DEAR EDUCATOR,

Welcome to GemKids for Schools—an exciting educational journey into the world of gems!

The field of gemology provides an extraordinary opportunity for educators; through one topic, we are able to illuminate for young students the big-picture connections between nature, human industry, arts, and culture. Follow the path of a gem from mine to market, and you will witness how a simple geological process can profoundly impact human societies over time.

This standards-based curriculum will excite and instill a passion for gemology by engaging your 3rd- to 5th-grade students in the science and art of gems. They will explore how gems are formed in the natural environment, how people labor to bring the gems into use, how civilizations have valued gems throughout time, and how questions of ethics guide the field today and into the future.

By using these lessons with your students, you will open their eyes to the story behind each stone and guide them to discover the multifaceted world in which they live.

Sincerely,

Your Friends at GIA (Gemological Institute of America)

ACKNOWLEDGMENTS
We would like to thank our advisors.

TEACHER ADVISORY BOARD
• Colleen Guertin Parenteau, Science Teacher and Sustainability Committee Chair at Shore Country Day School, Massachusetts
• Doug Streblow, Environmental Education and Program Manager at Earth Team, California
• Suzanne Pitkewicz, Elementary School Teacher at Fairfax Country Public Schools, Virginia
LESSON 1: ROCK STARS

How are gems formed?

Topics: Intro to Rocks, Minerals, and Gems

Learning Objectives:

Students will be able to...

- Define rocks, minerals, and gems
- Summarize in their own words how gems are formed
- Work collaboratively to make scientific predictions about minerals and gems

Essential Questions:

- What is a rock?
- What is a mineral?
- What is a gem? How do gems form?

LESSON 2: A DAZZLING JOURNEY

How does a gem get to me?

Topics: The Environment and Industry of Gems (Gemology)

Learning Objectives:

Students will be able to...

- Understand the journey of a gem “from mine to market”
- Generate hypotheses from prior knowledge
- Retell how a gem gets from the earth to a piece of jewelry or art

Essential Questions:

- How do I interact with gems in my everyday life?
- What is the process for gems to get out of the earth and into a piece of jewelry or art?
- Why is it important to be honest in business?
LESSON 3: TIME TO SHINE!  21
What are the world’s all-time greatest gems?

Topics: Gems and Jewels Throughout History (Arts and Culture)

Learning Objectives:
Students will be able to...
• Make personal connections with the concept of sentimental versus monetary value
• Explain why a gem is valuable
• Explore how jewelry has evolved over time
• Compare and contrast jewelry from around the world

Essential Questions:
• What is value?
• How is value different to different people?
• How has jewelry changed and stayed the same over time?
• Why are gems important to society, both now and in the past?

LESSON 4: LOOK INTO THE CRYSTAL BALL  29
What is the future of the bling business?

Topics: Current Issues, Ethics, Careers in Gemology (Community)

Learning Objectives:
Students will be able to...
• Discuss ethical issues in the field of gemology, including questions about imitation gems.
• Dramatize the connectivity among various jobs in gemology
• Express how ethical issues affect the field of gemology
• Reflect on key points

Essential Questions:
• What can I do to solve ethical problems in the world of gemology — and beyond?
• What kinds of jobs are there in gemology?
• How do gemologists work together to solve important problems?

APPENDICES A–K  39
HOW TO USE THIS CURRICULUM

GemKids for Schools is designed for easy implementation in upper elementary classrooms, with you — the 21st century educator — and your students in mind.

CROSS-CURRICULAR
Lessons are anchored in English Language Arts and Science, and also address Social Studies, Art, Math, and Technology.

ENGAGING ACTIVITIES
Lessons are student-centered and inquiry-led. Each lesson contains an engaging warm-up, a real-world context as introduction to the topic, differentiated hands-on activities, assessment, reflection, and a community-building wrap-up. Learning activities are designed to reach all kinds of minds through varied tasks and collaborative exploration. Fun facts and famous quotations are sprinkled throughout the curriculum. Lessons include teacher tips, key vocabulary, extension activities, and home connections.

STANDARDS-BASED
The curriculum is aligned with national education standards (Next Generation Science, Common Core ELA and Math, National Council on Social Studies, and National Visual Arts Standards). A standards chart can be found on the GemKids site at gemkids.GIA.edu/gem/teacher-guide. To address the needs of busy teachers, a set of Common Core handouts can be used for test prep, homework, or class work (beginning with Appendix C). In addition, critical 21st century skills, such as creativity and innovation, are integrated seamlessly into the learning tasks and activities.

PACING RECOMMENDATIONS
The lessons are designed for an upper elementary school classroom, where teachers can break apart instruction to suit the needs of their students. Each lesson can be taught in one 60-minute class period, but can also be divided into shorter lessons to be taught throughout the day or week. We recommend lessons be delivered in sequence, but they can also stand alone as individual lessons. Timing estimates may vary from class to class.

CULMINATING PROJECT
Celebrate learning with an optional interdisciplinary gemology exhibition at the end of the unit. See the sidebar on page 34 for more information on planning and preparing for this meaningful presentation of student work.
ABOUT GEMOLOGY

Gemology is the study of natural gems — diamonds, colored stones, and pearls — as well as their synthetic, imitation, and treated counterparts. While addressing optical and physical properties and geographic origin, gemology also deals with the more subjective matters of beauty and value.

A relatively new science, gemology has its roots in mankind’s earliest attempts to create ornamental objects. Ancient Greek and Roman naturalists recorded extensive observations of gems, and basic treatments such as dyeing, coating, and heating. But through the 19th century, gemological instruments were limited to the weight scale, a jeweler’s loupe, and a well-trained eye. Gemology emerged as a specialized field of study during the early 20th century with the establishment of educational and laboratory facilities such as the Gemmological Association of Great Britain (Gem-A) and the Gemological Institute of America (GIA). The advent of synthetic gems and increasingly sophisticated treatments required more advanced means of identification.

ABOUT GIA

Since 1931, GIA has been a global leader in gemological education, laboratory services, instruments, and research. A nonprofit organization, the Institute’s mission is to protect the public by providing the education, research, and unbiased gem grading standards needed to make an informed gem purchase. GIA offers internationally respected professional diploma programs and courses in gemology and jewelry arts. The Institute created the 4Cs of diamond quality and the International Diamond Grading System™, and its laboratory is entrusted with grading and identifying millions of gems annually. GIA’s precision microscopes and other gem instruments are the choice of industry professionals worldwide. And as new gem sources are discovered and new synthetics and treatments appear on the market, GIA’s research efforts provide ongoing gem identification and treatment detection. We also share this information with the trade through Gems & Gemology, GIA’s award-winning journal, and other trade publications. GIA has laboratories and campuses located at major gem and jewelry centers around the world and is headquartered in Carlsbad, California.

ABOUT GIA — FOR KIDS

GIA is a school and a laboratory dedicated to the study of gems. Teachers, scientists, librarians, writers, photographers, and many others work at GIA all over the world. Our purpose is to study gems and jewelry, and to teach about them — so that everyone can be informed.

People come from all over the world to study at GIA. Many want to work in the gem and jewelry industry. We teach them how to identify and evaluate gems. And we teach them how to design and make jewelry. Our library is the largest gem and jewelry library in the world. We have over 57,000 books on gems and jewelry, with the oldest book dating back to 1496. We also collect and preserve mineral specimens, jewelry, gem art, and gemological equipment.
LESSON 1
ROCK STARS
How are gems formed?

Rocks get a bad rap for being boring — but when you open your eyes to the wonders of geology, each pebble contains a story about how the earth was made. In this introductory lesson, students will learn about the dramatic science of geology and get their hands dirty with a fun, hands-on science lab. This lesson sets the foundation for the rest of the curriculum by providing a basic understanding of rocks, minerals, and gems. (Please note that this is not a lesson on the rock cycle or rock formation.)

PREPARATION
- Print and cut out Gem Nametags (Appendix A, p. 39) for whole class
- Copy student handouts (1 per student)
- Set up Anchor Chart: Rocks, Minerals, and Gems (see Image 1.1, p. 8)
- Gather materials for demonstration: 4 different colors of clay, sugar cookie (1), chocolate chip cookie (1 for today, whole box for Lesson 2)
- Gather materials for Crystal Geode Egg-speriment: eggs, tissues, table salt, sugar, baking soda, metal spoons, muffin pan, hot water, measuring cup, paper cups or small containers, and food coloring (optional). See activity on p. 10 for specific quantities
- Review script for The Story of a Gem activity (Appendix B, pp. 40–41)

STUDENT HANDOUTS
- Show What You Know! (p. 13)
- Crystal Geode Egg-speriment (p. 14)

KEY VOCABULARY
rock, mineral, gem, gemology, rare, durable

LEARNING OBJECTIVES
Students will be able to...
- Define rocks, minerals, and gems
- Summarize in their own words how gems are formed
- Work collaboratively to make scientific predictions about minerals and gems

ESSENTIAL QUESTIONS
- What is a rock?
- What is a mineral?
- What is a gem? How is it formed?

TOPICS
Intro to Rocks, Minerals and Gems

SUBJECT CONNECTIONS
Science, English Language Arts

TIME REQUIRED
One 60-minute class period (Note: Lesson can be divided into two shorter sessions after The Story of a Gem activity.)

SUPPLIES
- Folder for each student, or section of an existing binder, to be used as Gemology Folders
- 3–4 sticky notes per student
- Lined paper (2 sheets per student)
- Chart paper, overhead, or SMART Board (for Anchor Chart)

DID YOU KNOW?
“Diamond” comes from the Greek word adamas, which means “invincible.” For being the hardest material on earth, that is the perfect name for this gem!
LESSON 1: ROCK STARS

WARM-UP (10 MINUTES)

1) GEMOLOGIST MEET AND GREET

Distribute Gem name tags (Appendix A, p. 39). Tell students that the names represent famous “rock stars” that they will be learning about during the lessons. Give students five minutes to walk around the room and greet each other with their new names. Older students can memorize their names.

When students are seated, ask them for guesses about what the names represent. Reveal that the “rock stars” are famous gems and students are going to be learning about the science, art, and history of gems. Distribute Gemology Folders and have students write gem names on folders. Throughout the lessons, students will compile their work into these folders.

INTRODUCTION (15 MINUTES)

2) SHOW WHAT YOU KNOW (KNOW, WONDER, LEARN (KWL) PRE-ASSESSMENT)

Distribute the Show What You Know! handout (p. 13), and have students fill in what they already know about rocks, minerals, and gems. Give each student two sticky notes to write his or her two best ideas to place on the Anchor Chart.

Come to rug or meeting place, and unveil Rocks, Minerals, and Gems Anchor Chart. Invite students to place sticky notes and share their prior knowledge.

DID YOU KNOW?

Red garnet necklaces were worn by Egypt’s pharaohs.
DEMONSTRATION (10–15 MINUTES)

3) THE STORY OF A GEM

In the first part of this presentation, you will use cookies to introduce your students to the basic definitions of rock, mineral, and gem.

In the second part, you will use pieces of clay and videos to teach them about how a gem is formed in the earth. For a more hands-on version of the demonstration, you may opt to provide clay for your students to make their own “earth”s.

A complete script is available in *Appendix B*, pp. 40–41.

Get Ready

1) Gather these items to have nearby for demonstration: *Rocks, Minerals, and Gems Anchor Chart*, chart marker(s), sugar cookie, chocolate chip cookie, 4 colors of clay, butter knife, pencil.

2) Prepare key definitions (optional): Write the key definitions on sentence strips, chart paper, or SMART Board in advance.
   - **Minerals** are natural, nonliving parts of the earth, made up of elements.
   - **Rocks** are made up of minerals.
   - **Gems** are beautiful, rare, and durable. They come from nature: rocks, plants, or animals.
   - **Rare**: Not common and hard to find
   - **Durable**: Hard, tough, and stable

3) Cue up GIA videos:
   - **How Peridot Is Formed** (0:46) www.youtube.com/watch?v=VypY_4dJUoU&list=UUAf_vBJ2i1QfoI8GAuBHTw
   - **How Opal Is Formed** (0:57) www.youtube.com/watch?v=a2r4ZV_q8OY

Optional: Use the following search engine terms to find other great video resources online: “how gems are made,” “rocks and gems and minerals,” “how pearls are formed.” There are many student-friendly videos about gemology available online.

4) Preview your script: A step-by-step script can be found in *Appendix B*, pp. 40–41.

DID YOU KNOW?

The incredible colors of amethyst cover different shades of purple—from light purple to reddish purple to purple.

Amethyst
MAIN ACTIVITY (20 MINUTES)

4) CRYSTAL GEODE EGG-SPERIMENT

Now that students have a basic understanding of rocks, minerals, and gems, invite them to deepen their understanding with this hands-on science activity to grow minerals.

Divide students into groups of 3–5 and give each group a set of gemologist supplies. Keep a set of group supplies at a central Teacher Table.

GEMOLOGIST SUPPLIES (per group)
- 3 eggs
- 3 tissues
- 1/8 cup of each "mineral" in a paper cup: table salt, regular sugar, baking soda
- Metal spoon
- Trash bowl (to discard egg yolks)

TEACHER TABLE SUPPLIES
- Muffin pan
- Tissues
- Hot water in cups (1 per group)
- Red, blue, green food coloring (optional)

Explain to students that, today they will be growing minerals from basic elements, and seeing what they can make. Introduce the materials. Distribute hot water to older students. Distribute Crystal Geode Egg-speriment handout, p. 14.

Give students time to follow the directions on the handout. Younger students can be led through the steps one at a time with teacher modeling, whereas older students can work in small groups at their own pace. The first step should be modeled for all ages.

Keep the eggs in a visible place in the room for students to check daily. By the end of the week, you should see small mineral crystals.

DIG DEEPER!

NOTES FOR THE TEACHER

In this experiment, you’ll be dissolving the “mineral” in hot water to create a super-saturated mineral-water mixture inside a “geode.” When the hot mixture cools and the H₂O evaporates, the remaining molecules will begin to bond together, forming crystals.

In nature, geodes are crystals that form in hollow spaces inside of certain rocks. When water seeps into the hollow space, it brings along dissolved minerals, which eventually form into a lining of crystals. Most geodes contain quartz crystals, but they can also contain other mineral crystals.

The atoms in each mixture will form the same crystal shape each time. The salt will form into cube-like crystals. Sugar will form into hexagonal prisms. Baking soda crystals will be small and white, and look like frost or icing. Epsom salts will produce delicate, slivery shapes, and alum powder will make large, boxy shapes.
**REFLECTION & WRAP-UP (15 MINUTES)**

5) **WHO, WHAT, HOW? (ASSESSMENT)**

Instruct students to divide a paper into three sections, and write “rocks,” “minerals,” and “gems” in each section (see Image 1.2). On top, they should write their name (Who); in each section, they define (What) and write how rocks, minerals, and gems form (How). Papers can be collected for assessment and returned to students’ Gemology Folders the next day.

6) **CIRCLE OF WONDERINGS**

It’s time to come together and reflect on your learning. Ask students to record new and lingering questions about gems in the “W” section of their KWL chart. Then ask them to sit in a circle and share one question or add it to the class chart. Collect KWL papers to assess prior knowledge, respond to questions, and return to students for post-assessment at the end of the unit.

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**DID YOU KNOW?**

In Hindu legend, moonstone is made of solid moonbeams. Many cultures link this gem with moonlight.

**TEACHER TIPS**

Science Journals — If your students use science or lab journals, encourage them to record their observations each day.

Supersize Your Crystals — For truly impressive crystals, try the activity with Epsom salts (used for soaking sore muscles) and alum powder (used for pickling and preserving food). Both are relatively easy to find in pharmacies or grocery stores.

Data Table — Consider making a large data table (with dates) for students to collaboratively chart and track their scientific observations over time.
EXTENSION ACTIVITIES

COMMON CORE READING PASSAGE
The Birthstones and Lore handout (Appendix C, pp. 42–43) can be assigned for homework, used during Guided Reading, or as an independent assignment. With a Lexile score of 710, this is an appropriate Common Core text for 3rd and 4th grade. A 5th-grade teacher may choose to modify the assignment to include a more rigorous prompt.

HOME CONNECTION: ROCK COLLECTION
Encourage students to seek out and collect a variety of rocks after school and on the weekend. Rocks can be exhibited in the classroom.

GEE, A GEODE
Extend the learning with a mini-lesson on geodes. Show students images of geodes and let them research independently or in small groups. Order a kit of geodes and break them open in class! DO be careful and be sure to use protective eyewear!

ROCK CYCLE LABS
To teach the rock cycle, make edible rocks. Metamorphic rock: squeeze together soft candies. Igneous rock: melt together chocolate chips and let them harden. Sedimentary rock: spread treats into layers. There are a number of other hands-on labs to choose from.

Search for “rock cycle activities” online and you’ll find dozens!

PEARLS OF WISDOM
Post “Pearls of Wisdom” (found throughout this curriculum) in the classroom and have students write comments on what the quotes mean to them.

DID YOU KNOW?
In 1967, a Tanzanian tribesman came across a cluster of very clear and very blue crystals. The gem would soon be called “tanzanite.”

Tanzanite
Many large amethyst geodes come from volcanic deposits. The deposits provide a steady supply for cut gems of all sizes.

TEACHER TIP
Rise and Shine with Gemology
If your school has adopted the Morning Meeting structure to begin each day, consider integrating gems into your routine.

Greetings
• Greet each other with your Gem name tags.
• Draw Gem name tags out of a hat and greet whomever you drew.
• Crumple Gem name tags into rocks, throw them in the center of the circle, and choose a rock star to greet.

Sharing Topics
• Ask, “Have you ever seen a gem in real life?”
• Discuss, “Would you rather have a gem collection that you would never sell, or one expensive gem to sell? Why?”
• Read Everybody Needs a Rock by Byrd Baylor. Invite students to bring in a special rock to share.
SHOW WHAT YOU KNOW!

What do you already KNOW about...?

<table>
<thead>
<tr>
<th>ROCKS</th>
<th>MINERALS</th>
<th>GEMS</th>
</tr>
</thead>
</table>

What do you WONDER about rocks, minerals, and gems?

What did you LEARN about rocks, minerals, and gems?
CRYSTAL GEOIDE EGG-SPERIMENT

1) Check to make sure that you have all the supplies you need:
   - 3 eggs
   - 3 tissues
   - Cup of hot water
   - Trash bowl
   - 1/8 cup of each "mineral" in a separate paper cup: table salt, regular sugar, baking soda
   - Metal spoon

2) Prepare the eggs. WATCH YOUR TEACHER FIRST! Use the metal spoon to gently tap the top of each egg. Use your fingers to remove the top of the egg and empty the insides into the trash bowl. Use a tissue to gently dry the inside of each egg. Using a pencil, gently write your team number on each egg. Label the eggs A, B, C.

3) Mix the minerals. WORK TOGETHER AND GO SLOWLY! Use the recipe to create three different "mineral" mixtures, one for each paper cup. Stir each mixture with your finger or clean metal spoon. Raise your hand when you are ready to add the food coloring. Your teacher will share it with you. Pour one mineral mixture into each of the eggs and record which "mineral" was poured into which egg. Take turns holding the eggs so they don't spill! Bring your eggs to the teacher table and place them in the muffin tin. Gently stuff a tissue around each shell to keep it upright.

   EGG A
   Mineral: __________________________
   Color: __________________________

   EGG B
   Mineral: __________________________
   Color: __________________________

   EGG C
   Mineral: __________________________
   Color: __________________________

4) Make predictions. Answer these questions in complete sentences on a piece of lined paper.
   1) What is a mineral crystal?
   2) Which "mineral" mixture will produce the most eye-visible crystals? Why?
   3) What is a gem?
   4) Do you think you will grow a gem? Why or why not?
LESSON 2
A DAZZLING JOURNEY

How does a gem get to me?

In this lesson, students will find out how a rough gem becomes a polished jewel with a hands-on simulation of mining, cutting, appraising, and selling gems. They will make connections between the natural environment of gems and the industry that gives them value, and discuss the ethical and environmental issues that arise as gems travel from mine to market. (If teaching this lesson in isolation, begin with Show What You Know! activity and videos from Lesson 1.)

TOPICS
The Environment and Industry of Gems

SUBJECT CONNECTIONS
English Language Arts, Science, Economics, History, Social Studies

TIME REQUIRED
One 60-minute class period (Note: Lesson can be divided into two shorter sessions before Journey of a Gem Simulation activity.)

SUPPLIES
☐ Folder for each student, or blank paper
☐ 2–3 sticky notes per student
☐ Lined paper or student journals

PREPARATION
☐ Copy student handouts (1 per student)
☐ Gather materials for Journey of a Gem Simulation: chocolate chip cookies, paper clips, modeling clay, notecards
☐ Display Rocks, Minerals, and Gems Anchor Chart from Lesson 1 (see Image 1.1 on p. 8)
☐ Review script for Journey of a Gem simulation activity (Appendix D, pp. 44–45)

STUDENT HANDOUTS
• The Journey of a Gem Guide (p. 19)
• From Magma to Me Conclusion (p. 20)

KEY VOCABULARY
mine, gem cutting, appraise, clarity, carat

LEARNING OBJECTIVES
Students will be able to...
• Simulate the journey of a gem “from mine to market”
• Generate hypotheses from prior knowledge
• Retell how a gem gets from the earth to a piece of jewelry

ESSENTIAL QUESTIONS
• How do I interact with gems in my everyday life?
• What is the process for gems to get out of the earth and into a piece of jewelry?
• Why is it important to be honest in business?

DID YOU KNOW?
Alexandrite was discovered in the Ural Mountains of Russia in 1830. That is actually pretty recent for a gem discovery.

Diamonds, Rubies, Sapphires, and Emeralds...What's the Difference?

- Diamonds are the hardest substance known to man. They are made from pure carbon and are usually found in alluvial deposits.
- Rubies and Sapphires, on the other hand, are both varieties of corundum and are found in a variety of locations around the world. Rubies are red, while Sapphires can be any color except red.
- Emeralds are a variety of beryl and are usually found in Colombia, Brazil, and Africa.

Star-shaped Alexandrite

Alexandrite

GemKids for Schools • Grades 3–5

gemkids.GIA.edu
LESSON 2: A DAZZLING JOURNEY

WARM-UP (5 MINUTES)

1) GEMS IN MY LIFE
Personal connections make learning relevant! Give students 5 minutes to decorate their Gemology Folders (or a piece of blank paper) with answers to the question: “Where can I see gems in my life?” Students may draw or write words. If they struggle to think of personal ideas, engage the class in a quick brainstorm together. Students share illustrated folders with a small group.

INTRODUCTION (10 MINUTES)

2) FROM MAGMA TO ME HYPOTHESIS (PRE-ASSESSMENT, WRITING PROMPT)
Ask, “How do gems get out of the earth and into a piece of jewelry?” Give students time to think quietly. Write the question on the board.

Distribute lined paper. Explain that a hypothesis is a scientific guess. Scientists make hypotheses to answer questions and they use what they already know to try to come up with answers that makes sense. Give students time to write a hypothesis to answer the question. Encourage creative thinking and emphasize that you do not expect them to know the right answer! Early finishers can draw a diagram.

Ask a few students to share their ideas. Explain that they are about to roll up their sleeves and find out!

TEACHER TIP
A Picture Is Worth a Thousand Gems
Use photos and videos to help students understand the challenging ideas of mining, gem cutting, and international gem markets. Additionally, take photos of the students while they’re working and display them in the room.

Videos
• Gem Mining in Cambodia (1:35)
  GIA.edu/news-research-cambodia-mining-pardieu
• South Sea Cultured Pearl (0:50)
  www.youtube.com/watch?v=u-QJmWhKjKg&list=UUAf_v-BJ2i1Qfo18GAuBHTw

Slide shows
• A Sunstone Odyssey
  GIA.edu/gia-news-research-butte-sunstone
• Emerald Sources of Brazil
  GIA.edu/research-news-brazil-emerald-sources-lucas
LESSON 2: A DAZZLING JOURNEY

MAIN ACTIVITY (30 MINUTES)

3) THE JOURNEY OF A GEM SIMULATION

Have some fun with this guided simulation! As students recreate each step of the “mine to market” process, your enthusiastic narration will add dramatic flair and humor to the activity.

A complete script is available in Appendix D, pp. 44–45.

Get Ready

1) Gather materials: You will distribute materials during the activity, in order to ensure that students pay attention to each step. More advanced students can collect their materials from a central table, as needed.

☐ Step 1: The Journey of a Gem Guide (p. 19; 1 per student)
☐ Step 2: chocolate chip cookie (1 per team)
☐ Step 3: paper clips (2–3 per team)
☐ Step 4: small piece of modeling clay (1 per student)
☐ Step 5: diamond rubric included in handout
☐ Step 6: notecard (1 per team)

Other materials:
☐ Timer
☐ Optional prizes

2) Preview your script: A step-by-step script can be found in Appendix D.

3) Make student groups: Divide students into pairs (or let them work independently) and give them a moment to think of a gem-themed team name. While they are thinking, distribute The Journey of a Gem Guide.

DID YOU KNOW?

In ancient times, sailors wore aquamarine to protect themselves from danger or harm at sea. They were engraved with Poseidon or Neptune, the gods of the sea.

Aquamarine

 Pearls of Wisdom

Better a diamond with a flaw than a pebble without.

CHINESE PROVERB
LESSON 3: TIME TO SHINE!

REFLECTION & WRAP-UP (15 MINUTES)

4) FROM MAGMA TO ME CONCLUSION
(POST-ASSESSMENT, WRITING PROMPT)
Distribute From Magma to Me Conclusion handout, p. 20. Give students time to respond to the reflection questions. Have students share with a partner or whole group.

5) CIRCLE OF LEARNING
It’s time to come together and reflect on your learning. Ask students to record the three most interesting things they’ve learned on sticky notes, then sit in a circle and share one idea each. Sticky notes can be collected on Rocks, Minerals, and Gems Anchor Chart (from Lesson 1) to “anchor” the new learning into students’ minds over the next few lessons.

EXTENSION ACTIVITIES

COMMON CORE READING PASSAGE
The Mohs Scale of Hardness handout (Appendix E, pp. 46–47) can be assigned for homework, used during Guided Reading, or used as an independent assignment. With a Lexile score of 780, this text is a Common Core “stretch text” for 3rd grade, and appropriate for 4th and 5th grades.

FAMILY INTERVIEW
Students can interview a family member to make connections between learning at school and learning at home. Ask a family member or friend if they have a special piece of jewelry and why it is personally significant to them. Students can work with his or her family to research what the materials are made of and where the jewelry originated.

GEM-MOMETRY MATH LABS
Gem cutting is an excellent context for learning about geometry. Make soap gems: use an illustrated chart of gem cuts to measure, plan, and cut glycerin soap into colorful gem shapes. Build a paper gemstone: find and print a template for simple origami shapes, fold with bright paper, then glue together to make bigger gem shapes. Sculpt clay gems: give students time and measurements to build a 3-D multifaceted gem with modeling clay. Use these resources to find multifaceted gem shapes: gemkids.GIA.edu/gem/teacher-guide

PRECIOUS POETRY
Read Kenn Nesbitt’s funny poem “Digging for Diamonds” aloud to the class, and have students recite it or set it to music.

Sapphire

In 2010 England’s Prince William gave Kate Middleton a blue sapphire engagement ring. It belonged to his mother, the very famous and beloved Princess Diana.

DID YOU KNOW?
In 2010 England’s Prince William gave Kate Middleton a blue sapphire engagement ring. It belonged to his mother, the very famous and beloved Princess Diana.

Pearls of Wisdom
I never worry about diets. The only carrots that interest me are the number of carats in a diamond.

MAE WEST
THE JOURNEY OF A GEM GUIDE

NAME: ____________________________________________________________

DATE: ____________________________________________________________

LESSON 2 • A DAZZLING JOURNEY • STUDENT HANDOUT 1

START HERE!

STEP 1 • FIND GEMS

STEP 2 • BUILD A MINE

STEP 3 • DO THE MINING

STEP 4 • CUT THE GEMS

STEP 5 • APPRAISE/GRADE THE FASHIONED GEMS

STEP 6 • MARKET/SELL THE GEMS

STEP 7 • REPAIR THE ENVIRONMENT, SUPPORT THE COMMUNITY

ADD IT ALL TOGETHER TO MAKE YOUR TOTAL SCORE: ______

4Cs
COLOR - IS THE COLOR BRIGHT AND BEAUTIFUL?

CUT - ARE THE LINES STRAIGHT AND DOES GEM SPARKLE OR GLITTER?

CLARITY - IS THE GEM FREE OF BEANIES AND INCLUSIONS?

CUT WEIGHT - IS IT BRIGHT?

SORRY, BUT NO.

SO-So

Wow! Amazing!

GemKids for Schools • Grades 3-5

gemkids.GIA.edu

Page 19
1) Use your own words to explain how a diamond gets from the earth to a piece of jewelry. Use the back of this page if you need more room.

___________________________________________________________________________________________________________
___________________________________________________________________________________________________________
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___________________________________________________________________________________________________________
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2) Was your hypothesis correct? How has your thinking changed?

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___________________________________________________________________________________________________________
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___________________________________________________________________________________________________________
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3) In your opinion, why is honesty important in mining, producing, and selling gems?

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___________________________________________________________________________________________________________
Lesson 3
Time to Shine!

What are the world’s all-time greatest gems?

Travel back in time to learn about the world’s greatest gems! In this lesson, students learn to see gems through a cultural and historical lens, expanding their understanding of what makes a gem valuable to include sentimental as well as monetary value. Students will take on the roles of gemologists as they explore the GemKids Jewelry Time Machine website in various hands-on differentiated tasks.

Topics
Gems and Jewelry Throughout History

Subject Connections
English Language Arts, Technology, Art, Social Studies, History

Time Required
One 60-minute class period (Note: Lesson can be divided into two shorter sessions after Jewelry Time Machine activity.)

Supplies
- Folder for each student, or section of an existing binder
- 3–4 sticky notes per student
- Computers or tablets with Internet connection
- Lined paper or student journals

Preparation
- Copy student handout (1 per student)
- Prepare What Is Valuable? Anchor Chart (see Image 3.1 on page 22)
- Prepare computers or tablets for online student use

Learning Objectives
Students will be able to...
- Make personal connections with the concept of sentimental versus monetary value
- Explain why a gem is valuable
- Explore the continuity and change in how jewelry has evolved over time
- Compare and contrast jewelry from around the world

Student Handouts
- Gemology Lab Planning Sheet (p. 28)

Key Vocabulary
value, valuable, monetary, sentimental, era

Essential Questions
- What is value?
- How is value different to different people?
- How has jewelry changed and stayed the same over time?
- Why are gems important to society, both now and in the past?

Did you know?
Topaz has an exceptionally wide color range. Imperial topaz is a medium reddish orange to orange-red and the most valued species of topaz.
LESSON 3: TIME TO SHINE!

WARM-UP (15 MINUTES)

1) IMAGINE... (FREE-WRITE)
The purpose of this warm-up is to connect kids personally to the idea that objects have both sentimental and monetary value.

“Imagine that you were going on a long trip and could only take three items from your home with you. What would you take, and why?”
Students write freely in response to this open-ended prompt, and share their writing with a partner or table group.

2) WHAT IS VALUABLE TO ME? (DISCUSSION)
Come to the rug and have students quickly share their three items.

Write the key words on the What Is Valuable? Anchor Chart (see Image 3.1) or on the board and use student examples to teach the meaning.
• value
• valuable
• monetary
• sentimental

Ask, “How is value different to different people?”
Connect that, throughout history, some very expensive gems became very important to certain cultures. Ask, “Why do you think some gems were valuable to a whole group of people?” Mention how some things lose value, while others gain value over time, and ask what causes those changes in value. Record students’ thinking on What Is Valuable? Anchor Chart.

DID YOU KNOW?
Nessie is a 2-meter (6.6-foot) prehistoric reptile called a “pliosaur.” Nessie’s bones turned into opal over millions of years.

Pearls of Wisdom
The pearl is the queen of gems and the gem of queens.
CHINESE PROVERB

Image 3.1: What Is Valuable? Anchor Chart
### LESSON 3: TIME TO SHINE!

### VALUABLE GEMS IN HISTORY

<table>
<thead>
<tr>
<th>Location</th>
<th>Gemstone</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ANCIENT EGYPT</strong></td>
<td><strong>EMERALD</strong></td>
<td>The first known emerald mines were in Egypt, dating from 4,000 years ago. Ancient Egyptians believed that the color green promoted health in babies and crops. Queen Cleopatra, Egypt’s last pharaoh, had a passion for emeralds, and often gave gifts of emeralds carved with an image of her face.</td>
</tr>
<tr>
<td><strong>ANCIENT BURMA</strong></td>
<td><strong>RUBY</strong></td>
<td>Rubies from Burma (today’s country of Myanmar) have been around since 600 AD. Early Burmese warriors carried rubies to make themselves invincible in battle. They actually put rubies under their skin!</td>
</tr>
<tr>
<td><strong>NORTH AMERICA</strong></td>
<td><strong>TURQUOISE</strong></td>
<td>Turquoise is called the “fallen sky stone” by Native American tribes. Some tribes believed that the stone had healing powers, while others believed that the stone would bring success in battle. Today, turquoise is still used in Native American ceremonies and rituals.</td>
</tr>
<tr>
<td><strong>CHINA</strong></td>
<td><strong>JADE</strong></td>
<td>Jade has long been considered valuable in Chinese culture and history, and it is still popular today. Its colors range from chalky white to apple green to lavender. Jade is two different minerals — nephrite and jadeite — but both are cherished in China. An ancient Chinese saying goes, “Gold has a value; jade is invaluable.”</td>
</tr>
</tbody>
</table>
LESSON 3: TIME TO SHINE!

RESEARCH (15–30 MINUTES)

3) THE GEMKIDS JEWELRY TIME MACHINE

This excellent interactive website allows kids to scroll through different eras and view some of the great jewels of all time.

Allow students to explore the GemKids Jewelry Time Machine (gemkids.GIA.edu/jewelry-time-machine) with a partner. Alternately, view an abbreviated timeline with the whole class while students record their thinking. Younger students may need your help in understanding the timeline structure of the website. Let students’ own curiosities and interests drive the learning as you circulate to hear thoughts and questions.

Draw a large timeline from the year 3000 BCE to today on the board (see example in Image 3.2 below).

When students are finished exploring, use the class timeline to record what students noticed at different eras. Define era as “a period of time.”

Ask:
• Which is the earliest era? What did you notice about their jewelry?
• Which was your favorite era? What did you notice about the jewelry of that era?
• How has jewelry changed over time? How has it stayed the same over time?
• What developments in history may have changed the style of jewelry over time?

DID YOU KNOW?

Tourmaline is known for its dazzling colors. Some have more than one color, like watermelon tourmaline, which is pink in the middle and green around the outside.

Image 3.2: Jewelry Timeline
LESSON 3: TIME TO SHINE!

MAIN ACTIVITY (25 MINUTES)

4) THE GEM LAB (LEARNING CENTERS)
It’s time to get creative! These independent art activities are structured to take place in “centers,” or simultaneous activity stations. Explain to students that they’ll be working together to create a collection of artworks that teach about jewelry and gems throughout time. Introduce learning centers and let students choose where to go. Distribute Gemology Lab Planning Sheet (p. 28) to guide student work.

Get Ready

1) Choose the best activities for your students: Use the Gemology Lab Direction Slips (Appendix F, p. 48) to determine the best options for your students.

2) Gather the correct supplies:
- Be a Bench Jeweler — Foil, various art supplies like sequins, yarn, glue, construction paper
- Be an Appraiser — Blank paper, colored pencils
- Be a Gem Historian — Blank paper, colored pencils
- Be a Jewelry Designer — Blank paper, colored pencils
- Be a Gem Curator — Blank paper, colored pencils, scissors, glue or tape, map
- Be a Field Gemologist — Blank paper, colored pencils, encyclopedia or world map

3) Prepare the technology: This activity would work best with tablets or laptops for each pair of students, but can also be modified for a classroom with limited tech resources: limit options, print images in advance, give groups turns on the computers, have students sketch at the computer and work at their seats.

DID YOU KNOW?
A zircon found in Australia is the oldest mineral on earth: It is 4.4 billion years old!
LESSON 3: TIME TO SHINE!

REFLECTION & WRAP-UP (15 MINUTES)

5) TIME TO SHINE! (PRESENTATION)
Display student work on desks or walls. Play music from Thailand or India, homes to some of the largest gem markets. Give students time to walk around and write feedback on sticky notes, in the form of “Polished” and “Rough” comments. Invite other classes or community members.

6) CIRCLE OF REFLECTION
Come to the rug or meeting place. Ask students to turn and talk to a friend about the following questions:

- Why do you think gems are valuable?
- How did jewelry stay the same over time? How did it change over time?
- What factors do you think influenced these changes in jewelry? Think about tools, technology, transportation, and so on.
- Why do you think gems and jewelry are important to society, both now and in the past?

Go around the circle and ask every student to share one thing he or she found interesting from learning about gems throughout history.

DID YOU KNOW?
Morganite was named in honor of a famous American banker, J.P. Morgan. He was one of the most important gem collectors in the early 1900s, and donated gems to museums.

Pearls of Wisdom
There are three things extremely hard: steel, a diamond, and to know one’s self.
BENJAMIN FRANKLIN
LESSON 3: TIME TO SHINE!

EXTENSION ACTIVITIES

COMMON CORE MATH
The Diamonds from the Mine handout (Appendix G, p. 49) can be assigned for homework, used during Guided Math, or used as an independent assignment. Levels correlate to grades: Level One is 3rd grade, Level Two is 4th grade, Level Three is 5th grade.

FAMILY TIME MACHINE
Invite students to share the GemKids Jewelry Time Machine and other GemKids online resources with parents (gemkids.GIA.edu).

DAZZLING GEM RESEARCH AUCTION PROJECT
Extend student learning with the GemKids Gem Explorer interactive tool on the GemKids website (gemkids.GIA.edu). Organize a creative research-based auction simulation. Assign each student a gem, then give them time to create an informational poster to display before the auction starts. Advanced students may also use the GIA Gem Encyclopedia. Buyers can be given a certain amount of money to purchase fake gems. Display posters in the classroom.

GEM GEOGRAPHY
Provide students with blank world maps to create their own gem geography maps. Have each student pick three different gems and research where they are found. Then, ask students to translate their findings to the blank map and create their own key. Ask students why they think certain gems come from certain locations. Enhance the tech component by integrating Google Maps, and letting students plot points where gems are found around the world. Students could also use Google Translate to learn the names of gems in local languages.

MY PERFECT GEM
Let students find their ideal gem with the GemKids interactive Find My Gem game (gemkids.GIA.edu/FindMyGem).

Pearls of Wisdom
I adore wearing gems, but not because they are mine. You can’t possess radiance, you can only admire it.
ELIZABETH TAYLOR
### GEMOLOGY LAB PLANNING SHEET

<table>
<thead>
<tr>
<th>My gemology job is...</th>
<th>I am working...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>□ Independently</td>
</tr>
<tr>
<td></td>
<td>□ With a partner</td>
</tr>
<tr>
<td></td>
<td>□ With a small team</td>
</tr>
</tbody>
</table>

Write your directions here:

__________________________________________________________________________________________________
__________________________________________________________________________________________________
__________________________________________________________________________________________________

Space for planning and drawing

Remember to write your name on all of your papers!
LESSON 4
LOOK INTO THE CRYSTAL BALL

What is the future of the bling business?

What does the future hold for gems, gemologists, and your students? In this lesson, students get to know current ethical issues and careers in gemology. As students explore issues that matter to the world community, they will strengthen their own classroom community with *The Bling Business Machine* (a collaborative theater game) and *Passing Notes* (a silent conversation protocol) activities.

**TOPICS**
Current Issues, Ethics, Careers in Gemology

**SUBJECT CONNECTIONS**
English Language Arts, Social Studies, Ethics, Community

**TIME REQUIRED**
One 60-minute class period (Note: Lesson can be divided into two shorter sessions after *The Bling Business Machine*.)

**SUPPLIES**
- Folder for each student, or section of an existing binder
- 3–4 sticky notes per student
- Computers or tablets with Internet access
- Lined paper or student journals
- Timer
- *Show What You Know! KWL* from Lesson 1, p. 13

**PREPARATION**
- Copy *Passing Notes Set* (1 set per 3 students)
- Copy *Pearls of Wisdom* (2 copies per student)
- Prepare *The Bling Business Machine Anchor Chart* (see Image 4.1, p. 31)

**STUDENT HANDOUTS**
- *Passing Notes Set* (includes Note #1, Note #2, Note #3) (pp. 35–37)
- *Pearls of Wisdom* (p. 38)

**KEY VOCABULARY**
ethical

**LEARNING OBJECTIVES**
Students will be able to...
- Discuss ethical issues in the field of gemology, including questions about theft and imitation gems
- Dramatize the connectivity among various jobs in gemology
- Express how ethical issues affect the field of gemology
- Reflect on key points

**ESSENTIAL QUESTIONS**
- What can I do to solve ethical problems in the world of gemology — and beyond?
- What kinds of jobs are there in gemology?
- How do gemologists work together to solve important problems?

**DID YOU KNOW?**
Renaissance painters used lapis lazuli to make "ultramarine" blue paint. Nothing could compare to its brightness.
WARM-UP (10 MINUTES)

1) BLING BUSINESS BRAINSTORM
Divide students into small groups and give them 5 minutes to brainstorm as many gemology jobs as they can. When time is up, go around the room for each group to say one job, as you record them on the board. Help students fill in any jobs that are missing. Give hints, if necessary.

POSSIBLE BLING BUSINESS JOBS
Choose the jobs that you have discussed in the previous lessons.
- **Gem Miner** (extracts gems from nature)
- **Buyer** (buys and sells gems)
- **Gem Lab Scientist** (uses microscopes and other tools to identify gems)
- **Gem Cutter** (uses tools to cut and polish rough gems)
- **Appraiser** (decides what a gem is, and how much it is worth)
- **Jewelry Designer** (turns creative ideas into jewelry)
- **Bench Jeweler** (makes or repairs jewelry)
- **Retailer** (sells gems and jewelry to customers)
- **Laboratory Gemologist** (person who studies and identifies gems)
- **Field Gemologist** (visits mines and collects gems from around the world)
- **Jewelry Historian** (studies the history of jewels)
- **Gem Researcher** (learns about gems)
- **Diamond Grader** (grades diamonds according to the 4Cs and provides quality reports)
- **Gemology Instructor** (teaches the principles of gemology and practice of gem grading and identification)

DID YOU KNOW?
Although 100 years might seem like a long time, it is really not that long ago in the world of gems. Kunzite was discovered in 1902 in San Diego County, California, in the United States.

Kunzite

Pears of Wisdom
Many individuals have, like uncut diamonds, shining qualities beneath a rough exterior.

Juvenal

TEACHER TIP
Online Display
Display the “Careers” page on the GemKids site while you play this game. Students will benefit from the visual reminder, and you can click on the definition instead of writing them all on the board.
Go to gemkids.GIA.edu/resources/careers
INTRODUCTION (15 MINUTES)

2) THE BLING BUSINESS MACHINE
Show students how the parts of the “bling business” work together with this adaptation of a classic theater game, “Human Machine.” In the first part of the game, each student “adds on” to the scene to show how gemology jobs work together. In the second part, you’ll dramatize how unethical behaviors interrupt the machine and jeopardize the field.

How the Machine Works
Write “The Bling Business Machine” on the Anchor Chart on the board or chart paper (see Image 4.1). Ask students, “Which job comes first?” (Miner)

Call on a student to answer the question, explain the job, and come to the front and make a simple motion that evokes mining. For example, the student could crouch down and pretend to hit a rock with a pick. Student continues making simple motion, record “Miner” on the Anchor Chart.

Teach students that, when you call “Stop!,” the machine must stop. When you call “Go!,” the machine continues working. Demonstrate with miner a few times.

Ask, “What happens after the miner finds the gemstones?” Call on student to answer question and join the miner, adding to the scene. Continue with entire job chain (using the brainstorm list) — until every job is dramatized.

What Breaks the Machine
“Stop!” interrupts the machine. Explain that, in a perfect world, the machine would run smoothly. However, in the real world sometimes there are problems, sometimes people make ethical mistakes.

Let students act out what would happen to the machine if...

• a miner got hurt
• someone stole the gems from the jeweler
• the appraiser lied

Write the word “Ethical” on the Anchor Chart, and ask for student definitions. Explain that when individual people make bad ethical choices, it has a negative effect on many others. Define “ethical” as “honest, and making the right choices.”
MAIN ACTIVITY (30 MINUTES)

3) WHAT WOULD YOU DO? PASSING NOTES ACTIVITY

In this activity, students will engage with each other in a “nonverbal conversation” about ethical dilemmas. This technique allows a safe space in which to honestly explore the challenging topics of greed, peer pressure, and lying.

Students sit in groups of three. Distribute a set of Passing Notes (pp. 35–37) to each group — there should be three scenarios for each group, three papers total.

Explain the rules: This is a silent activity called Passing Notes. When I start the timer, you will take one note, read it, and write your thoughts. You may answer the question, and write questions or comments. When the buzzer goes off, put your pencil down.

- Set the timer for 4 minutes: Each student takes one paper, reads the scenario and silently writes his or her answer on the paper. When timer buzzes, students finish their sentences and pass the papers to the right.
- Set the timer for 5 minutes: Each student reads the scenario and the comments of the first student, and can respond to the scenario or the comments of the first student, or can ask questions. When timer buzzes, students finish their sentences and pass the papers to the right.
- Set the timer for 6 minutes: Each student reads the scenario and the comments of the first and second students, and can respond to the scenario or the comments, or can ask questions. When timer buzzes, students pass papers around and read ideas. Give students time to talk about the scenarios.

Continuing the Conversation

Students will likely be eager to continue talking about these ethical issues. Here are some ways to continue the conversation and support students in their critical thinking:

- Post completed Passing Notes papers in the classroom and let students read each other’s ideas.
- Pass the papers around for a second round, and have students comment on each other’s new ideas.
- Give students time to write in their journals about one of the prompts.
- Use the Passing Notes protocol for other ethical dilemmas in your class community.

Did You Know?

Some peridot comes from outer space! This image on the left is of an actual slice of meteorite with peridot crystals. It was found in Argentina in 1951.
4) ETHICS IN THE WORLD DISCUSSION

Now that the students have been thinking about ethical issues that connect to their own lives, engage them in a more complex ethical situation: the dangers of mines. This is a sensitive topic — consider the maturity of your students when you decide how to talk about it.

Here is a possible script: “Like all mining, gem mining can be dangerous work. Also, gems have been used as money to buy weapons and fund violent conflicts. It might be dangerous for people who work in those mines or live near those conflicts because they may get hurt.”

Possible questions:

• Have you heard of this? Where did you hear about it?
• Why would a miner work in a dangerous mine?
• Do you think people should buy gems from mines where workers can get hurt?

Teach students that gemologists are very concerned about this problem, just like they are concerned about the problems in the Passing Notes activity. Teach students about the Kimberley Process and conflict-free diamonds (see Teacher Tip! sidebar).

Explain that trained experts are needed to keep mines safe, be able to evaluate their find, appraise fairly, keep sellers honest and ethical, and protect the environment.

REFLECTION & WRAP-UP (20 MINUTES)

5) WHAT DID I LEARN? (SELF-ASSESSMENT)

Redistribute Show What You Know! KWL handout from Lesson 1, p. 13, and ask students to fill in what they learned. If students get stuck, they can look through their gemology folders for ideas or work with a partner. If doing this lesson in isolation, give students sticky notes to add information about careers in gemology and ethical issues onto the Anchor Chart.

6) PEARLS OF WISDOM CLOSING CIRCLE

Distribute Pearls of Wisdom handout (p. 38). Students choose the two most interesting things they learned about gems and write them inside two pearl shapes. Sitting in a circle, each student reads one Pearl of Wisdom and places it on Anchor Chart. Encourage students to give original ideas each time and not to repeat answers. If they get stumped, allow a friend to share an idea.

TEACHER TIP

Ethical Diamond Resources

Background information for teachers about the Kimberley Process, conflict-free diamonds, and any other efforts by the gem industry to deal with the safety of miners, can be found at:

• voices.nationalgeographic.com/2012/01/12/conservation-gemstones-beyond-fair-trade/
• www.kimberleyprocess.com
• www.state.gov/e/eb/tfs/tfc/diamonds/index.htm
• www.responsiblejewellery.com

DID YOU KNOW?

For centuries, people thought spinel was ruby. It was discovered to be a separate mineral a couple of centuries ago. Even so, spinel is loved for its rich red color and history.
EXTENSION ACTIVITIES

COMMON CORE MATH
The Jewelry on the Red Carpet handout (Appendix H, p. 50) can be assigned for homework, used during Guided Math, or used as an independent assignment. Levels correlate to grades: Level One is 3rd grade, Level Two is 4th grade, Level Three is 5th grade.

DEAR PARENT OF A GEMOLOGIST:
Send home the Parent Connection newsletter (Appendix I, p. 51) to involve families in the children’s learning.

GEMS IN THE NEWS
Read aloud a current news article while students follow along in their own text and record their thinking. Discuss how gems may appear in the news and our daily lives. Try this New York Times article: www.nytimes.com/2013/06/13/science/in-glittering-gems-reading-earths-story.html

ASK A GEMOLOGIST
Watch an interview from GIA’s Tucson 2014 Gem Show videos (GIA.edu/tucson2013-show) or divide students into small groups to browse and watch interviews. To prepare for writing the letter, students look through gemology folders to generate a list of Shimmering Questions, which can be added to the KWL chart from Lesson 1, p. 13.

Students can email: gemkids@gia.edu, or mail letters to:
GemKids at GIA
The Robert Mouawad Campus
5345 Armada Drive
Carlsbad, CA 92008

Fancy color diamonds come in almost any color you can imagine. Red, green, purple, and orange are generally the most rare, followed by pink and blue. Yellows and browns are the most common fancy colors.
NOTE #1

You are with your class on a gemology field trip and have gone into the tunnel of a local gem mine. While your classmates are inspecting a crystal with the teacher, you notice something sparkling between two rocks. You use a stick and a paper clip from your pocket to get it out. It is a gem! It is glittering and dark red! You have never seen anything so beautiful in your life! You are able to get the gem out and keep it for yourself, but it doesn’t belong to you. It belongs in a museum. If you tell the mine owner, the gem will be taken away. *What do you do?* Write or draw out your answer.
NOTE #2

You love learning about gems, so you grow up and become a gemologist and gem cutter. You become a very talented gem cutter. In fact, you are so talented that you can make an imitation that looks like a natural diamond to most people. If you sell these imitation diamonds, it is important to disclose that they are not natural, but rather made by man. **If you decide to go into the business of selling imitation diamonds, what would you do to remain an honest and ethical business person?** Write or draw out your answer.
You were born and raised in Asia. You live in Bangkok, a city in the country of Thailand, that is known for colored stones. You are the fifth generation in your family to run a very successful and well-known family business, a retail jewelry store specializing in colored gemstones and jewelry. Because you have worked at the store for as long as you can remember, the gem and jewelry industry is second nature to you. A competing retailer comes in to the store and asks that you come work for him. You feel that you should be loyal to your family, but at the same time, you would like to experience working for someone else. **What do you do?** Write or draw out your answer.
PEARLS OF WISDOM

Directions: Write the most interesting things you learned about gems and gemology in the pearl below.

_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
## Gem Name Tags

These famous “rock stars” can be used to kick off Lesson 1.

<table>
<thead>
<tr>
<th>Midnight Ruby</th>
<th>Fire Queen Opal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neelanjali Ruby</td>
<td>Andamooka Opal</td>
</tr>
<tr>
<td>Earth Star Diamond</td>
<td>Argyle Pink Jubilee Opal</td>
</tr>
<tr>
<td>Golden Eye Diamond</td>
<td>Star of India Sapphire</td>
</tr>
<tr>
<td>Hope Diamond</td>
<td>Millennium Star</td>
</tr>
<tr>
<td>La Peregrina Pearl</td>
<td>Crimson Star of Siberia</td>
</tr>
<tr>
<td>Dom Pedro Aquamarine</td>
<td>Archduke Joseph</td>
</tr>
<tr>
<td>Golconda Star Sapphire</td>
<td>Crown of Cortez Emerald</td>
</tr>
<tr>
<td>The Star of Lakshmi</td>
<td>Reward of Faith</td>
</tr>
<tr>
<td>Tiffany Yellow</td>
<td>Spirit of Grisogono</td>
</tr>
<tr>
<td>Star of Africa</td>
<td>Darya-i-Noor</td>
</tr>
<tr>
<td>The Black Orlov</td>
<td>Ritika Kunzite</td>
</tr>
</tbody>
</table>
STORY OF A GEM TEACHER SCRIPT

COOKIE DEMONSTRATION (BASIC DEFINITIONS)
All of you know what a rock is. You know that... (Summarize prior knowledge from chart.) But do you know what a rock is made of? Today you’re going to find out!

Think about rocks like cookies. (Show sugar cookie.) Cookies are made with more than one ingredient. What is this cookie made of? (Students volunteer answers, such as “sugar, flour.”) Right! Imagine that those ingredients are minerals. Rocks are made up of a lot of different minerals that you may not be able to see. (Write: Rocks are made of minerals.)

Minerals are everywhere and can be used in many different ways. They come from nature, but they are not alive. Some minerals you may know are talc, calcite, and copper. The material in a pencil is the mineral graphite mixed with clay and water. (Write: Minerals are natural, nonliving parts of the earth.)

Sometimes, you get a rock that looks like this. (Show chocolate chip cookie.) There are ingredients you cannot see in it, like butter and salt, but there are other ingredients that you can see, like the chocolate chips or nuts in the cookie. These represent the minerals. (Write: Minerals are the recipe of elements that come together to form specific shapes.) Mineral crystals are elements that have had the chance to form into the size our eyes can see. The chemical elements that a mineral is made of determine what shape it will be.

Usually, minerals don’t have a lot of room to grow into crystals. But sometimes, they do. And sometimes, the mineral crystal is extremely beautiful, very rare, and very durable — and then it is called a gemstone (Write: Gems are beautiful, rare, durable.) Some gem material comes from organic matter, meaning they came from living or once-living plants or animals. For example, amber is a beautiful gem material that’s actually fossilized tree resin that formed at least 1 million years ago. These are referred to as organic gem material. (Write: Gems come from nature, either from minerals, plants, or animals.)

QUICK “TURN AND TALK”
Listen in as students turn to a partner and discuss quick assessment questions:
• What are rocks made of?
• Give an example of a mineral.
• Are there more minerals or gems on earth? How do you know?
CLAY DEMONSTRATION (GEM FORMATION)

Many of you already know what a gem is. (Summarize prior knowledge from chart.) How do you think a gem is made? (Take a few ideas from students.)

Some gems come from deep inside the earth. Some come from plants and animals. Let’s talk about the ones that come from inside the earth.

The earth has four layers. The inner core is at the very center. It is a hot, solid ball of iron and nickel. (Roll one color of clay into small ball.) Around it is the outer core. (Cover with a small piece of a different-colored clay.) The mantle is the thickest layer of the earth’s structure and the source of magma or molten rock. (Cover growing ball with thick clay of different color.) Finally, the part that we must recognize is called the crust. It’s made of rocks. (Cover the ball with blue or green clay.)

Basically, the mantle is full of hot magma, which is made of minerals. When the magma comes pushing up from the mantle, it moves the crust around and makes different kinds of rocks in the crust. (Using butter knife, cut through the earth to show the cross-section of layers. Push pencil through clay ball from inner core to crust.)

If the right chemical elements are present – and the temperature, time, and pressure are just right – and there’s room to grow – a gem crystal might form. We will get to make our own crystals today!

And if the crystal is beautiful, rare, and durable, then people who study gems – called gemologists – study it and determine what the gem is. We will be learning more about gemologists and how they identify different gems later. For now, let’s watch some videos of how the earth makes gems. (Show GIA videos. See links on page 9.)

Some gems, like amber and pearls, come from plants or animals. Does anyone know where a pearl comes from? Pearls come from a variety of mollusks, including oysters. The mollusk gets a foreign material (parasite, another tiny creature, sand, etc.) in their shells and it irritates them. To reduce the irritation the mollusk grows layers of nacre over it. The layers are made of the same material as the inside of their shells called Mother of Pearl. It takes from six months to six years for the layers to make into a pearl.
**HAPPY BIRTHSTONE TO YOU!*  
**Directions:** Read the passage below and answer the question that follows.

A birthstone is a gem that symbolizes a month of birth. In some cultures and traditions, people believe that birthstones have special powers. Those beliefs are called “lore.” Read on to find out your birthstone and its lore.

<table>
<thead>
<tr>
<th>JANUARY</th>
<th>GARNET. Although garnets come in many colors, most garnets you see are dark red. This is why garnet was named after the seeds of a pomegranate. Garnets are believed to stop bleeding and cure inflammations.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEBRUARY</td>
<td>AMETHYST. Amethyst is purple quartz. It is one of the most popular stones used in jewelry. Amethyst is said to control evil thoughts and sharpen your sense of sight.</td>
</tr>
<tr>
<td>MARCH</td>
<td>AQUAMARINE. Aquamarine’s name comes from “aqua,” which means water, and “marine,” which means sea. Aquamarine is thought to cure pain, and to protect against dangers at sea.</td>
</tr>
<tr>
<td>APRIL</td>
<td>DIAMOND. Diamond, the hardest gemstone on earth, symbolizes invincibility and gives its wearer superior strength and good fortune.</td>
</tr>
<tr>
<td>MAY</td>
<td>EMERALD. Ancient writings tell us that emeralds were found in Cleopatra’s mines in Egypt. Emerald is believed to heal snakebites and give its wearer the ability to see into the future.</td>
</tr>
<tr>
<td>JUNE</td>
<td>PEARL. Pearls form in mollusks, including oysters. They are thought to make one feel peaceful and happy.</td>
</tr>
<tr>
<td>JULY</td>
<td>RUBY. Ruby is the red variety of corundum. In ancient India, it was called “king of gems.” Wearing ruby would bring health, wealth, and wisdom. The Burmese thought a ruby put under your skin would make a warrior invincible.</td>
</tr>
<tr>
<td>AUGUST</td>
<td>PERIDOT. Peridot is found in volcanic lava and even in meteorites from space! Peridot is thought to improve emotions. It was Cleopatra’s favorite stone.</td>
</tr>
<tr>
<td>SEPTEMBER</td>
<td>SAPPHIRE. Sapphire comes from the corundum family, and forms in nearly every color of the rainbow except for red; red corundum is known as ruby. Deep blue sapphires are thought to have special healing powers for eyes, the plague and as a poison antidote.</td>
</tr>
<tr>
<td>OCTOBER</td>
<td>OPAL. Opals are sensitive stones, and might crack if they get too hot or too dry. Once it was thought to have the power to preserve the life and color of blonde hair.</td>
</tr>
<tr>
<td>NOVEMBER</td>
<td>TOPAZ. Topaz is believed to give its wearers long life, beauty, intelligence, and sweet dreams.</td>
</tr>
<tr>
<td>DECEMBER</td>
<td>TURQUOISE. Turquoise comes in many shades of blue and green. It is used in many Native American traditions.</td>
</tr>
</tbody>
</table>

*Adapted from GIA GemKids Workbook*
Writing Prompt: Do you believe the lore about your birthstone? After reading the description of each birthstone and its lore, write a paragraph in which you answer the question and explain your reasons, using two examples from the text.

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JOURNEY OF A GEM TEACHER SCRIPT

SETTING THE STAGE
Gemologists, may I have your attention? It’s time to roll up your sleeves and get to work! (Encourage students to pretend to roll up their sleeves to kick off the drama.) Today we will go deep underground to find gems and take them every step of the way to people who want to buy them! For this work, you will have to share materials and show cooperation, teamwork, and honesty. (Provide any expectations for noise level and classwork protocols.)

STEP 1 — FIND THE GEMS
The first step is finding the gems. There are many ways to find gem deposits. Some prospectors are experts on specific gemstones and know the exact environment that they’re usually found in. Sometimes it is just luck, because nature can move gems from where they were originally formed — usually through rain and rivers. The easiest way to find gemstones, however, is to discover stones on the surface of a dry riverbed. Look at the map! (Point to Step 1 on handout.) Do you see the dry riverbed? The first step is finding gem deposits. Circle the biggest cluster of gems.

STEP 2 — BUILD A MINE
Now, how are we going to get the gems out? (Students share a few ideas.) Well, the gems are underground, so let’s build a mine. What is a mine? (Discuss that a mine is a pit or a tunnel from which gems are taken. Distribute cookies.) The second step is building a mine where the gems are. Place your cookie mine over the area with the biggest gem deposits and trace it.

STEP 3 — DO THE MINING
Now that you’ve built a mine, it’s time to get the gems out! Here are the rules:

- Use your equipment to touch your mine — NO FINGERS!
- Your mine must stay upright — no turning over!
- Remove clean gemstones (chocolate chips) from your mine and put them in a separate pile.

(Distribute paper clips.) The third step is finding the gems inside the mine. Use this equipment to remove gems. You have 5 minutes! (Set timer.) (Circulate and praise students who are working together and finding big gems. Students who are arguing are making the mine unsafe.)

- What was difficult? (e.g., getting clean gems, getting whole gems — relate to how this is not easy)
- What went well? (e.g., good teamwork — relate to hard work done by teams of miners)
- What would you do differently next time?
STEP 4 – CUT THE GEMS
Look at these beautiful rough gems! Do you think they’re ready to be sold in a jewelry store? *(Students share answers.)* We need someone to cut them into geometric shapes! Thank goodness you’re here and you know how to cut a gem. *(Distribute small pieces of modeling clay for students to shape.)* The fourth step is cutting the rough gemstones into shapes. Use your guide for inspiration to make shapes out of your gems.
- Did it take you longer to make some shapes than others? *(Relate to some cuts requiring more experience, training, and skill.)*

STEP 5 – APPRAISE/GRADE THE FASHIONED GEMS
I wonder how much these beautiful cut gems are worth? Since they’re diamonds, we can look for the 4Cs: cut, color, clarity, and carat weight. Take a look at your 4Cs rubric and follow with me. *(Explain rubric.)* The fifth step is to appraise the gems, which means to say how much they’re worth. Use the rubric to give yourself points based on the 4Cs. Soon you’ll be selling the diamonds.
- Did you think about lying? Why?
- What will happen if you are dishonest?
- Why is it important to be honest when doing business?

STEP 6 – MARKET/SELL THE GEMS
Now that you know how much your gems are worth, you can sell them. Use the notecard to make a price tag for your gem. For example, if your appraise score was 10, sell the gem for $10. *(Distribute notecard.)* The sixth step is to sell the gems honestly. Write your team name and your price on the notecard.

(Act as an investigator coming to see if gems are being sold honestly. Go from group to group and evaluate the rubric for honesty. Honest students receive a handshake. Dishonest students have gems taken away.)

STEP 7 – REPAIR THE ENVIRONMENT AND SUPPORT THE COMMUNITY
Congratulations to all students who successfully mined, cut, appraised, and sold their gems. *(Round of applause.)* Can anyone guess the last step? The final step is to repair the environmental damage we’ve done. Use your tools to put the mine and all its crumbs back into the shape you circled.
- Was it hard to put the environment back together the way you found it? Why? In the real world, mining can have a big impact on the environment. It is the responsibility of the mine owner to restore the land that has been mined to a natural and economically usable state.
- Did you plan your mining reclamation process prior to mining?
- Should you have? Why or why not?
- How can the mining industry help people protect their communities before they mine and repair their communities afterwards?
Directions: Read the passage below and answer the questions that follow.

Some gems are harder than others. Some scratch easily. Many people prefer to buy hard, more durable gems, but how do they know which are harder and which are softer? In 1822, a German professor and mineralogist named Dr. Friedrich Mohs created a way to grade the hardness of minerals. Known as the Mohs Scale, all minerals are tested for hardness and given a number from 1 to 10. The minerals with low Mohs Scale numbers are softer and are easily scratched. The minerals with high Mohs Scale numbers are harder to scratch.

The Mohs Scale can be confusing. For example, diamond is a 10 and corundum, ruby and sapphire, are each a 9. You might think that diamond is only a little harder. In fact, diamond is 140 times harder than corundum. Diamonds can scratch every other mineral so Dr. Mohs gave it the number 10. Diamond is the hardest substance on Earth. That means that a diamond can scratch any other mineral. Yet no other minerals can scratch a diamond, except diamond. Diamond is harder than steel! When a diamond cutter wants to cut and polish a diamond crystal, they have to use tools made with diamonds and diamond dust.

*Adapted from the GIA GemKids Workbook*
APPENDIX E: LESSON 2

COMMON CORE READING COMPREHENSION HOMEWORK 2 (continued)

MOHS SCALE OF HARDNESS

NAME: ____________________________________________________ DATE: _______________________

1) The illustration best helps the reader understand which sentence?
   a. “The minerals with high Mohs scale numbers are hard to scratch.”
   b. “Diamond is many times harder than corundum.”
   c. “We call it the Mohs Scale.”
   d. “Yet no other mineral can scratch a diamond, except diamond.”

2) According to the passage, why is the Mohs Scale confusing?
   a. It is confusing because a diamond is a 10, but talc is a 1.
   b. It is confusing because it is difficult to know which minerals are harder.
   c. It is confusing because it looks like diamond is only a little harder than corundum, when it is actually much harder.
   d. It is confusing because it was made a long time ago.

3) Which detail from the passage best explains why gemologists use tools made of diamonds?
   a. “Many people prefer to buy hard gems, but how do they know which are harder and which are softer?”
   b. “Yet no other minerals can scratch a diamond, except diamond.”
   c. “Diamonds can scratch every other mineral, so Dr. Friedrich Mohs gave it the number 10.”
   d. “Diamond is the hardest substance on Earth.”
APPENDIX F: LESSON 3

GEMOLOGY LAB DIRECTION SLIPS

Print and cut these direction slips to guide students in Lesson 3’s Gem Lab activity, page 25.

As an **APPRAISER**, your job is to decide what a gem is and how much money it is worth. Today you will design a museum handout for a famous historic jewel.

1) Choose a favorite piece of jewelry from the timeline.
2) Write 3–5 sentences about why you think it is valuable. Remember to think about beauty, rarity, and durability.
3) Design a full-page museum handout that shows the jewel, tells its name, and explains why the jewel is valuable.

When you finish, answer this question: **What makes your favorite jewel valuable?**

As a **BENCH JEWELER**, your job is to make or repair jewelry using tools. Today you will recreate an historic piece of jewelry.

1) Choose a favorite piece of jewelry from the Time Machine.
2) Sketch it and write its name.
3) Explore your materials and plan how to make the jewelry.
4) Use your tools and materials to build it.

When you finish, answer this question: **What steps did you do to make a model of a famous piece of jewelry? How would you do it differently next time?**

As a **GEM HISTORIAN**, your job is to learn the history of gems and teach others. Today you will create a timeline of famous jewels.

1) Sketch a timeline on your planning sheet.
2) Find 5 favorite pieces of jewelry from the Time Machine.
3) Draw and label the jewels along the timeline. Write where they were found or what culture they’re from.
4) On blank paper, create an illustrated timeline to show your learning.

When you finish, answer this question: **What do you notice about when and where famous jewels were made?**

As a **JEWELRY DESIGNER**, your job is to turn creative ideas into jewelry. Today you will create a collection of jewelry in the style of one specific era.

1) Choose one era from the Time Machine and look at all the jewels.
2) Write what these pieces have in common.
3) Sketch and color a small collection of jewelry pieces that fit that pattern.
4) Name each piece.

When you finish, answer this question: **What do the pieces have in common?**

As a **CURATOR**, your job is to find and organize gems in museum displays. Today you will create a display of gems from around the world.

1) Go to gemkids.GIA.edu/view-all-gemstones.
2) Choose 3 gems and learn about them.
3) Make a notecard for each gem, including the name, a picture, where it is found, and interesting information.
4) Glue the notecards onto a paper and give your exhibit a name.

When you finish, answer this question: **Is there a particular part of the world that supplies the most gems?**

As a **FIELD GEMOLOGIST**, your job is to travel the world and collect gem samples for studying in labs. Today you will develop a map to guide others.

1) Go to gemkids.GIA.edu/view-all-gemstones.
2) Explore 5 - 10 gems and make a list of countries where they come from.
3) Design a map using your own map key to show which gems are in which countries.

When you finish, answer this question: **What do you notice about the geography and gems in the country you chose? Make a prediction about how the geography affects the finding of gems.**
APPENDIX G: LESSON 4

COMMON CORE MATH LEARNING TASK

DIAMONDS FROM THE MINE

NAME: ___________________________________________________ DATE: _______________________

Directions: Read the passage below and answer the questions in Level One, Two, or Three (circle one).

The Scene
You are the operations manager at a large diamond mine. It is an exciting time at the mine. Many large, valuable diamonds have been found within the last six months. The largest is the size of an egg and weighs about 200 carats. Also found were 12 rare blue diamonds that together weigh about 120 carats, as well as a vivid pink diamond that weighs 28 carats. You will soon have to ship all of these diamonds off to London to be sold.

Solve these problems on a new piece of paper. Hint: Use scrap paper to draw the problem if you get stuck.

Level One
1) How many diamonds will you need to pack for shipping?
2) All of the blue diamonds are the same size. How many carats does each blue diamond weigh?
3) You must list the total weight of the diamonds on the packing order. How many total carats of diamonds are you shipping?
4) You expect the mine to keep producing diamonds at this rate. If you find twice as many large, valuable diamonds in the next six months, how many total carats will you have found altogether?

Level Two (all of the above, plus...)
5) The diamonds are being shipped in three custom-made plastic cubes. Each side of each cube takes 10 minutes to create. How many hours will it take to make all three cubes?
6) It costs $100 to ship and insure 10 carats of diamonds.
   a. How much would it cost if you shipped only the blue diamonds?
   b. How much would it cost to ship only the egg-sized diamond?

Level Three (all of the above, plus...)
7) The diamonds are being shipped to a diamond broker. The diamond broker has agreed to pay for two thirds of the shipping cost. Your company will pay half of what is left. A group of diamond cutters who want to examine the diamonds in London will pay the remainder. What fraction will the cutters pay?
8) 5 carats = 1 gram. How many total grams do the diamonds weigh? (Round to the closest gram.)
APPENDIX H: LESSON 4

COMMON CORE MATH LEARNING TASK

JEWELRY ON THE RED CARPET

NAME:___________________________________________________________ DATE:_____________________

Directions: Read the passage below and answer the questions in Level One, Two, or Three (circle one).

The Scene

It is awards season and famous actors work on the perfect outfit for walking down the red carpet. They borrow jewelry from jewelers to wear to the award shows and come to your Beverly Hills, CA store, with requests for jewelry. You have nearly $100 million in inventory to lend.

Solve these problems on a new piece of paper. Hint: Use scrap paper to draw the problem if you get stuck.

Level One

1) An underground vault keeps your inventory safe. In the vault are 160 locked drawers to hold jewelry and gems. 123 drawers contain your daily inventory. The rest of the drawers contain the special pieces that will be borrowed by actors. How many drawers contain the special pieces?

2) Your store uses security cameras in each room of the store including the storage rooms, the rooms where the jewelry is created, the selling rooms, and the vault. There are three security cameras in each room and there are nine rooms in all. How many cameras does your store use?

3) An exciting young actress who recently starred in her first big movie will be borrowing a ruby and diamond bracelet. Today is February 16 and it isn’t a leap year. You have agreed to lend her the jewelry until the end of the month. How many days will the jewelry be on loan?

Level Two (all of the above, plus…)

4) Each drawer in the vault requires two keys to open. How many keys are needed to open just the drawers containing the daily display pieces?

5) Every drawer in the vault will need to be opened as jewelry is moved to display cases in the store upstairs or for actors coming in to select jewelry to borrow. There are five employees authorized to open drawers in the vault. How many drawers will each employee open?

Level Three (all of the above, plus…)

6) Your jewelry store is on the first floor of a tall business building. You have also rented another office on a higher floor.
   a. The rent for your office is $700 a month. How much office rent do you pay in a year?
   b. Today you entered the building on the first floor and immediately went down two floors to the underground vault to retrieve some jewelry you will be showing. You then went up ten floors to your office to meet with your client. After your appointment with your client, you went down to the store on the first floor of the building. Which floor is your office on?
HOME CONNECTION LETTER

DEAR FAMILY OF A GEMOLOGIST

Date: __________________________

Dear Family of a Gemologist,

Did you know that you are related to a gemologist? A gemologist is _______________________.
________________________________________________________________________________________________________.

This week we have been studying rocks, minerals, and gems in class. I have learned so many fascinating facts about gems and the earth. Here are interesting things I’ve learned:

1) ________________________________________________________________________________________________

2) ________________________________________________________________________________________________

3) ________________________________________________________________________________________________

The best part of the GemKids for Schools was ____________________________________________________________
________________________________________________________________________________________________________.

We can continue to learn together about “How stones become rock stars” at gemkids.GIA.edu

Sincerely,

Your Precious Gem, ______________________________________________
APPENDIX J: LESSONS 1–4

COMMON CORE HOMEWORK ANSWER KEY

WRITING PROMPT: HAPPY BIRTHSTONES TO YOU!
Use grade-appropriate rubric to evaluate writing prompt.

READING COMPREHENSION: MOHS SCALE OF HARDNESS
1) B
2) C
3) C

MATH: DIAMONDS FROM THE MINE
1) 14 diamonds
2) 10 carats
3) 348 carats
4) 696 carats
5) 3 hours
6) a. $1,200  b. $2,000
7) 1/6
8) 70 grams

MATH: JEWELRY ON THE RED CARPET
1) 37 drawers
2) 27 cameras
3) 12 days or 13 days
4) 246 keys
5) 32 drawers
6) a. $8,400  b. 9th floor
GLOSSARY

appraise — To evaluate an item to see how much it is worth

carat — A unit of measure for gemstones

clarity — Describes how clear the gem is; if the stone has a lot of inclusions or not

crystal — A solid material with flat surfaces and angles caused by its small sets of repeating atoms that form its geometric shape

durable — Hard, tough, and stable

ethical — Honest and making good choices

era — A period of time

gem — A mineral or organic material that is beautiful, rare, and durable

gemologist — A person who studies gems

gemology — The study of gems

imitation gem — Any material that looks like a natural gem and is used in its place

mine — A pit or tunnel where you can find minerals

miner — A person who brings precious minerals out of the ground

mineral — A natural, nonliving part of the earth

monetary — Relating to money

rare — Uncommon and hard-to-find

rock — A natural material made up of two or more minerals

sentimental — Relating to feelings

valuable — Worth a lot

value — How much something is worth

TEACHER TIP

Wonderful Word Walls

Enrich your word wall with these content-specific vocabulary words. Write each word on a notecard, and have students define the term in their own words and draw a picture.