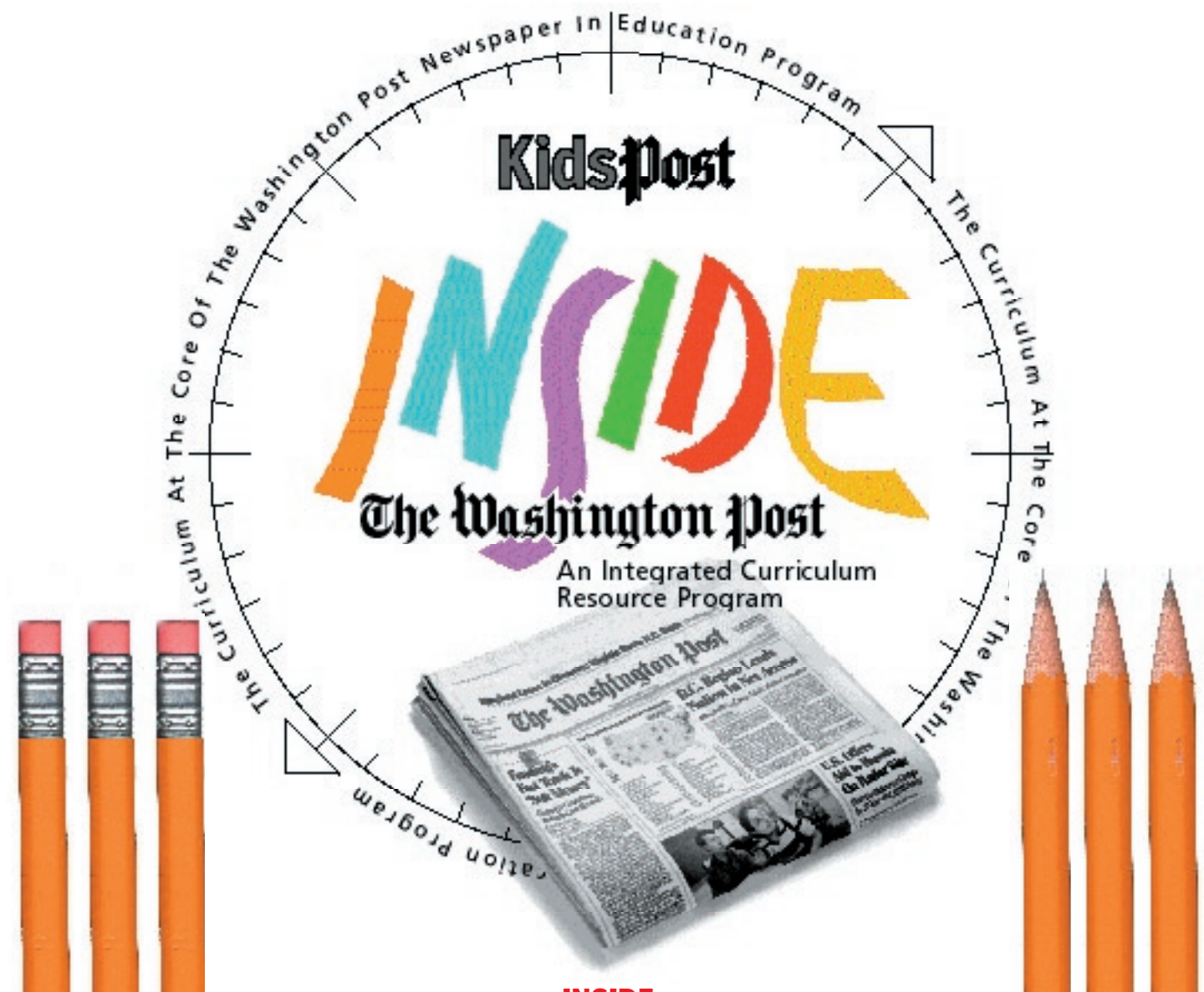


CURRICULUM GUIDE: PENCIL POINTS

Volume 2, Issue 1



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Pencil Points

Kids Post Article: "Get the Lead Out"

Lesson: Students will compare and contrast pencil qualities and collect data. Students will create advertisements as persuasive posters and/or write a business letter.

Level: All

Subjects: Science, Language Arts, Mathematics

Related Activity: Art

Procedure

Read

Read the KidsPost article "Get the Lead Out: Does the New Ballpoint Pencil Have the Writing Stuff?" and the two sidebars, "Get the Point?" and "The Birth of a Pencil."

Discuss

1. A consumer is a person who gets a product, or something he or she wants, takes the product home and uses or consumes it. Identify the consumers in this article and the name of the product they used.
2. What attributes make the Liquid-Lead Ballpoint Pencil "a cross between a pencil and a pen"?
3. What is the connection between lead and the "lead" in pencils?
4. How did the Stylus company manipulate graphite to create what they promote as "the first major pencil advancement in nearly a century"?
5. Which statements in this article by reporter Fern Shen show that the Stylus company needs to go back to the drawing board and redesign its new product?
6. What's the motive, or purpose, for KidsPost to send samples of the new product to students at a

local elementary school?

7. What question does this statement answer: "Luckily, the stain disappeared when the shirt was washed." Who would be glad to know this and why?
8. Do you think wood pencils will become obsolete?
9. After reading this article, what product would you choose to use when writing? Defend your choice with evidence from this article AND your own personal experience.
10. Trace innovations that resulted in the pencils we use today. Use a world map or globe. Begin in Greece. Make sure you stop in England, Germany and France. What direction do you need to head for the 1847 discovery? Find the state in which the Stylus company is based.

Expand Vocabulary

Give students "Word Study ... A Look at Graphite." Have students share the captions they have written for the photograph.

Analyze

Have students compare and contrast items (pens, pencils, paper towels) made by different companies. For this lesson, use pencils of three different companies. You may want the children to compare a "regular" pencil to a mechanical pencil. If you are able to purchase the Liquid-Lead Ballpoint Pencil, you may wish to include it. Are your students' reactions to it similar to those of students in the article? Duplicate and give each student the "Get the Point?" reproduc-

Vocabulary

Alternative: A choice between two equal possibilities

Biodegradable: Capable of being decomposed by natural or biological agents

Company: A business, a firm

Graphite: A soft, steel-gray to black, hexagonally crystallized allotrope of carbon with a metallic luster and a greasy feel. It is used in lead pencils, paints and coatings.

Hexagonal: Having six sides

Mongolia: An ancient region of east-central Asia comprising modern-day Nei Monggol (Inner Mongolia) and the country of Mongolia. The Mongol empire once stretched from China to the Danube River and into Persia.

Obsolete: No longer in use; outmoded in design, style or construction

Product: Something produced by human or mechanical effort or by a natural process; what a company sells

Pulverize: To pound, crush, or grind to a powder or dust

Stylus: A sharp, pointed instrument used for writing, marking or engraving

Definitions are from the American Heritage Dictionary



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ible found in this guide. Students will test pencils and collect data on each pencil using the variables included on the chart. A rating scale is suggested.

Evaluate

Evaluation of the pencils may include: Which pencil is the best buy? Which pencil produces the best result (copy that is dark enough to read, clean erasure)? Write a paragraph and/or create a graph to communicate findings.

Share

After they collect the data and discuss it with classmates, have students create advertisement posters using the results.

Write

Write a business letter.

- Look at the objects in your school and home. Select one that could be improved.
- Brainstorm your ideas for improvement. Select the best idea.
- Think of reasons for this improvement: What will it be able to do better? Who else will use the object when it is redesigned?
- Find out who makes the product.
- Write a letter to the company in which you suggest your idea to improve the object. Persuade the manufacturer this is a good idea by saying why it should be improved.

Enrichment

Create a collaborative-, class- or peer partner-created book. Cut the cover and the pages in the shape of a pencil. To create the book: Use yellow construction paper for the cover. Color tip end with your own pencil; use brown construction paper, marker or crayon and jagged markings to show the area chewed on by the pencil sharpener; name your pencil, eg

“Mongol #2” or “Literacy #1.” Draw an eraser with orange or pink crayon or marker. That’s your book’s cover. Pages should be cut using the outline of the cover.

Now for the content: Make it a FACT or FICTION book about the invention of the pencil. Here are some sample pages or models:

Page 1: Pencils are just long wooden sandwiches with a filling made of graphite. FACT of FICTION?

Page 2: FACT: Factories that make pencils truly make them like a sandwich. Two pieces of wood are pressed together with a thin strip of graphite, or what you call lead, wedged in the middle. Factories do not make pencils by drilling a hole down the middle of a strip of wood and pouring graphite into that hole.

Page 3: Pencils are always colored yellow. FACT or FICTION?

Page 4: FICTION. Use information from your KidsPost to tell the readers of your book just about how many pencils wear the color yellow and how pencils came to be painted that color.

... and so the pattern of a FACT or FICTION book could continue with the book being put to use in grade 1 or grade 2 classrooms for those students who might not regularly access KidsPost but use pencils.

“Get the Lead Out” can be found at www.washingtonpost.com/wp-dyn/articles/A25463-2002Oct14.html

“Get the Point?” can be found at www.washingtonpost.com/wp-dyn/articles/A25462-2002Oct14.html

“The Birth of the Pencil” is on page 5 of this curriculum guide or <http://www.washingtonpost.com/wp-dyn/articles/A34748-2002Oct16.html>

Inventions on the Web

➤ <http://www.uspto.gov/>
United States Patent, Trademark Office
Click on “Patents” for everything you need to know about patents and to conduct an advanced search for inventions. Check out “First Time Visitors” and the “Kids Pages.”

➤ <http://www.inventamerica.com/>
Invent America

A program for K-8 that develops creative thinking and problem solving skills through an invention challenge. Eureka, the invention eagle, takes visitors on a tour of the informative Web site. Check out the list of 2001 contest winners, then order a kit for more information.

➤ <http://www.washingtonpost.com/wp-dyn/articles/A47581-2002Aug5.html>
“Feeling Playful?”

Although the KidsPost article’s news peg is an exhibit at the National Museum of American History, students learn about the relation of play to creativity.

➤ <http://www.washingtonpost.com/wp-dyn/articles/A47580-2002Aug5.html>
“The Children of Invention”

The August 6, 2002, KidsPost article highlights young inventors.

➤ <http://www.washingtonpost.com/wp-dyn/articles/A11209-2002Jul1.html>
“Invention Deficit? Not Among These Kids: Ingenuity Leads to Arduous Patent Quest”

In July Sandra Evans first reported in the Post about young inventors. More examples of young inventors and opportunities to showcase your inventions included.

➤ <http://www.school.discovery.com/teachers>

Discovery Channel

Click on “Lesson Plans.” Under Technology, you will find “Inventors and Inventions” and “Inventor’s Workshop” lesson plans.

NAME _____

- Scoring**
- 1 : Below standard, not satisfactory
 - 2: Acceptable, satisfactory
 - 3: Exceptional, very satisfied

Get the Point?

You have been given three pencils to compare and contrast. You have used the pencils. Now it is time to rate them. Use the rating system in the upper right corner to grade their qualities. Total each column to get the final rating.

| Pencil #1 | Pencil #2 | Pencil #3 | Comments |
|--|-----------|-----------|----------|
| Company: | | | |
| Type: | | | |
| Price per pencil: | | | |
| Durability | | | |
| Graphite Quality | | | |
| Durability Does it hold up under pressure? Did the lead break often? | | | |
| Graphite Quality Does it write smoothly? Is what you wrote dark enough to read? | | | |
| Smudge Factor Does the graphite hold to the paper or smudge when your hand crosses over what you have written? | | | |
| Eraser Quality Is the eraser large enough? Does it erase well? Subtract 0.5 if it fell off the pencil | | | |
| Sharpness Is it easy to sharpen? Does the point remain sharp for long? | | | |
| Comfort Is it easy to hold? | | | |
| Aesthetics Do you like the casing color? Does it come in other casing colors? | | | |
| Total | | | |



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Word Study

A Look at Graphite

"Carefully form your letters so they will be legible. You want people to be able to read what you write," your teacher says before moving to the next student's desk.

You reposition your fingers on the yellow pencil and continue writing.

What you call lead in your No. 2 pencil is actually made of graphite. Lead was used long ago. Ancient Greeks and Romans shaped lead into a pointed stylus to mark paper. In the mid-1500s, graphite was discovered in England. They called it lead. Even when their error was discovered, people continued to call graphite lead.

The word "graphite" wasn't named for a scientist or an element. It comes from the Greek word *graphein* that means to write. In Latin, the word was *graphus*.

When you create a graph, you use a pencil so you can easily erase what you have written. You want the measurements that you have drawn to be exactly right.

"Graph" is often used as a suffix. It is added after root words to tell how something was written or drawn. Let's look at some of these words.

Seismograph

What does a seismograph record? Here's a clue. The Greek verb *seiein* means to shake.

Pictograph

Ideas or words can be represented using pictures. Some hieroglyphs

The Birth of a Pencil

Most people think pencils are made by drilling holes in round pieces of wood and sticking in a lead. Wrong.

1. Blocks of wood, usually cedar, are sawed into thin sheets called "pencil slats." A machine cuts grooves into each slat. Then a core is laid into each groove. The core is made by grinding up graphite, mixing it with clay and other materials, forming it into ropes and baking it.

2. A second grooved slat is glued over the first one, making a pencil sandwich.

3. The sandwich is cut into individual pencils and painted.

4. A groove is cut at one end to accept the metal ring that holds the eraser. (The ring is called a "ferrule.")

5. A machine pushes a glue-filled ferrule onto each pencil, followed by an eraser.

The number on a pencil shows the hardness of the pencil core. The cores are made mostly of graphite and clay. The more clay, the harder the pencil. Harder pencils make lighter lines and have higher numbers.

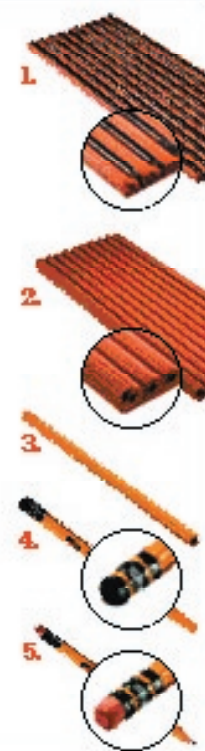
A No. 1 pencil is the darkest and has the least clay. The No. 2 is

considered the best for general use.

Europeans use a system of letter grades. An F pencil sharpens to a fine point. A B means the line is black, and an H means it's hard. A pencil graded BBHH is very black and very hard.

A No. 2 pencil is the same as an HB.

SOURCE: BROWN TECHNOLOGIES A CO.; PENCILS.COM



require much time to decipher. The ancient Egyptian hieroglyphs were both ideograms and phonograms. They represented either objects or sounds. You can draw one pumpkin to represent the idea of "one"; then draw three ghosts to represent the ideas of "three."

Phonograph

You have heard songs recorded on CD or cassette. Before CDs, people listened to music on a phonograph record. The root word comes from the Greek word, *phono*, meaning sound or voice. You might find it interesting to read about the first phonograph machine that was invented in the early 1800s, then inventor Thomas Edison's improvement that was also known as a phonograph, and later improvements in technology that resulted in better sound quality.

Photograph

Below is a photograph of a pencil. Photo comes from the Greek word *phos* or *phot* that means light. In the space below, tell us about the pencil in this "light writing." Pick up your pencil. Sharpen the graphite to a point. Write legibly so we can decipher your message.





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Pencil It In

Can you find 21 words associated with pencils and their improvement? Find and circle the words listed. Words run left to right, right to left, top to bottom and bottom to top and diagonally.

| | | | |
|---------|----------|--------|-----------|
| Brittle | Conte | Liquid | Pulverize |
| Brush | England | Mongol | Rope |
| Carbon | France | Nub | Stylus |
| Casing | Graphite | Pen | |
| China | Greek | Pencil | |
| Clay | Lead | Point | |

After you have found the 21 words in the Word Find, use six of them in a paragraph to tell something you know about pencils.

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



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Academic Content Standards (The main lesson addresses these academic content standards.)

This lesson addresses academic content standards of Maryland, Virginia and the District of Columbia. Among those that apply are:

Maryland*Language Arts*

Writing (3.0): Students produce informational, practical, persuasive and narrative writing that demonstrates an awareness of audience, purpose and form. Persuasive Writing: By the end of grade 5, students write to persuade an intended audience by selecting an appropriate form that (3.5.7)

- establishes a clear position in support of a proposition or proposal,
- supports the position with organized and relevant evidence.

By the end of grade 8, students support arguments with detailed evidence, examples, and reasoning, differentiating between evidence and opinion (3.8.7)

Practical Writing: By the end of grade 5, students write letters (friendly and formal).

Mathematics

Knowledge of Statistics (4.0): Students will collect, organize, display, analyze, and interpret data to make decisions and predictions. By the end of grade 5, students know and are able to organize and display data using stem and leaf plots, line plots and line graphs; analyze and interpret stem and leaf plots, circle graphs, line plots and line graphs.

Process of Problem Solving (7.0): Students will demonstrate their ability to apply a wide variety of mathematical concepts, processes and skills to solve a broad range of problems. In order to solve problems, students will be able to organize, interpret and use relevant information; apply appropriate problem-solving strategies to solve a problem from visual, numerical and symbolic perspectives.

A complete list of State Content Standards of Maryland can be found at <http://www.mdk12.org/mspp/standards/>.

Virginia*English*

Writing, Grade 3: 3.8 The student will write stories, letters, simple explanations and short reports across all content areas. Writing, Grade 7: 7.8 The student will develop narrative, expository, persuasive, and technical writings.

- Elaborate the central idea in an organized manner,
- Choose vocabulary and information that will cause a reader to perceive images and tone

Mathematics

Probability and Statistics, Grade 3: 3.21 The student, given grid paper, will collect data on a given topic of his/her choice and construct a bar graph showing the results. A title and key will be included.

Science

Scientific Investigation, Reasoning, and Logic, Grade 6: 6.1 The student will plan and conduct investigations in which

- observations are made involving fine discrimination between similar objects,
- differences in descriptions and working definitions are made,
- one variable is manipulated over time with many repeated trials.

A complete list of Standards of Learning of Virginia can be found on the Web at <http://www.pen.k12.va.us/>.

Washington, D.C.*Language Arts*

Language for Research and Inquiry, Content Standard 3: Students use language and symbol systems (e.g., timelines, maps, graphs and charts) to define problems and organize information. By the end of grade 3, the student produces a report that

- develops a controlling idea or theme that conveys a perspective on a subject,
- includes appropriate facts and details,
- excludes extraneous and inappropriate information,
- uses a range of appropriate strategies, such as providing facts and details, describing or analyzing the subject, and a relevant anecdote.

Mathematics

Data Analysis, Statistics, and Probability Science, Content Standard 3: Students collect, organize, represent, evaluate and interpret data. By grade 3, the student constructs and labels graphs; collects, organizes and records data in pictographs and bar graphs, and interprets the results; determines the mean of a set using concrete objects.

Science

Scientific Inquiry, Content Standard 1: Understand and develop abilities to do scientific inquiry by asking questions based on current knowledge, performing investigations and devising logical explanations. By the end of grade 5, the student will conduct investigations to know that scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.

A complete list of Standards for Teaching and Learning of the District of Columbia Public Schools can be found at <http://www.k12.dc.us>.