

Dr. Birdley Teaches Science!

Properties of Matter

Featuring the Comic Strip



Middle and High School



Innovative Resources for the Science Classroom

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Incentive Publications, Inc.

Nashville, Tennessee

About the Author

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Nevin majored in Biology at Swarthmore College and went on to earn his Master's in Education at the Harvard Graduate School of Education. He began developing curriculum as a student teacher in Roxbury, Massachusetts.

"Mr. Katz" has been teaching science over 6 years, in grades 6 through 11. He currently teaches Biology, Environmental Science, and Physical Science at Ludlow High School in Ludlow, Massachusetts.

Nevin's journey with Dr. Birdley and the cast began in the summer of 2002, when he started authoring the cartoon and using it in his science classes. From there, he developed the cartoon strip, characters, and curriculum materials. After designing and implementing the materials, he decided to develop them further and organize them into a series of books.

Cover by Geoffrey Brittingham

Edited by Jill Norris

Science Editors: K. Noel Freitas and Scott Norris

ISBN 978-0-86530-535-9

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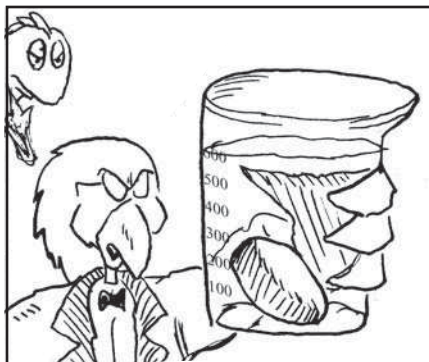
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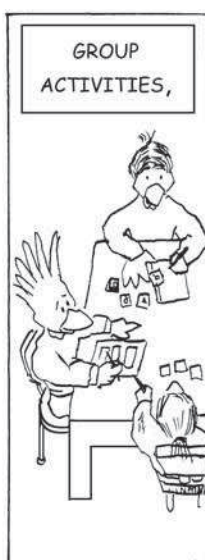
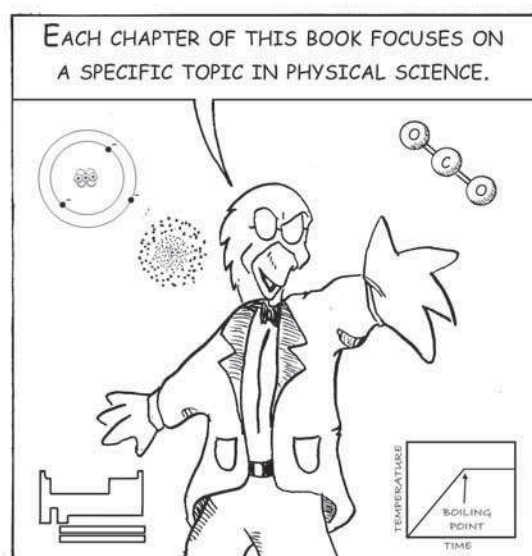
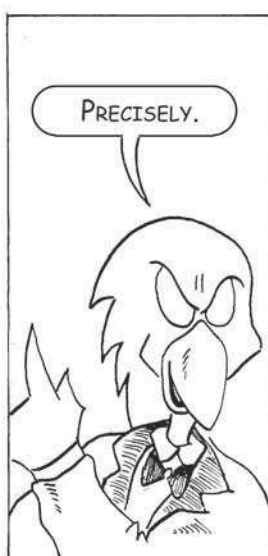
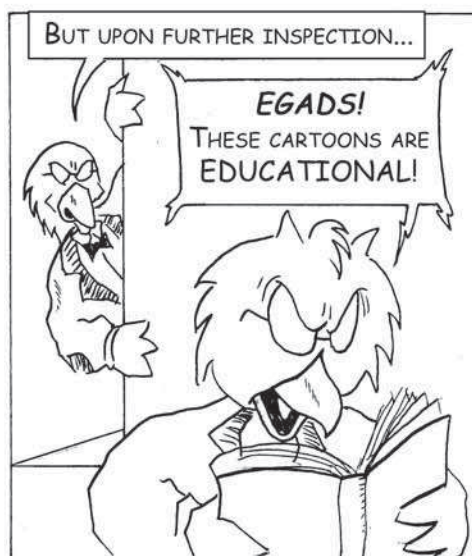
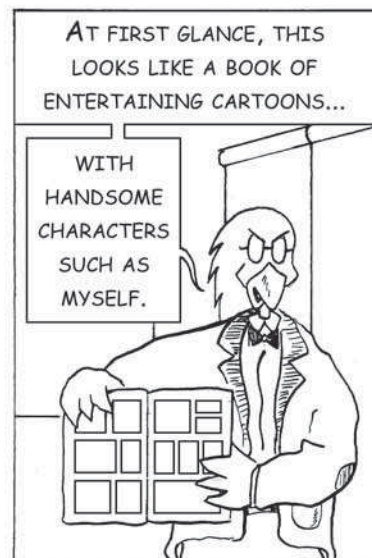
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The Source Cartoon

The *Source Cartoon* explains the central concepts of the overall chapter. It is usually one to two pages in length. Expect to find the following in a given source cartoon:

- A central idea with supporting details
- Visual images related to the topic being presented
- Explanations of science concepts
- A range of characters that explain the information to each other or to the reader

Cartoon Logo & Title

Intro Panel

Objective: Find the density of the biscuit

Central Idea #1: Find volume by using water displacement method

Central idea #2: Find mass of object using a triple beam balance

Central Idea #2: Density is equal to mass divided by volume

NAME: _____
CLASS: _____ DATE: _____

DR. BIRDLEY THE BISCUIT
INVESTIGATES

CRUNCH!!

THIS IS AN OUTRAGE! MY NEW BISCUIT IS HORRENDOUS! I FEEL LIKE I'M EATING A ROCK.

I PROPOSE AN EXERCISE. LET'S CALCULATE THE DENSITY OF THE BISCUIT.

YOU ALL HAVE TOO MUCH FREE TIME.

I HAVE A BEAKER HERE THAT IS FILLED WITH 500 mL OF WATER. LET'S SUBMERGE THIS BISCUIT IN THE WATER TO FIND ITS VOLUME.

~SPLOSH~

AH-HA. THE WATER LEVEL CHANGED BY 100 MILLILITERS...SO THE VOLUME OF THE BISCUIT MUST BE 100 mL.

GOODNESS! THE MASS LOOKS LIKE 1200 GRAMS! HIGHLY UNUSUAL.

YEP. NOW LET'S DIVIDE THE MASS BY THE VOLUME TO FIND THE DENSITY.

$$d_{\text{BISCUIT}} = \frac{M_{\text{BISCUIT}}}{V_{\text{BISCUIT}}} = \frac{1200\text{g}}{100\text{ mL}} = 12\text{ g/mL}$$

THIS BISCUIT IS MORE DENSE THAN A LEAD WEIGHT!

I'M FILING A COMPLAINT.

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The Cartoon Profile

The *Cartoon Profile*, which outlines a source cartoon's science content, is useful for planning or teaching a lesson. Central elements include:

- The objectives in the cartoon, which are listed alongside the related state or national standards.
- The “questions for discussion” below the image, which are useful for getting students engaged and checking for understanding.

Objectives
and
Synopsis

Main ideas
and relevant
standards

Key terms



COMPOUND X

States of Matter

Objectives

1. To show what happens to temperature when a substance reaches its boiling point.
2. To define boiling point.
3. To illustrate an experimental setup that can be used to determine the boiling point of a substance.

Synopsis

Dr. Birdley demonstrates how to find the boiling point of an unknown compound using an apparatus consisting of a hot plate, beaker, ringstand, clamp, and thermometer. As he instructs the students, he forgets to watch the thermometer and the compound boils away before he can record any data.

Main Ideas

1. The boiling point is the temperature at which a substance changes from a liquid to a gas.
2. Once a substance reaches its boiling point, the temperature stops increasing.
3. Collecting accurate data requires careful observation.
4. The hot plate is used to induce heat, while the thermometer is used to measure the temperature.
5. The clamp, which is attached to a ringstand, holds the thermometer in place.

Vocabulary

Boiling point Hot plate

Ringstand Thermometer

Characters

Dr. Birdley, students



Source
cartoon
image

Questions for Discussion

❑ Before Reading:

1. What is boiling point?
2. Can identifying the boiling point or melting point of a compound help you to identify it?
3. How is boiling different from evaporation?

❑ After Reading:

1. From looking at the graph in panel 2, what happens to the temperature of the water after reaching its boiling point?
2. What mistake did Dr. Birdley make?

Discussion
questions

