

Title: Introduction to Steel. Where do steel parts come from?

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Externship Business: [Walker Forge](#)

Overview / Description:

Most people don't realize that manufacturing is all around them and that almost everything they use is manufactured. Students will be shown ores, steel billets, forged steel, and finished steel parts. Students will learn about how raw materials are mined and then transported from factory to factory in order to be turned into the products that are all around us.

Subject(s):

STEM

Grade Level(s):

Grades 5-8

Learning goals/objectives:

After completing this activity, students should be able to:

- explain the steel manufacturing process
- create a picture/map model of the process from mining through final product (mining, smelting, rolling, forging, machining, assembling)

Type of Activity:

- Individual
- Small Group
- Whole Class

Teaching Strategies:

- Discussion
- Partner work
- Use of Technology
- Role Playing
- Simulation
- Performance Assessment

Content Standards

Wisconsin Standards for Science

Crosscutting Concept: Patterns

SCI.CC1.m - Students recognize macroscopic patterns are related to the nature of microscopic and atomic-level structure. They identify patterns in rates of change and other numerical relationships that provide information about natural and human-designed systems. They use patterns to identify cause and effect relationships and use graphs and charts to identify patterns in data.

Crosscutting Concept: Cause and Effect

SCI.CC2.m - Students classify relationships as causal or correlational, and recognize correlation does not necessarily imply causation. They use cause and effect relationships to predict phenomena in natural or designed systems. They also understand that phenomena may have more than one cause, and some cause and effect relationships in systems can only be explained using probability.

Model Academic Standards for School Counseling

Career Development Domain

Content Standard H: Students will understand the relationship between educational achievement and career development.

- Core Performance Standard 1: Attain educational achievement and performance levels needed to reach personal and career goals.
- Core Performance Standard 2: Participate in ongoing, lifelong learning experiences to adapt to and excel in a diverse and changing economy.

Length of Time and length of class periods:

2 Class Periods (90 Minutes)

Materials List:

- <https://www.youtube.com/watch?reload=9&v=9I7JqonyoKA> (About Steel 6:45)
- <https://www.youtube.com/watch?v=mRA6RY2o9Lg> (4:50 Steel Forging)
- <https://www.youtube.com/watch?v=q3xHWIWPxtM> (4:50 How it's made Steel)
- <https://etc.usf.edu/maps/galleries/us/minerals/index.php> (Map of Mines)
- Walker Forge Powerpoint and video
- [11X17" blank map of the United States](#)
- <http://www.kaempfandharris.com/blog/20-facts-about-steel-that-you-probably-didnt-know> (Steel Facts)
- https://steel.org/~media/Files/AISI/Fact%20Sheets/50_Fun_Facts_About_Steel.pdf (More Steel Facts)
- Steel parts from Walker Forge or another forge location
- <https://www.ussteel.com/locations> (Steel Finishing Locations)
- https://www.google.com/search?ei=s6ZnW6TnCsW1tgXxvJilCA&q=Steel+Forging+United+States&og=Steel+Forging+United+States&gs_l=psy-ab.3..33i22i29i30k1i3.4931.13576.0.13682.4

[6.33.2.0.0.0.196.3253.0j26.27.0...0...1.1.64.psy-ab..21.25.2960.6..0j0i22i30k1j35i39k1j0i67k1j0i131k1j0i20i264k1j0i131i20i263i264k1j0i20i263k1j0i131i20i263k1j0i20i263i264k1j33i21k1j33i160k1.156.agGld0mAUso](https://www.youtube.com/watch?v=9I7JqonyoKA) (Steel Forging Map)

- [Steel Map Rubric](#)

Directions (Step-by-Step):

1. Pass around steel parts and ask students what they think they are made out of
 2. Have students get into pairs and list any facts they know about steel.
 3. Share the facts as a class.
 4. Ask students where they think steel comes from. Write the answers on the board.
 5. Show the first video link - <https://www.youtube.com/watch?reload=9&v=9I7JqonyoKA> (About Steel 6:45)
 6. Ask questions about the video.
 7. Split the class into groups of 3-4 and have each group get a [blank map of the United States](#).
 8. Show students the links to the fact links:
 - <http://www.kaempfharris.com/blog/20-facts-about-steel-that-you-probably-didnt-know>
 - https://steel.org/~media/Files/AISI/Fact%20Sheets/50_Fun_Facts_About_Steel.pdf
- This can be done using Google Classroom.
9. Tell the students that they will need to find and make a key for the following locations on the map:
 - a. Iron Ore Mines (see attachment)
 - i. <https://etc.usf.edu/maps/galleries/us/minerals/index.php> (Map of Mines)
 - b. Steel-Making Locations (See attachment)
 - i. <https://www.ussteel.com/locations> (Steel Finishing Locations)
 - c. Forging Plants (See attachment)
 - i. https://www.google.com/search?ei=s6ZnW6TnCsW1tgXxvJilCA&q=Steel+Forging+United+States&oq=Steel+Forging+United+States&gs_l=psy-ab.3..33i22i29i30k1I3.4931.13576.0.13682.46.33.2.0.0.0.196.3253.0j26.27.0...0...1.1.64.psy-ab..21.25.2960.6..0j0i22i30k1j35i39k1j0i67k1j0i131k1j0i20i264k1j0i131i20i263i264k1j0i20i263k1j0i131i20i263k1j0i20i263i264k1j33i21k1j33i160k1.156.agGld0mAUso (Steel Forging Map)
 - d. Draw arrows from mines to steel-making locations. Draw arrows from steel-making locations to forging plants.
 10. Using the attached facts sheets, write 5 facts about steel at the bottom of each map.

Wrap-Up:

- Share maps and facts when finished. Discuss the significance of the location of the mines to the steel-making locations to the forging plants.

Formative/Summative Assessment:

- Formative = Use exit card and ask for a steel fact on each card.
- Summative = Grade the maps using the [Steel Map Rubric](#)

Extension Activity for differentiation:

- Give students the option to create a digital map vs the hard copy map
- Attach additional video links for students finishing early
- Invite a representative in from a steel-making or forging plant to discuss where they source their raw products from and what they make from these products

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NAME _____

DATE _____

HOUR _____

STEEL MAP RUBRIC

Directions: Using a blank United States map, make a key for the following:

- a. Iron Ore Mines
- b. Steel Making Locations
- c. Forging Plants
- d. Draw arrows from mines to steel making locations. Draw arrows from steel making locations to forging plants.
- e. Include 5 "Did You Know" facts at the bottom of the map

Yes (2) Somewhat (1) No (0)

Color Coded the Iron Ore Mines

Color Coded Steel Making Locations

Color Coded the Forging Plants

Included arrows between mines, steel making locations, and forging plants

Included 5 "Did you Know" facts at the bottom of the map

Apparent Effort

Neatness

TOTAL _____ / 14 points

