

Erie Canal: How Technological Change Affects Markets and Prices

by
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Lesson Description: Students will engage in role playing and other activities to analyze the effects of a technological change on markets and prices.

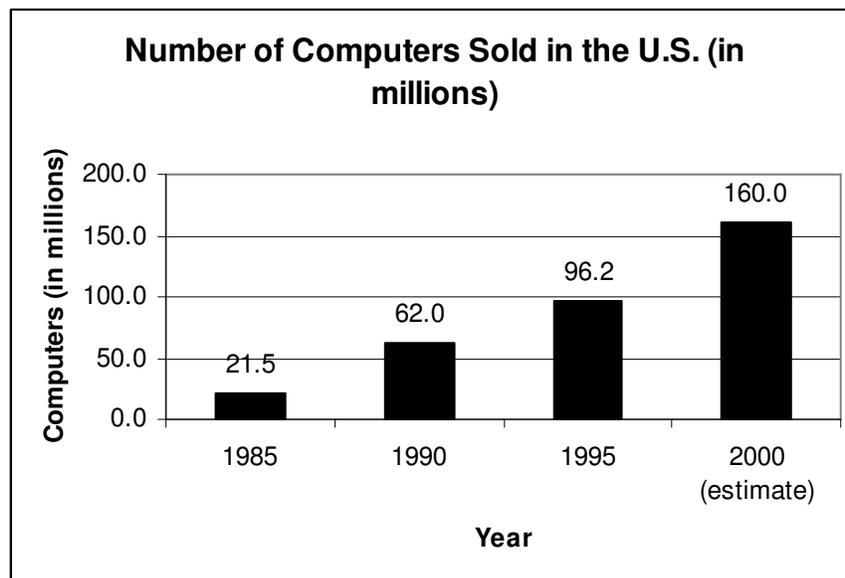
Grade Level: Eighth

Essential Question: How does innovation impact the way people live?

End of Cluster Expectations (Benchmarks): Students will analyze how changes in technology and cost interact in competitive markets to determine or change the price of goods.

Link to Additional Standards, if any: History Standard I, Chronology (change over time); Geography Standard 2, (humans shaping natural environments).

Assessment - Constructed Response:



How might a change in technology have affected the market for personal computers over the past fifteen years? Explain.

Desired Response:

2 = The price of computers is lower now. There are more computers available now because they can be built faster. Because the supply has increased, the price has decreased.

1 = The price of computers has gone down.

0 = There are more computers now than in 1980.

Scoring Rubric:

2 = This response gives a valid effect with an accurate and relevant explanation.

1 = This response gives a valid effect with an inaccurate or irrelevant explanation.

0 = Inaccurate response.

Assessment - Multiple Choice:

What was the impact of the invention of the sewing machine?

- a. Cost of the machines reduced supply.
- b. Cheaper shirts became available.
- c. The quality of the shirts declined.
- d. New technology increased prices.

Correct response: b

Objectives:

Students can analyze the impact that a change in technology has on markets and prices.

Prior Knowledge and Skills: Students possess and can exhibit an understanding of the basic economic concepts of supply and demand. They can do supply and demand graphs. They will need to know the definitions and applications of the terms: technology, goods and services.

Time to complete: Two 45 minute periods

Materials:

- Visual 1 - Erie Canal Song (audio www.kiddiddles.com/mouseum/e014.html; www.eriecanalvillage.net/pages/song.html)
- Visual 2 – Map of New York State (physical/political), map 1
- Visual 3 – Map of the Canal (including elevation), map 2
- Activity 1 – Erie Canal Role Cards
- Activity 2 – Erie Canal Data Sheet and Erie Canal Data Sheet Answers
- Visual 4 – Supply and Demand Base Graph
- Visual 5 – Comparisons of Technology on the Canal (www.uh.edu/engines) Go to Episode 1420 for better master pictures
- Activity 3 – News Accounts 1835 and 2000
- Background Information for Teacher (www.canals.org/erie.htm)

Procedure – Day 1:

1. Play the Erie Canal Song as the students enter the room. Have Visual # 1 displayed. When the song is over, ask students if they have been anywhere along the Erie Canal. Have they seen or been on any canal? Then ask if they know what the purposes of canals are? (various responses) Tell them that today they are going to investigate the Erie Canal.
2. Distribute a physical/topographical map of New York State. (Visual # 2) Tell the students they are living in the early 1800's. Ask what ways were used to travel and move goods during that time. (Foot, horses alone, and horses with wagons.)
3. Looking at the map, what type of problems would a person encounter using those methods? (Can't move large quantities easily, trouble getting over all the rivers, up the hills, equipment failure because of terrain, took a long time, horses have to stop and rest or they break down.)
4. What was usually the cheapest and most efficient way to move goods? (By boats over water because floating the goods is easier than pushing or pulling across rough ground.)
5. In 1792, a canal was built to allow cargo to go around Little Falls on the Mohawk River. It is now 1815. There is a proposal to construct an overland waterway or canal to connect the Hudson River Valley to Lake Erie at Buffalo. You are going to play a role of a person who might be affected by the building of this canal. Hand out the map with the path of the canal on it. (Visual # 2)
6. Divide the class into groups of seven. Have each student in each group draw a role card. The role play will be occurring in all groups at the same time. Pass out the Erie Canal Data Chart to every student. Go over the questions that the chart asks.
7. Each student then reads the background of his role to his group out loud. Each student completes the chart as the role play is taking place. After each group is done, display a transparency of the Erie Canal Data Chart. As the groups share their findings, record the information on the chart. (The answers for the chart are on the completed chart provided.)
8. Ask the students: Who are the producers of the food? (*farmers*) Where did they live? (*Western New York, Pennsylvania, and Eastern Ohio*) Who produces goods like glassware, cloth, tools? (*manufacturers*) Where did they live? (*Hudson River Valley, New York City, New England*) For what are the farmers consumers? (manufactured goods) What goods would the manufacturers want to buy? (food)
9. Draw a supply and demand base graph on the board or make a poster of it. (See Visual #3.) Give each student a copy of the graph. Randomly assign each student

one of the following items: cloth, glass, corn, wheat, boats, horseshoes, axes, plows, and fruit. Ask each student to complete the graph to illustrate the change in the market he/she has after the canal was opened. Did the canal change the demand or the supply of goods first? (*Supply*) Why? (*Because of the lowering of the shipping costs, which in turn lowered the price of goods to consumers. They then bought greater quantities of the goods. Demand does not change initially, but quantity demanded does.*)

10. Tell the students to bring all their materials to class the next day.

Procedure – Day 2:

1. Review the previous day's activity. All students should have the maps, data charts, and question sheet on their desks. As a warm up, ask the students some factual questions about the canal. What two bodies of water are joined by the canal? (*Hudson River and Lake Erie*) In what year did construction commence? (*1817*) When was it completed? (*1825*)
2. Hand out the news article dated 1835. Either read it aloud or have one student play the role of the reporter. Discuss the following: What happened to the costs of transporting goods by canal instead of overland? (*Dropped from \$90 to \$125 per ton to \$4 per ton.* What does that mean to the consumers? (*They will pay much less for specific goods which allow them to purchase more of other goods.*)
3. "How did the construction of the Erie Canal affect employment in New York State? In New York City? Explain. (*Possible responses: Increased a great deal over a 10 year period. With the ability to carry greater quantities of cargo further and faster, it would have been necessary for more individuals to be employed in canal service. Construction workers would have to be hired. Boats had to be built. Horses were needed. In New York City, likewise, greater numbers of people would be needed to meet the growing service needs. Dockworkers, sailors, and blacksmiths would all be in demand along the whole canal because of the increase in the traffic of goods from across the state.*)
4. How would the completion of the canal have affected farmers in western New York State economically? Explain. (*The farmers would be able to ship more produce to a large market like New York City faster. The farmer could sell more of his supply. This would increase the farmer's revenue. In turn, the farmer would be able to purchase more goods from the East.*)
5. Display Visual of the two barges. Ask students what might be another explanation for a continued decrease in transportation costs? (*New technology: the use of steam powered boats over mules.*)

6. How do new technologies affect consumers and producers? (*Costs to producers decrease and prices for consumer goods decrease.*)
7. Handout the newspaper article for the year 2000. For what is the Erie Canal being used today? Distribute the article “Millions Allocated for Recreational Use of Canal.” Why was the canal enlarged in mid-nineteenth century? (*To compete with the railroads*) When did the Canal stop being used for commercial traffic? (*1994*) Why was the canal closed as a commercial venture? (*High labor costs and competition from railroads and interstate highways made it no longer profitable*) Did the Erie Canal achieve what its supporters wanted to do? What evidence can you give? (*It reduced the costs of transporting goods tremendously from \$95/ton to \$4 per ton in ten years. This link to the West opened up many areas for economic activity, created jobs and reduced prices of goods to consumers. It also provided a wider variety of goods.*)
8. For what economic activity is the canal now being used? (*Recreation and tourism*)

Closure:

Pick a technological innovation like the television, a calculator, or CD player. Ask the students how are TVs different than they used to be. (*Smaller, in color, better sound, sharper picture.*) What has happened to price of TVs? (*They have decreased and many people in the US have multiple sets.*) How do many consumers behave when a new very expensive gadget comes on the market? (*Many wait to buy because they know that the prices will come down as new technology becomes available and competitors increase the supply.*)

Research: Have each student research other technological changes in transportation by identifying the costs and benefits, gainers and losers from that change. They can begin this research on the web site Engines of Our Ingenuity at www.uh.edu/engines.

Tips for the Teacher If teaching in a TAM environment, break students into heterogeneous groups. If possible, go to web sites for pictures and maps during class.

Extensions or Reinforcement Ideas:

- Using the web site Engines of Our Ingenuity, give students a list of technological changes. Have them report to the class: What problem the idea addressed, how it was accomplished, and what impact the innovation had on how people live(d). www.uh.edu/engines You can create similar lessons with this web site as you do other units for your class. There are 1999 episodes available.
- Show students the video “The Erie Canal,” available from the History Channel.
- Have the students write a letter to Governor DeWitt Clinton explaining their support or opposition to the construction of the canal in economic terms.
- To look at the effects of technological change in a different context, use the activity, “The Changing Price of Cotton,” in *Adventures in Economics and U.S. History, Volume 2*, copyright 2000 Econfun, LLC, Richmond, VA.

Citations for Graphics, Information, Adapted Lesson, etc.:

- “Erie Canal”, copyright 1998 National Canal Museum. Accessed 4/28/03
- “Route of the Erie Canal and the Elevations Along It”, copyright 1988-1999, John H. Lienhard

Visual 1

Erie Canal Song

Low Bridge, Everybody Down

(Written by: Thomas Allen in 1905)

I've got a mule, and her name is Sal,
Fif-teen miles on the Er-ie canal,
She's a good ol' worker and a good ol' pal,
Fifteen miles on the Er-ie can-al,
We've hauled some barges in our day,
Filled with lum-ber coal and hay,
And ev'ry inch of the way we know
From Al-ba-ny to Buff-a-lo OH

Chorus

Low bridge ev'-ry bod-y down,
Low bridge for we're com-in to a town,
And you al-ways know your neighbor,
You'll always know your pal,
If you've ev-er navigated on the Er-ie can-al

Chorus

We'd better look round for a job old gal,
Fif-teen miles - on the Er-ie can-al,
You bet your life I wouldn't part with Sal,
Fif-teen miles on the Er-ie can-al,
Giddap 'there gal we've passed that lock,
We'll make Rome fore six o'clock,
So, it's one more trip and then we'll go,
Right back home to Buff-a-lo OH

Chorus

Oh, where would I be if I lost my pal?
Fif-teen miles on the Er-ie can-al.
Oh, I'd like to see a mule as good as Sal,
Fif-teen miles on the Er-ie can-al,
A friend of mine once got her sore,
Now he's got a busted jaw,
'Cause she let fly with her iron toe,
And kicked him in to Buff-a-lo OH

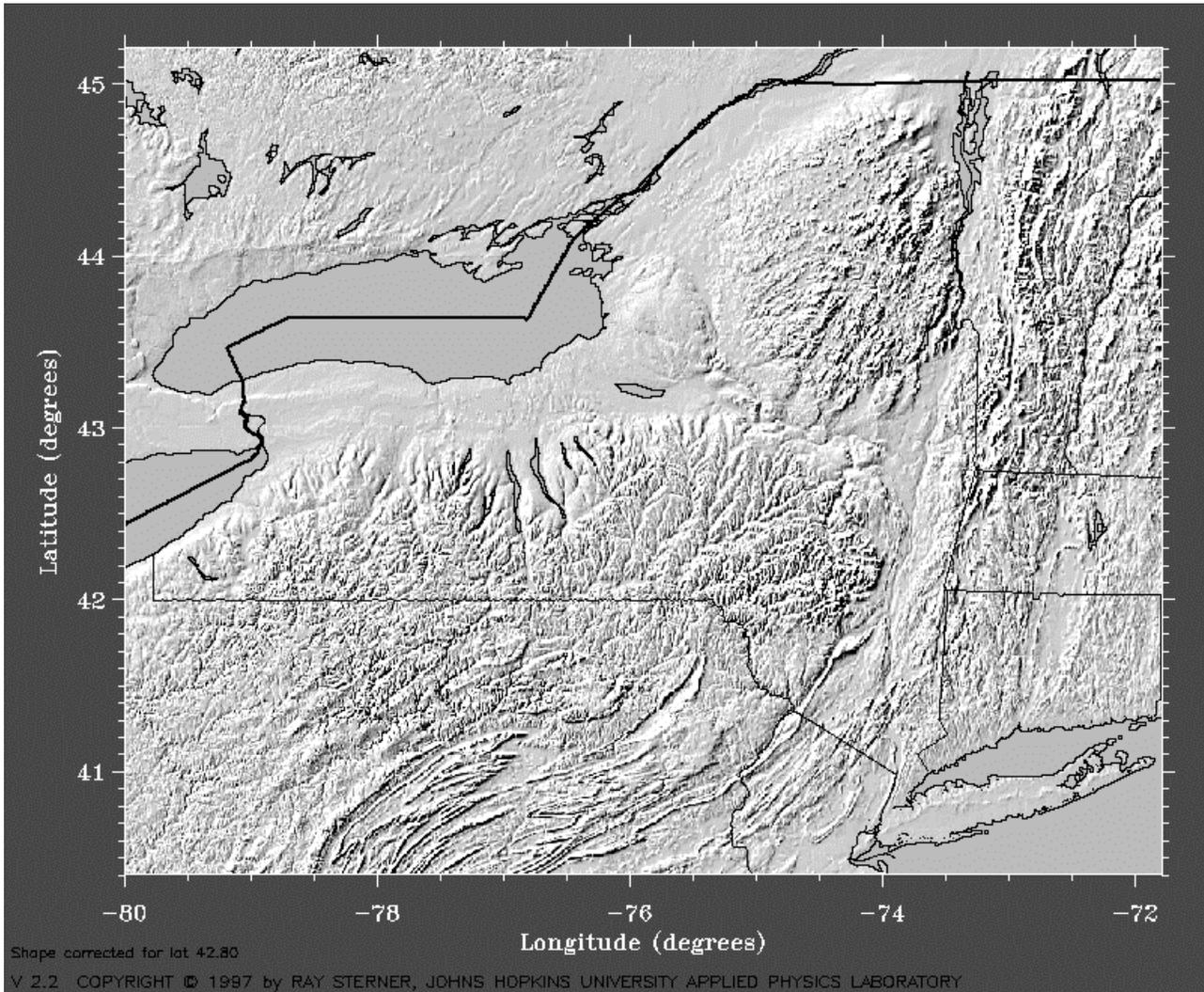
Chorus

Don't have to call when I want my Sal,
Fif-teen miles on the Er-ie can-al,
She trots from her stall like a good old gal,
Fif-teen miles on the Er-ie can-al,
I eat my meals with Sal each day,
I eat beef and she eats hay,
And she ain't so slow if you want to know,
She put the "Buff" in Buff-a-lo OH

Chorus

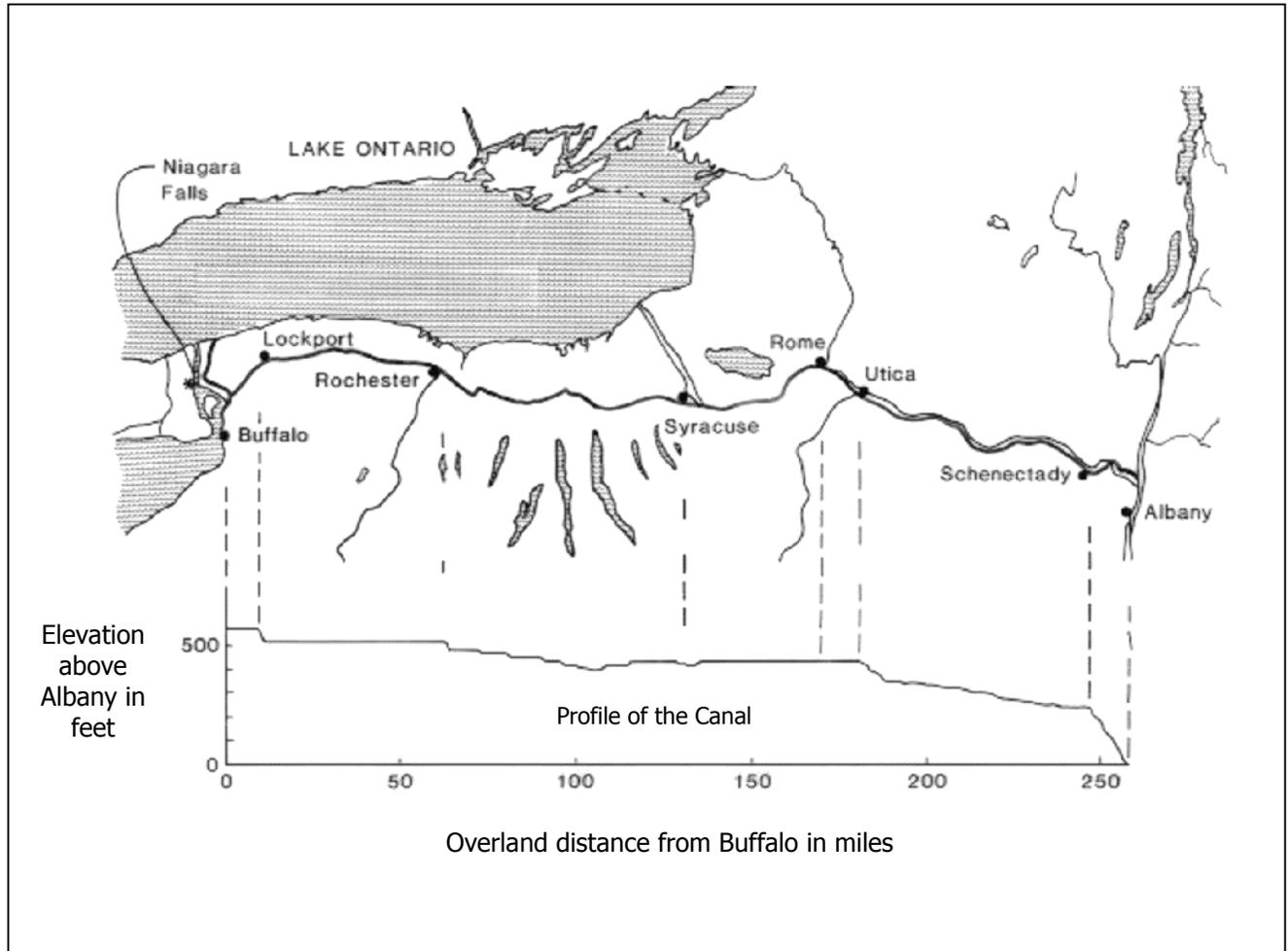
Visual 2

Map of New York State



Visual 3

Map of the Canal



Activity 1

Erie Canal Role Cards

MANUFACTURER # 1: I'm looking for new markets to sell my cloth. There are many people moving across the Appalachians to the Great Lake region. I need to transport large amounts to make a profit. It costs between \$90 and \$125 per ton to ship west. We would also like to be able to pay less for food.

MANUFACTURER #2: Farmers in the west need the tools I make so that they can produce more efficiently. Shipping them overland means I have limited ability to ship large quantities. Another way to transport my goods would also help those farmers ship us their crops more cheaply.

OHIO FARMER: I moved to this territory because land was plentiful and cheap. I can produce a lot of grain but it costs between \$90 and \$125 per ton to ship east where there is a demand for my crops. My family wants manufactured goods from the east like cloth, shoes, furniture and glassware but they are very expensive.

NEW FARMER from MASSACHUSETTS: I'm thinking about relocating to an area in Indiana where land is very inexpensive and very fertile. One of my neighbors has been trying to discourage me from going because he claims the shipping costs are so high I would have trouble staying in business.

IRISH IMMIGRANT: Several of my fellow Irishmen have heard that they could get work on constructing some kind of canal. We would receive wages of 80 cents a day for 10-12 hours which is more than I am getting now. Plus the distance is well over 300 miles so it should take a couple years. This means steady work. Local men along the route will also be hired.

Activity 1 (Continued)

BUILDER/DESIGNER: Governor Dewitt Clinton has hired a group of us to make an overland waterway to connect New York City to Lake Erie and Buffalo. The total distance is 363 miles long, has a constant depth of four feet, will be 28 feet wide at the bottom and 40 feet wide at the top. There is an ascent and descent of 675 feet through 83 locks. There will be 18 Aqueducts so the canal can go over rivers and large streams. Bridges will have to be constructed to carry the canal over roads and farms which will be cut by the waterway. It's quite an undertaking. Since we have never done anything like this before, we have no idea how long it will take or whether it will work. The geography will cause us problems and so will the materials and methods of construction. There are lots of hills, mountains, rivers, and swamps in the region that will be a challenge.

POLITICIANS (1817): We think that the construction of a canal that provides continual water transportation for shipping between New York and Lake Erie at Buffalo will bring economic growth and prosperity to the whole state. There are many resources in this area that can be used for many economic activities and we want to be able to make use of them. It will improve the standard of living for the people who live in this region.

Activity 2

Erie Canal Data

What are the dates for the building of the canal?	
Who were the groups that wanted the canal?	What benefits did they expect from the canal?
What productive resources did they need for construction?	
What were the problems of trade in this region?	
What types of jobs were created because of the canal?	

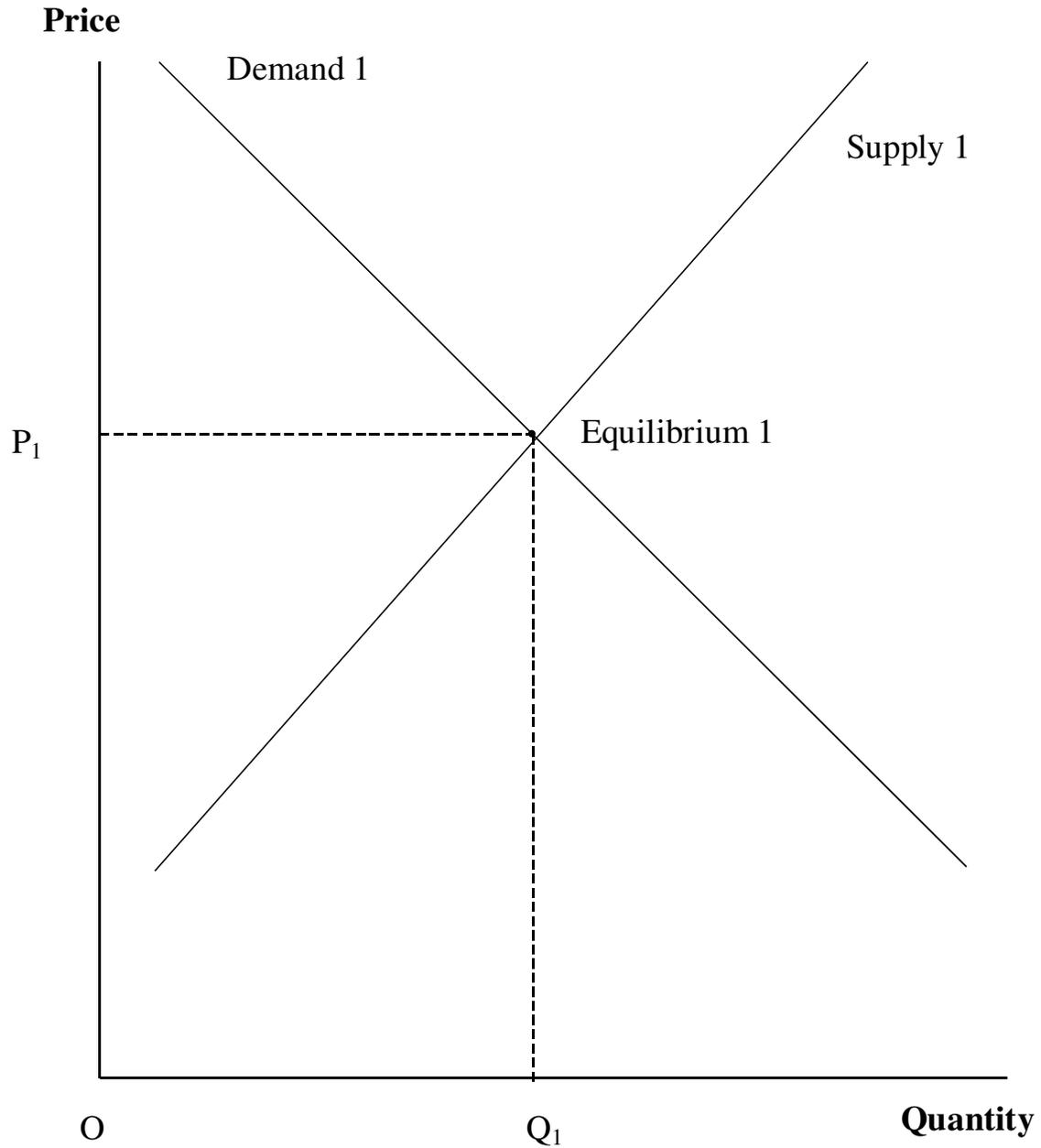
Activity 2 - Answers

Erie Canal Data

<p>What are the dates for the building of the canal?</p>	<p>1817-1825 1836-1862 Expanded for larger boats 1903-1918</p>
<p>Who were the groups that wanted the canal?</p> <p>Manufacturers</p> <p>Farmers</p> <p>Laborers</p> <p>Politicians</p> <p>Merchants</p> <p>Consumers</p>	<p>What benefits did they expect from the canal?</p> <p>Wanted new markets to sell their goods. Needed lower shipping costs.</p> <p>Needed to ship their crops east more cheaply. Connect to markets like New York City.</p> <p>Looking for jobs that were physical strength, wanted ones that were steady and lasting.</p> <p>Wanted the economy to grow.</p> <p>Lower costs meant that they could sell their goods more cheaply so that they could sell more total volume.</p> <p>Prices would come down on lots of goods.</p>
<p>What productive resources did they need for construction?</p>	<p>Natural resources: timber, rocks, water, horses</p> <p>Labor: construction workers, blacksmiths, engineers,</p> <p>Capital: tools, equipment, picks, shovels, wagons, boats</p>
<p>What were the problems of trade in this region?</p>	<p>There were too many natural obstacles so shipping was expensive. Like lots of rivers, many hills and mountains, swamps. Could not haul large amounts at one time. Equipment breakdowns of the horses and wagons.</p>
<p>What types of jobs were created because of the canal?</p>	<p>In addition to increasing the number of farmers, manufacturers, and merchants, the demand for construction workers, engineers, suppliers, blacksmiths, boat builders.</p>

Visual 4

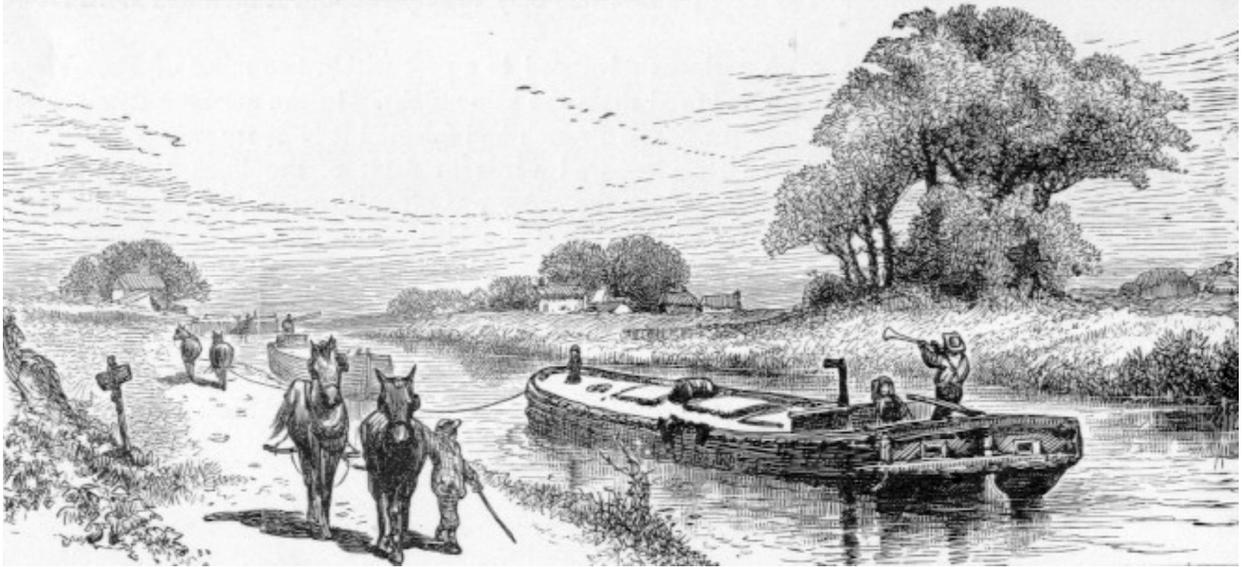
Supply & Demand Base Graph



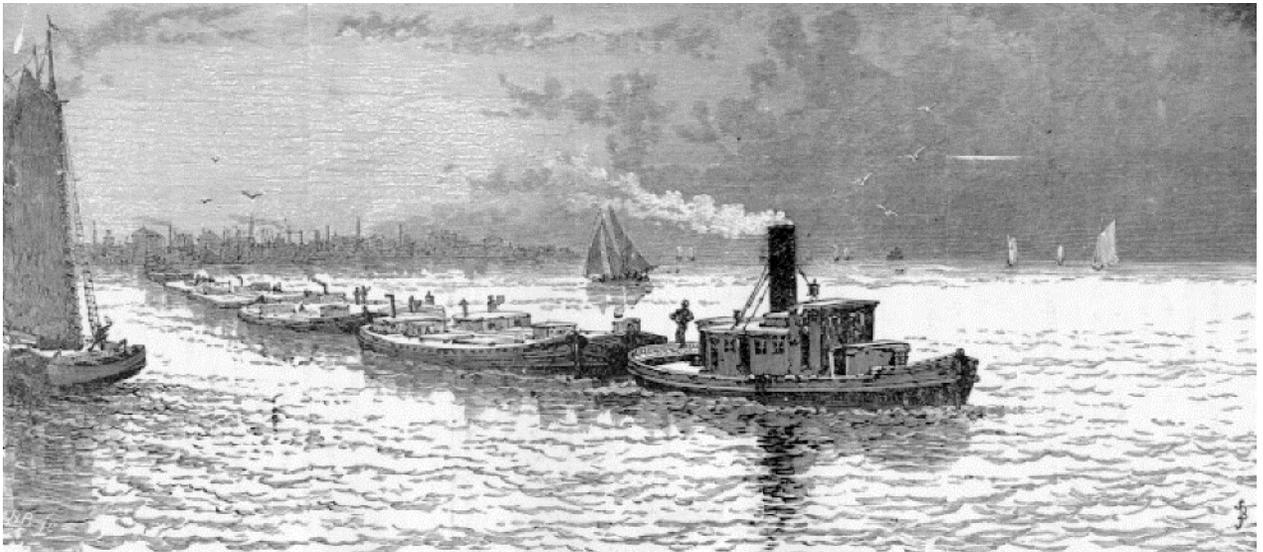
Effects on: Price
Quantity

Visual 5

Comparisons of Technology on the Canal



Mule Drawn Boat on the Canal



Steamboat on the Canal

Activity 3

ERIE GAZETTE

Fall 1835 Community Celebrates the Canal's
Tenth Anniversary

What a success the Erie Canal has had over the 10 years since its opening. We are gathered here to celebrate the waterway that connects New York City, as well as the state, with the areas of Ohio, Indiana and Illinois. Water transportation has historically been the least expensive way to ship large quantities of goods efficiently. Many jobs have been created, from the construction of 2000 canal boats to the employment of 8000 men and 9000 horses that help transport the goods along the canal. When first opened, shipping costs were \$90 - \$125 per ton for goods to go between New York and the Great Lakes. Today, that cost has dropped to \$4 per ton. What an advantage for all producers, whether farmer, merchant or manufacturer. The consumer has also benefited from lower prices and a wider variety of goods and services.

Summer 2000 Millions set Aside for Recreational Use of
The Erie Canal and Barge System

The New York State Legislature has approved several million dollars for the development of the New York State Barge Canal System as a tourist and recreational resource. Although the original Erie Canal had tough competition from the railroads and the interstate highways, it managed to stay in business until 1994. The Erie Canal was enlarged between 1836 and 1862. Boats on the canal were then able to carry 250 tons of freight, while the earlier ones were limited to 30 tons. Tolls were abolished in 1882 and more canals were added between 1903 and 1918. Technology changed the methods of operation to steam, diesel, and electricity. Small size and high labor costs caused the shutting down of the barge/canal system for commercial traffic.

Background Information for Teacher



National Canal Museum

Hugh Moore Historical Park and Museums

Erie Canal

The Erie Canal was the most famous and successful of America's early towpath canals. The Erie Canal was able to breach the barrier of the Appalachian Mountains and link Lake Erie with the Hudson River. The Erie Canal was also an integral part of a larger system of New York state canals which bound together the Hudson River with Lake Champlain and the Canadian canals that flowed to the St. Lawrence River. Branches of this New York State Canal also linked the Finger Lakes and reached the Susquehanna River System.

The ancestor of the Erie Canal was the Western Inland Lock Navigation Company which was chartered by the New York State Legislature in 1792. The goal of this company was the creation of an uninterrupted water transportation route from The Hudson River to Lake Ontario by improving and linking the Mohawk River, Oneida Lake and the Oneida River. After experiencing immense technical and financial difficulties, the Western Inland Navigation company did create a one mile canal to by-pass the Little Falls of the Mohawk River. Although the company collected tolls for use of its canal, its revenue barely provided enough funds to keep its locks in working order.

Despite the limited success of the Western Inland Locks Navigation Company, many prominent commercial and political leaders began to call for the creation of a state built canal that would cross New York to link the Hudson river with Lake Erie. Foremost among them was DeWitt Clinton, a former mayor of New York City and nephew of George Clinton, the long term governor of New York State. His advocacy of what would become the Erie Canal won him election as Governor of New York in 1817. On July 4, 1817, ground was broken for the Erie Canal at a site near Rome, NY. Few present at this impressive ceremony realized the tremendous task that awaited the canal's builders. The Erie Canal would be over 363 miles long and its builders would have to overcome rivers, swamps, and hills. Its channel would be 28 feet wide at the bottom and 40 feet wide at the top. The canal would have a uniform depth of 4 feet. The entire canal would have an ascent and descent of 675 feet which would be overcome through use of 83 locks. Eighteen aqueducts would carry the canal over rivers and large streams. Numerous bridges had to be built across the canal to accommodate roads and farms which were severed by the waterway.

Background Information for Teacher

The Erie Canal was built through the combined efforts of local laborers and Irish immigrants. They were each paid 80¢ per day for 10 to 12 hours of toil. Since no civilian engineering schools existed in the United States, during the years during which the Erie Canal was built, the Erie Canal was designed by men who learned on the job. The most important of these engineers were Benjamin Wright, James Geddes, Nathan Roberts, Canvass White, and John Bloomfield Jervis. Many of these individuals would later go on to build other canals and make important contributions to the development of American civil engineering. It was Canvass White who first manufactured hydraulic cement on this continent. Hydraulic cement was to become an essential part of canal and bridge construction since it would harden and bond under water. John Bloomfield Jervis developed key innovations that helped to make railroads possible in much of the United States and he also created New York City's famed Croton water supply system.

The Erie Canal was finished on November 4, 1825 when Governor DeWitt Clinton poured a keg of Lake Erie water into the New York Harbor. The Erie Canal soon became a great commercial success. Before the completion of the Erie Canal, it cost between \$90 and \$125 to ship a ton of cargo between Buffalo and New York City. Within the first ten years of the canal's existence, the cost had dropped to \$4 per ton. Within a year of the opening of the Erie Canal some 2,000 boats, 9,000 horses and 8,000 men were employed in the transportation of goods on the canal. Despite the later competition of railroads, the Erie Canal continued to be a great success. The Erie Canal made it possible for both New England and immigrant farmers to settle and develop the rich farmlands of the Mid-western states of Ohio, Indiana, and Illinois. These farmers would send their crops to eastern markets via the canal and receive in return manufactured goods. Since much of this trade was centered at New York City, this seaport soon became America's largest and most prosperous city.

The Erie Canal was enlarged between 1836 and 1862. After the completion of this enlargement, boats that could carry up to 250 tons of cargo rapidly replaced the earlier boats which could carry only 30 tons of goods. In 1868, the Erie Canal carried 3 million tons of freight. During 1882, all tolls were abolished on the New York State canals. To take advantage of changes in technology, the Erie Canal and the other major branches of the New York State Canal System were transformed into the Barge Canal System between 1903 and 1918. On this system, boats and barges were pushed or pulled by steam or diesel powered tug boats and the locks were operated by electricity. The New York State Barge Canal carried commercial traffic until 1994 when its relatively small size coupled with rising labor cost brought this traffic to an end. However, during the late 1990's, the federal and state governments are spending millions of dollars to enhance and increase recreation use of the New York State Canal System.

Background Information for Teacher

For further information, read:

Andrist, Ralph K.; The Erie Canal; New York, NY: American Heritage, 1964.

Shaw, Ronald; Erie Water West; Lexington, KY: University of Kentucky Press, 1996.

Sheriff, Carol; The Artificial River; New York, NY: Hill and Wang, 1996.

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