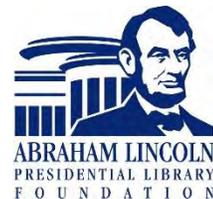




# Telegraphs

Lesson Plan created by:

Abraham Lincoln Presidential Library & Museum



The Civil War Tech Program is made possible thanks to generous support from AT&T.

## LESSON PLAN

**Grade:**4<sup>th</sup>-8<sup>th</sup> grade

**Title:** Telegraph Civil War Tech

**Timeframe:** 60 minutes

**Brief Synopsis:** Instantaneous communication, like texting, is taken for granted these days, but 150 years ago it was transforming the world. Thanks to the telegraph, messages that once traveled at the speed of a fast horse could move as fast as lightning. Participants will find out how the telegraph worked, who created it and how it compares to texting and calling today. They can decode messages sent during the Civil War and use replica telegraph machines.

**Essential Question:** How were telegraphs important as a type of Civil War technology and how did they changing communication and warfare?

**Objectives:** Students will be able to:

1. Explain how telegraphs worked.
2. Demonstrate how Morse code worked by sending messages that can be deciphered.
3. Explain the difference between communication during the Civil War and today.

**Learning Standards:** This lesson addresses the following Illinois State Learning Standards.

### ELA

CCR Reading: Key Ideas and Details:

2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
3. Analyze how and why individuals, events, and ideas develop and interact over the course of a text.

CCR Writing: Research to Build and Present Knowledge:

9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

CCR Speaking and Listening: Comprehension and Collaboration:

1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

CCR Speaking and Listening: Presentation of Knowledge and Ideas:

6. Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

### Social Science

*Inquiry Skills*

4<sup>th</sup>-5<sup>th</sup> grade:

Communicating Conclusions and Taking Informed Action

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Telegraphs Lesson Plan

Page 2 of 16

SS.IS.7.3-5. Identify a range of local problems and some ways in which people are trying to address these problems.

SS.IS.8.3.3-5. Use listening, consensus- building, and voting procedures to decide on and take action in their classroom and school.

6<sup>th</sup>-8<sup>th</sup> grade:

Evaluating Sources and Using Evidence

SS.IS.4.6-8.LC. Determine the value of sources by evaluating their relevance and intended use.

SS.IS.5.6-8.MC. Develop claims and counterclaims while pointing out the strengths and limitations of both.

Communicating Conclusions and Taking Informed Action

SS.IS.8.6-8.LC. Analyze how a problem can manifest itself and the challenges and opportunities faced by those trying to address it.

SS.IS.8.6-8.MdC. Assess individual and collective capacities to take action to address problems and identify potential outcomes.

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SS.IS.8.6-8.MdC. Assess individual and collective capacities to take action to address problems and identify potential outcomes.

### *Civics*

4<sup>th</sup> grade:

SS.CV.1.4. Distinguish the responsibilities and powers of government officials at the local, state, and national levels.

5<sup>th</sup> grade:

SS.CV.4.5. Explain how policies are developed to address public problems.

6<sup>th</sup>-8<sup>th</sup> grade:

SS.CV.5.6-8.MdC. Analyze the purposes, implementation, and consequences of public policies in historic and contemporary settings.

### *Geography*

5<sup>th</sup> grade:

SS.G.3.5. Analyze the effects of specific catastrophic and environmental events as well as technological developments that have impacted our nation and compare to other places.

6<sup>th</sup>-8<sup>th</sup> grade:

SS.G.1.6-8.LC. Use geographic representations (maps, photographs, satellite images, etc.) to explain relationships between the locations (places and regions) and changes in their environment.

SS.G.3.6-8.MdC. Explain how changes in transportation and communication influence the spatial connections among human settlements and affect the spread of ideas and culture.

### *Economics and Financial Literacy*

6<sup>th</sup>-8<sup>th</sup> grade:

SS.EC.2.6-8.LC. Analyze the role of innovation and entrepreneurship in a market economy.

### *History*

4<sup>th</sup> grade:

SS.H.1.4. Explain connections among historical contexts and why individuals and groups differed in their perspectives during the same historical period.

5<sup>th</sup> grade:

SS.H.3.5. Explain probable causes and effects of events and developments in U.S. history.

6<sup>th</sup>-8<sup>th</sup> grade:

SS.H.1.6-8.LC. Classify series of historical events and developments as examples of change and/or continuity.

SS.H.1.6-8.MC. Use questions generated about individuals and groups to analyze why they, and the developments they shaped, are seen as historically significant

SS.H.4.6-8.LC. Explain multiple causes and effects of historical events.

## Science

4<sup>th</sup> grade:

4-PS3 Energy

4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

4-PS4 Waves and their Applications in Technologies for Information Transfer

4-PS4-1. Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move

4-PS4-3. Generate and compare multiple solutions that use patterns to transfer information.\*

5<sup>th</sup> grade:

3-5-ETS Engineering Design

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

## Mathematics

Overall Mathematical Practices:

8. Look for and express regularity in repeated reasoning.

4<sup>th</sup> grade:

Operations and Algebraic Thinking: Generate and analyze patterns.

5<sup>th</sup> grade:

Operations and Algebraic Thinking: Analyze patterns and relationships.

8<sup>th</sup> grade:

Statistics and Probability: Investigate patterns of association in bivariate data.

### **Vocabulary Words:**

Telegraph      a tool used to send a coded message over wires a distance with electrical impulses

Electric pulse   a change in electric current

Morse code      a system of dots (short pulse) and dashes (long pulse) use to represent the alphabet to communicate over a distance

Telegram        a message sent via a telegraph

Hackers         a person that breaks into a system to gain information by unauthorized means

### **Materials:**

Overall:

Content Information Sheet

Student Reading Sheet on telegraphs

Discussion Questions (in packet)

Pictures of Telegraph Machine and Lines (in packet)

2 – Telegraph machines (optional)

Experiment #1 Card – Electric Pulse Activity (in packet)

Experiment #2 Card – Morse Code Activity (sound) (in packet)

Experiment # 3 Card – Morse Code Activity (visual) (in packet)

Materials for Demonstration and Experiments – see experiment card for listing (in packet)

**Procedures:**

1. Introduce the concept of the communication and telegraphs by asking students what they mean. Using discussion questions 1-3. Have students read the Student reading sheet on telegraphs.
2. Explain that we will be talking about how the telegraph works, play a game simulating the way a telegraph works, learn about Morse Code, and send messages using Morse Code by sound and sight.
3. Discuss how the telegraph works
4. Do Demonstration Card #1 to show how a telegraph works include discussion of the Morse Code.
5. Complete the Electric Pulse Activity
6. Discuss how Morse Code works.
7. Complete Morse code activity (sound)
8. Complete Morse code activity (sight)
9. When all of the teams have finished sending their messages gather them together and ask their opinions on which method they preferred for sending messages.
10. Discuss why the use of telegrams and Morse code was important during the Civil War.

**Discussion questions:**

1. What types of communication do we use today?
2. When I say the word “telegraph” what do you think of?
3. What do you know about the telegraph?
4. What are President Lincoln’s options for sending his message to General Grant?
5. What is Morse Code?
6. What happens to the messages as they move along the string?
7. What is a major problem sending messages via computer today?
8. How can telegraph messages be hacked?
9. What happens to the signal strength when the line is hacked?
10. What types of situations would they use visual Morse code?
11. What situations would be best for Morse Code by sound?
12. Ask student about communication methods after the Civil War?
13. How did communication advance?
14. What do we use for communication today that is similar?
15. What do they envision as future evolutions of communication?
16. Ask students to name one thing they learned about telegraphs today.
17. What did they learn about Morse Code?

## Resources:

### Online resources

#### *Video*

First Telegraph Message <https://www.history.com/topics/inventions/telegraph>

PBS video on Lincoln and the first situation room <https://www.youtube.com/watch?v=UYQ4-hNhkM>

Telegraph in Civil War by History Channel <https://www.youtube.com/watch?v=iOICsjn1JjU>

PBS video on Lincoln and Telegraph <https://www.youtube.com/watch?v=-9tMoZr0AHM>

Fairfax Station, Virginia by Fairfax Railroad Station Museum (sound is poor)  
<https://www.youtube.com/watch?v=J2HNXrGmOLA>

Civil War History: The Telegraph by Blue Media  
[https://www.youtube.com/watch?v= AiG1VPRGZo](https://www.youtube.com/watch?v=AiG1VPRGZo)

#### *Websites*

This day in history October 24, 1861 on completion of the first transcontinental telegraph line  
<http://www.history.com/this-day-in-history/western-union-completes-the-first-transcontinental-telegraph-line>

This day in April 22, 1863 about an attempt to cut General Grant from telegraph  
<http://www.history.com/this-day-in-history/union-raid-cuts-mississippi-telegraph-wires>

Brief information about Samuel Morse and the Morse Code <http://www.history.com/news/six-things-you-may-not-know-about-samuel-morse>

### Other resources

Allen, Thomas B. and Allen, Roger MacBride. *Mr. Lincoln's High-Tech War*. Washington D.C.: National Geographic, 2009.

### **Further Reflection:** (more questions)

1. What are similar concerns about sending messages that we have today?
2. How can communications be kept safe?
3. How have you seen the Morse code used? What other types of codes have you seen or used?

## Student Reading Sheet

A telegraph is a device for transmitting and receiving messages over long distance. It uses text or symbols without an object physically bearing the message. It requires that the method used for encoding the message be known to both sender and receiver.

An electrical telegraph was developed and patented in the United States in 1837 by Samuel Morse. The Morse code was developed with dashes and dots to signal the alphabet.

dot = 1 second

dash = 3 seconds

“Lincoln knew he would need the telegraph to keep in touch with his troops as they moved into Virginia. When Lincoln arrived in Washington, the War Department did not even have its own telegraph connection. To send a message the War Department sent a man to the central telegraph office. If there was a line, he stood in it. At the counter, he handed a paper to a clerk, who handed it to a telegrapher, who put it in the stack of outgoing messages to wait its turn. Soon after Lincoln took the oath of office, he gave orders to have a telegraph line strung directly to the War Department Building, which was a short distance to the White House. During the war, by day and by night, President Lincoln walked to the War Department...There in the telegraph office, he ran the war by Morse Code, writing and reading messages.”

*---Mr. Lincoln's High-Tech War: How the North Used the Telegraph, Railroads, Surveillance Balloons, Ironclads, High-Powered Weapons and More to Win The Civil War.*

## Content Information Sheet

### Telegraph Information & History

1. History of the Telegraph
  - a. Developed in 1830s and 1840s by Samuel Morse and others who developed a long distance communicate by electrical pulses on a wire.
  - b. At first it was viewed as a toy, but later became an important way to communicate in the 19<sup>th</sup> century.
  - c. Morse and Alfred Vail in 1843 received funds from the US Congress to set up and test the telegraph system they had created.
  - d. This was to be tested between Washington D.C. and Baltimore, Maryland.
  - e. The test was conducted on May 24, 1844.
  - f. The first message sent was "What hath God wrought!"
  - g. Western Union Telegraphy Company was one of the first companies to unify a system to send the messages on in the 1850s. They laid the first transcontinental telegraph line in 1861. They were the first nationwide company.
  - h. The telegraph eventually replaced the Pony Express as the main way to send messages over distances.
2. How a telegraph works
  - a. A message is sent over a long distance using wire.
  - b. Electricity sends the message along the wire.
  - c. At various points along the way, more electricity had to be added to the wire to keep the message going. This was generally at telegraph poles and stations.
  - d. Through a series of taps and switches, an operator sends out a message. A receiver is able to understand the message.
3. Lincoln and the Telegraph
  - a. Shortly after he was installed as President, Lincoln ordered a telegraph wire to be strung to the War Department so he could easily communicate in private with the Generals in the field.
  - b. Before this, he would have to stand in line with everyone else wanting to send a telegraph message/telegram and wait his turn.
  - c. He spent many hours in the telegraph office reading telegraph messages.
  - d. He communicated directly with the Generals on the front lines.
  - e. He both read and wrote messages daily.
  - f. He had telegraph officers set up a chair for Mr. Lincoln to sit in when he was there.
  - g. He spend many hours in the office reading and writing messages to the Generals in the field.
  - h. He was the first President to manage war this way and have direct communicate with the war front.
4. Telegraph messages
  - a. Messages used Morse code but it was not a direct translation.

- b. Telegraph operators had to use a cipher to decode what was sent as a message.
- c. The cipher was a series of well-defined steps that can decode the message being sent. It is clearly understood by both the sender and receiver.
- d. The messages were encrypted (use of a secret code) to hide what was being sent to and from the field so that others would not know the plan.
- e. Most messages did not make sense until it was decoded by telegraph operators.

## **Morse Code Information**

1. Morse Code
  - a. Ask students "What is Morse Code?"
  - b. Communication form where letters, numbers, and punctuation are represented by combinations of dots and dashes.
  - c. Each dot and dash is a burst of electricity which travels through telegraph wires
  - d. A dot is a one-second burst, a dash is a three-second burst.
  - e. Point out that the message is sent using Morse Code which is a series of bursts of electricity. What happens to the messages as they move along the string?
  - f. They get weaker as is represented by the decreasing thickness of the yarn.
  - g. Ask the students how will the message reach other stations?
  - h. Answer: Message will need to get more electricity from a power source located along the telegraph line
2. Hacking telegraph wires
  - a. Can telegraph wires be hacked? Yes
  - b. Hackers could break into the lines and get messages sent from one person to another.
  - c. Ask what happens to the signal strength when the line is hacked? Signal strength decreases and message won't necessarily continue on to the final destination because of lower electricity fueling the pulses.
  - d. What does the hacker need to do to go undiscovered? Add more electricity to send message on and send new message
  - e. Will the message stay the same as the original? Possibly not.
  - f. During the Civil War US telegraph operators discovered someone hacking into their lines. They had to alter their messages and send fake messages down that line to trick the hacker. The hacker was never discovered but the US telegraph operators always knew when he was on the line because each telegraph operator has their own style of sending Morse Code on a line just like everyone has different handwriting styles.

## ***Demonstration #1 Card – Telegraph Activity***

### **Materials:**

2- sets of telegraph lines made out of yarn or string (lines should have 1 string then tied to 3 strings at one end, then the 3 strings are tied to six string at the other end) See example diagram.

Pencil

Small box

Diagram of telegraph wire

Diagram of the setup for activity

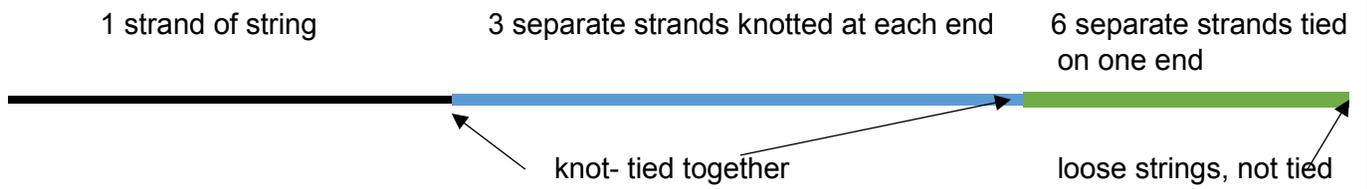
### **Purpose:**

Demonstrate how messages were sent via the telegraph including information on Morse Code and hacking.

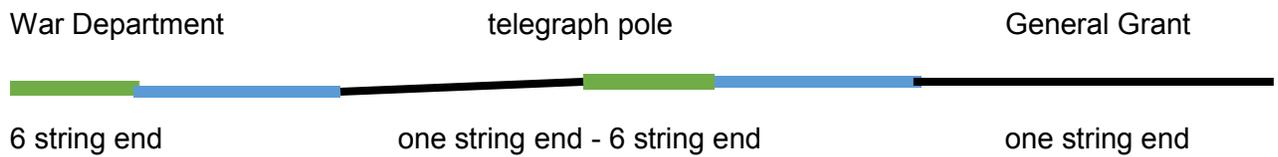
### **Activity:** (Classroom)

1. Ask for 3 volunteers
2. Have one volunteers stand to the right of the room. Place the second volunteer ten feet away. Have the third volunteer stand in the center. Give a pencil and a box (telegraph machine) to the volunteers on the far right and left.
3. Stand next to the volunteer on the far right and explain that they are President Lincoln. The President is standing in the War Department's telegraph office preparing to send a message to General Grant who is down in Virginia. What are his options for sending his message to General Grant?
4. Lincoln decides to send a telegram. He writes his message and gives it to a telegraph operator who translates the message into Morse Code.
5. Explain what is Morse Code. Start with asking students "What is Morse Code?"
6. Hand the student the string end with the 6 pieces together. Walk away from the student holding out the string until it reaches the end and hand it to the middle student (telegraph pole). Have the student representing Lincoln tap the pencil on the box a few times to replicate a telegraph going out. The message is sent using Morse Code which is a series of bursts of electricity.
7. Ask students - What happens to the messages as they move along the string? They get weaker as is represented by the decreasing thickness of the string.
8. Ask the students - how will the message reach General Grant? The message will need to get more electricity from a power source located along the telegraph line which is at the telegraph pole. Hand the third volunteer the second length of string at the six-string end and give the single string end to the volunteer portraying General Grant to complete sending the message.
9. Discuss hacking by asking students to think about modern-day concerns with sending messages, especially highly sensitive and private ones. What type of problems can arise sending messages via computer?
10. Can telegraph wires be hacked? Hackers could break into the lines and get messages sent from one person to another.
11. Ask a fourth volunteer to come up. Take 2-3 of the strings from one of the six-string portions of the line and hand them to the fourth volunteer. Ask what happens to the signal strength when the line is hacked? Signal strength decreases and message won't necessarily continue on to the final destination because of lower electricity fueling the pulses.
12. Discuss how hackers did to go undiscovered include add more electricity to send message on and send new message. Will the message stay the same as the original? Possibly not.
13. Explain how telegraph operators knew when the line was being hacked.

### Diagram of Telegraph Wire



### Diagram of Telegraph Activity



## ***Experiment #1 Card - Electric Pulses Activity***

### **Materials:**

2-6 wadded up pieces of paper

### **Purpose:**

Demonstrate how continuous short bursts of energy move an item from one place to another.

### **Activity:** (Classroom)

1. Tell students they will be responsible for moving their wadded up paper from one end of the classroom to another. They will move the ball from one place to another by blowing on it. They cannot use their hands to move the ball unless it is jumping from one table or desk to another one a row away.
2. If the ball needs to travel from one row of desks or tables they may use their fingers to flick the ball. They cannot pick up the ball and drop it.
3. Every member of their team or class must move the ball at least 3 times.
4. If the ball hits the ground, the telegraph line has been cut and they must start over.
5. Divide the classroom into teams and tell them where their starting and end points will be. If it is a small classroom, have the students stay at their desks and give one ball to the front row and another to the back row. Have the class move the ball to the front or back of the room depending on where it starts.
6. Be aware this activity gets VERY noisy. Allow game play to continue until the paper wads reach their final destination at least one time.

### ***Experiment #2 Card - Morse Code Activity (sound)***

#### **Materials:**

Black Morse Code Sheet

Pencils

Paper

Telegraph Machines – a pencil or finger and a box

#### **Activity:**

1. Break class into teams of six students. Break each team into groups of three. Give each group of three two Morse Code Sheets and pencils and paper for each student.
2. Tell the students they will work in groups of three to create a three word coded message. They can use a three-word sentence or choose three random words. Once their three-person group decides on their message they should write it down and work together to translate the message into Morse code. They should make sure their partner team does not know what their message is. Have the students create one “clean” copy of the message with only the Morse code version of the message on it.
  - a. When translating, they should leave one pinky space between each letter.
  - b. Students should put a slash mark at the end of each word.
  - c. Students should indicate which side of their paper is the top.
3. When the students finish translating their messages, have students make a simple telegraph machine by using their pencil or finger to tap on a box or desk. Have each team member send one word of their message using the telegraph machine.
  - a. Demonstrate that one second of sound represents a dot and three seconds of sound represents a dash.
4. After the telegrams are sent via the telegraph machine, have the three-student teams exchange messages with their partner team and translate the opposing team’s messages.

### ***Experiment #3 Card - Morse Code Activity (Visual)***

#### **Materials:**

Black Morse code Sheets

Pencils

Paper

Black paper cut into smaller squares

White paper cut into smaller squares

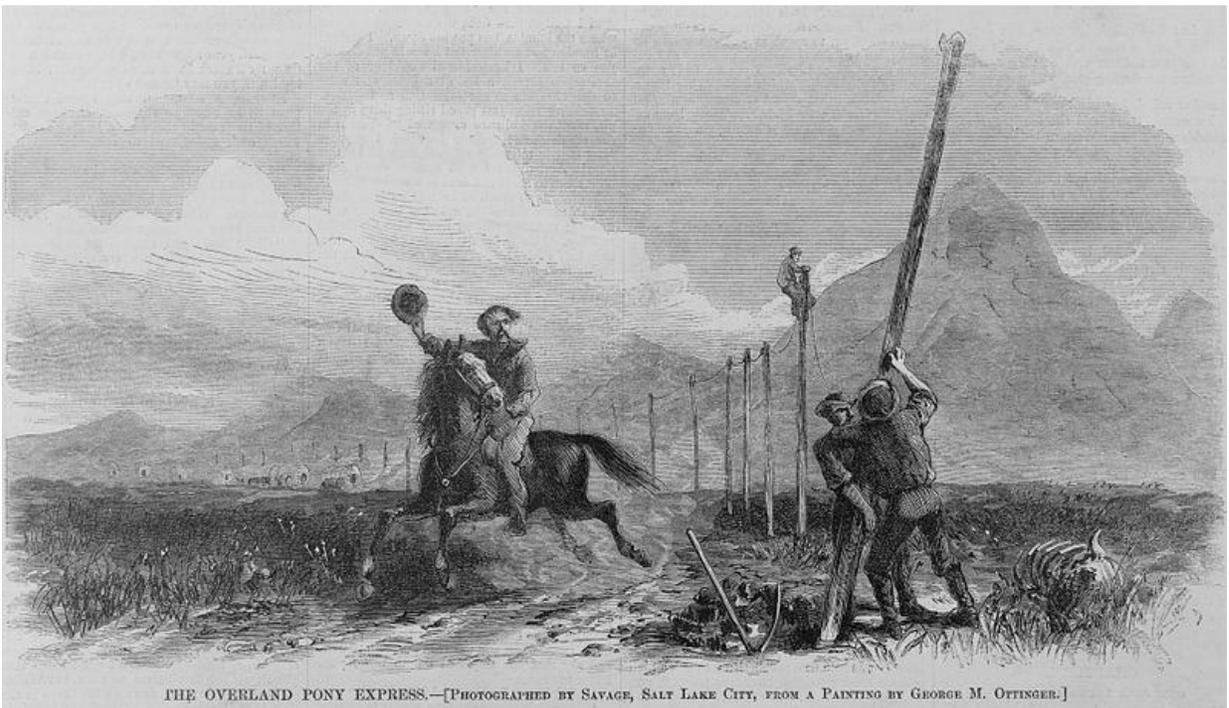
#### **Activity:**

1. Have the students remain in their three person teams.
2. Ask each team to select a word that is at least eight letters in length. The word cannot be supercalifragilisticexpialidocious. Every team will try to select that word.
3. Have the teams translate the word into Morse code.
4. Once the words are coded, instruct the students to use the Black Morse Code sheets to send their word to their partner team. Student will need to tape one small black paper square to the white small square. They can tape them on their pencils to make flipping of the squares easier to see. Students will flip the paper square back and forth in the following pattern: one second for a dot and three seconds for a dash.
5. The teams should send the message one letter at a time allowing the opposing team to correctly guess the letter before moving on to the next letter.
6. When the first team finishes sending their visual Morse code message, the second team should do the same.

## Pictures of Telegraph Machine and Lines



Credit: John Schanlaub



THE OVERLAND PONY EXPRESS.—[PHOTOGRAPHED BY SAVAGE, SALT LAKE CITY, FROM A PAINTING BY GEORGE M. OTTINGER.]