Currency & Printing

Grade Levels: 9-12

Subject Areas: Government, Economics, Technology, and College Readiness

Learning Objectives
• The history of journalism and newspaper publishing in early Texas and American History
• The history of newspaper, journalism, people and treaties through Mexican and Texas history

Students will learn to:
• Use primary and secondary sources, including original artifacts, to discuss the importance of word choice and purpose.
• Identify the history and development of currency through people and events on specific times through printing and illustration through time
• Demonstrate an understanding of the different forms of media and printing styles

Lesson Details
1. Pre-arrival lesson options: vocabulary activity and crossword
2. Main lesson ideas:
   • Distribute the infographic on how money is made, courtesy of information from the U.S. Department of the Treasury.
   • Handwriting analysis exercise, with signature and partner activity
   • Identifying counterfeit money activity, spot the difference.
   • After museum visit and taking note on currency, both American coins/notes and Texas Independence currency notes.
3. Post-visit lesson options: discussion/reflection questions and post-visit activity.

Vocabulary words associated with lesson:
analysis, copy, currency, engraving, etching, forensic, forgery, intaglio, letterpress, mint, offset printing, photogravure, plate, printer, printing press, siderography, signature, stereotype

Applicable TEKS*

As a courtesy, these items are complimentary from The Printing Museum, and we kindly ask that these lessons aren’t distributed to schools and classes that are not coordinating a lesson or trip with The Printing Museum. Thank you.

*TEKS as of July 2021.
For each section write a vocabulary word in the top, and circle the part of speech it is. Then, define it, write a few synonyms, and a sentence using the word.

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Use the correct vocabulary word for each definition.

Down
1. engrave (metal, glass, or stone) by coating it with a protective layer, drawing on it with a needle, and then covering it with acid to attack the parts the needle has exposed, especially in order to produce prints from it
2. a mechanical process developed by Jacob Perkins in the early 1800s enabling the unlimited reproduction of engraved steel plates
4. an image produced from a photographic negative transferred to a metal plate and etched in
5. relating to or denoting the application of scientific methods and techniques to the investigation of crime
7. a person whose job or business is commercial printing
8. a design incised or engraved into a material
9. press, a mechanical device for applying pressure to an inked surface resting upon a print medium, thereby transferring the ink
10. the action of forging or producing a copy of a document, signature, banknote, or work of art
11. printing, commercial printing, widely used printing technique in which the inked image on a printing plate is printed on a rubber cylinder and then transferred
13. a sheet of metal, plastic, or some other material bearing an image of type or illustrations from which multiple copies are printed
14. a thing made to be similar or identical to another or matter to be printed

Across
3. a person's name written in a distinctive way as a form of identification
6. the process or art of cutting or carving a design on a hard surface, especially so as to make a print
9. press, a mechanical device for applying pressure to an inked surface resting upon a print medium, thereby transferring the ink
12. printing from a hard raised image under pressure, using viscous ink
14. a system of money in general use in a particular country
15. detailed examination of the elements or structure of something
16. a relief printing plate cast in a mold made from composed type or an original plate
17. a place where money is coined, especially under state authority
How Money is Made

A step-by-step introduction to printing money

Currency production at the Bureau of Engraving and Printing (BEP) is quite different from its beginnings in 1862, which consisted of a handful of people separating notes with a hand-cranked machine in the basement of the Treasury building. The production of U.S. currency is not an easy or simple task, but one that involves highly trained and skilled craftspeople, specialized equipment, and a combination of traditional old world printing techniques merged with sophisticated, cutting edge technology. There are numerous, distinctive steps required in the production process.

Designing, Engraving & Siderography

The first step in creating currency is designing the look of it. Over time, American money has gone through many changes and what we use now, doesn’t look the same it did a hundred years ago. Once the designers design the money, it goes through the engraving and etching process. An artist etches a intricate web of lines and details for the money, making it harder to forge. Next is the siderography, where individually engraved elements such as the portrait, border, counters and text are first combined like pieces of a jigsaw puzzle to form one complete face or back of a note using a transfer press.

Paper & Ink

Right after the siderography is complete, the plastic master plates are transferred from siderography and used by plate makers to create hundreds of identical printing plates — identical because they are all based on the same plate. All money is made with specific ink and paper to make it harder to create counterfeit money. It’s unique to the bureau’s ingredients. The ordinary paper that consumers use throughout their everyday life such as newspapers, books, cereal boxes, etc., is primarily made of wood pulp; however, United States currency paper is composed of 75 percent cotton and 25 percent linen.

Printing Plates & Offset Printing

All though the processes can be lengthy, there is a specific way to print money, along with specific machines to give authentic detailed money. Offset printing is Offset printing utilizes aluminum based plates, or plates made from a similar metallic material. For every color during the printing process a separate metal plate has to be used. In the plate printing process, ink is applied to a plate so that it remains only in the engraved areas. Paper is then laid atop the plate, and the two are pressed together under great pressure. As a result, the ink from the recessed areas is pulled onto paper, creating a finished image.

Creating a John Hancock

Even though printing was starting to slowly become more mass produced, all of America’s founding documents were handwritten and signed, especially currency so it couldn’t be counterfeited or forged. Even today, most identities are narrowed down to handwriting, which is why a signature is so important! Your signature is unique to you and needs to be something that can not be easily forged by someone. While some people have a signature in cursive, many in today’s generation print their signature letter by letter because it’s not taught in schools as much as it used to. Below, you are going to work on your own signature in cursive.

Tips for writing in cursive:
• Trace the letters below (this is optional).
• Connect each of your letters together.
• Don’t lift your pen/pencil until the end of the word. Cross the ‘t’s and dot the ‘i/j’s at the end.
• Make it your own. It doesn’t have to match the letters below or anything else, or you can add some flair to it, too. It is your identity!

Do you know what it means when someone asks for your John Hancock? If someone is asking, they want your signature!

John Hancock was president of Congress when the Declaration of Independence was adopted and signed. He is primarily remembered by Americans for his large, flamboyant signature on the Declaration, so much so that “John Hancock” became, in the United States, an informal synonym for signature. If you look at the copies of the Declaration, you’ll see his signature big and bold above everyone else’s.

Name: ______________________________________

Creating a John Hancock

Uppercase

ABCDEFGHIJKLMNOPQRSTUVWXYZ

Lowercase

abcdefghijklmnopqrstuvwxyz

Practice Space

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Each person has a unique handwriting style that is developed over time but there are different factors that cause variation in a person’s handwriting, like different writing instruments, mood, age, or how hurried the person is. Read the list of important handwriting characteristics to take note of.

Below is an example of forged handwriting. The top (S) is the original, and the bottom (Q) is the forged signature. Using the list to the right, annotate all the differences or key aspects of the signatures.

Name: ________________________________

**Partner Activity**

As noted above, forensic scientists use signatures to protect identities. With a partner, you are going to recreate the exercise above with your own signature.

1. Draw your signature that you practiced on the previous page. Remember it has to be cursive!
2. Switch papers with a partner.
3. Your partner is going to try and copy your signature as best as they can.
4. Switch papers back with your partner.
5. Note/circle and annotate in the extra space around the differences from your original signature.

**Line Quality**
Do the letters flow or are they erratic and shaky?

**Spacing**
Are the letters equally spaced or crowded?

**Size consistency**
Is the ratio of height to width consistent?

**Continuous**
Is the writing continuous or does the writer lift the pen?

**Connecting Letters**
Are capitals and lowercase letters connected and continuous?

**Letters Complete**
Are letters completely formed or is a part of it missing?

**Cursive and printed letters**
Are there printed letters, cursive letters, or both?

**Pen Pressure**
Is pressure equal when applied to upward and downward strokes?

**Fancy curls or loops**
Are there fancy curls in parts of the signature?

**Placement of crosses on t’s and dots on i’s**
Correct or misplaced? Are t’s crossed, crossed in the middle, toward top, or toward the bottom? Are the i’s dotted, dotted toward the right, left, or centered?
When false documents or other items are copied for the purpose of deception, it’s considered counterfeit. Changes to the design of US bills over the years have mostly been for anti-counterfeiting, not aesthetics.

Take a look at the materials and features of real money.

### Bank Note Materials

- US dollars made from 75% cotton, 35% linen. It is often mixed with linen, abaca, or other fibers
- Most paper currency made from cotton paper with 80-90g weight per sq meter
- Average lifespan of a banknote is 2 years
- Infused with polyvinyl or gelatin to give extra strength
- Early Chinese banknotes were printed on mulberry bark
- Watermark and thread incorporated during paper forming process
- Thread is for security purposes, decreases risk of counterfeit
- Varnishing and coatings reduce accumulation of dirt and debris during circulation
- Windows in paper covered by holographic foils add more difficulty for counterfeiting

### Features Found in Real Currency

Clear red and blue fibers are woven throughout the bill. Security thread is evident, consisting of a thin, embedded vertical line or strip with the denomination of the bill written on it. There is also a watermark that appears on the right side of the portrait of the bill in the light.

- There is minute microprinting on the security threads as well as around the portrait.
- Portrait stands out from the background & appears raised off the paper.
- Serial number is evenly spaced and the same color as the Treasury seal.
- Check letter and Quadrant Number
- Federal Reserve seal has no sharp points
- Series Identification
- Treasury seal has clear, sharp sawtooth points
- Clear, distinct border edge to green resulting from color-shifting ink.
Counterfeit has been popularized and glamorized in recent years, but the concept has been around for centuries. Check out the timeline below for a brief history.

- **1200 CE**: China moves from coins to paper money around 700 BCE. By 1271 CE (Silk Road, Marco Polo) the emperor had good grasp on money supply and denominations. Inscription: “those who are counterfeiting will be decapitated”
- **1300 CE**: Most 18th century banknotes produced through copper plate engraving and printing:
  - Were single-sided
  - First banknotes made through intaglio printing
- **1700 CE**: Ben Franklin’s printing firm attempts anti-counterfeiting design for Continentals. Added printings of leaves to the bills to give them a unique design that would be difficult to copy.
- **1800 CE**: Watermarks first used in 1697 by Berkshire papermaker Rice Watkins. Made it harder and more expensive to forge banknotes.
- **1900 CE**: Mary Butterworth (American) used starched cloth and hot iron to transfer the pattern of the note onto paper, then inked the design.
  - Turned into a family business, sold bills for ½ price
  - Brought to trial in 1723 but acquitted due to lack of evidence.
- **2000 CE**: Journalist Samuel Upham began producing fake Confederate notes as novelty items to support the Unionist cause:
  - Had disclaimer that they were fake, but cotton traders began cutting the line of and spending the m in the South
  - Government offered $10,000 for his capture, Upham claimed he printed $15,000,000 in fake bills.

In 2012, Frank Bourassa had nearly $1M of counterfeit $20’s seized by authorities. He is one of the most prolific counterfeiters in US history. He is a Canadian man with a history of drug dealing and petty/grand larceny.

In 2001, determined less than 0.01% of $600B in circulation in the US are counterfeits. Most US counterfeits done by inkjet or other printers (easily identifiable).
Congratulations! You are now in charge of creating modern money! You are at the first step of creating money: designing it. Below, follow the directions to create new fresh take for today’s currency. Keep in mind all the features found in modern currency to prevent forgery.

**Flat currency/notes**
1. Create three different images for money. Think of leaders or heros that you would like to represent your currency value.
2. Add wording or phrases to your design.
3. Name the three different values (for example, we have the $1, $5, $10, etc.). You could even design the first $3 bill!
4. Lastly, add your John Hancock so no one can copy your money!

**Coins**
1. First, decide what images should be on the two faces of your coins.
2. Next, think about word choice. Every coin has the year it was created and phrases or mottos engraved on it.
3. Lastly, make sure you add how much your coin is worth.
4. Have fun and get creative with your design.
Use the questions below to prompt discussion and reflection after the museum trip.

1. What was your favorite exhibit?

2. What’s one thing you learned from the activities?

3. What’s one thing that surprised you?

4. Is there anything you wished you could have seen more of?

5. Why is a signature important to have?

6. Why do you think the development of the printing press was so important to developing currency?

7. In your own words, how has the development of money changed in the last 200 years?

8. Why do you think we changed from metal currency to printed currency?

9. What are the advantages or disadvantages of paper bills over metal currency?

10. Why is the design so important to the printing and development of modern currency? (Hint: forgery)

11. In this day and age, what is the future of currency?