

EVERY PENCIL IS A SANDWICH

Everything you wanted to know about a timeless
creative tool.



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About the Author

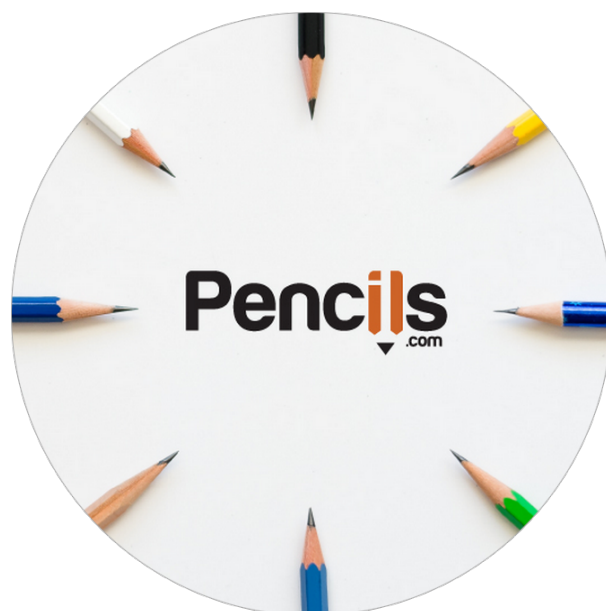
Alexander Poirier is a writer who has worked with Pencils.com for over three years. A seasoned pencil pusher, his favorite pencil is the Palomino Blackwing 602. Chat with him on Twitter or Instagram **@pencilscom**.

What's inside...

Have you ever wondered how they get the lead inside of a pencil? Or what the “2” on a #2 pencil really means? Well, then let us introduce ourselves. We’re Pencils.com, and we’ve been the go-to source for pencil facts, news and information for nearly 20 years. But that’s not all; we’re also one of the web’s leading providers of woodcased pencils, notebooks, sharpeners and creative tools.

In this ebook, you’ll discover the truth behind the lead pencil myth, learn the ten steps to making a quality pencil, unearth the location of the world’s first graphite deposit, and find out why $1+1 = \text{HB}$.

Behind Pencils.com is California Cedar Products Company, the world’s leading supplier of wooden slats used in the production of wood-cased pencils. Our wood is used in Palomino’s writing products as well as many of the top pencil brands worldwide, including most of the wood-cased pencils sold on this site.



A fourth generation, family-owned company, Cal Cedar has been built on a tradition of excellence both in the production of superior products and in our dedication to building strong relations with our customers. When it comes to experience in the pencil industry, the family goes back seven generations.

PENCIL HISTORY



The earliest known woodcased pencil, courtesy of Faber-Castell.

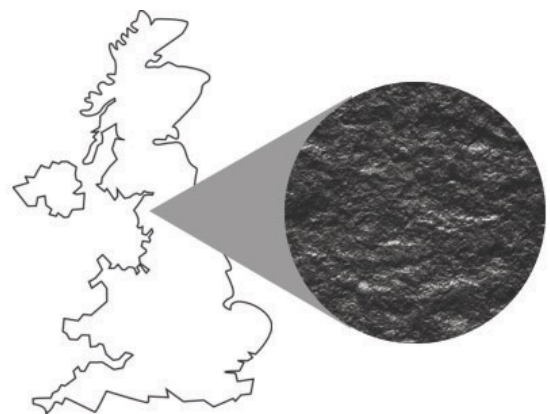
The Earliest Forms of Self-Expression

Did you know that modern pencils owe it all to an ancient Roman writing instrument called a stylus? Scribes used this thin metal rod to leave a light but readable mark on papyrus (an early form of paper). Other early styluses were made of lead, which is what we still call pencil cores even though they are actually made of non-toxic graphite (more on that later). But pencil history doesn't stop there...

Graphite came into widespread use following the discovery of a large graphite deposit in Borrowdale, England in 1564. Appreciated for leaving a darker mark than lead, the mineral proved so soft and brittle that it required a holder. Originally, graphite sticks were wrapped in string. Later, the graphite was

inserted into hollowed-out wooden sticks and, thus, the wood-cased pencil was born!

Nuremberg, Germany was the birthplace of the first mass-produced pencils in 1662. Spurred by Faber-Castell (established in 1761), Lyra, Steadtler and other companies, an active pencil industry developed throughout the 19th century industrial revolution.



Pencil History in the United States

Early settlers depended on pencils from overseas until the war with England cut off imports. William Monroe, a Concord, Massachusetts cabinet-maker, is credited with making America's first wood pencils in 1812. Another Concord native, famous author Henry David Thoreau, was also renowned for his pencil-making prowess.

The American pencil industry took off when The Joseph Dixon Crucible Company (now Dixon Ticonderoga) and more pencil manufacturers started getting into the act and, towards the end of the 19th century, New York and New Jersey hosted several factories established by prominent German pencil manufacturers, including Faber-Castell, Eberhard Faber, Eagle Pencil Company (later Berol) and General Pencil Company.

The first mass-produced pencils were natural and unpainted to show off high-quality wood casings. But, by the 1890s, many pencil manufacturers started painting pencils and imprinting them with brand names.

Following the Wood

Early American pencils were made from Eastern Red Cedar, a strong, splinter-resistant wood that grew in Tennessee and other parts of the Southeastern United States. To be nearer to the source, Northern manufacturers migrated south and set up wood mills until, eventually, the greatest concentration of U.S. pencil manufacturers had established factories in Tennessee. To this day, the remaining U.S. pencil producers are primarily concentrated in the South.

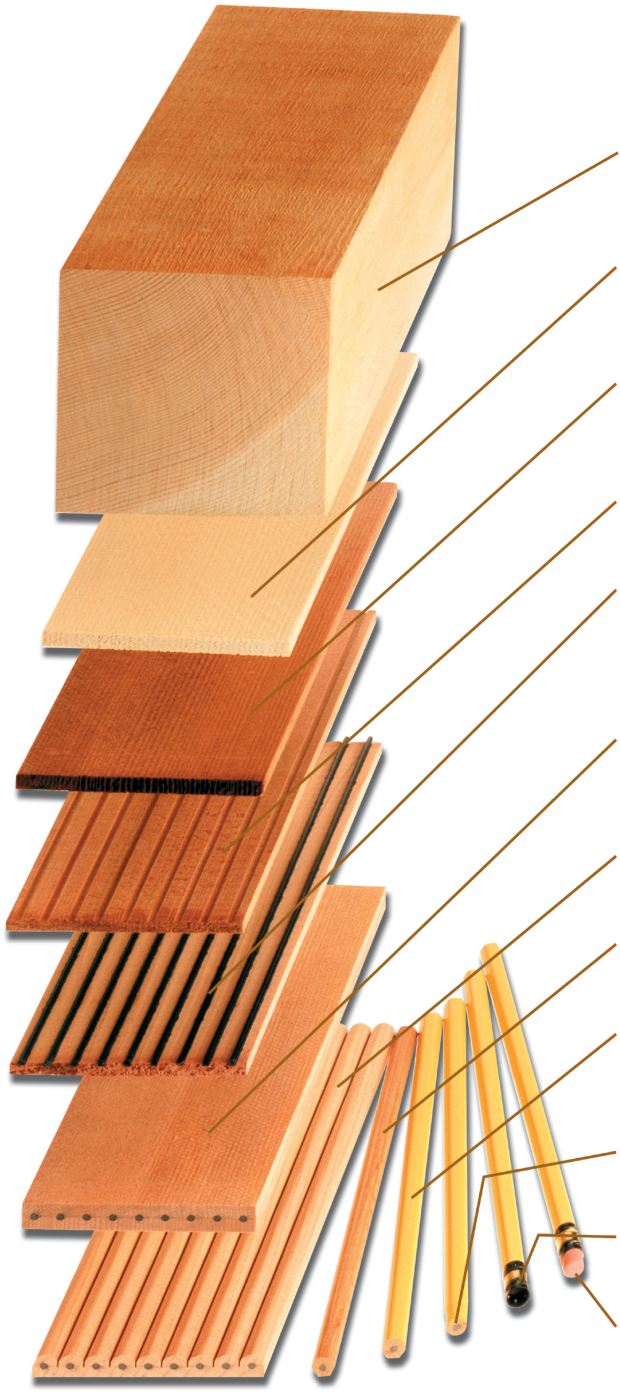
By the early 1900s, however, additional sources of wood were needed. Pencil manufacturers turned to California's Sierra Nevada mountains where they found Incense-cedar, a species that grew in abundance and made superior pencils. California Incense-cedar soon became the wood of choice for domestic and international pencil makers around the world.

To ensure the continued availability of Incense-cedar, forest workers and landowners have carefully managed the stands of trees, and timber companies have committed to harvesting Incense-cedar on a sustained-yield basis. "Sustained-yield" means that the annual growth of the forest is greater than the amount harvested from the forest. Forests managed on a sustained-yield basis are abundant and healthy and will continue to provide wood for people and habitats for animals for generations to come.

Incense-cedar has a smooth, fine grain that sharpens evenly and provides a superior pencil performance when compared to other wood species.

How a Cedar Pencil is Made

Lightweight and durable, Cedar Pencils are produced from a renewable resource – genuine Incense-cedar from the carefully managed, sustainable forests of California and Oregon.

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1. Incense-cedar logs are milled into 3 x 3-inch lumber called "pencil stock." The pencil stock is kiln dried to ensure dimensional stability and then cut into blocks.
 2. "Pencil blocks" are sawed into "slats," each one-half the thickness of a finished pencil. Tungsten-tipped saw blades ensure precision tolerances of $\pm .0003$ inch.
 3. Pencil slats are saturated with a non-toxic emulsion of wax and stain. This mixture gives the cedar pencil its distinctive color and makes the pencil easier to sharpen.
 4. Each stained slat is machine-grooved to receive the pencil lead.
 5. Pencil "lead," a fragile mixture of clay and graphite, is placed into the grooves of the bottom slat. The strength and stability of Incense-cedar keeps the pencil lead from breaking.
 6. A second grooved slat is glued on top of the leaded slat, forming a "sandwich." Each sandwich is held tightly together in a hydraulic clamp until the glue dries.
 7. High-speed machinery shapes and cuts the slat sandwich into individual pencils.
 8. Each pencil is sanded to a smooth, satiny finish. After sanding, the pencils are ready for finishing.
 9. Several coats of non-toxic finish are applied to each pencil. After the finish has dried, the manufacturer's name is heat-stamped into one face of the pencil.
 10. A shoulder is cut into one end of the pencil to accept the "ferrule," a metal device that secures the eraser tip.
 11. The ferrule is inserted onto the pencil end, and is clinched to the wood.
 12. An eraser is inserted into the ferrule. Erasers can be clinched, glued, or punch-riveted into place. The finished pencil is now ready for sharpening and use.



"Every pencil is like a sandwich."



THE LEAD PENCIL MYTH

Here's a myth buster: There is no lead in pencils. Rather, the core is made up of a non-toxic mineral called graphite. The common name "pencil lead" is due to an historic association with the stylus made of lead in ancient Roman times.

EARLY GRAPHITE DISCOVERIES

Graphite came into widespread use following the discovery of a large graphite deposit in Borrowdale, England in 1564. As the story goes, a passerby found bits of a shiny, black substance clinging to the roots of a fallen tree. The whole countryside was abuzz with talk about this mysterious mineral, which eventually came to be known as "plumbago" or, more commonly, "Blacklead." They found it left a dark mark, making it ideal for writing and drawing, but so soft and brittle, some type of holder was required. Initially, they wrapped graphite with string. Later, the graphite was inserted into hollowed out wooden sticks. The wood-cased pencil was born!



In 1795, a French chemist named Nicholas Jacques Conté patented a new process for making graphite pencil leads. This method mixed powdered graphite and clay in a water slurry, then formed sticks which were hardened in a kiln. These composite graphite-clay “leads” allowed for more efficient use of graphite and revolutionized the pencil industry. Not only did the formula reduce costs, but by adjusting the ratio of clay and graphite powder, the changing hardness allowed more control of the lightness and darkness of the graphite mark left on the paper. It’s proved to be a win-win for creative folks ever since!

GRAPHITE IN AMERICA

In 1821, Charles Dunbar (author Henry David Thoreau’s brother-in-law) discovered a graphite deposit in New England that proved to be of a quality superior to any previously found in the United States (though not typically up to the European quality). Still, his finding spurred the U.S. pencil industry to set up their manufacturing centers close to these graphite deposits. Eventually, the Thoreau pencil factory came to be known as one of the finest makers of pencils in America.

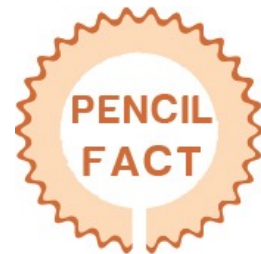
GRAPHITE EUREKA IN SIBERIA

In 1847, French merchant Jean-Pierre Alibert was searching for gold in Siberian streams when he came upon some very round, very smooth pieces of pure graphite. Reasoning that they must have been carried a long distance downstream, he trekked some 270 miles until he came to the source of his discovery. There he set up a mine but, during the first seven years of operation, the mine produced graphite of marginal quality. Then a rich and unbroken deposit of the highest-quality graphite was uncovered, a find that yielded pieces of pure ore weighing as much as 80 pounds!



PENCIL CORES TODAY

Today’s graphite writing cores are a mixture of graphite and clay. By varying the graphite to clay ratio, pencil makers adjust the core “hardness”—usually identified by a number (2, 2-1/2 or 3) or letters (HB,2B, H or F). Head over to page 9 for more info!



Henry David Thoreau designed pencils at his father's pencil factory before retreating to Walden.

GRAPHITE GRADING SCALES EXPLAINED



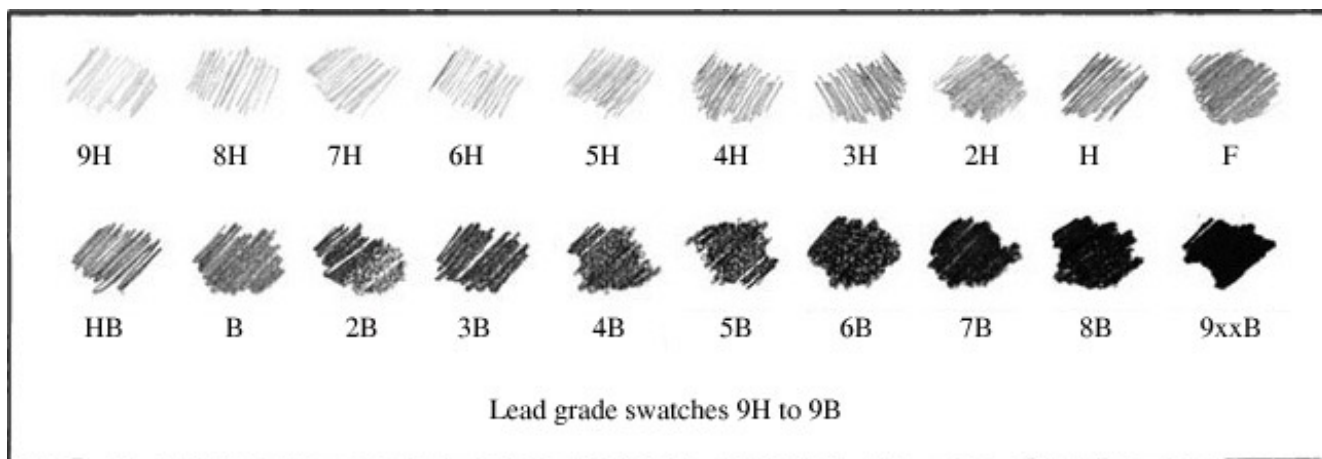
A pencil's graphite grade actually refers to its *graphite hardness*. This grade can generally be found towards the unsharpened end of the pencil, as seen here. There are two graphite grading scales used around the world: the numerical graphite scale and the HB graphite scale.

Contrary to popular belief, however, there is no industry standard for these scales.

NUMERICAL GRAPHITE SCALE



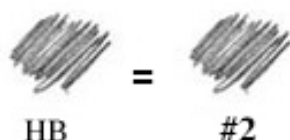
The first graphite grading scale is a numeric scale. Using this scale, the hardness of the core is often marked on the pencil — look for a number (such as “2” “2-1/2” or “3”). The higher the number the harder the writing core and the lighter the mark left on the paper. As the pencil core becomes softer (through the use of lower proportions of clay) it leaves a darker mark as it deposits more graphite material on the paper. Softer pencils will dull faster than harder leads and require more frequent sharpening.



HB GRAPHITE SCALE

The second graphite grading scale is known as the HB scale. Most pencil manufacturers outside of the U.S. use this scale, using the letter “H” to indicate a hard pencil. Likewise, a pencil maker might use the letter “B” to designate the blackness of the pencil’s mark, indicating a softer lead. The letter “F” is also used to indicate that the pencil sharpens to a fine point.

Historically, pencil makers also use combinations of letters to tell us about the graphite — a pencil marked “HB” is hard and black, a pencil marked “HH” is very hard, and a pencil marked “BBB” is really, really black! Today, however, most pencils using the HB system are designated by a number such as 2B, 4B or 2H to indicate the degree of hardness. For example, a 4B would be softer than a 2B and a 3H harder than an H.



GRAPHITE SCALE COMPARISONS

Generally, an HB grade (about the middle of the scale) is considered to be equivalent to a #2 pencil using the U.S. numbering system.

In reality however, there is no specific industry standard for the darkness of the mark to be left within the HB or any other hardness grade scale. Thus, a #2 or HB pencil from one brand will not necessarily leave the same mark as a #2 or HB pencil from another brand. Most pencil manufacturers set their own internal standards for graphite hardness grades and overall quality of the core, some differences are regional. In Japan, consumers tend to prefer softer darker leads; so an HB lead produced in Japan is generally softer and darker than an HB from European producers.

Finding what works best for your own artistic and writing needs is generally a matter of personal preference and experimentation with different brands of pencils.

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