American Ingenuity:
Embracing the Freedom to Dream

September 25 – November 21, 2010

TEACHER RESOURCE GUIDE

American Ingenuity: Embracing the Freedom to Dream

Exhibit Introduction

Throughout the exhibition ***American Ingenuity: Embracing the Freedom to Dream*** at the Lorenzo Cultural Center students will examine America from the perspective of a nation characterized by its unparalleled ability to dream, to invent and to "do". Students will discover through exhibits, presentations and activities our nation's history through the lens of our great inventors, innovators and entrepreneurs.

This packet of information is designed to assist teachers in making the most of their students' visit to the Lorenzo Cultural Center. Contained in this packet are:

1. An outline of the exhibit
2. Facts, information, quotes and activities related to the exhibit
3. Lesson plans related to the exhibit
4. A resource list with websites, addresses and information

American Ingenuity: Embracing the Freedom to Dream
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PART I: EXHIBIT OUTLINE

What is it about Americans and their willingness to explore the unknown, chart new territory and create new possibilities? Join us this fall at the Lorenzo Cultural Center to discover our American heritage from the perspective of a nation characterized by its unparalleled ability to dream, to invent and to "do." Through exhibits, presentations and activities, we'll explore our history through the lens of our great inventors, innovators and entrepreneurs. We'll study what it is to be creative as well as how to nurture original, inventive thinking. And we'll look at the question of our future and the importance of encouraging continued resourcefulness and the desire to strike out on the path for something new.

PART II: TIMELINE

Eureka! We've come a long way since the invention of the bow and arrow in 20,000 B.C. Since that time, the inventions and the innovators that created them have changed our daily lives. Where would we be without wheels, calendars, paper, eyeglasses, clocks, the printing press, telescopes, and vaccines? Invention happens when the right mix of creative people, resources, and inspiring surroundings come together. This timeline provides just a sample of the discoveries and gadgets created from 1800 to the present.

1800 – 1849 Inventions
1800 – Electric Battery
1800 – Coffee Pot
1824 – Braille
1827 – Ohm's Law
1843 – Rotary Printing Press
1843 – Vulcanized Rubber
1846 – Sewing Machine
1849 – Safety Pin

1850 – 1874 Inventions
1852 – Elevator
1858 – Can Opener
1859 – Escalator
1860 – Vacuum Cleaner
1866 – Dynamite
1867 – Typewriter
1869 – Air Brake
1870 – Chewing Gum
1873 – Barbed Wire
1873 – Blue Jeans

1875 – 1899 Inventions
1875 – QWERTY Keyboard
1876 – Refrigerator
1876 – Telephone
1877 – Toilet Paper
1879 – Light Bulb
1885 – Halftone Printing Process
1886 – Coca-Cola
1889 – Automobile
1889 – Matches
1893 – Cracker Jack
1895 – Wireless Telegraph
1897 – Jell-O
1899 – Paper Clip

1900 – 1924 Inventions
1901 – Assembly Line
1901 – Lionel Trains
1902 – Flashlight
1903 – Airplane
1903 – Windshield Wipers
1907 – Paper Towels
1908 – Cellophane
1912 – Liquid-fueled Rocket
1913 – Zipper
1919 – Toaster
1920 – Hair Dryer
1923 – Traffic Light

1925 – 1949 Inventions
1925 – Masking Tape
1927 – Television
1928 – Penicillin
1935 – Monopoly
1937 – Shopping Cart
1938 – Nylon Stockings
1942 – Duct Tape
1945 – Microwave Oven
1946 – Disposable Diapers
1946 – First Computer
1947 – Transistor
1947 – Instant Photography
1948 - Velcro

1950 – 1974 Inventions
1950 – Frisbee
1951 – Liquid Paper
1956 – TV Remote Control
1956 – Heart Pacemaker
1958 – Laser
1959 – Barbie Doll
1968 – Microprocessor
1969 – Jumbo Jet
1971 – Pocket Calculators
1973 – Ethernet and Internet
1974 – Post-it Notes

1975 – 1999 Inventions

1976 – Personal Computer
1979 - Trivial Pursuit
1982 – Compact Discs (CDs)
1983 - Mobile Phone
1991 - World Wide Web
1993 - Beanie Babies
1998 – Google

21st Century Inventions
2000 - iPod
2001 - Segway
2002 - ROOMBA Robotic Vacuum
2003 - Hybrid Car
2005 - YouTube
2006 - Military Robot
2007 – iPhone
2008 – Retail DNA Test
2009 – Retinal Implants

PART III: BACKGROUND INFORMATION

Top 10 American Inventions

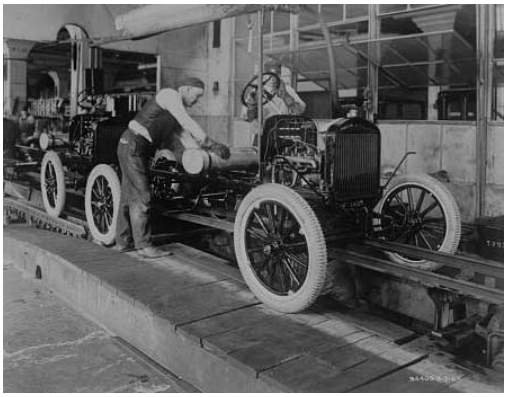
The Light Bulb

Thomas Edison didn't conjure up the idea for a light bulb from thin air, but he did perfect its design, giving birth to the country's electric industry in the process. Edison's bulb lit up the world, one block at a time, beginning with his laboratory's street in New Jersey in 1879. It has taken well more than a century, and the intense demand for more energy efficient lighting, to begin to displace the incandescent bulb as the standard.

Besides perfecting the light bulb, Edison also holds nearly 1,100 patents. (Department of Interior, National Park Service, Edison National Historic Site)

The Assembly Line

The consummate American innovator, Henry Ford, changed the way industry operates when his automotive assembly line rolled into use in 1908. While America didn't invent the car, with mass production made more efficient by Ford, many manufactured goods instantly became affordable to a wider swath of Americans.



After WW1, factories switched from making weapons to consumer goods. The automobile assembly line, like this one in 1923, made goods that had been only for the super-rich available to the middle class. (Library of Congress, Detroit Publishing Company)

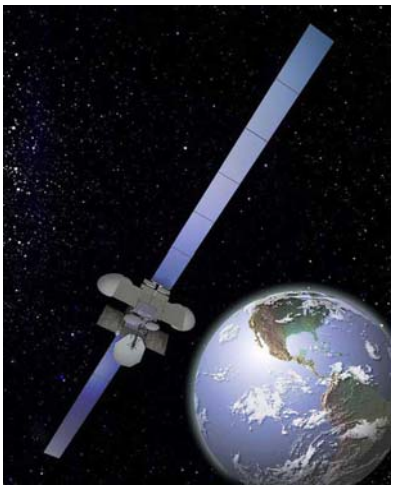
Transistors

The electronic age would be nothing without the transistor, a semiconductor used in everything from televisions to computers. Three-terminal transistors were developed by a three-man American team, who built upon each other's ideas and each won the Nobel Prize in 1956 for their groundbreaking work.

Transistors are now found in a range of consumer electronics, from computers to television sets. (Stockexpert)

Communications Satellites

The world's first communications satellite was developed by the U.S. Army and launched into space in 1958, beaming a message back to Earth from President Eisenhower: "Through the marvels of scientific advance, my voice is coming to you from a satellite traveling in outer space." Though the Apollo missions were flashier, scientifically, it was the development of the communications orbiters that would become the real money-makers.



Satellites have lead to a communications industry boom. (Boeing)

Magnetic Resonance Imaging

Countless lives have been saved thanks to the advent of the MRI, a painless, non-invasive way of seeing straight into the human body with amazing detail. It was Raymond Damadian, an American scientist familiar with the principles of nuclear magnetic imaging, who first proposed that the technology could be used to safely scan for disease. The first MRI machine went into use in 1977.

MRI machines allowed doctors a convenient way to peek inside the human body without having patients go under the knife. (Dreamstime)

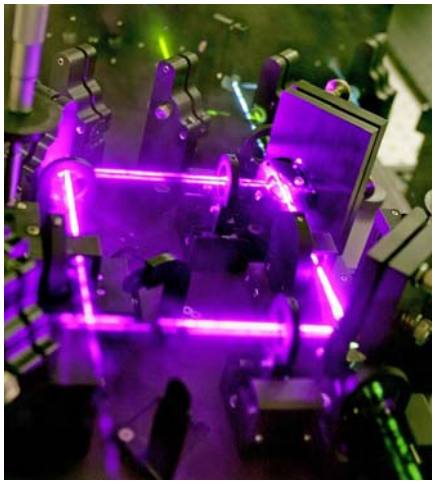
The Internet

Many people (except Al Gore) could take partial credit for the invention of the Internet, but the technology indisputably had its first unceremonious moments in the late 1960s in the bowels of America's institutes for higher learning. Developed for military research, the "ARPAnet" connected four computers at UCLA, Stanford, UC Santa Barbara and the University of Utah. Scientists typing there sent the first email, too, in 1971.

The internet was originally built for military research before it connected the rest of the world. (Darren Hester/MorgueFile)

Laser Technology

With so many applications and a commercial value in the many billions of dollars, the laser ranks as one of America's most practical inventions of the 20th century. Though Albert Einstein first described the properties of a laser in 1917, it wasn't until 1960 that scientists at the Hughes Research Laboratories in California first demonstrated the phenomenon. Today, we use lasers anytime we put on a CD or DVD, perform eye surgery, scan a barcode, put on a rock concert and, of course, shine one of those annoying red lights in someone's eye.



A laser setup used to study nanotube fluorescence. (Daniel Dubois/Vanderbilt University)

Putting a Man on the Moon

The USSR may have been the first to reach space, but it was NASA's Apollo program - conceived in 1960 during the Eisenhower administration - that truly captured the world's imagination, putting a man on the moon in 1969. The speed at which scientists went from concept to realization of the space program, helped in no small part by competition

with their Communist rivals, was nothing short of miraculous compared to the lumbering pace of many innovations today.

Neil Armstrong took this picture of Buzz Aldrin, showing a reflection in Aldrin's visor of Armstrong and the Lunar Module during the Apollo 11 mission. This is one of the few photographs showing Armstrong (who carried the camera most of the time) on the moon. (NASA)

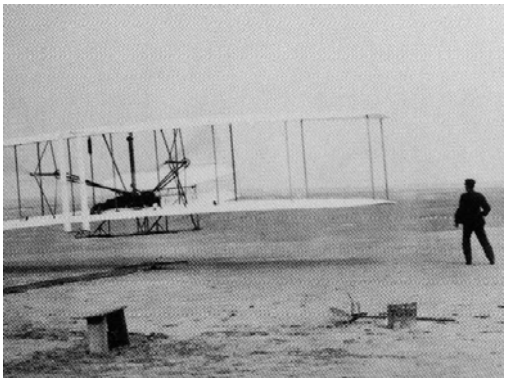
The Atomic Bomb

Perhaps not as whimsical as landing on the moon, few would deny the explosive impact of the invention of the atomic bomb, first tested in New Mexico in 1945. Besides its effect on the way the world wages war, the Manhattan Project was also a reflection of America's melting pot, employing a number of newly immigrated scientists, including some who had escaped persecution under Germany's Third Reich.

The first nuclear bomb explosion at the Trinity Test Site New Mexico, July 16, 1945, taken from 6 miles away. (Library of Congress)

Flight

Is there anything more American than a pair of otherwise unassuming brothers from Ohio revolutionizing the way the world is connected? When Orville and Wilbur Wright succeeded in their first manned, powered, heavier-than-air and (to some degree) controlled-flight aircraft in 1903, soaring for 12 seconds over the ruddy fields of North Carolina, science entered the aerial age and has never looked back.



On December 17, 1903, two brothers from Dayton, Ohio, named Wilbur and Orville Wright, were successful in flying an airplane they built. Their powered aircraft flew for 12 seconds above the sand dunes of Kitty Hawk, North Carolina, making them the first men to pilot a heavier-than-air machine that took off on its own power, remained under control, and sustained flight. (NASA)

Source: Live Science

Orville and Wilbur Wright

Nurtured by an educated and supportive family in Dayton, Ohio, the Wright brothers' spent many years in the bicycle repair and manufacturing business. The business not only provided their livelihood, but also funded their aeronautical experiments. On December 17, 1903, brothers Wilbur (1867-1912) and Orville (1871-1948) Wright made four brief flights at Kitty Hawk with their first powered aircraft. The Wright brothers had invented the first successful airplane. The brothers realized that if the wing on one side of the aircraft met the oncoming flow of air at a greater angle than the opposite wing, it would generate more lift on that side. As a result, that wing would rise allowing the aircraft to bank. If the pilot could manipulate the wings in this way, he could maintain balance and turn the aircraft as well. The genius of the Wright brothers was not just the singular act of get a flying machine into the air, but in the approach they employed to create the technology of flight. Their method of evaluation and experimentation remains an essential tool in aerospace research and development to this day.

Source: Smithsonian National Air and Space Museum

The Most Famous Medical Advances of the 20th Century

The twentieth century saw a remarkable output of lifesaving and enhancing medical advancements and inventions. The following is a summary of the most well known.

Penicillin
Was discovered by bacteriologist Sir Alexander Fleming at London's St. Mary's Hospital in 1928 when he observed colonies of bacterium Staphylococcus aureus being dissolved by blue-green mold. Upon further experimentation he found that a pure culture of the mold produced a substance that killed some disease-causing bacteria. He named this substance penicillin.

Artificial Heart
Dutch-born medical researcher Willem J. Kolff invented the first artificial heart but it was an American doctor Robert Jarvik who in 1982 completed the design of the first permanently-implantable artificial heart- the Jarvik-7 made of Dacron polyester, plastic, and aluminum with an internal power system that ensured it consistently beat at least 100,000 times a day pumping blood through the body. The Jarvik devices were implanted to sustain patients waiting for transplants.

Pacemaker
Canadian electrical engineer John Hopps invented the world's first cardiac pacemaker in 1950. His device was too large to be implanted inside of the human body but an improved version was designed by New York medical researcher Wilson Greatbatch in the late 1950's making it implantable and powered by a corrosion-free lithium battery.

World's First Test-Tube Baby
Working on finding an alternative solution for conception since 1966, Dr. Patrick Steptoe, a gynecologist at Oldham General Hospital, and Dr. Robert Edwards, a physiologist at Cambridge University eventually found a way to successfully fertilize an egg outside a woman's body and performed the in vitro' (in glass) fertilization procedure on Lesley Brown on November 10, 1977 and at 11:47 p.m. on July 25, 1978, the first test tube baby Louise-Joy Brown was born.

CPR
In the late 1950s, Dr. Peter Safar invented cardiopulmonary resuscitation or CPR with the development of the ABCs (airway, breathing, circulation) of resuscitation, including "mouth-to-mouth" resuscitation.

Oral Contraceptives
The first oral contraceptive, Enovid, was developed by Polish-born chemist Frank B. Colton in the late 1960s. The synthetic hormone pill prevents ovulation or the release of new eggs in a woman's body thus preventing conception.

Recognition of Tobacco Use As A Health Hazard
The 1964 Surgeon General's report on the health risks of smoking prompted changes in social norms and public awareness of the fatal consequences of continued tobacco use.

Genetic Engineering
Researchers Stanley Cohen and Herbert Boyer invented the DNA cloning technique allowing genes to be transplanted between different biological species. Medical products made possible by their work include synthetic insulin for those with diabetes, a clot-dissolving agent for heart-attack victims and a growth hormone for underdeveloped children.

HIV Protease Inhibitors
Invented between 1989 and 1994, HIV protease inhibitors lower the viral load carried by AIDS patients. They were considered the first breakthrough in over a decade of AIDS research and were developed by researchers for several pharmaceutical companies: Hoffmann-La Roche Inc, Abbott Laboratories, Merck & Co, Agouron Pharmaceuticals and Vertex Pharmaceuticals. There are currently five HIV protease inhibitors approved by FDA for the treatment of HIV infection.

Prozac
It is the world's most widely prescribed antidepressant which works by increasing brain levels of serotonin, a neurotransmitter that is thought to influence sleep, appetite, aggression and mood. The team of inventors of Prozac was lead by Ray Fuller.

Inventive Detroit

A major reason Detroit became the Motor City is the region was filled with people that tinkered with the notion of "what if…"

A few of Detroit's most noted inventions, inventors, and entrepreneurs include:

Elijah McCoy – Automatic Lubricating Cup for Steam Engines

In the late 1800s there were many automatic lubrication systems for trains, but McCoy's was considered the best. Thus, railroad engineers made a point of asking for "the real McCoy." McCoy grew up in Ypsilanti, the son of escaped slaves.

Alex Manoogian – Single-handed Faucet

Manoogian's Masco Corp. spent 1 ½ years perfecting the design of the single-handed faucet and has since sold hundreds of millions of the devices. In late 1928, Manoogian and two partners took the first initials of their last names and $5,000 and set up Masco Screw Products in a loft near Greektown. Manoogian became a well-known philanthropist and donated his riverfront mansion to the city as the mayor's residence.

Stan and Iris Ovshinsky – Electric Car Battery

The Ovshinskys formed Energy Conversion Devices on McNichols and Schaefer in 1960. Over the years the company has obtained more than 150 patents for devices ranging from batteries to digital switches. Companies around the world use their materials for video displays, copiers, solar power cells and computers.

Jerome Horwitz – AZT Drug to Fight HIV

A Wayne State professor emeritus, Horwitz is the chemist that developed AZT. He designed AZT as a cancer-fighting drug in 1964. Unfortunately, he never filed for a patent, so he has not reaped the financial windfall. Horwitz graduated from Central High School, University of Detroit, University of Michigan, and Northwestern University.

Edmund Copeland, Nathaniel Wales, and Arnold Gross – Refrigerator

The three men founded what became the Kelvinator Co. in a building on East Jefferson near Chene and invented the refrigerator in Detroit in 1914. Kelvinator made fridges until the late 1960s in a plant on Plymouth Road.

Edward Olsen – "Toddler Tumbler" now known as the "sippy cup"

A tool and die worker in Detroit for 25 years, Olsen invented the spill-proof container when his infant son had trouble learning how to drink from a cup. His Toddler Tumbler was a huge hit in the early 1950s.

Claude Harvard – machine to find and reject faulty piston pins, and the Machinist Training Institute at Focus: HOPE

Accepted into the Henry Ford Trade School in 1926, Harvard was told by the principal that blacks seldom graduated because of a school rule against fighting. There were no fights and Harvard graduated near the top of his class in 1932. He was hired by Ford Motor Co. and Ford went on to patent 29 of Harvard's inventions.

F.A Hubel and Robert Scherer – machine-made gelatin capsules

Detroit led the nation in developing medicinal capsules. Pharmacist F.A. Hubel created a machine-made gelatin capsule in 1874 that was later perfected by inventor Robert Scherer in the 1930s.

Gar Wood – hydraulic boat hoist

Wood was a world-famous boat racer and world-class inventor that lived in Detroit for decades. In addition to inventing the hydraulic boat hoist, Wood also shocked the world by installing an airplane engine in a boat, changing the sport forever.

Carl Djerassi – oral contraceptives

A professor at Wayne State from 1952 to 1959, Djerassi, helped develop oral contraceptives through his breakthroughs in chemistry.

Charles Kettering – electrical ignition

A long-time Detroiter, Kettering held 140 patents and, in addition to the electrical ignition, invented a lightweight diesel engine that made the diesel locomotive possible, the refrigerant Freon, four-wheel brakes, and safety glass. In 1909, along with Edward Deeds, he established the Dayton Engineering Laboratories Co., or Delco, where he made many of his inventions.

George Schuler – automatic coffee maker

Detroit jeweler George Schuler invented the first automatic coffee maker in the 1850s.

John DeLorean – DeLorean DMC sports car

DeLorean was founder of the DeLorean Motor Company. While at General Motors, he was most well known for developing the Pontiac GTO muscle car, the Pontiac Firebird, and Pontiac Fiero. The DeLorean DMC-12 sports car was featured in the movie *Back to the Future*.

William B. Stout – Skycar

Stout's aviation career began as a result of his success in his automotive efforts. He began working at the Packard Motor Car Company in 1916 when they started an aviation division. Stout's innovations included the Skycar, an automobile/airplane hybrid; and a Pullman Railplane and Club Car. He is also known as the originator of prefab housing and the sliding car seat.

Source: The Detroit Almanac, 2000.

Henry Ford (1863-1947)

Henry Ford was born in Dearborn, Michigan, July 30, 1863. From a young age, he enjoyed tinkering with machinery. He experimented with internal combustion engines and 'gasoline buggy' designs while working for the Edison Illuminating Co. In 1899 he left Edison to enter the fledgling automobile industry and in 1903 formed the Ford Motor Company which soon became the undisputed industry leader. At a time when other manufacturers saw cars as luxury items for the wealthy, Ford was determined to build a simple, reliable and affordable car for the average American worker. Out of this determination came the Model T and the assembly line - two innovations that revolutionized American society and molded the world we live in today.

The assembly line, which increased the efficiency of manufacturing while lowering cost, was at the core of Ford's success at producing an affordable car. Prior to the introduction of the assembly line, cars were individually crafted by teams of skilled workmen, which was slow and expensive. The assembly line reversed the process of automobile manufacture, where instead of workers going to the car, the car came to the worker who performed the same task of assembly over and over again. With the introduction and perfection of the process, Ford was able to reduce the assembly time of a Model T from twelve and a half hours to less than six hours

Source: "Henry Ford Changes the World, 1908," EyeWitness to History www.eyewitnesstohistory.com (2005).

Fred Sanders

Sanders was first opened by Fred Sanders June 17, 1875 and started with a single retail shop in Downtown Detroit. Over the years the company concentrated on expanding its retail stores and eventually built up to over 57 stores in the Metropolitan Detroit area. These stores not only sold candy, fudge toppings, and baked goods, but also had fountain counters serving light lunches, as well as an assortment of desserts including the popular Ice Cream Sodas, Sundaes and Hot Fudge Cream Puffs.

Sanders soon became the leading purveyor of candies in the metropolitan Detroit area. Sanders also began to sell directly to the national supermarket chains, as well as to other retailers in the area. Many of the national stores were outfitted with Sanders in-store bakery stations for cake decorating and more, while others featured the Sanders full line of products in 12 to 40 foot sections in their bakery departments.

It was in 1876 that Fred Sanders served his first Ice Cream Soda. The popular drink at that time was the Sweet Cream Soda, but one summer evening, with his store packed with thirsty customers, he discovered that all his sweet cream had soured. He then quickly decided to substitute ice cream for the sweet cream and his customers were delighted with the new drink.

Source: *http://www.sanderscandy.com/index.php?main_page=page&id=1*

James Vernor, Sr. (1843-1927) Father of 'Detroit's Drink'

Pharmacist James Vernor, Sr., opened his drug store at 235 Woodward after being discharged from the Fourth Michigan Cavalry in July of 1865. Like all good pharmacists, he had a soda fountain in his store. There are conflicting stories about the birth of the famous ginger ale. One of the most popular has Vernor experimenting with a formula before leaving for the Civil War, and upon returning, found the taste he had been looking for when he opened the wooden cask. The secret blend of purified water, the finest Jamaican Ginger in proportion with other fruit juices, combined with four years of aging seemed to be the magic recipe for the drink.

In the early 1900s, the demand for Vernor's grew as Detroit grew. Every first-class drug store installed equipment specifically to serve the popular drink, and thousands of cases were delivered to hospitals and homes. The company was sold a few times and now belongs to the Dr. Pepper/Snapple group of soft drinks. "The plant is gone. The huge illuminated sign is gone. The fountain at the foot of Woodward is gone. But many Detroit hearts are warmed with the fond memories of a man, his ginger ale, and the mark he left on his city."…Keith Wunderlich, Vernor's historian

Source:
http://web.archive.org/web/20080203195330/http://www.vernors.com/beverages/VernorsArticle.htm

Mary Chase Perry Stratton (1867-1961)

Mary Chase Perry Stratton was a potter. She founded Pewabic Pottery in 1903. Under her leadership, Pewabic Pottery produced vessels, lamps, architectural tiles, and was known for its iridescent glazes used in churches, schools, libraries, the Shedd Aquarium in Chicago, the Nebraska State Capitol, and the Herald Square in New York as well as in the collections of the Detroit Institute of Arts and the Freer Gallery. In Michigan, Pewabic installations can be found in countless churches (including Christ Church at Cranbrook, Holy Redeemer Church and St. Paul Cathedral in Detroit), schools, commercial buildings and public facilities (such as Detroit's Guardian Building, Northwest Terminal, the Detroit Public Library, and the new Comerica Ballpark,) public spaces (Detroit People Mover Stations) and private residences (particularly in Detroit's Indian Village and nearby Bloomfield Hills and Grosse Pointe.) Pewabic art pottery can also be found in many private and public collections including the Detroit Institute of Arts and the Freer Gallery at the Smithsonian Institution in Washington, D.C.

Today Pewabic Pottery has been designated as a National Historic Landmark and is Michigan's only historic pottery.

Source: http://www.pewabic.com/our-beginnings.htm

The American Boy Magazine

The American Boy was a magazine published out of Detroit that was aimed at young men. The American Boy was published from 1899 to 1941. According to this advertisement from 1917, the magazine was read by more than 500,000 fifteen to sixteen year old boys.

Source: http://americanhistory.si.edu/ONTHEMOVE/collection/object_504.html

The Daisy Air Rifle

The Daisy Air Rifle had its beginnings back in 1882 as part of Michigan's Plymouth Iron Windmill Company. In 1886, Plymouth inventor Clarence Hamilton introduced a product which was a combination of metal and wire, vaguely resembling a gun that could fire a

lead ball using compressed air. President of the company, Lewis Cass Hough, gave it a try and, after his first shot, enthusiastically exclaimed, "Boy, that's a daisy!"

Source: http://www.daisy.com/history.html

“Stove Capitol of the World”

Before it became the Motor City, Detroit was known nationwide as the "Stove Capital of the World." At the beginning of the 20th century, no fewer than five major companies The Michigan Stove Company, The Detroit Stove Works, The Peninsular Stove Company, The Art Stove Company, and Detroit Vapor Stove manufactured models that could burn wood, coal, coke and, later, gas.

In 1860, brothers Jeremiah and James Dwyer started the city's first stove factory at the foot of Mount Elliott, on Detroit’s east side, and were soon joined by many other manufacturers. Later the Detroit Stove Works, which claimed to be "the largest stove plant in the world," merged with the Michigan Stove Company, the company responsible for building the "World's Largest Stove,” a giant facsimile of the Garland kitchen range.

Source: *http://www.ns.umich.edu/index.html?Releases/2001/Jul01/r070901c*

Motown

What do Smokey Robinson, Martha and the Vandellas, The Temptations, The Four Tops, Diana Ross and the Supremes, Gladys Knight and the Pips, the Jackson 5, Stevie Wonder and Marvin Gaye all have in common? They were the superstars who would come to be known as the Motown Sound.

A former boxer and automobile worker, Berry Gordy was a budding songwriter when he was urged by Smokey Robinson to establish Motown Records. The two had become friends years earlier and Robinson, who was the lead singer of a band called The Miracles, produced, wrote and sang several of Motown's most memorable hits — including the labels' first smash song, "Shop Around" in 1960. A year later, "Please Mr. Postman," by The Marvelettes, was the labels’ first No. 1 song, but certainly not the last.

Founded on Jan. 12, 1959, Motown quickly became another Detroit factory; where the Big Three produced automobiles, Motown assembled the soul and pop classics that changed America.

Source: Time Magazine, Gilbert Cruz, January, 2009

Retail Luminaries

Joseph Lowthian Hudson (1846-1912)

In 1881, J. L. Hudson founded what would be the basis for Hudson's Department stores, located inside a shop at the Detroit Opera House. Hudson at first focused on men's and boy's wear, and chose to set low prices and an easy return policy, which provided financial success and engendered strong customer loyalty. As business volume grew, Hudson added sales professionals and additional lines of goods, including women's clothing and house wares. Hudson incorporated his venture in 1891 as the J. L. Hudson Company

In addition to providing the seed capital for Hudson Motor Car Company, J.L. Hudson was also involved the American Vapor Stove Company, Dime Savings Bank, American Exchange National Bank, the Detroit City Gas Company and the Third National Bank of Detroit. When the Third National Bank collapsed in the financial panic of 1893, Hudson felt personally liable for the failure and paid from his personal accounts an amount equal to the balances of record held by each account holder. The move cost Hudson $265,000, however the goodwill that it showed also paid Hudson dividends in the form of increasing market share for his businesses. Hudson was also active in civil causes in greater Detroit area.

*Source: *Lach, Edward L. Jr. "Hudson, J. L."; [http://www.anb.org/articles/10/10-02233.html American National Biography Online , January 2001 Update.*

S. S. Kresge (1867-1966) "The Frugal Tycoon"

Sebastian Spering Kresge was born on a farm in Pennsylvania, and in his early 20s, used his savings to purchase a share in two stores, one in Memphis and one in Detroit. Kresge moved to Detroit and took control of his first store. By 1912, Kresge had 85 stores and he established the S. S. Kresge Corporation which eventually became the holding company controlling both the K-Mart and Sears & Roebuck chains.

Throughout his lifetime, S. S. Kresge was known as thrifty and frugal. He bragged that he never spent more than thirty cents on lunch, wore inexpensive, plain suits until they practically fell apart, and lined his shoes with paper after the soles wore out. At the age of fifty-eight, Kresge was coaxed into taking up golf, but he soon quit because he lost too many balls and decided he could not afford to continually replace them.

Raised a strict Methodist with the belief that alcohol, tobacco, and gambling were unnecessary evils, Kresge also thought it was his Christian duty to share his wealth. In 1924, to commemorate the one hundredth anniversary of his company, he contributed $1.3 million to set up the Kresge Foundation "to promote the well-being of mankind." Before he died, Kresge donated approximately $175 million to the foundation.

Source: http://www.referenceforbusiness.com

Michigan's 'Unsung Heroes'

William Stout (1880-1956)

William Stout was an "Imagineer" and an early pioneer in the fields of motor vehicle manufacturing and aviation. He was primarily known for his unique designs of airplanes, automobiles, busses and trains. Stout is remembered in aviation for his part in the design of the famous Ford Tri-Motor "Tin Goose" and in automotive circles for the Scarab, nine of which were built.

Jerome Remick

Founder of the extremely successful Jerome H. Remick & Company sheet music publishing house, he sold millions of copies of such hits as "Oh, You Beautiful Doll," "Bye, Bye Blackbird," "Put on your Old Grey Bonnet" and "Under the Shade of the Old Apple Tree," to name just a few hit standards.

Thomas E. Clark

Founder and namesake of Tecla Company, well-known inventor Tom Clark was mainly involved with the wireless telephone and was one of the forefathers in ship-to-shore wireless communication. He developed and built the transmitter for WWJ Radio One.

William Seward Burroughs (1857-1898)

Burroughs Adding Machine Company traced its founding to William Seward Burroughs who invented and patented the first workable adding and listing machine in St. Louis, Missouri in 1885. In 1904 the Company moved to Detroit where it built a plant of 70,304 square feet in a cornfield owned by the Ferry Seed Company.

Dexter Mason Ferry (1833-1907)

Founder of the D. M. Ferry & Co. in Detroit, Michigan, Dexter Mason Ferry is credited as the invented the "commission box," which is a seed rack for retail display. He was also one of the first to utilize brightly colored seed packets. The company merged with the California based seed company C. C. Morse to become the Ferry-Morse Seed Company and relocated to Kentucky in 1959.

Inventions Quiz

1. For thousands of years doctors told patients suffering from pain to chew on the bark of a willow tree. Even as far back as 400 B.C. Hippocrates recommended a tea made from yellow leaves. It wasn't until the 1800s that scientists discovered what was in the willow tree that relieved pain and reduced fever. What was the substance called?

ASPIRIN

Felix Hoffmann, a German chemist, produced a stable form of acetylsalicylic acid, more commonly known as aspirin, in 1897. Hoffmann was searching for something to relieve his father's arthritis. He studied a French chemist named Charles Gergardt's experiments and "rediscovered" acetylsalicylic acid--or aspirin, as we now know it.

2. It may be hard to believe, but what home video game instructions began with the phrase, "Avoid Missing Ball for High Score?"

PONG VIDEO GAME

Pong was the invention of Nolan Bushnell, a young engineer who introduced video table tennis to arcades in 1972. Simple and addictive, Pong launched the craze for home video games. It was introduced by Atari in 1974--long before anyone had seen a personal computer.

3. It started in the U.S. and has conquered the world. In some parts of the world it sells for three times the price of liquor. It was originally sold as a brain tonic, but was poorly received. What is the name of this product?

COCA-COLA

The product that has given the world its best-known taste was born in Atlanta, Georgia, on May 8, 1886. Dr. John Pemberton, a local pharmacist, produced the syrup for Coca-Cola®, and carried a jug of the new product down the street to Jacobs' Pharmacy, where it was sampled, pronounced "excellent" and placed on sale for five cents a glass as a soda fountain drink.

4. What toy, invented in 1945, is still popular with the public and flip-flops all over the place - especially down stairs?

SLINKY®

The Slinky® debuted at Gimbel's Department Store in Philadelphia, Pennsylvania in 1945. Richard James, the inventor, was skeptical about how the Slinky® would sell. All his doubts were put to rest when all 400 Slinkys for sale were purchased in 90 minutes. Since then, over three hundred million Slinkys have been sold worldwide.

5. A trip to the drug store helped this candy manufacturer invent a new candy type that is still on the market nearly 100 years later - even though the idea had a hole in it. What is this candy called?

LIFE SAVERS

Clarence Crane had basically been a chocolate maker. Chocolates were hard to sell in summer, however, and so he decided to try to make a mint that would boost his summertime sales. In 1912, candy maker Clarence Crane first marketed "Crane's

Peppermint Life Savers." In 1913, Crane sold the rights to his Life Savers candy to Edward Noble for only $2,900.

6. St. Louis, Missouri hosted the 1904 World's Fair where this treat was invented to cool off on those hot summer days. What is it?

ICE CREAM CONE

The first true edible conical shaped cone for serving ice cream was created at the 1904 Worlds Fair in St. Louis by Ernest Hamwi. His waffle booth was next to an ice cream vendor who ran short of dishes. Hamwi rolled a waffle to contain ice cream and the cone was born.

7. An American Indian of the Huron tribe long ago invented a snack food that became very popular with the new Americans, so popular that sales now exceed over four billion dollars a year. What is this snack food called?

POTATO CHIPS

In the summer of 1853, Native American George Crum was employed as a chef at an elegant resort in Saratoga Springs, New York. One dinner guest found Crum's French fries too thick for his liking and rejected the order. Crum decided to rile the guest by producing fries too thin and crisp to skewer with a fork. The plan backfired. The guest was ecstatic over the browned, paper-thin potatoes, and other diners began requesting Crum's potato chips.

8. A toy still popular today, was invented at Yale University in the 1940s, modified by a space enthusiast from the West coast in the 1950s and renamed by a California manufacturing company president in the 1960s. What is the name of this toy?

FRISBEE

Flying-saucer enthusiast Walter Frederick Morrison designed a saucer-like disk for playing catch and it was produced by the Wham-O company. On a promotional tour of college campuses, the president of Wham-O encountered the pie-plate-tossing craze at Yale. And so the flying saucer from California was renamed after the pie plate from Connecticut.

9. People all over the world made this item from grape vines and stiff grasses as both a religious adornment and as an item of amusement. It took a couple of Americans, however, to figure out how to make money out of it. What was this item called?

HULA HOOP

In 1957, an Australian company began making wood rings for sale in retail stores. The item attracted the attention of Wham-0, who manufactured the plastic hoop in a variety of bright colors the following year.

10. What invention, more than 100 years old, has a product, a company, a town, an institution and a school named after it?

HERSHEY BAR

Ever since Milton Hershey introduced the Hershey milk chocolate bar to the world in 1900, he never looked back. The company, products, town and institutions that bear his name were well positioned to continue and grow.

PART IV: FAMOUS QUOTES

Never before in history has innovation offered promise of so much to so many in so short a time. – *Bill Gates*

The important thing is not being afraid to take a chance. Remember, the greatest failure is to not try. – *Debbi Fields, founder of Mrs. Fields Cookies*

Innovation is the specific instrument of entrepreneurship.
– *Peter Drucker, management consultant*

Human subtlety will never devise an invention more beautiful, more simple or more direct than does nature because in her inventions nothing is lacking, and nothing is superfluous.
– *Leonardo da Vinci*

Innovation is not the product of logical thought, although the result is tied to logical structure.
– *Albert Einstein*

I believe in being an innovator. – *Walt Disney*

If you're not failing every now and again, it's a sign you're not doing anything very innovative.
– *Woody Allen*

The five essential entrepreneurial skills for success are concentration, discrimination, organization, innovation and communication. – *Michael Faraday, chemist and physicist*

Genius is 1% inspiration and 99% perspiration. – *Thomas Edison, founder of General Electric*

I had to make my own living and my own opportunity! But I made it! Don't sit down and wait for the opportunities to come. Get up and make them!
– *Madam C.J. Walker, first female self-made millionaire*

Don't judge yourself by others' standards ... have your own. And don't get caught up into the trap of changing yourself to fit the world. – *Berry Gordy*

High expectations are the key to everything. – *Sam Walton, founder of Wal-Mart*

Innovation distinguishes between a leader and a follower. – *Steve Jobs, Apple CEO*

Accident is the name of the greatest of all inventors. – *Mark Twain*

Whatever has happened in my quest for innovation has been part of my quest for immaculate reality. – *George Lucas*

I never did anything worth doing by accident, nor did any of my inventions come by accident; they came by work – *Thomas Alva Edison*

I have the wherewithal to challenge myself for my entire life. That's a great gift.
– *Twyla Tharp*

PART V: AMERICAN INGENUITY LESSON PLANS

Lesson Plan: Thomas Edison Timeline

Grade Level: 1-6
Primary Subject: History, Science
Crayola USA
http://www.crayola.com/lesson-plans/detail/thomas-edison-timeline-lesson-plan/

Pair this activity with the following Lorenzo Cultural Center presentations:

- "Thomas Edison and Nikola Tesla: Inventors in Conflict" on Saturday, October 23 at 1pm
- "A Day in Edison's Lab" on Wednesday, October 6 at 11am and 1pm

Michigan Curriculum Content Standards:

- 4-H3.0.9 Create timelines to sequence and describe important events in Michigan history; annotate with connections to the past and impact on the future.

Supplies

- Fine Line Markers
- Colored Pencils
- Model Magic®
- No-Run School Glue
- Glitter Glue
- buttons

Why?

Track how Edison's inventions changed everyday life. Imagine a world without light bulbs or sound recordings!

Steps

1. Read about U.S. inventor Thomas Edison. What years did he work? With what resources did he work? What challenges did he overcome? Find the dates and names of his major discoveries. What did his first light bulbs, phonographs, and other items look like?
2. Work with a small group of classmates to compile a list of Edison's most important inventions, and their dates, with Crayola® Colored Pencils. Be ready to explain why you think they are so important.

3. Count out one button for each invention, or make small Crayola Model Magic replicas of each one.
4. Glue the invention buttons or replicas in a line along the top of a large paper with Crayola School Glue. Connect them with a line of Crayola Glitter Glue. Dry.
5. Write the dates and any information that is important about each invention on the timeline with Crayola Fine Line Markers. If you used buttons, draw a picture to represent the invention. Label each one. Title your Thomas Edison Timeline.

Adaptations

Tally which inventions students chose as Edison's most important. Which were chosen most often? Why?

Write about what it was like to live in Thomas Edison's time era. Edison was a lighthouse keeper and a carpenter in his early years, before some of his 1,093 ideas were patented, setting a world record. Compare and contrast how people live today, and what kind of inventions are popular now.

Work individually or in small groups to create 3-D inventions. Write or tell the class about the invention's purpose. Draw blueprints to scale of how it was constructed.

Create similar timelines for other important people, events, or inventions. Find out what other scientific breakthroughs were necessary BEFORE Edison could come up with his ideas. For example, the unit of electrical current, ampere, is named for André Ampere, a French physicist who founded the science of electrodynamics.

Benefits

Children research information about U.S. inventor Thomas Edison, who is best known for inventing the light bulb and the phonograph.

Students find information about the dates of Edison's inventions, what these inventions did, and how they looked.

Students create a pictorial timeline of Edison's inventions, listing them in chronological order.

Lesson Plan: Thank You, Mr. Edison! Edison's Role in the Electrification of America

Grade Level: 7-12
Primary Subject: History, Economics
Library of Congress
http://memory.loc.gov/learn/lessons/99/edison/teach.html

Pair this activity with the following Lorenzo Cultural Center presentations:

- "Thomas Edison and Nikola Tesla: Inventors in Conflict" on Saturday, October 23 at 1pm
- "A Day in Edison's Lab" on Wednesday, October 6 at 11am and 1pm

Michigan Curriculum Content Standards:

- USHG 6.1.1 FACTORS IN THE AMERICAN INDUSTRIAL REVOLUTION – Analyze the factors that enabled the United States to become a major industrial power.
- ECONOMICS 1.1.2 ENTREPRENUERSHIP - Identify the risks, returns and other characteristics of entrepreneurship that bear on its attractiveness as a career.

In *Electrifying America: Social Meanings of a New Technology*, David E. Nye argues, "A technology is not merely a system of machines with certain functions; it is part of a social world. Electrification is not an implacable force moving through history, but a social process that varies from one time period to another and from one culture to another" (p. ix). Nye continues, "Americans adopted electrical technologies in a wide range of social, political, economic, and aesthetic contexts, weaving them into the fabric of experience" (p. x).

Using documents (links provided), plus supplementary material, students investigate electrification as both a technological and social process. A focus of the student's investigation is Thomas Edison, because, as Nye contends, "Electricity was the sign of Edison's genius, the wonder of the age, the hallmark of progress" (p. 1).

The Early Motion Pictures and Sound Recordings of the Edison Companies

Andre Millard notes in his book, *Edison and the Business of Innovation*, "Many remember Edison as the man who brought the wonders of electric light to the world. Yet in terms of the amount of time spent experimenting on the phonograph, Edison should be remembered as the man who labored for years to bring us the clear, faithful reproduction of music. This was his life's work." (pp. 220-21) It was a quest that spanned fifty-two years.

Edison Biography:

1. Read The Life of Thomas A. Edison (http://memory.loc.gov/ammem/edhtml/edbio.html) to gain an understanding of the major features of Edison's life.
2. The Timeline for Inventing Entertainment (http://memory.loc.gov/ammem/edhtml/edtime.html) provides information about the major events in Edison's personal life and the key dates for the phonograph and motion pictures. Develop a timeline which provides the most essential items relevant to the development of the phonograph, sound recordings, and motion pictures.

Phonograph:

Thomas Edison developed both a cylinder phonograph and recordings and a disc phonograph and recordings.

1. Go to Edison Sound Recordings (http://memory.loc.gov/ammem/edhtml/edsndhm.html) and read the introductory material.
2. Mrs. Lathrop mentions her phonograph by referring to the Victrola. However, this was a brand name for a competitor. Despite Edison's pioneering work, Victrola became a term people used as a synonym for the phonograph. The History of the Edison Cylinder Phonograph (http://memory.loc.gov/ammem/edhtml/edcyldr.html) is an informative summary of Edison's work with the first type of phonograph and recordings.
3. Also informative is the complete catalog for Edison Phonographs, Cylinder Types: 1913-1914. (http://memory.loc.gov/ammem/edhtml/catalog/catalog1.html)
4. Edison's work with discs is in The History of the Edison Disc Phonograph (http://memory.loc.gov/ammem/edhtml/eddschst.html). This collection provides a history of both the Edison cylinder and disc phonographs.
5. Based on the material about Edison's development of the phonograph:
    a. Construct a visual display and history of the phonograph, illustrating the changes over time.
    b. Include Edison material as well as that of various models over the years up to current "boom boxes," CD players, and component systems. Materials for recent equipment can be found in contemporary publications.
    c. Compare and contrast these systems in terms of design and technology.

Sound Recordings:

Edison recordings also provide an auditory archive. Mrs. Lathrop says she listened to her Victrola. You can hear what she heard, or at least listen to similar recordings.

1. Go to Edison Sound Recordings (http://memory.loc.gov/ammem/edhtml/edsndhm.html) to search the selected recordings.
   The disc recordings include instrumental, vocal, spoken word, spoken comedy, foreign language and ethnic, religious, opera, and concert selections.
2. Go to Overview of Edison Disc Recordings by Genre (http://memory.loc.gov/ammem/edhtml/edgenre.html.)
   Each genre offers an opportunity to analyze the type of selection and cultural factors which influenced their development. Prepare a web-based presentation with your group that incorporates select portions of several recordings and analyzes each genre.

Motion Pictures:

Mrs. Lathrop wrote about seeing "a masterpiece at the Movies." Edison's work with the "Movies" began with the earliest camera test in 1891 and ended in 1918, when his company ceased film production. Edison Motion Pictures (http://memory.loc.gov/ammem/edhtml/edmvhm.html) is the brief introductory page to the film collection.

Working in your assigned group:

1. Read your section of:
   - History of Edison Motion Pictures (http://memory.loc.gov/ammem/edhtml/edmvhist.html), and
   - Overview of Edison Motion Pictures by Genre (http://memory.loc.gov/ammem/edhtml/edmpfr.html).
2. Create a web-based presentation that contains:
   - a brief summary of an aspect of Edison movie history; and
   - an analysis of one of the film genres, including films.

Lesson Plan: Wright Brothers 1900 Glider

Grade Level: 6-9

Primary Subject: Science, Math, History

http://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Learning.to.Fly-The.Wright.Brothers.Adventure.html

Pair this activity with the following Lorenzo Cultural Center presentations:

- Lorenzo Cultural Center Exhibit: Kites to Kittyhawk
- "The Myths of Innovation" on Wednesday, September 29 at 1pm
- "America: Land of Invention" on Saturday, October 2 at 1pm

Michigan Curriculum Content Standards:

- SCI.I.1.E.3 — Manipulate simple devices to make measurements or scientific investigations.
- SCI.I.1.M.3 — Use tools and equipment appropriate to scientific investigations.
- SCI. IV.3.E.5 — Manipulate simple mechanical devices and explain how their parts work together.
- USHG 6.1.1 FACTORS IN THE AMERICAN INDUSTRIAL REVOLUTION – Analyze the factors that enabled the United States to become a major industrial power.

The Wright Brothers' 1900 aircraft was flown repeatedly at Kitty Hawk, North Carolina, during the fall of 1900, mostly as a kite but also as a piloted glider.

The brothers' main concern at this time was to learn how to control the forces on an aircraft. Others who had thought it was more important to fly first and figure out control later had died in crashes. The Wright Brothers used this aircraft to learn the fundamentals of aerodynamics.

The brothers had observed soaring birds twist their wings to change direction and had successfully done the same thing, which they called "wing-warping," in 1899 by twisting the wings of a small kite. In 1900, the brothers decided to test wing-warping on an aircraft that was large enough to carry a person. The pilot could control the roll of the aircraft by using a foot pedal. The pedal was connected to wires that pulled on the wing tips and warped (or twisted) the wing, producing unequal forces on the wings, which would roll the aircraft.

The 1900 aircraft was relatively large: it had a 17-foot wingspan, a 5-foot chord, and 4 feet between the wings. Without the pilot, the 1900 craft weighed about 50 pounds. In 1900, glider pilots usually flew in a vertical position. The Wright Brothers correctly understood that this produced a lot of aerodynamic drag that would slow the glider down. They chose instead to streamline their aircraft by having the pilot lie horizontally on the

lower wing. The aircraft had two wings covered by tightly woven sateen fabric, a stabilizer mounted on the front of the aircraft, and no tail.

All aircraft wings have a natural tendency to flip tail over nose because of the pressure distribution around the wing. To prevent their aircraft from flipping, the Wright Brothers attached a horizontal stabilizer (called a "canard," after the French word for "duck") to the front of the aircraft. On later models the shape of the stabilizer was varied by the pilot to provide pitch (up and down) control. But on the 1900 aircraft, they fixed the stabilizer in place and just tested the wing-warping. They found it too confusing at this time to prove both pitch and roll control.

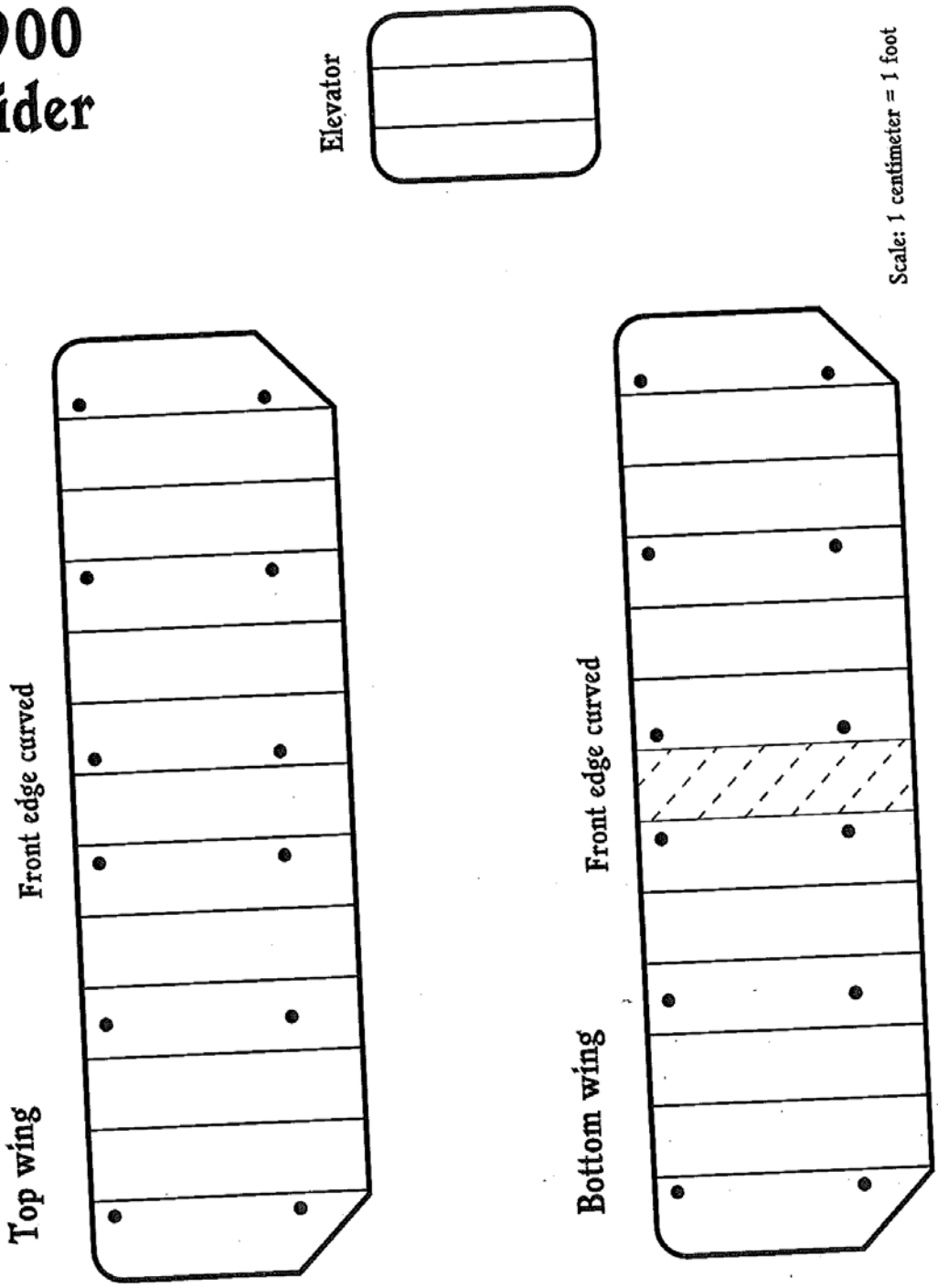
For 3 weeks, the winds were so light that they flew their craft only as a kite, using chain to simulate the weight of a pilot and operating the controls by cable from the ground. On their final day the winds grew strong, so they decided to test the craft as a glider, with Wilbur as pilot. Launching from a dune hill, he made about a dozen glides, some lasting as much as 20 seconds and covering up to 400 feet, longer than a football field! Even though this was the only day of the season with winds strong enough to carry a pilot, the flights showed that wing-warping was a success. Lessons learned on the 1900 aircraft were incorporated into all of the later Wright aircraft.

Wright Brothers 1900 Glider Model Instructions
Designed by Roger Storm, NASA Glenn Research Center

Materials
•One or two clean Styrofoam meat trays, at least 8.5 inches (21.5 centimeters) by 5.5 inches(14 centimeters), preferably white
•30 to 35 toothpicks • Low-temperature glue gun
•Scissors
•Hobby knife, razor utility knife, or single-edge razor blade (adult help here)
•Cardboard or board to cut on
•Ultrafine-tip black marker
•Ruler
•Emery board
•Manila file folder
•Small plastic toy army soldiers, about 2 inches (5 centimeters) tall (optional)

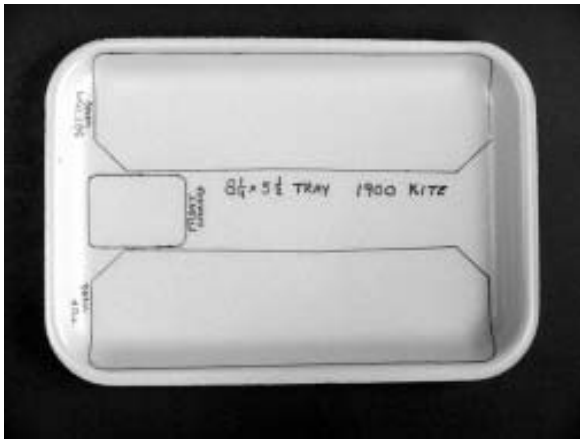
General Instructions
•Use scissors to cut out all three templates on the heavy lines of the 1900 Glider template.
•Do all hobby knife or razor blade cutting on the board or cardboard to protect your working surface.
•The finished model is for display only; it is not meant to fly.

1900 Glider

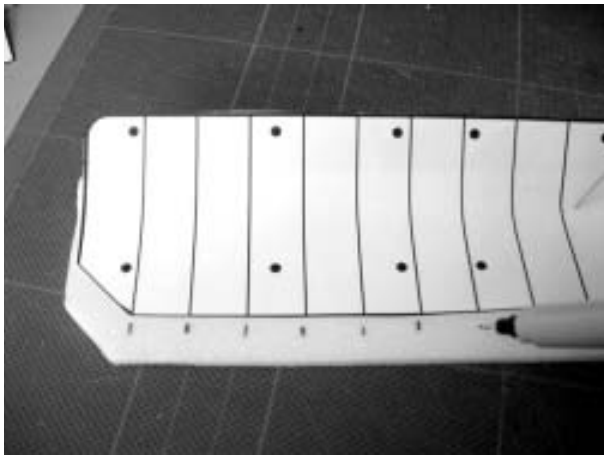

Elevator
Scale: 1 centimeter = 1 foot
Front edge curved
Top wing
Front edge curved
Bottom wing

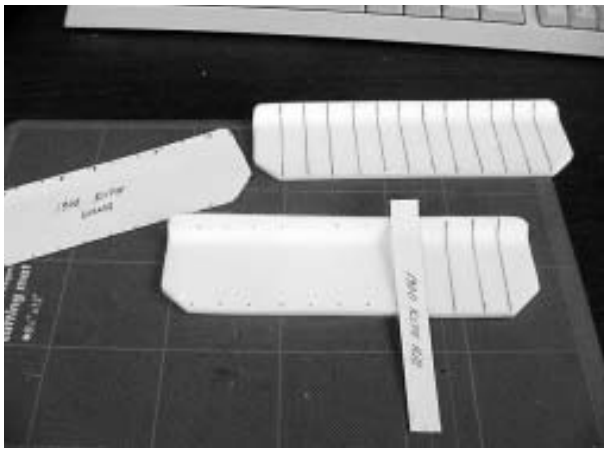
Procedure

1. Carefully trace the wing and elevator shapes on the inside of the Styrofoam tray as shown. Be sure the front edges of the wings go about two-thirds of the way up the curved sides of the tray. Check the bottom of the tray and avoid any logo found there. You may need two trays. Cutout the wings and elevator with the hobby knife or scissors. Use the emery board to smooth the cut edges and sand off the pen lines.

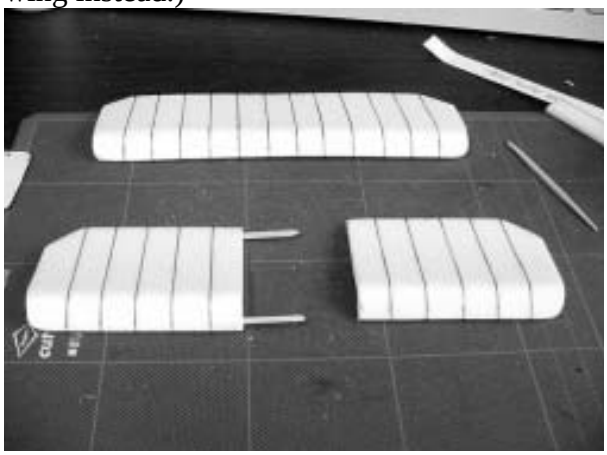


2. Using the templates as a guide, mark the locations of the rib lines on the tops and bottoms of the wing and elevator sections with the ultrafine-tip black marker. Make two sets of marks, one on each edge. Connect the marks to make the rib lines. Make a rib template from a manila folder to draw the rib lines (so the end of the template can be bent to conform to the rounded shape of the Styrofoam).

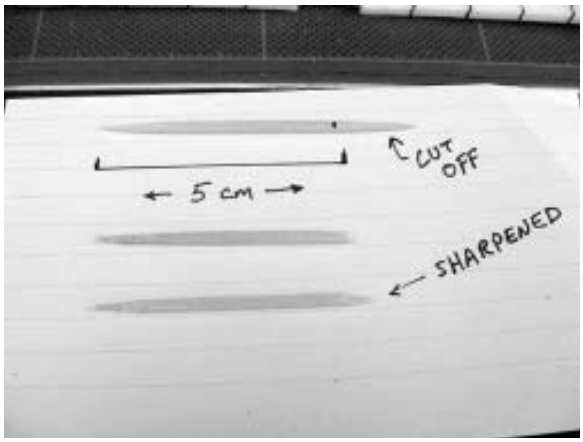




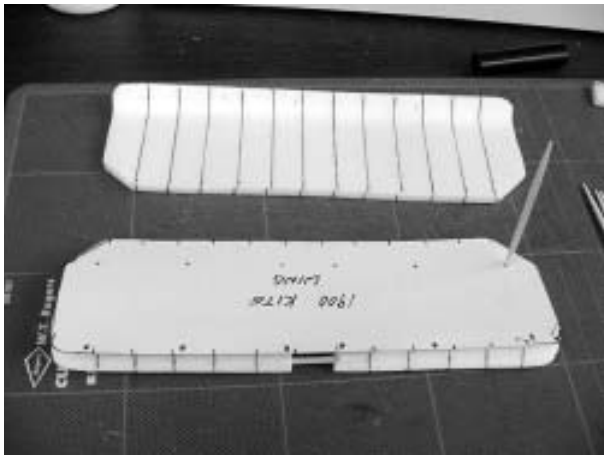
3. Cut out the center of the lower wing only as shown by the dotted lines on that template. Cut a toothpick in half and sharpen the cut ends. Dip the ends in glue and stick them in the cut edges to join the lower wing halves, leaving a .6-inch (1.5-centimeter) gap between the halves. (If the Styrofoam is thin, glue the tooth picks to the underside of the wing instead.)



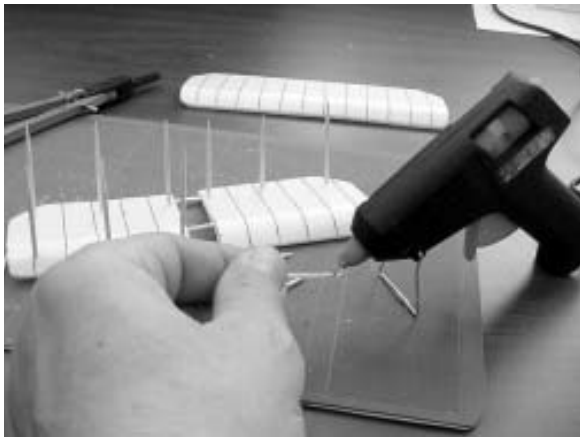
4. Make 12 spars by cutting toothpicks to a 2-inch (5-centimeter) length and sharpening the cut ends.



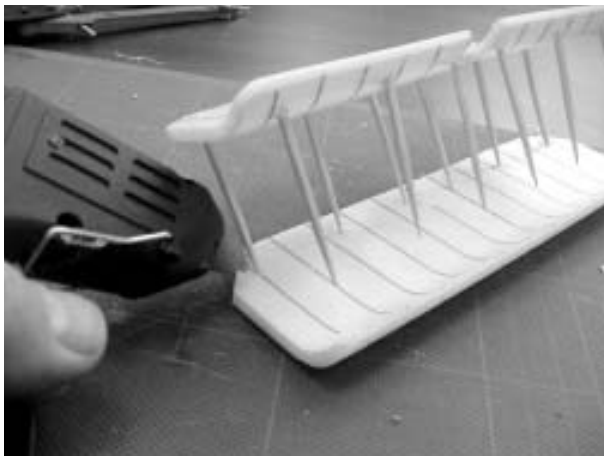
5. Use the wing template and a sharp toothpick to mark the holes for the spars on the top surface of the lower wing and bottom surface of the upper wing. Note that the front edges of the wings curve down. In this picture the upper wing in the back is upside down.



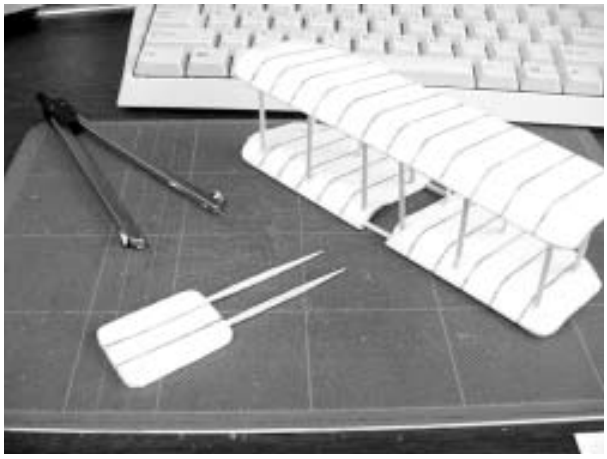
6. Dip toothpicks in glue and insert them in the spar holes now marked in the lower wing. Try not to push them all the way through the wing. Be sure they are standing up as straight as possible.



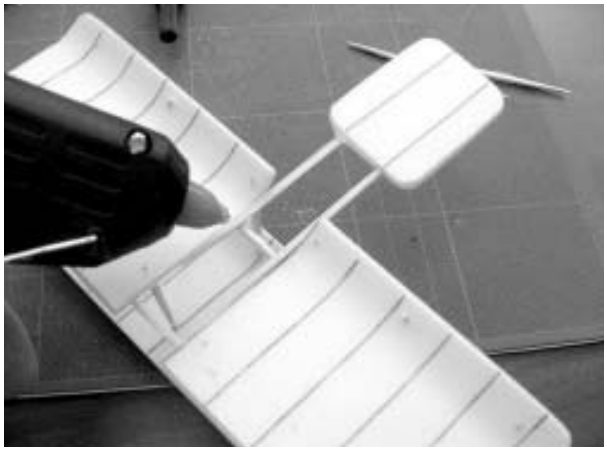
7. Now, with both the upper and lower wings and wings upside down (the edges should be curving up at this point), insert the back row of spars into the underside of the top wing. Use the marked holes as a general guide, but keep the spars straight and evenly spaced. Put a little glue on each to keep them in place as shown in the picture. Now join the front spars to the top wing, remembering to keep them straight and fasten them with dabs of glue. This takes some effort to get everything in the right place and is easier to do with two people.



8. Stick two toothpicks into the edge of the end of the elevator and add a dab of glue to hold them in place. (If the Styrofoam is thin, glue toothpicks to the underside of the elevator instead.)

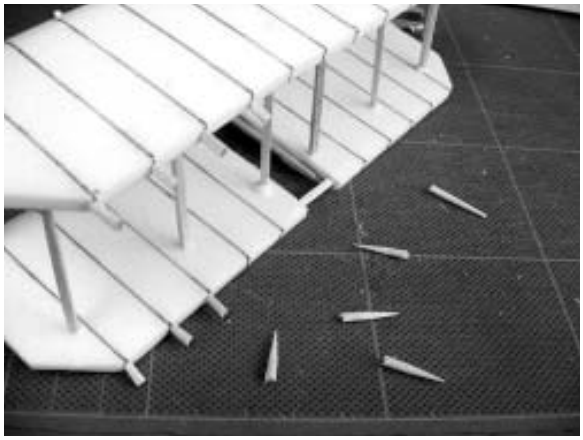


9. Turn the glider over and glue the elevator assembly on either side of the opening in the lower wing as shown.

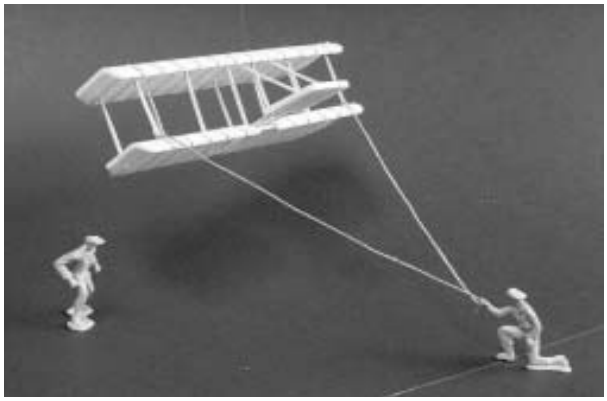


10. Turn the glider over again and insert a tooth-pick in the center of the left rib line as shown and add a bit of glue. Then insert the other end of the toothpick into the front edge of the upper wing and glue. Add another toothpick in the same way to the right rib line. (If the Styrofoam is thin, glue these to the underside of the upper wing instead.)

11. (Optional) Cut enough .6-inch (1.5-centimeter) toothpick pieces to stick into the back edge of each wing on the lines to simulate the ribs.



12. For display, the kite can be hung on a thread and strings can be added to be held by kneeling plastic toy soldiers. ADULTS: You may add figures by cutting, swapping, and gluing parts of plastic army soldiers. To obtain the desired poses, arms and legs can be removed and some from other soldiers glued in their place. Guns and helmets should be trimmed away using a hobby knife and the figure arms and legs can be shaped, swapped, or repositioned to fit and glued on. Five-minute epoxy works best for this.



Lesson Plan: Henry Ford - A Cultural Icon
Grade Level: 8 – 12th
Primary Subject: American History
State of Ohio
http://www.infohio.org/Documents/ID/AdamichHenryFord200308.doc

Pair this activity with the following Lorenzo Cultural Center presentations:

- "The Myths of Innovation" on Wednesday, September 29 at 1pm
- "America: Land of Invention" on Saturday, October 2 at 1pm
- "Ford Rouge Factory Tour" on Friday, October 29 at 11am and 1pm

Michigan Curriculum Content Standards:

- USHG 6.1.1 FACTORS IN THE AMERICAN INDUSTRIAL REVOLUTION – Analyze the factors that enabled the United States to become a major industrial power.
- USHG 6.1.5 A CASE STUDY OF AMERICAN INDUSTRIALISM – Using the automobile industry as a case study, analyze the causes and consequences of this major industrial transformation.
- ECONOMICS 1.1.2 ENTREPRENUERSHIP - Identify the risks, returns and other characteristics of entrepreneurship that bear on its attractiveness as a career.

Timeframe: Five 50 minute class periods; 2-3 days reserved for school library research

OVERVIEW
Throughout history, individuals and groups have accomplished tasks that had far-reaching impact – beyond satisfying the original need or goal. Henry Ford's innovative method of producing automobiles in mass quantities – the assembly line – is an excellent example of this phenomenon. Numerous economic, technological, and social changes resulted from Ford's assembly line and corporate activities. Some changes were viewed positively; others were not. This lesson is designed to introduce students to the ability to infer and identify relationships between actions/activities using a thesis statement and supporting details.

GOAL/OBJECTIVE
Students will learn how to develop and support a thesis related to specific topical requirements prescribed in the goal statement:

Goal Statement: Henry Ford contributed pioneering innovations to the growth and development of United States industrialization which affected economic, technological, and social development during the late Nineteenth and early Twentieth century.

Objectives:

1. Given use of INFOhio Electronic Resources, students will list and cite two economic innovations developed by Henry Ford with 100% accuracy.
2. Given use of INFOhio Electronic Resources, students will list and cite two technological innovations developed by Henry Ford with 100% accuracy
3. Given use of INFOhio Electronic Resources, students will list and cite two social innovations developed by Henry Ford with 100% accuracy.
4. Given the six Henry Ford innovations selected and cited above, students will write a five-paragraph essay stating why each innovation is important and evaluate each using the criteria listed in the five-paragraph essay rubric.

ESSENTIAL QUESTIONS

How have automobiles affected the way we

1. Work, travel and communicate?
2. What does the automobile symbolize to our culture?
3. Which automobile models you can identify are considered "special automobiles" in history and why?
4. How have the manufacturing innovations of Henry Ford affected industrialization in America?

TIMEFRAME

Five class sessions are recommended with two or three of those sessions reserved for school library research. Additional time for out-of-school research (including use of local public and college/university libraries as well as local/state historical societies with extensive automotive history collections is encouraged.

ACTVITIES

--Students will have ample time to go to library and use INFOhio resources. Collaborate with librarian to refresh students' skills with accessing and using resources.

--Day One

The student progress checklist and Five-paragraph essay rubric will be distributed and reviewed as the basis for introducing the lesson. Next, discussion should be developed using the essential questions and keywords identified in the goal statement. Ask the students to list a "pool of terms" on paper to use for research purposes. Provide an overview of available library resources, and refer to the student progress checklist for their first task – matching the generated keywords with the goal statement, objectives listed, and their individual development of a thesis statement.

--Days Two-Four

In conjunction with the student progress checklist, students will use generated keywords to identify Henry Ford-related resources (including print, non-print, and electronic). As identified by the checklist, the students will evaluate the content of the resources selected and link the information obtained with the information needed to support their thesis statement. At any time during the research process, students can begin pre-writing activities (outline, thesis statement structure, etc.)

--Day Five
Students will use notes and resources to write their five-paragraph essay during the class period. This timed writing activity will reinforce their timed writing experiences with proficiency testing and will expose them to new timed writing activities they will experience in other post-secondary and job-related writing/testing environments.

END PRODUCT
Five-paragraph essay supporting the impact of the economic, social, and technological contributions of Henry Ford.

Supporting Materials: Students will be encourage to supplement their supporting arguments with visual representations of such examples as the assembly line, the Ford Model T, early 20th century roads and driving, migration of workers from the agrarian South to the industrial North, etc.

Other Web Sites

- Crawford Automobile Collection – Western Reserve Historical Society - http://search.wrhs.org/auto/crawfordlist.cfm
  Provides an excellent link to car photos. The cars may be viewed in person by many Ohio students!
- Henry Ford Museum - http://www.thehenryford.org/museum/default.asp
  Gives one perspective on history and concepts related to Henry Ford (evaluate for bias because of corporate Ford-based origin
- Society of Automotive Historians - http://www.autohistory.org/links.html
  Provides links to auto museums, resources, etc. which are chosen by noted automotive historians

Lesson Plan: Anatomy of the Brain
Grade Level: 3-12
Primary Subject: Science
The University of Washington
http://faculty.washington.edu/chudler/baw1.html#A

Pair this activity with the following Lorenzo Cultural Center presentations:

- "From Chemistry to Cures" on Sunday, October 3 at 2pm
- "Super Science Day: The Physics of Sound" on Sunday, October 10 at 1:30pm
- "Backyard Brains" on Sunday, November 7 at 2pm

Michigan Curriculum Content Standards:

- SCI.I.1.E.3 — Manipulate simple devices to make measurements or scientific investigations.
- SCI.I.1.M.3 — Use tools and equipment appropriate to scientific investigations.

Objectives: In this lesson sequence, students will learn a few basic facts about the anatomy of the human brain.

Key terms include: brain stem, medulla, frontal lobe, parietal lobe, occipital lobe, temporal lobe. They will learn that an adult human brain weighs about 3 pounds, and is about the size of two fists pressed together.

Materials needed:

1. Overhead and/or black line copies of a diagram of the human brain (the simpler the better)
2. Colored pencils
3. Optional: modeling clay (optional); potato flakes, sand, gallon-sized ziploc bags and red food coloring (optional); brain molds and jello

Methods:

1. To introduce the lesson, stress that the brain is a marvelously complex and intricate organ of the body and that neurologists are learning new things about its workings every day. However, there are some things that we do already know about the brain's structure and function. This lesson will be a brief introduction to this amazing control center of our bodies. Those who are interested can find a great deal more information on the Neuroscience for Kids web pages Introduction to the Nervous System.

   Other good resources include various coloring books, magazines and articles.

2. Show students an overhead or pass out copies made from the brain diagram.

The brain is divided into 3 main areas:

A. the brain stem, responsible for basic body functions such as heartbeat regulation;
B. the cerebellum, responsible for things such as balance and muscular coordination and
C. the cerebrum, made of two distinct hemispheres and responsible for higher brain functions including thinking and emotions.

You could have students color and label these regions as you speak, if you chose to hand out an unlabeled diagram. Or they could make a clay brain, following the guidelines found on the brain modeling page.

3. To make a nice, cheap, portable model of the brain, have students put their two fists together. This represents the two hemispheres of the brain with their fissures (folds). The wonderful thing is that two fists together are about the size of an individual's brain! Stress that brain size in humans is not related to intelligence. If you do a later lesson on neurons (Topic C) you will expand on this idea in more depth. Students will likely ask questions about the roles and functions of the right brain and the left brain. For more information on these topics, see, one brain or two.

The front parts of the brain (thumb side, if your brain is positioned as though its owner were looking at you) are called the frontal lobes. These lobes are responsible for reasoning and higher brain functions. The upper middle lobes (around the middle fingers) are the parietal lobes, responsible for touch. The lower middle lobes, the backs of the hands (nearest the ears in a person) are the temporal lobes, responsible for hearing. Finally, the back lobes (pinkie fingers) are the occipital lobes, responsible for vision.

Another nice model can be found in the lesson plan called Potato Head. This lesson was originally from the Brain Power program at the Pacific Science Center and Group Health. In this lesson, you mix potato flakes, sand, warm water and food coloring in a ziploc bag. The resulting mixture is about the size, weight, and color of an adult human brain. This activity also has a remarkable "WOW!" effect on students. If you have lots of time and money, you can have students in groups make their own potato head brains. Otherwise, make up 1-4 yourself to pass around the room. They can be rewarmed in the microwave for later classes, to save on material costs. They can be added to a worm bin or garden for disposal.

Another nice activity if you have a small class or lots of time is to make up jello brains using a jello mold. There are several companies that sell the jello brain mold.

If you are going to do brain activities for a full week (or even if not!), you should seriously consider assigning the creative video assignment. You may also wish to tell students ahead about the next lesson, Brain Drop, so that they can practice and prepare

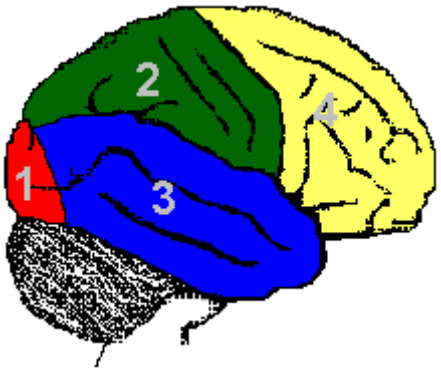
ahead at home. You will certainly get better-thought-out designs this way and increase students' anticipation.

Here is a ten-point multiple choice quiz on today's lesson. It could be done right on paper and graded as is or done on a Scantron form, according to your preference. You might choose to make it open-note to reward those students who took good notes as you were using the overhead, or it could be closed-note.

QUIZ ON BASIC BRAIN ANATOMY

NAME: _____ Date: _____ Period:_____

Refer to the following diagram of a brain to answer the following questions. If you are writing directly on this quiz paper, circle the letter of the answer that you feel best answers the question. If you are using a scantron form, find the number of each question on the form and use a Number 2 pencil to color in the letter of the option that you feel best answers each question.



1. The lobe of the brain important for vision is called:
   a. the temporal lobe
   b. the occipital lobe
   c. the parietal lobe
   d. the frontal lobe

2. The lobe of the brain important for the sense of touch is called:
   a. the temporal lobe
   b. the occipital lobe
   c. the parietal lobe
   d. the frontal lobe

3. The lobe of the brain important for hearing is called:
   a. the temporal lobe
   b. the occipital lobe
   c. the parietal lobe
   d. the frontal lobe

4. The lobe of the brain important for reasoning is called:
   a. the temporal lobe
   b. the occipital lobe
   c. the parietal lobe
   d. the frontal lobe

5. The lobe on the diagram labeled 1 is:
   a. the temporal lobe
   b. the occipital lobe
   c. the parietal lobe
   d. the frontal lobe

6. The lobe on the diagram labeled 2 is:
   a. the temporal lobe
   b. the occipital lobe
   c. the parietal lobe
   d. the frontal lobe

7. The lobe on the diagram labeled 3 is:
   a. the temporal lobe
   b. the occipital lobe
   c. the parietal lobe
   d. the frontal lobe

8. The lobe on the diagram labeled 4 is:
   a. the temporal lobe
   b. the occipital lobe
   c. the parietal lobe
   d. the frontal lobe

9. An adult brain weighs approximately:
   a. 1 lb. b. 3 lb. c. 5 lb. d. 7 lb.

10. A person's brain is about the size of:
   a. their heart b. their stomach c. 1 fist d. 2 fists

Answers: 1.b 2.c 3.a 4.d 5.b 6.c 7.a 8.d 9.b 10. d

Lesson Plan: Space Solar Panels
Grade Level: 4-6
Subjects: Science, Mathematics
http://www.nasa.gov/pdf/371703main_SMII_Problem2.pdf

Pair this activity with the following Lorenzo Cultural Center presentations:

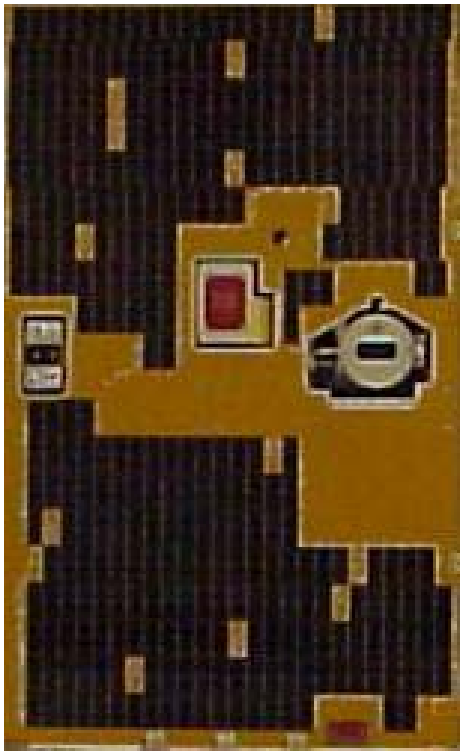
- "Stanford Ovshinky: Sparking A Revolution" on Wednesday, November 10 at 11am

Michigan Curriculum Content Standards:

- P4.2B - Name devices that transform specific types of energy into other types (e.g., a device that transforms electricity into motion).
- P4.12C - Explain how stars, including our Sun, produce huge amounts of energy (e.g., visible, infrared, ultraviolet light).

Satellites use electricity to run their various systems and experiments. Since the dawn of the Space Age, engineers have used solar cells to generate this energy from sunlight. In this exercise, you will calculate how much power the IMAGE satellite can generate from one of its 8 hexagonal faces, allowing for the areas lost by instrument windows and other blank areas on the satellite. Note: The solar cells used by the IMAGE satellite can generate 0.03 watts per square centimeter of area.

IMAGE satellite Face 1



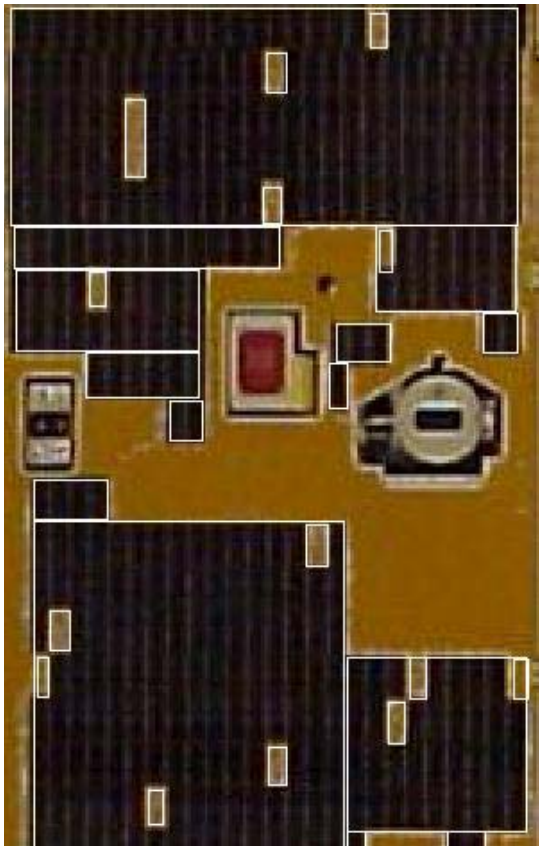
The panel above is 136 centimeters long and 90 centimeters wide. The solar cells that generate the electricity are shown in black. The brown-colored areas do not generate electricity.
Come up with a plan to determine the sizes of the black areas from the given information and image, then answer the three questions above after performing the required calculations.

Question 1: What is the usable area of the satellite's face shown below?

Question 2: What electrical power can be generated by the panel?

Question 3: If there are 8 similar panels on the satellite, what is the approximate total power that can be generated if all faces are fully illuminated, and have about the same number of solar cells?

Goal: Students will calculate the area of a satellite solar panel and estimate the total electrical power that can be generated. Students will use the images and dimensions provided to create a scaled drawing of each satellite face, and from this determine the scaled dimensions of the dark solar cell areas.
Note: If you want to make a full-sized model of the satellite visit the *IMAGE Satellite Scaled Model* page at http://image.gsfc.nasa.gov/poetry/workbook/page14.html



As a benchmark: The maximum possible area of the panel is 136 cm x 90 cm = 12,240 sq cm. The maximum power is therefore (0.03 watts/sq cm) x 12,240 sq cm = 367 watts if the panel is fully illuminated.

The scale factor of the students image is 137 cm (actual) / 10.2 cm (picture) or **13.4**

Suggested Method: Determine the black area by breaking the panel into rectangles as indicated by the letters from left to right. Subtract from each rectangle the area of the non-black regions. There are 15 small rectangles within the boxed black regions. Each have the same size = 0.3cmx0.5cm (image). Note, perform all area calculations in 'image' units, then convert final area answer to actual units by multiplying by (13.4)^2.

ID	W	L	A	ID	W	L	A	ID	W	L	A
A	6.0	3.5	21.0	**E**	0.7	0.5	0.4	**I**	0.4	0.5	0.2
B	0.5	3.2	1.6	**F**	0.5	0.5	0.3	**J**	0.9	0.5	0.5
C	1.0	1.7	1.7	**G**	1.4	0.5	0.7	**K**	3.7	4.0	14.8
D	1.0	2.3	2.3	**H**	0.2	0.5	0.1	**L**	1.9	2.0	3.8

W, L = image width and height in cm
A = image area in sq.cm.

Question 1: What is the usable area of the satellite's face? **Answer**: Add A-L areas to get 47.4 sq cm, then subtract the areas of the 15 non-celled rectangles (15 x 0.15 = 2.3) and get 47.4 – 2.3 = 45.1 square cm in image units. Convert to actual area by multiplying by 13.4 x 13.4 = 179.6. The total area of the solar cells is then 45.1 x 179.6 = 8100 sq. cm. Note, the maximum panel area is 12,240 sq. cm, so (8100/12240) x100% = 66% of the panel is covered by solar cells.

Question 2: What electrical power can be generated by the panel? **Answer**: 0.03 W/sq. cm x 8100 sq. cm = 243 watts.

Question 3: If there are 8 similar panels on the satellite, what is the approximate total power that can be generated if 4 faces are fully illuminated at a given time, and have about the same number of solar cells? **Answer:** 4 x (243 W) = 972 Watts.

Lesson Plan: Artists as Explorers
Grade Level: 3-12
Primary Subject: Fine Arts, Language Arts
The Kennedy Center
http://artsedge.kennedy-center.org/content/2301/

Pair this activity with the following Lorenzo Cultural Center presentations:

- "The Creative Habit: Learn It and Use It for Life - Twyla Tharp" on Thursday, October 14 at 1pm and 7pm
- "Butch Hartman: Fairly Odd Parents" on Thursday, October 21at 7pm
- "Brainstormers! Take Off Show" on Thursday, October 28 and Thursday, November 11 at 11am
- "Breaking the Sound Barrier: The Sphinx Organization and Classical Music - Aaron Dworkin" on November 17 at 11am

Michigan Curriculum Content Standards:

- Arts Education Current Standard 4: Understanding, Analyzing, Describing and Evaluating Arts in their historical, social & cultural contexts.
- Arts Education Current Standard 5: All students will understand, analyze, and describe the arts in their historical, social, and cultural contexts.

Lesson Overview:

Explorers exist in every field of human endeavor, including geography, the arts, sciences, and philosophy. In this lesson, students will gain an understanding of humans' need to explore. They will create a "journey map" depicting the accomplishments of artistic explorers, and research the influences that caused the artists to embark on these explorations.

Length of Lesson:

Five 45-minute class periods

Instructional Objectives:

Students will:

- Learn about journey maps and explorers.
- Expand their understanding of the term "explorer" to include those individuals who have made discoveries in the areas of arts and literature.
- Identify artists and writers who are "explorers."
- Make journey maps detailing these explorers' creations, ideas, and influences.

Introduction

Lead the students in a discussion of the human need to explore. In what ways has the human race been affected by all forms of exploration and discovery? Explorations can lead to one final discovery, or to more questions. What types of explorations are the students most familiar with? Prompt the students by asking questions such as:

> What do you think of when you hear the word "explorer"?
> What makes an explorer different from other people?
> What motivates him/her to explore?
> What keeps people from being explorers? (i.e., fear, doubt, money)

Ask students to brainstorm the most famous explorers from the past and the present day. Make a list on the blackboard.

Activity

Examine the explorers named by students thus far. Ask the students to start thinking of people who are explorers in fields other than geography, such as science, politics, and the arts. Remind students that an intellectual exploration can be like a journey even if it does not include travel.

Focus the classroom discussion on explorers in the arts. Name artist "explorers" for each of the following genres of art: theatre, literature, musical theatre, visual arts, music, and dance. Examples might include:

Theatre:

> Shakespeare, August Wilson, Arthur Miller

Literature

> Edmund Spenser, Ernest Hemingway

Musical Theatre

> Richard Rodgers, Stephen Sondheim

Visual Arts

> Picasso, Jackson Pollock, Georgia O’Keefe

Music

> Mozart, Duke Ellington, Philip Glass

Dance

Bob Fosse, Martha Graham, Twyla Tharp, Alvin Ailey

Introduce students to the concept of "journey mapping" and show examples, such as the examples from the National Geographic MapMachine.

Examples of journey maps can also be found in *The Times Atlas of World History*. Traditionally, journey maps show the mapping of geographical explorations. Extending this idea, journey maps can be made to trace various forms of progress, including in some cases the physical movement of ideas, inventions, systems of government, art styles or motifs, and social and religious movements.

For example, the idea of democracy can be traced from its inception in Greece to its republican adaptation in Rome. Democracy could then be traced to a modified version in the universal democracy of clerics, its adoption in the Magna Carta, the ideas of John Locke, its oligarchic form in the thought of America's founding fathers, the present-day understanding of democracy in the United States, and its adaptation in developing countries.

Tell the students that they will be making journey maps related to concepts in the arts, focusing on the work of certain "explorers." Students should research the influences that caused the artists to embark on their "exploration," particularly the childhood/adolescent experience of the artist, their homelands and hometowns, their schooling, family life, the ideas or discoveries that they developed, the way that those ideas influenced other artists and changed the genre in which they worked, their social interests, etc.

For an example, see Picasso—The Early Years, 1892-1906 from the Museum of Fine Arts, Boston Web site. This exhibition examines the first decade and a half of Picasso's extraordinary career, a period in which he constantly adopted new styles and experimented with new approaches. Discuss the ways in which Picasso can be considered an artistic "explorer."

Allow students to create their journey maps in any creative way they choose. They can either make traditional maps that show geographic locations, or make a timeline-style map that shows a chronological order of events, or a creative method of their own design (subject to your approval).

Closure

Display the various journey maps around the room and bind them all into a classroom "atlas." Ask the students what surprised them most about their research and creation. Relate the work of this activity to their studies of other cultures. Compare and contrast two artists of the same genre that come from different countries, and look for the similarities and differences in the journey maps of these two artists.

Assessment:

Use the Assessment Rubric to evaluate student learning.

Sources:

Print:

Barraclough, Geoffrey,ed. *The Times Atlas of World History*. Revised Edition. Maplewood, NJ: Hammond, 1985.

Authors:

ARTSEDGE and DoDDS, Curriculum Partnership
The John F. Kennedy Center
Washington, DC

Lesson Plan: Innovation through Experimentation

Grade Level: 9-12

Primary Subject: Fine Arts

PBS, From the Top at Carnegie Hall

http://www.pbs.org/wgbh/fromthetop/for-teachers/season-2/205/innovation_through_experimentation.php

Pair this activity with the following Lorenzo Cultural Center presentations:

- "Super Science Day: The Physics of Sound" on Sunday, October 10 at 1:30pm
- "The Creative Habit: Learn It and Use It for Life - Twyla Tharp" on Thursday, October 14 at 1pm and 7pm
- "Butch Hartman: Fairly Odd Parents" on Thursday, October 21at 7pm
- "Breaking the Sound Barrier: The Sphinx Organization and Classical Music - Aaron Dworkin" on November 17 at 11am

Michigan Curriculum Content Standards:

- Arts Education Current Standard 3: All students will analyze, describe and evaluate works of art
- Arts Education Current Standard 4: Understanding, analyzing, describing and evaluating arts in their historical, social & cultural contexts

Description: Students will learn how composer François Rabbath developed innovative ways to play the double bass as a result of not having any formal training, and they will invent their own creative learning processes.

National Music Standard: 8 Understanding relationships between music, the other arts, and disciplines outside the arts, 9 Understanding music in relation to history and culture

Background

In this episode Kiyoe Wellington from Oahu, Hawaii plays a haunting and unusual piece by French composer François Rabbath on the double bass (also known as contrabass or upright bass). Kiyoe's family is a huge part of the international double bass world. Her grandfather was renowned double bassist George Wellington, Sr., who began the biennial Hawaii Contrabass Festival. Kiyoe's mother now directs the festival. When she was thirteen years old Kiyoe even had the opportunity to play Reitba for François Rabbath. Rabbath discovered the double bass on his own and learned to play with only the aid of a contrabass method textbook he found. With no formal teacher to guide his studies, Rabbath relied on his own imagination to solve difficulties he encountered in his practicing. These techniques, which he later published, became the foundation of the Rabbath method. He has been called the "Paganini of the double bass" – pushing the traditional boundaries of the instrument's repertoire to include solos that can be described as no less than virtuosic.

Materials
Computer with media player and Internet access; speakers and projector if needed; pencils and paper

Activity Instructions
1) Watch the video segment that includes Kiyoe's performance. Ask students for their reactions. http://www.pbs.org/wgbh/fromthetop/video/season-2/205.php
2) Watch a YouTube clip on François Rabbath describing how he discovered his double bass techniques: http://www.youtube.com/watch?v=Yy-03jH_mrE&feature=related. Discuss with students a couple of the difficulties he encountered while teaching himself his instrument and the ways in which he solved these problems.
3) Brainstorm with students various tasks or skills they have formally been taught and those they remember teaching themselves (examples: reading, riding a bike, brushing one's teeth, drawing).
4) Collectively or in small groups write down the steps we traditionally take to teach or learn a certain skill (example: for reading we often start with the alphabet and the phonetic sounds of each letter). Then brainstorm alternative ways one might achieve the same goal.
5) Let each group choose an instrument that's at hand and invent a new or different way to play it.
6) Discuss the benefits and challenges of formally being taught a skill versus figuring it out on one's own, and the role imagination plays in innovation.

Find out more!
About Kiyoe Wellington
Kiyoe also appeared on From the Top's radio program. You can hear her play and learn more about her musical life at:
http://www.fromthetop.org/Programs/Performers.cfm?pid=2462

About double bass techniques
The Rabbath technique versus the Simandl technique is a familiar controversy in the double bass world.
http://doublebassblog.org/2006/11/rabbath-versus-simandl-comparative.html
http://en.wikipedia.org/wiki/Fran%C3%A7ois_Rabbath
http://www.liben.com/FRBio.html

About the history of the double bass
http://en.wikipedia.org/wiki/Double_bass

Lesson Plan: The Story of La-Z-Boy "The Invention and the Patent"
Grade Level: 9-12
Primary Subject: History, Technology
Inventerrific
http://www.inventerrific.com/f/La-Z-BoyLessonPlan2.pdf

Pair this activity with the following Lorenzo Cultural Center presentations:

- "The Myths of Innovation" on Wednesday, September 29 at 1pm
- "America: Land of Invention" on Saturday, October 2 at 1pm
- "Inventing Michigan: Inventors Known & Unknown" on Wednesday, October 20 at 11am and 1pm

Michigan Curriculum Content Standards:

- ECONOMICS 1.1.2 ENTREPRENUERSHIP - Identify the risks, returns and other characteristics of entrepreneurship that bear on its attractiveness as a career.
- SCI.I.1.E.3 — Manipulate simple devices to make measurements or scientific investigations.
- SCI.I.1.M.3 — Use tools and equipment appropriate to scientific investigations.

Objective: All students will use primary and secondary records to analyze how an invention moves successfully through the patent process.

Materials: Materials downloaded from web sites referenced below, black line master and tools for cutting out the model chair (see directions page for more detailed list of materials needed)

Procedure A:
1. Ask students to go to www.uspo.gov to explore the patent process.
2. Assess their understanding of their findings in a discussion or written essay question of your choice.
3. Go to www.inventerrific.com and click on the educators tab to download the complete patent of Edward Knabusch and Edwin Shoemaker for the reclining chair.
4. Ask students to describe the meaning and purpose of an abstract by comparing the full description in the patent download (primary source) to the write up provided in this lesson plan (secondary source).

Procedure B: 1. Make copies of black line master included in this lesson and the directions for assembly of the model recliner and distribute to students along with necessary tools.
2. Ask students to cut out and construct the model recliner as per directions.

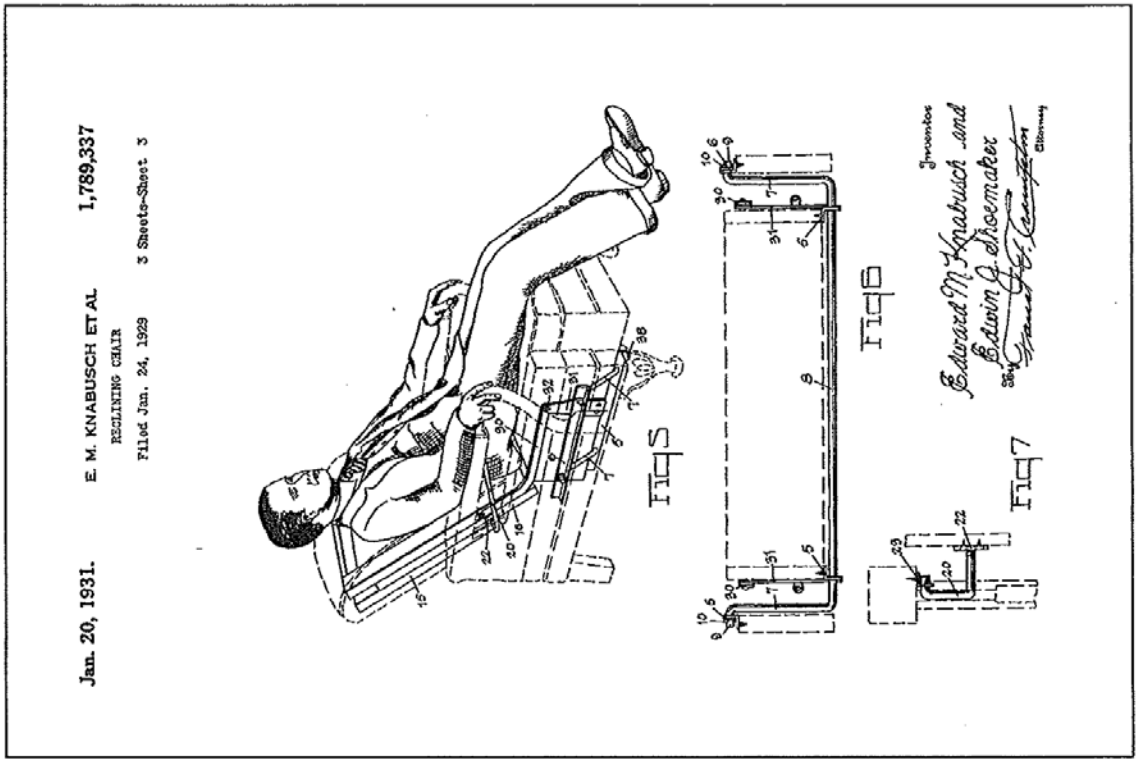
Contact information: *For questions, suggestions or further information about these and other lesson plans, inventors, their patents and life stories, go to our web site at www.inventerrific.com or call 1-248-202-4100. To contact authors Amy Clarke or Ron Loeffler e-mail them at aclarke@inventerrific.com or rloeffler@inventerrific.com. For the La-Z-Boy Corporation web site go to www.lazboy.com*

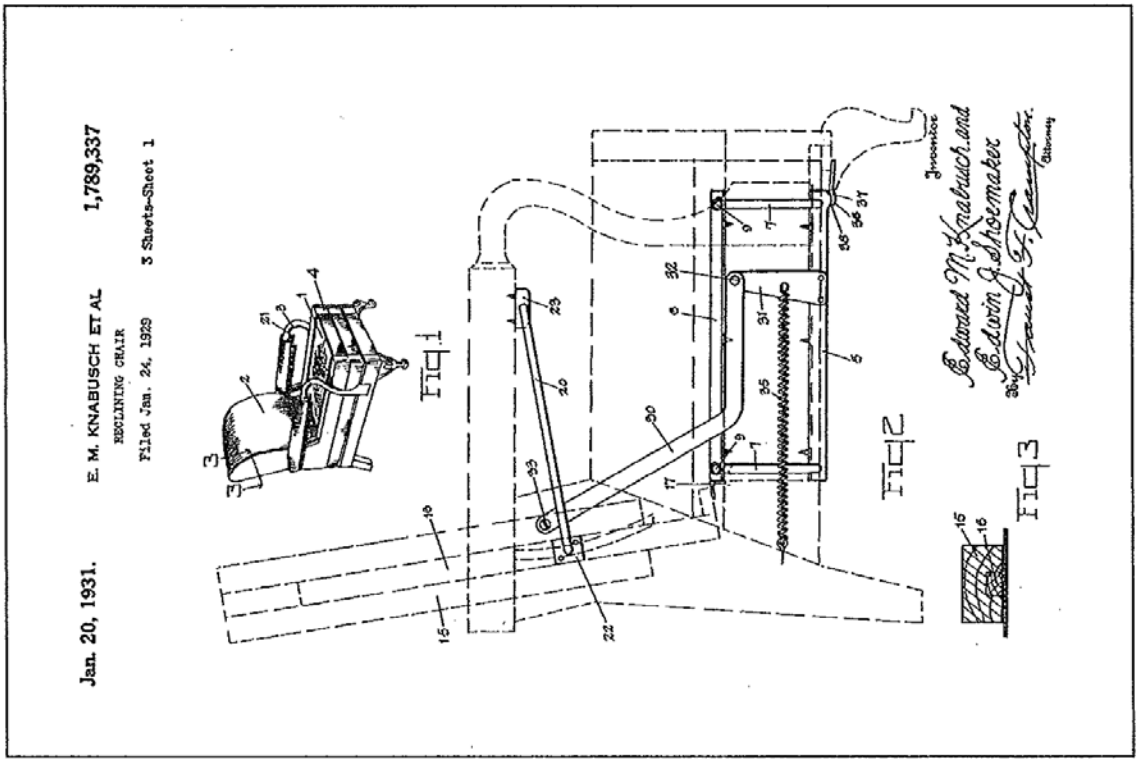
Reference Material - "The Invention and the Patent"
Patent Description for Patent No. 1,789,337

The idea behind Edward Knabusch and Edwin Shoemakers' Patent No. 1789337 is to have a chair that a person can comfortably sit upright in and also recline back in. The seat and back of the chair are movable and swing on metal arms designed to balance the weight of the person sitting in the chair. The chair is covered with fabric upholstery and is stylish to look at. The wood frames under the upholstery are assembled with glue and nails. The fabric is applied to the body frame, the seat frame and the back frame using tacks that are pounded in with a small hammer. Some of the chair frame is exposed and is sanded smooth with a lacquer finish applied. Under the fabric upholstery is soft cotton batting. Coil springs are also used in the seat.

The chair body is constructed with a hardwood frame that has four legs. The four legs rest on the floor and support all the weight of the chair and the person sitting on it. A separate hardwood seat frame that can swing forwards and backwards is mounted on four metal arms. The metal arms are connected to mounting brackets with rivets. The rivets allow the metal arms to turn. A machine shapes the rivets when the metal arms and mount brackets are put together so that they cannot come apart after assembly. The mount brackets are connected to the chair body on the top and the seat frame on the bottom with screws. A separate back frame swings on four metal arms that are connected to the seat mount brackets and two metal arms that are connected to the wood arms of the chair body with metal hinges. When the back is reclined, the seat moves forward and rises up. The swinging forward and lifting up of the seat provides a balance in the mechanism to offset the leverage of reclining the back. The mechanism balance allows the person sitting in the chair to change positions from upright to reclining with ease. The mechanism balance also supports the person sitting in the chair so that it doesn't move unless the person wants to change positions. A metal spring that is connected to the seat frame and the chair body can also be used to assist in bringing the back of the chair upright after it has been reclined. The fabric upholstery, batting and coil springs together with the hardwood frames and mechanism provide a very durable chair that is soft and comfortable and easy to use.

Story of La-Z-Boy: Primary Source- Original Patent Drawing





Story of La-Z-Boy, Lesson Plan: Recliner Construction Project Directions

Required materials: scissors or craft knife, white glue, 4 straight pins, large paper clip, crayons or
colored pencils, ruler and 8.5”x 11” heavy copy paper.

1. Color wood legs, arms and upholstery if desired–be creative on fabric design (figure 1)
2. Cut out all pieces–cutting out inside of arm can be optional (figure 2).
3. After cushions and base pieces are cut out go back and cut on dotted lines as well.
4. Score cushions and base on the solid lines with paper clip and ruler (figure 3), this will facilitate a nice, even fold when you carefully fold on the scored lines (figure 4).
5. All tabs marked “g” are to be attached with light application of glue (figure 4).
6. Tabs marked “t” are not glued but will be tucked inside when folding cushions and base (figures 4).
7. When glue is dry carefully insert pin through tab on both sides of back cushion where dot 1 appears (see cutout sheet) and into dot 2 on the seat cushion (figure 5).
8. Sides should be glued to the base so that the bottom of the base lines up with the bottom of the sides above legs and the front edge (figure 6).
9. After glue is dry, insert pins through arms at dot 3 (see cutout sheet) and into dot 4 on sides of back cushion (figure 7).
10. To simulate the reclining motion that this patent made famous gently put finger on top of back cushion and move back and forth (figure 8).

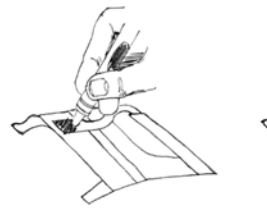


Figure 1

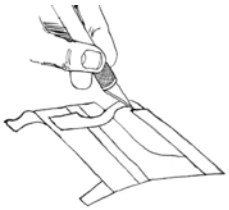


Figure 2

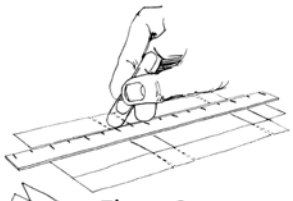


Figure 3

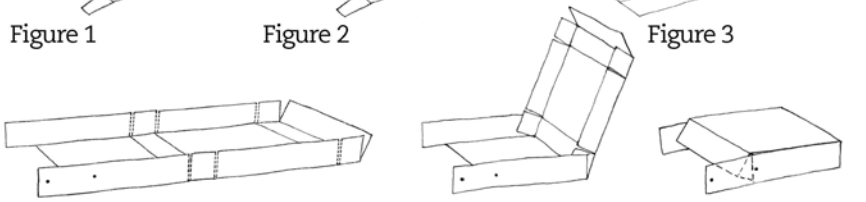


Figure 4 - Folding and glueing back cushion-leave two long tabs out-do not fold

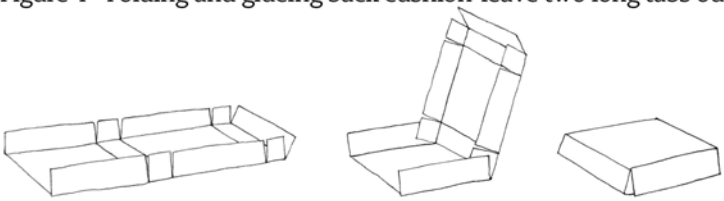


Figure 4 -Folding and glueing seat cushion and base

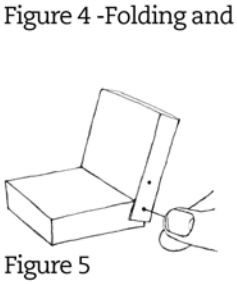


Figure 5

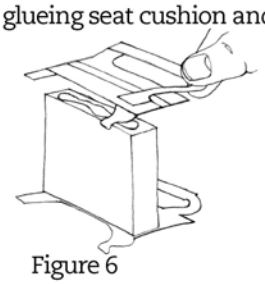


Figure 6

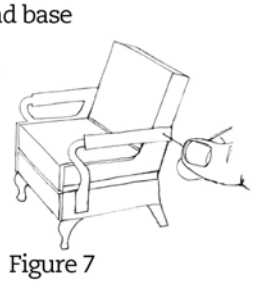
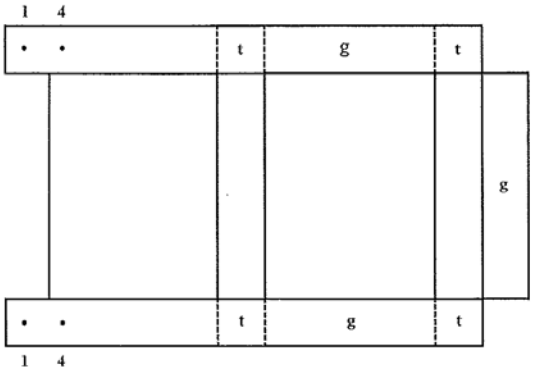
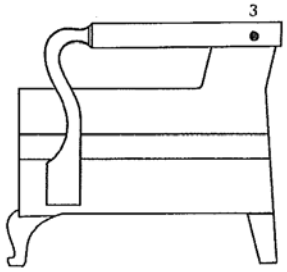


Figure 7

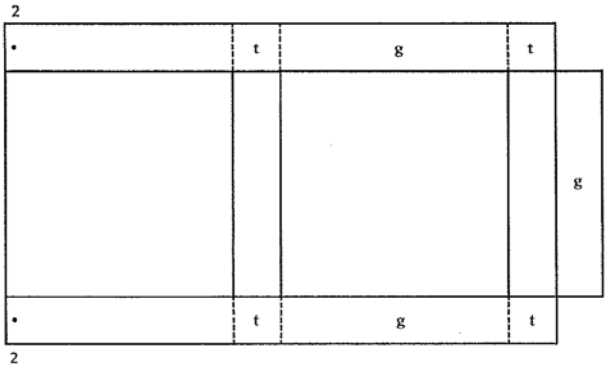
Figure 8



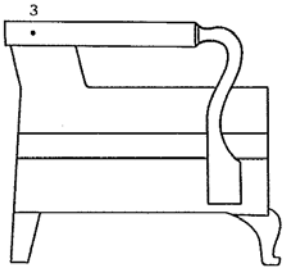
Back Cushion



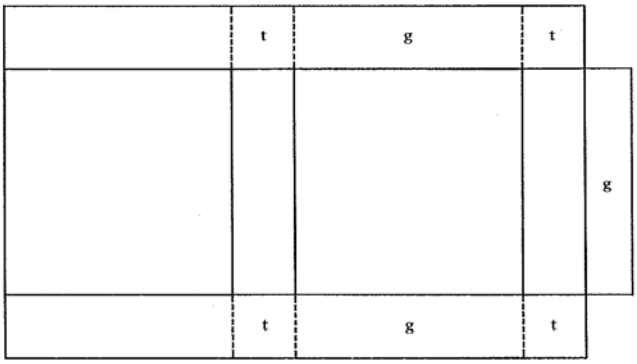
Right Side



Seat Cushion



Left Side



Base

Lesson Plan: Sending A Message to the Future, A Community Time Capsule

Grade Level: 4-12

Primary Subjects: Social Studies, Language Arts

Pair this activity with the following Lorenzo Cultural Center presentations:

- Lorenzo Cultural Center Exhibit "Yesterday's Tomorrows: Past Visions of the American Future"
- "Brainstormers! Takeoff Show" on Thursday, October 28 at 11am

Michigan Grade Level Content Standards

- 4 - H3.0.5 Use visual data and informational text or primary accounts to compare a major Michigan economic activity today with that same or a related activity in the past.

Objectives:

Students will:
Review important aspects of life in their community
Decide what makes their community unique
Select an object representing the community for inclusion in a time capsule
Write a letter to the future
Explain the significance of the object they selected for the time capsule in an oral presentation.

Materials:

Time Capsule Resource List
Class will determine what materials to collect for the time capsule and what to use for a time capsule container

Setting the Stage

Ask students: Imagine you want people 100 years in the future to know about your life. What would you want to tell people in the future? How would you send your message to the future?

Student Instruction

1. Explain that students will send a message to the future about their community in a time capsule. (Younger students may wish to focus on a smaller area, like their neighborhood, while older students can focus on a whole city or set of closely linked towns.) As a class, discuss what people in the future might want to know about your community. Brainstorm and write down as many aspects of life in your community as possible. As an aid for brainstorming, start with categories such as: people, places, businesses, traditions, cultural institutions, etc. Encourage student to be broad and inclusive in their thinking.
2. Ask students: What makes our community special? What makes it different than any other place? List and discuss student ideas.

Student Activity

1. Divide student into teams of two. Allow each team to select al different aspect of community life listed during the brainstorming. Assign each team to choose and obtain (or make) an object that represents their aspect of community life for inclusion in the time capsule. Younger students may need to review the idea of how an object can represent something larger than itself and discuss some examples. Encourage student to think carefully about their choice and ask family, friends, and neighbors for ideas. Remind them that their object should reflect something special or unique about your community.
2. Select or design a time capsule container so students will know what size items can fit in it. The teacher can make this choice prior to beginning the elsson or allow the class to brainstorm possibilities. For suggestions on time capsule containers, see the websites on the *Time Capsule Resource List*.
3. As a class, decide where and how the time capsule will be stored and when it will be opened. Develop a system to make sure people remember to open the time capsule at the time you select. See the websites on the *Time Capsule Resource List* for suggestions. For example, the International Time Capsule Society will register your time capsule for free.
4. Assign each student to write a letter to the people who will open the time capsule in the future explaining why your class made the time capsule and the significance of the object they selected for the capsule.
5. Invite other students in your school, parents, and community member to a "Time Capsule Sealing Ceremony." During the ceremony, each team of students should explain the significance of their object before placing it in the time capsule.
6. Deliver the time capsule to its storage place.

Time Capsule Resource List

The International Time Capsule Society (ITCS) – www.oglethorpe.edu/itcs
The ITCS was established in 1990 to promote the careful study of time capsules. It strives to document all types of time capsules throughout the world and maintaines a time capsule registry. You can register your time capsule with ITCS for free. The ITCS website also includes information on how to set up a time capsule.

Reunion Time Capsule – www.ustimecapsule.com
The site offers good instruction and questionnaires for creating a time capsule. For a modest fee, this company will store a time capsule submitted by your calss in a climate controlled environment and return it to students on their 20 or 30 year class reunion. Alternatively, the time capsule can be returned to the same grade level in 25 years. All schools are welcome to participate.

Future Packaging and Preservation – www.futurepkg.com

LORENZO CULTURAL CENTER EXHIBIT INFORMATION

MUSEUMS & EXHIBITS

American Ingenuity
Explores the themes of innovation, invention and entrepreneurship, showcasing through visuals and artifacts the creativity of those who innovate and the impact of their work.

Kites to Kittyhawk
In celebration of flight, this exhibit chronicles the kites and their inventors in the movement toward the goal of man-powered flight, from the early pioneers in Europe and the United States through the Wright Brothers and their first flight at Kitty Hawk.
From the Drachen Foundation

Yesterday's Tomorrows: Past Visions of the American Future
Provides a unique view, focusing on popular culture and technology, of how Americans of the late 19th and 20th centuries envisioned the future.
From the Smithsonian Institution's Museum on Main Street Program

The College for Creative Studies
201 East Kirby
Detroit, MI 48202
www.collegeforcreativestudies.edu/

Detroit Historical Museum
5401 Woodward Avenue
Detroit, Michigan 48202
313-833-7935
www.detroithistorical.org

The Henry Ford
20900 Oakwood Blvd.
Dearborn, MI 48124-5029
313-982-6001
www.thehenryford.org

Port Huron Museum
1115 Sixth Street
Port Huron, MI 48060
810-982-0891
www.phmuseum.org

OTHER LOCAL RESOURCES

Ann Arbor Hands On Museum
220 East Ann Street
Ann Arbor, MI 48104
734-995-5439
www.aahom.org/

Detroit Science Center
5020 John R. Street
Detroit, MI 48202
313-577-8400
www.detroitsciencecenter.org

Michigan Historical Center
702 West Kalamazoo Street
Lansing, MI 48909
517-241-2236
www.michigan.gov/dnr/0,1607,7-153-54463---,00.html

Sanders Candy Factory
23770 Hall Road
Clinton Twp, MI 48036
800-651-7263
Sanderscandy.com

Sphink Organization
www.sphinxmusic.org/

WEBSITES

Detroit Historical Society
www.detroithistorical.org
The Drachen Foundation
www.drachen.org/
Inventerrific
www.inventerrific.com

The Kennedy Center, Arts Edge
http://artsedge.kennedy-center.org/

Lawrence Tech University Formula Hybrid Team
www.ltu.edu/element1/

The Library of Congress
http://memory.loc.gov
National Aeronautics and Space Administration
www.NASA.gov

National Inventors Hall of Fame
www.Invent.org

National Museum of American History
americanhistory.si.edu/

PBS, From the Top at Carnegie Hall
www.pbs.org/wgbh/fromthetop/pages/

Twyla Tharp Official Website
www.TwylaTharp.com

SUGGESTED READING LIST

Hear these authors speak at the Lorenzo Cultural Center. Dates and times of presentations are listed after book titles below.

Confessions of a Public Speaker/ Scott Berkun. O'Reilly Media, 2009.

- Wednesday, September 29, 2010 at 11am and 1pm

Making Things Happen: Mastering Project Management/ Scott Berkun. O'Reilly Media, 2008.

- Wednesday, September 29, 2010 at 11am and 1pm

The Myths of Innovation/ Scott Berkun. O'Reilly Media, 2010.

- Wednesday, September 29, 2010 at 11am and 1pm

Innovate Like Edison: The Five-Step System for Breakthrough Business Success/ Sarah Caldicott. Plume, 2008.

- Wednesday, October 6, 2010 at 11am & 1pm

The Collaborative Habit: Life Lessons for working/ Twyla Tharp. Simon & Schuster, 2009.

- Thursday, October 14, 2010 at 1pm & 7pm

The Creative Habit: Learn it and use it for life/ Twyla Tharp. Simon & Schuster, 2005.

- Thursday, October 14, 2010 at 1pm & 7pm

Push Comes To Shove: An Autobiography/ Twyla Tharp. Bantam, 1992.

- Thursday, October 14, 2010 at 1pm & 7pm

iWoz: Computer Geek to Cult Icon: How I Invented the Personal Computer, Co-Founded Apple, and Had Fun Doing It/ Steve Wozniak with Gina Smith. W. W. Norton & Company, 2007.

- Thursday, November 12, 2010 at 7pm