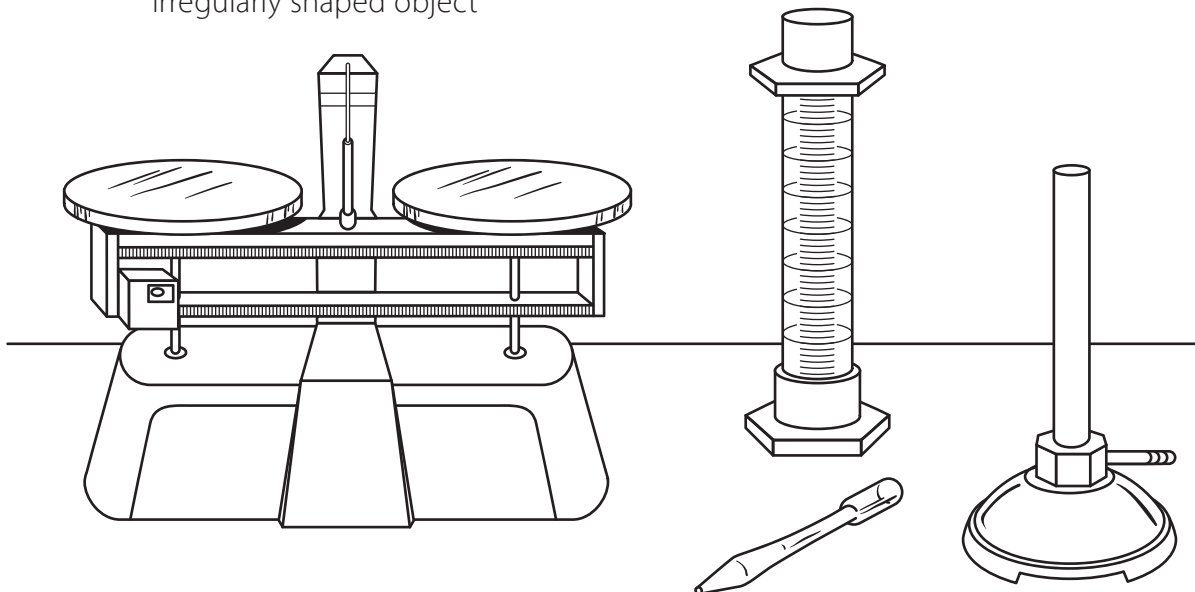
PHYSICAL PROPERTIES OF MATTER

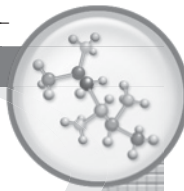
Tools of the Trade

MATCHING

DIRECTIONS: Match the name of each type of scientific measuring device below with the situation in which it would be used. Some situations may require more than one type of measuring device.

- | | | |
|----------|---|-----------------------------|
| 1. _____ | the acidity of an unknown substance | a. centimeter ruler |
| 2. _____ | the time it takes to heat water to 100°C | b. graduated cylinder |
| 3. _____ | the volume of a cube | c. digital scale or balance |
| 4. _____ | the distance between two large trees | d. beaker |
| 5. _____ | the angle of incline on a toy car ramp | e. gas burner |
| 6. _____ | the transfer of a very small amount of water between two test tubes | f. pipette |
| 7. _____ | the mass of an unknown substance | g. thermometer |
| 8. _____ | the density of a small, irregularly shaped object | h. meterstick |
| | | i. stopwatch |
| | | j. protractor |
| | | k. pH meter |
| | | l. calculator |





Calculating Mass

SCIENCE ACTIVITY

Mass is the amount of matter in an object. A **balance** is a tool that scientists use to calculate the mass of an object. In this activity, your group will use a triple beam balance to find the mass of different corn food products.

MATERIALS

- | | | | |
|---------------------------|-------------|------------------|----------------|
| triple beam balance | corn cereal | popped popcorn | tortilla chips |
| 5 resealable plastic bags | cornmeal | unpopped popcorn | |

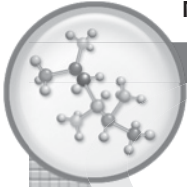
CAUTION: Before completing any food activity, ask families' permission and inquire about students' food allergies and religious or other food preferences.

PROCEDURE:

1. Your teacher will give your group five bags filled with different corn food products. Carefully examine each plastic bag, but do not open it.
2. Estimate the mass of each bag of food. Record each estimate in the data table below. Then, based on your estimates, arrange the bags in order from least to greatest mass.
3. Use the balance to find the mass of each bag. Record the actual mass in the data table.
4. Find the difference between your estimate and the actual mass. Record the difference in the data table.

DATA TABLE:

Type of Corn Product	Estimated Mass (g)	Actual Mass (g)	Difference in Mass (g)
Corn Cereal			
Cornmeal			
Popped Popcorn			
Unpopped Popcorn			
Tortilla Chips			



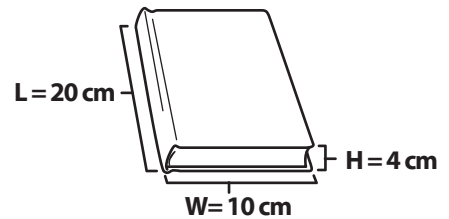
Calculating Volume

MATH SKILLS

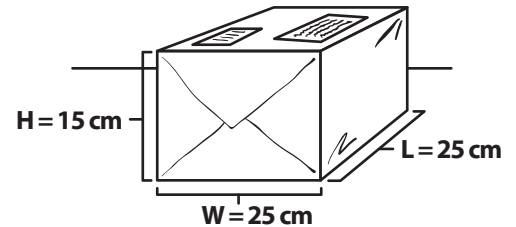
Volume is the amount of space that matter occupies. To find the volume of a regularly shaped object, multiply the length by the width by the height, or $L \times W \times H$. To find the volume of an irregularly shaped object, use the displacement method. The units of volume are mL or cm^3 . In this activity, you will calculate the volume of regularly and irregularly shaped objects.

DIRECTIONS: Find the volume of each object. Use the space below each problem or a separate sheet of paper to show your work.

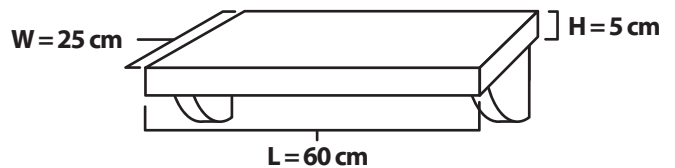
1. a. How much space does this book take up?



b. What is the volume of this box?

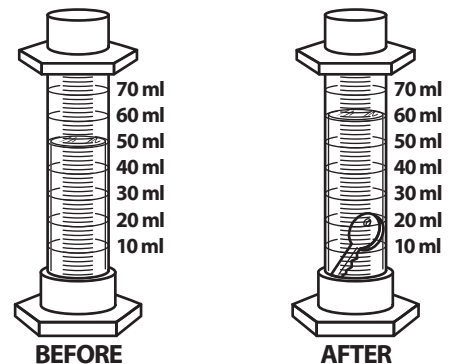


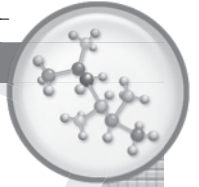
c. If you used the box in question b to ship books identical to the book in question a, how many books would fit in the box?



2. How much space does this bookshelf take up?

3. What is the volume of the key in the graduated cylinder?





Calculating Density

MATH SKILLS

Different objects may have the same mass but not the same volume. For example, one pound of rocks and one pound of grapes may have the same mass, but they probably do not have the same volume. You can compare these objects by finding their densities. The **density** of an object is the ratio of its mass to its volume. To find the density of an object, divide its mass by its volume, or $D = M/V$. The unit of density is g/cm^3 , which is read "grams per cubic centimeter."

DIRECTIONS: Calculate the density of each object. Use the space below each problem or a separate sheet of paper to show your work. Then, answer each question.

1. small rock



$$M = 5 \text{ g}$$

$$V = 2 \text{ cm}^3$$

2. feather



$$M = 0.5 \text{ g}$$

$$V = 10 \text{ cm}^3$$

3. lead in a pencil



$$M = 3 \text{ g}$$

$$V = 2 \text{ cm}^3$$

4. silver coin



$$M = 5.25 \text{ g}$$

$$V = 0.5 \text{ cm}^3$$

5. gold bar



$$M = 289.5 \text{ g}$$

$$V = 15 \text{ cm}^3$$

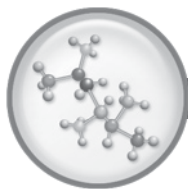
6. apple



$$M = 10 \text{ g}$$

$$V = 15 \text{ cm}^3$$

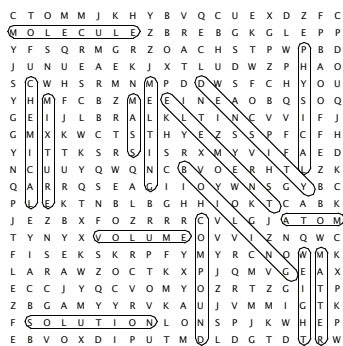
7. Which object is the least dense? _____
8. Which object is the most dense? _____
9. List the objects from least dense to most dense. _____
- _____



Branches of Physical Science (page 9)

1. hydrodynamics; 2. catacoustics;
3. magnetics; 4. aerodynamics;
5. aerostatics; 6. thermodynamics;
7. electrology; 8. acoustics;
9. mechanics; 10. chemistry;
11. optics; 12. electrostatics;
13. kinematics; 14. metallography

An Introduction to Matter (page 10)



An Introduction to Matter (page 11)

ACROSS

2. atom; 6. physical change; 8. volume;
9. solution; 10. mass; 12. element;
13. weight

DOWN

1. compound; 3. chemical change;
4. mixture; 5. matter; 7. molecule;
11. density

Tools of the Trade (page 12)

1. k; 2. d, e, g, i; 3. a, d; 4. h; 5. j;
6. f; 7. c; 8. b, l

Calculating Mass (page 13)

Answers will vary.

Calculating Volume (page 14)

1. a. 800 cm³; b. 9,375 cm³; c. 11 books;
2. 7,500 cm³; 3. 10 mL

Calculating Density (page 15)

1. 2.5 g/cm³; 2. 0.05 g/cm³; 3. 1.5 g/cm³;
4. 10.5 g/cm³; 5. 19.3 g/cm³;
6. 0.667 g/cm³; 7. The feather is the

least dense.; 8. Gold is the most dense.; 9. feather, apple, lead in a pencil, small rock, silver coin, gold bar

Mass, Volume, Density (pages 16–18)

Data table: 1. Mass = 15 g; Volume = 5 mL; Density = 3 g/mL; Sink; 2. Mass = 25 g; Volume = 30 mL; Density = 0.833 g/mL; Float; 3. Mass = 20 g; Volume = 25 mL; Density = 0.8 g/mL; Float; 4. Mass = 30 g; Volume = 5 mL; Density = 6 g/mL; Sink; 5. Mass = 50 g; Volume = 15 mL; Density = 3.333 g/mL; Sink; Conclusions: 1. An object with a density greater than 1 g/mL will sink in water because it is denser than water.; 2. Objects 1, 4, and 5 are denser than water. Answers will vary but may include: These objects could be made of a metal or stone.; 3. An object with a density less than 1 g/mL will float in water because it is less dense than water.; 4. Objects 2 and 3 are less dense than water. Answers will vary but may include: These objects could be made of plastic or wood.

The Density of Water (pages 19–21)

Procedure: 11. Correct predictions will say that the egg will float in salt water.; The mass of empty beaker will vary.; Data tables will vary.; Results/Conclusion: 1. Subtract the mass of the empty beaker from the mass of the beaker and water.; 2. Subtract the mass of the empty beaker from the mass of the beaker, water, and salt.; 3. The egg is more dense than tap water.; 4. The egg sank in the tap water. The density of the egg was greater than the density of the tap water.; 5. The density of the tap water increased when salt was added.; 6. The egg floated in the salt water. The density of the raw egg is less than the density of the salt water.; 7. An object will float if its density is

less than that of the liquid. The object will sink if its density is greater than that of the liquid.

Float Your Boat! (pages 22–23)

Data tables will vary.; Results/Conclusion: 1.–2. Answers will vary.; 3. Answers will vary, but the water displaced equals the mass of the boat loaded with paper clips.

Viscosity (pages 24–25)

Procedure: Predictions will vary.; Data tables will vary.; Results: 1.–2. Answers will vary based on student observations; 3. Answers will vary but may include: Three trials were conducted and the average was found to get a more accurate reading. This way, any potential mistakes that occurred could be averaged out.

Types of Measurement (page 26)

1. milligram, L, A; 2. volume, O, U;
3. kilometer, R; 4. milliliter, I, T;
5. gram, A; 6. cubic centimeter, I, N;
7. kilogram, I; 8. centimeter, N;
9. length, N, T; 10. density, N, T;
11. mass, S; 12. meter, E

Mystery Words: International System of Units

Ways to Measure (page 27)

Volume: 4, 11, 13; Mass: 2, 5, 9; Density: 1, 8, 14; Length: 3, 15, 16; Temperature: 6, 7, 10, 12

Learning about Changes (page 28)

temperature: physical property of matter that affects which state substances will be; molecules: groups of atoms that are held together by chemical bonds; evaporate: when liquid molecules heat up and change to a gaseous state of matter; condenses: when gaseous molecules cool and change to a liquid state of matter