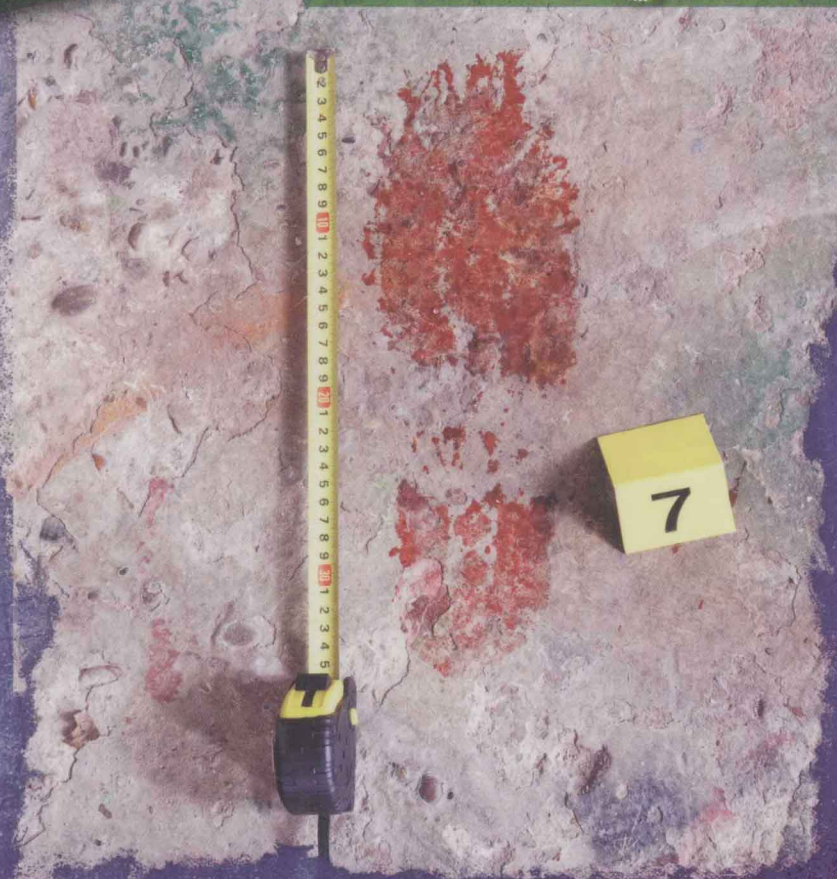


FORENSIC

SCIENCE

Advanced

Investigations



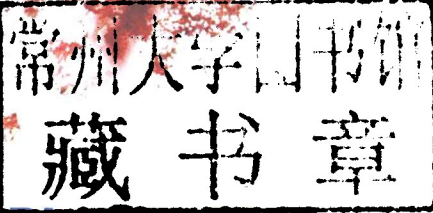
Brown & Davenport



FORENSIC

SCIENCE

Advanced Investigations



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Forensic Science: Advanced Investigations
First Edition

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Dedication

To our families and friends who supported us throughout this incredible journey.

WELCOME TO FORENSIC SCIENCE: ADVANCED INVESTIGATIONS

Introducing a new textbook that provides more advanced science behind forensics as well as labs and activities appropriate for high school students! *Forensic Science: Advanced Investigations* is student *and* teacher friendly. *Forensic Science: Advanced Investigations* integrates science, mathematics, and writing skills by using real-life applications and case studies, providing complete flexibility for any science program. Teachers can conduct a full-year's study of forensics or select topics for a half-year course. As another option, teachers may use the textbook in any science class to motivate students to learn science concepts through forensic applications. *Forensic Science: Advanced Investigations* is the new standard in high school forensic science . . . Case Closed!

Forensic Science: Advanced Investigations is meant as a companion book to *Forensic Science: Fundamentals and Investigations* by Bertino (ISBN 978-0-538-44586-3). For some classroom situations, this text can be used independently.

GETTING STARTED

Forensic Science: Advanced Investigations explains the science used in forensic-science techniques. It provides a chapter-by-chapter description of specific types of evidence and the techniques to collect and analyze the evidence. As students progress through the course, they refine the techniques and apply them to other areas of study. The topics covered in the 15 chapters include interrogation and reporting, laboratory techniques, arson and fire investigations, explosions, body systems, physical trauma, autopsy and truthful reporting, physiology of alcohol and poisons, advanced studies of DNA, forensic odontology, entomology, crime and accident reconstruction, cyber crimes, and criminal profiling.

The textbook is designed to motivate students. Forensic topics are introduced in case studies taken from headlines and popular media. These features engage students as they describe the historical development of forensic-science techniques. Inexpensive, easy-to-use labs provide students with opportunities for successful laboratory experiences as well as an appreciation of the true nature of forensic science problem-solving techniques. Suggestions for research projects extend and enrich student learning and interest.

CHAPTER FEATURES

Each chapter of *Forensic Science: Advanced Investigations* begins with a true story, student objectives, key vocabulary, and a *Key to Science Topics*. The *Key to Science Topics* identifies biology, earth science, chemistry, physics, psychology, or mathematics concepts integrated into chapter topics.

Special features include *Did You Know?* margin notes that provide additional facts and information, and *Digging Deeper* research activities that refer

students to the free online InfoTrac® database from Gale Publishing called the **Forensic Science e-Collection database**.

At the end of each chapter, a **Chapter Summary** reviews the main points of the chapter. A series of short **Case Studies** offer high-interest topics for critical thinking, writing, and classroom discussion. **Career Profiles** describe occupations related to forensic science. A **Chapter Review** contains both objective and short-answer questions to assess student understanding. A chapter bibliography lists the research sources.

Each chapter has **Activities** that provide hands-on experiences with forensic-science techniques. Each activity has clear, step-by-step directions for students of all reading levels. For teachers, they offer easy, quick preparation and minimal materials expense. Each activity includes objectives, materials, safety precautions, procedures, and other learning tools.

New features include Crime Scene S.P.O.T. (Student Prepared Original Titles) and Preventing Adolescent Crime Together (P.A.C.T.™). **S.P.O.T.** offers short stories written by actual students followed by critical-thinking questions. These also provide interdisciplinary instructions integrating reading and writing throughout the text. **P.A.C.T.** provides service-learning opportunities through projects addressing issues such as anti-bullying and social responsibility.

Capstone Projects give students the opportunity to apply key topics learned throughout the course.

FOR THE TEACHER

The **Wraparound Teacher's Edition** (ISBN 978-0-538-45090-4) contains teaching strategies and tips to engage students. It provides clarification of science content and forensic-science procedures, ideas to help stimulate student interest, evaluation opportunities, additional questions, and suggestions for further exploration and research.

An **Instructor's Resource CD-ROM** is available to teachers who adopt a classroom set of **Forensic Science: Advanced Investigations** (ISBN 978-0-538-45091-1). The CD contains additional activities, Power Point® presentations, student activity forms, rubrics, content blueprints, and enrichment materials.

Teachers can purchase a flexible, easy-to-use **Exam View® Electronic Test Bank and Test Generation Software CD-ROM** that contains objective questions that cover textbook content (ISBN 978-538-45092-8). The test bank includes questions for each chapter and a final exam. The **Exam View** software enables teachers to modify questions from the test bank or add their own questions to create customized tests.

An electronic **eBook** is also sold separately (ISBN 978-1-111-74685-8 PAC and 978-0-8400-6441-7 IAC). The eBook is a digitized version of **Forensic Science: Advanced Investigations**. It offers the same rich photographs, illustrations and other graphics, and easy-to-read fonts as the printed text. Students may view the PDF files on their computers.

CourseMate is also available separately for this text. CourseMate brings course concepts to life with interactive study and exam-preparation tools that support the printed textbook. This includes the interactive eBook,

and interactive teaching and learning tools including quizzes, flashcards, videos, and more. It also includes *Engagement Tracker*, a tool that monitors student engagement in the course. See <http://www.cengagesites.com/academic/?site=4625> for more information.

Available separately, the Forensic Science *Virtual Labs* give real-world lab experience within an online environment. Eighteen forensic-science lab activities based on two crime scenes are included. The labs can be used with any text on forensic science. See www.cengage.com/school for more information.

South-Western maintains a **website** to support this text. Both students and teachers using *Forensic Science: Advanced Investigations* may access the website at www.cengage.com/school/forensicscienceadv. The site provides teacher resources and information about related products. Student resources on the site include forms, additional projects, and links to related sites. In addition, a link is provided to the *Gale Forensic Science e-Collection* database which allows free online research in various journals and the Gale Virtual Reference Library.

ABOUT THE AUTHORS

Rhonda Brown is the department chair in the Science Department at East Ridge High School in Clermont, Florida. She teaches forensic science as well as biology and zoology. Brown developed the Florida state curriculum for Forensic Sciences I and co-authored the curriculum for Forensic Sciences II. She received her Master's degree in Education from Indiana Wesleyan and Bachelor of Science degree from the University of Southern Indiana. In 2004 she received National Board Certification, the East Ridge High School Teacher of the Year Award, and the 2005 Disney Teacherrific Award for Outstanding Educational Program. In 2010, she was named Central Florida STEM (Science, Technology, Engineering and Math) Teacher of the Year by the Air Force Association. Rhonda Brown has been a presenter at several local, state, and national education conferences including the National Science Teachers Association (NSTA) and Florida Association for Science Teachers (FAST).

Jackie Davenport teaches earth science, honors chemistry, and forensic science at Tavares High School in Tavares, Florida. She is the Small Learning Community Lead teacher for the Science, Technology, and Health Sciences community. Davenport is co-author of the Forensic Science II curriculum for the state of Florida. She earned a Master's degree in Educational Leadership from National Louis University and a Bachelor's in Science Education degree from East Carolina University. Her awards include Tavares High School Teacher of the Year, Lake County Teacher of the Year finalist, the 2005 Disney Teacherrific Award for Outstanding Educational Program, and Disney Teacherrific Special Judges Award in 2003. Jackie Davenport has served as a consultant for the National Education Program. She also has presented and facilitated at several state and national science teaching events, including the National Science Teachers Association (NSTA), Florida Association for Science Teachers, and Florida Association of Science Supervisors.

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**STRAIGHT FROM THE SOURCE,
NO ASSUMPTIONS**

THE CONTENT YOU REQUESTED

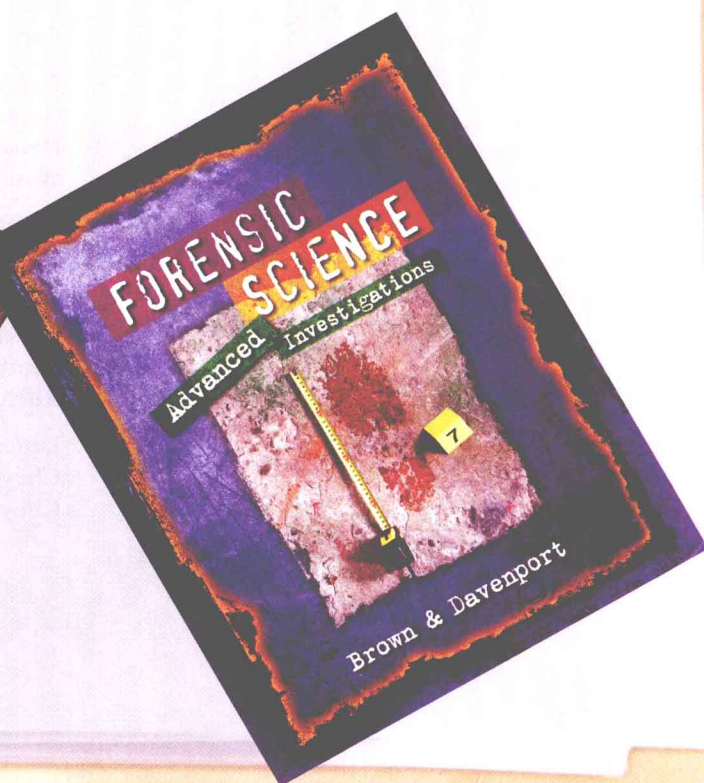
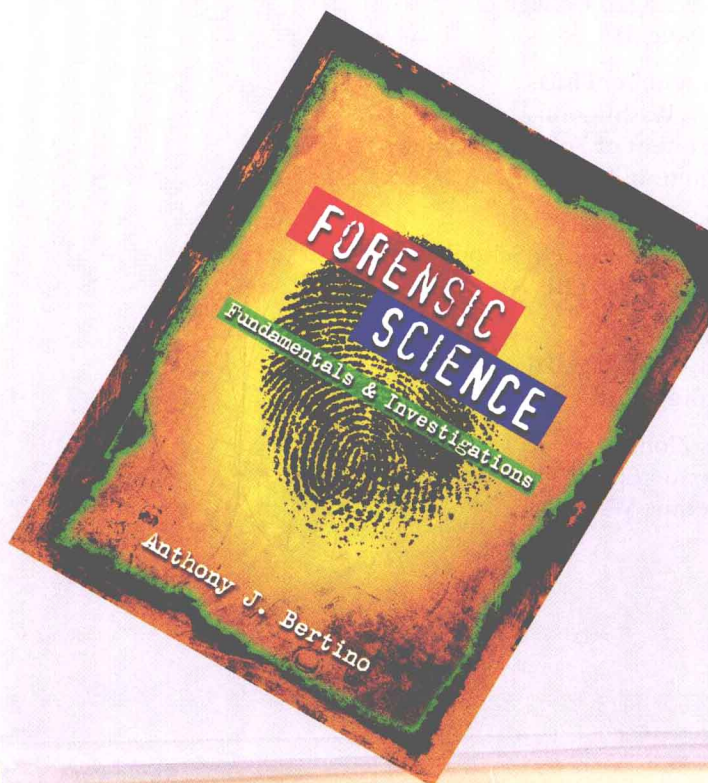
**EVIDENCE: Fingerprints of Expert Educators,
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This program's balance of relevant content and hands-on lab activities are a direct result of your input at every stage! No other forensic science program delivers precisely what you need for your students and your course.

- **Review board of more than 70 educators, focus groups, and ongoing educator feedback** guided each decision to ensure the program meets the educational needs of your students.
- **Student and teacher supplements support the workflow with time-saving tools.** Many resources represent "firsts" for the high school course, such as the innovative **Forensic Science e-Collection™ database** and the new **Virtual Labs**.
- **Forensic Science combines topics from math, chemistry, biology, physics, psychology, and earth science** into a single course with all materials clearly aligned with the **National Science Education Standards**. Distinctive icons identify topics in the chapter opener and throughout the text.

DR. CARL COPPOLINO

As science continues to advance, so do the tests to analyze and process evidence. In 1963, William Farber was found dead in his home in New Jersey. Doctors thought that Farber had died of a heart attack. Two years later, the wife of Mrs. Farber's lover was found dead in her home in Florida. At first, the family physician thought Dr. Carl Coppolino had died of a heart attack. However, prosecutors thought Dr. Carl Coppolino had poisoned Carmela Coppolino. Both bodies were exhumed and sent to separate trials. The first trial, in New Jersey, was for the murder of Coppolino's wife. The second trial, for the murder of Coppolino's wife, was for the murder of Coppolino's wife. Coppolino was acquitted of the first murder. The jury, however, admitted evidence from the toxicologist.



EQUIP STUDENTS WITH REAL-WORLD FIELD EXPERIENCE

ENGAGE THEM WITH HANDS-ON ACTIVITIES

The variety of high-interest lab activities saves you time, while giving students the hands-on experience needed to integrate their knowledge of science and related subjects. These activities outline the objectives, materials, safety precautions, scenarios, background information, detailed procedures and data tables, follow-up questions, and research opportunities. Plus, the affordable materials allow labs to be completed with minimal investment.

Capstone Crime Scene projects give students the opportunity to apply key topics learned throughout the course.

ACTIVITY 12-1 BODY BUGS

Objective:
By the end of this activity, you will be able to:
Demonstrate proper techniques for collecting, preserving, and identifying insects.

Materials:
(per group of four students)
2 chickens (whole or pieces)
2 plastic plates (preferably white)
2 pieces of wire mesh, with 1-inch mesh
tent spikes
hammer
collection bottles
isopropyl (rubbing) alcohol
hand lens
forceps
stereomicroscope
2 insect nets
Mason jars, with nylon stocking material in the lid
metric ruler

Safety Precautions:
Wear safety goggles.
Use disposable gloves as an extra precaution.
Wash hands after the lab exercise.

Procedure:
Day 1
1. Place a chicken or chicken parts onto two plastic plates.
2. In an appropriate place outside, put one plate in a sunny location and the other plate in a location shielded from direct sunlight.
3. Cover the plates with the wire mesh and secure the wire with the tent spikes to prevent animals from eating the "evidence."

Day 2
1. Collect your "evidence" from each bottle.
2. Sort the "evidence" for insect eggs and place them in the collection bottles. (There will be several different types of insects and several types of eggs.)
3. Use a stereomicroscope to observe the eggs and make measurements for each specimen.

ACTIVITY 12-2 A WORLD OF INSECTS

Objectives:
By the end of this activity, you will be able to:
1. Research insects native to various parts of the world.
2. Assess the importance of insects to forensics.
3. Produce a multimedia project illustrating a research topic.

Materials:
Computers with Publisher®, PowerPoint®, and/or Flash® Movie

Procedure:
1. After choosing a geographical area, research insects of forensic importance in that part of the world. Information should include the anatomy, life cycle, habitat, where they are found, food source(s), position in the food chain (predators, prey, etc.), forensic importance, and any other "fun facts" you may find.
2. Choose the format to showcase your research:
a. PowerPoint presentation
b. Flash Movie
c. Brochure

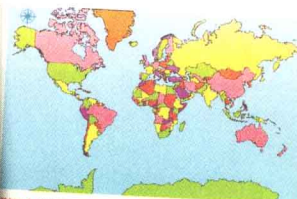


Figure 1. World map.

Preventing Adolescent Crime Together™ (P.A.C.T.)

Introduction:

Every year, children and adults are injured when using fireworks in celebrations. In this activity, you will develop a public awareness brochure to educate others about the dangers and safe handling procedures of explosives, particularly fireworks.

Procedure:

Part 1

1. Research the following information regarding fireworks safety:
 - Current statistics on fireworks injuries/deaths
 - Tips for preventing accidents
 - Laws and regulations regarding the use of fireworks in your area. Be sure to look for local as well as statewide regulations.
2. After completing the research, your group will design an informational brochure for other students. The brochure must be easy to read, informative, creative, and well organized.

Part 2

1. Find out who the legislators are for your area.
2. Using the information from your research, write a persuasive letter to a legislator to:
 - a. Request more specific regulations for use of explosive fireworks.
 - b. Request stricter or more lenient legislation regarding use of explosive fireworks.
 - c. Suggest a safety campaign or contest for students across the country. The winning entry could be presented before the next national celebration involving fireworks.



Figure 5-22. Fireworks.

Explosions

P.A.C.T.™ Activities (Preventing Adolescent Crime Together) provide service learning opportunities through projects addressing issues such as anti-bullying and social responsibility. Available with *Forensic Science Advanced Investigations*.

"I found this program to be the most student friendly. The well-written laboratory activities capture the students' interest immediately and enhance the forensic science curriculum by encouraging the students to think critically."

Glennis Kaplansky, East Brunswick High School

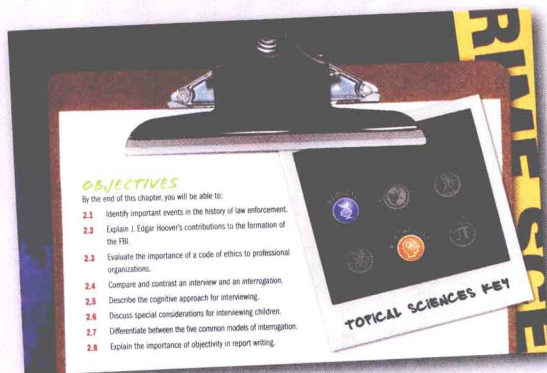
IT'S ALL IN THE DETAILS

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From a dynamic design to captivating images, practical applications, intriguing case studies, and glimpses into actual crime and lab scenes, every part of this text appeals to students. The program presents information the way students learn best.

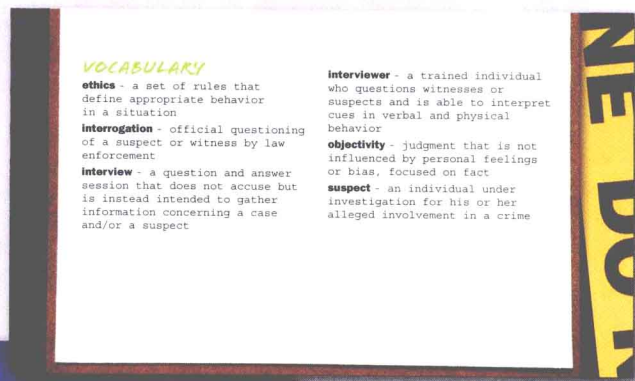
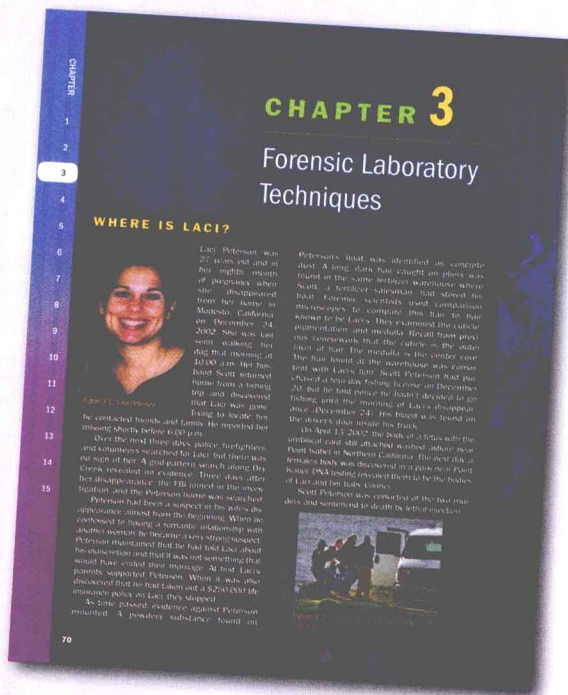
Chapter-opening scenarios highlight intriguing news shaping forensic science today. These exciting stories, taken directly from gripping headlines, draw students into the chapter information. Scenarios feature well-known cases, such as Chris Brown, Michael Jackson, Timothy McVeigh, and more.



Clear Learning Objectives guide how students' study, helping them focus on the key topics. Chapter content and assessment materials, tagged to specific learning objectives, provide a strong framework for mastering key concepts.

Scientific Terms and Vocabulary, highlighted in each chapter, introduce key terms, ensuring students are able to understand their meaning.

End of Chapter Review Questions, including multiple choice, short answer, and critical thinking, highlight cross-curricular connections and ensure students thoroughly comprehend principles before moving ahead.



CHAPTER 9 REVIEW

Matching

Match the following poisons with their method of entry into the body. Some answers may be used more than once and some review items may have more than one answer.

- | | |
|----------------------------------|---------------|
| 1. carbon monoxide Obj. 9.3, 9.4 | a. ingestion |
| 2. ricin Obj. 9.3, 9.4 | b. inhalation |
| 3. anthrax Obj. 9.3, 9.4 | c. injection |
| 4. snake venom Obj. 9.3, 9.4 | d. absorption |

Multiple Choice

DOWN AND DIRTY

ENABLE STUDENTS TO EXPLORE THE TOOLS OF THE TRADE WITH DYNAMIC ONLINE RESOURCES

The **Forensic Science companion website** takes learning to a new level with a wealth of learning and teaching resources.
www.cengage.com/school/forensicscienceadv

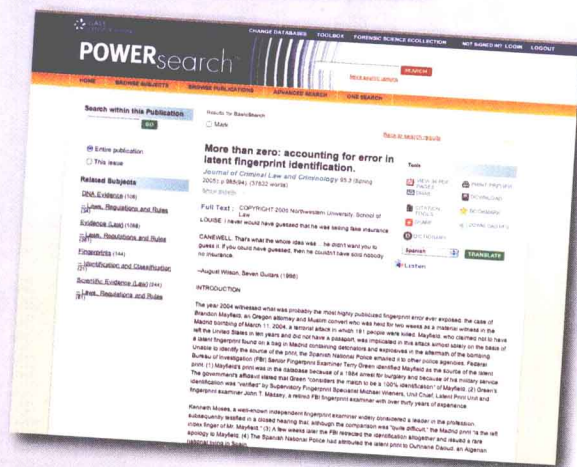
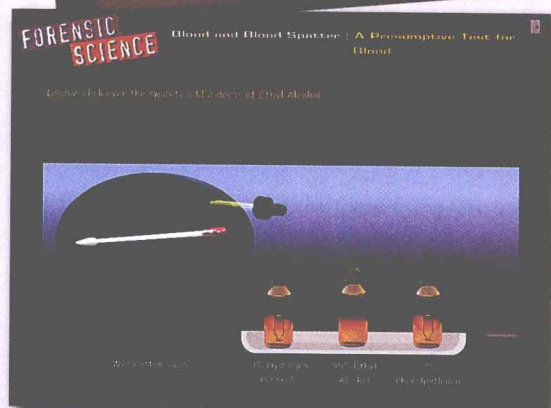
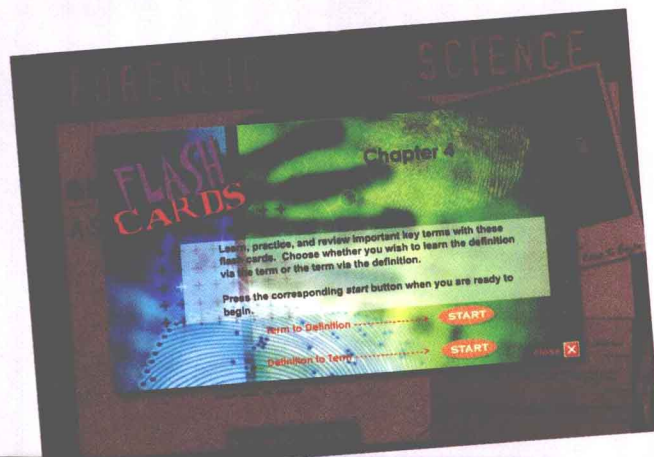
- Interactive learning activities and labs
- Forensic Science e-Collection™ database
- Web links to other dynamic science sites
- Interactive flashcards and crossword puzzles to review key terms
- Lab forms to complete in-text lab activities
- Lesson Plans
- PowerPoint® presentation slides

Digging Deeper with Forensic Science e-Collection guides students in exploring specific areas of interest related to forensic science for additional reinforcement.

Digging Deeper with Forensic Science e-Collection

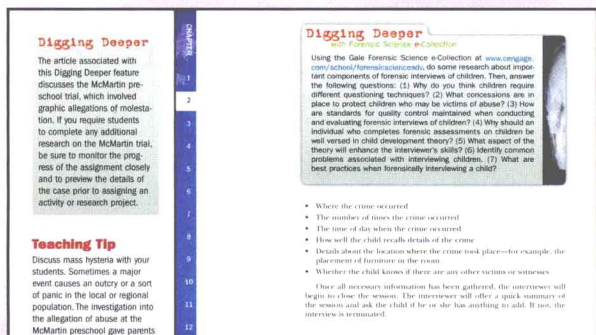
Many people die each year because someone was driving while intoxicated. Alcohol impairs reflexes, which makes driving extremely dangerous. But how much is too much? For people under the age of 21, it is illegal to consume any alcohol. States have laws that define legal blood alcohol levels for drivers over 21. Confirmatory tests for blood alcohol levels use gas chromatography. New presumptive tests are very accurate and can help law-enforcement personnel get the information they need more quickly. Using the Gale Forensic Science e-Collection

The **Gale Forensic Science e-Collection™** allows you and your students to investigate the mysteries of forensic science in-depth with online access to hundreds of articles—from highly specialized academic journals to general science-focused magazines. Stay current with the latest scientific developments in this growing field. No other publisher offers such a complete, exclusive resource. Free student access on the textbook companion website.



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- Teaching Resources
- Tips for Differentiated Learning
- Teaching Tips to engage, teach, explore, evaluate, and close the lesson
- Answers to end-of-chapter reviews and activities with additional details related to lab materials, safety precautions, procedures, data tables, and further student research
- Expanded cross-curricular information that connects biology, chemistry, earth science, physics, math, and English

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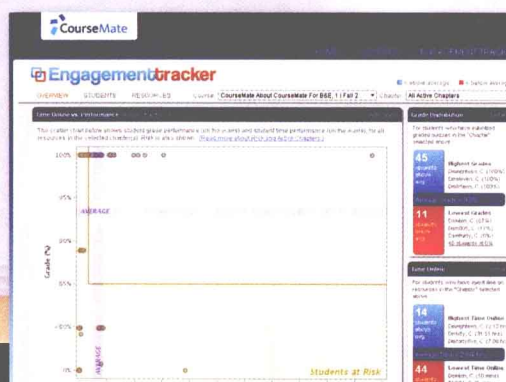
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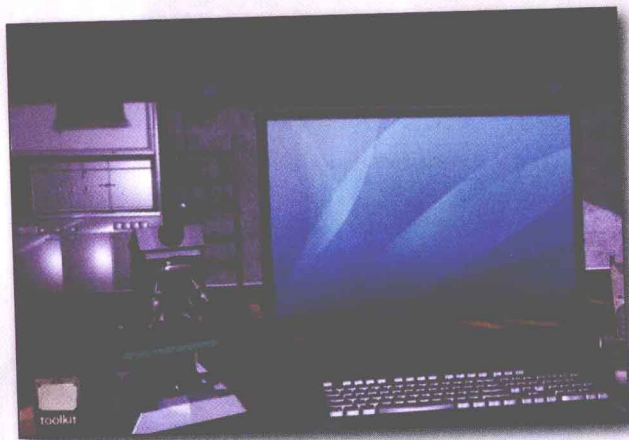
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NEW! FORENSIC SCIENCE VIRTUAL LAB PROGRAM



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Now you can give your students real-world lab experience within an online environment! The new virtual lab program includes 18 forensic science lab activities between two crime scenes.

Each lab activity includes:

- Background information
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- Critical thinking questions
- Research activities

Instructors can choose whether the items below will count as practice or graded assignments (entered in instructor grade book):

- Notebook
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- Mini Lab Assessment
- Individual Labs
- Crime Scene

Information about each activity includes: the time spent on the task, the number of attempts, and the amount completed. Instructors can arrange the graded items so that several assessments feed a single grade or each item will have an individual grade.

Forensic Science Virtual Lab Crime Scene 1

ISBN-13: 978-1-111-48253-4 (Printed Access Code)

Forensic Science Virtual Lab Crime Scene 2

ISBN-13: 978-1-111-57717-9 (Printed Access Code)

Coroner's Office Laboratory Data Sheet

The **Basic Crime Lab** includes 8 labs that let students experience:

- ☒ Blood Spatter Analysis
- ☒ Pollen/Spore Lab
- ☒ Hair Analysis
- ☒ Fiber Analysis
- ☒ Glass Analysis
- ☒ Document Analysis
- ☒ Fingerprint Analysis
- ☒ Ballistics Lab

The **Advanced Crime Lab** features 8 labs focused on enabling students to apply more sophisticated tools, such as:

- ☒ Toxicology
- ☒ Death /Autopsy
- ☒ Soil Examination
- ☒ Forensic Anthropology
- ☒ DNA Fingerprinting
- ☒ Tool Marks
- ☒ Casts and Impressions
- ☒ Fire and Explosives

Both Labs include activities and assessment for:

- ☒ Crime Scene Investigation/Evidence Collection
- ☒ Crime Scene Observation Skills

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