

# Explore TECHNOLOGY

## Overview

Students will investigate a variety of technologies used along the Silk Road (e.g. sericulture, papermaking, astrolabe, water clock). They will then invent a new technology or improve upon an existing one.

## Background for Educator

The Silk Road was a conduit not only for tangible goods but also for the scientific knowledge that underlies invention and innovation. As goods moved east and west as well as north and south along these trade routes, so did the ways they were made. These technologies helped transform the societies to which they spread. Key among them were silk making, paper making, and metalworking. Scientific knowledge in subjects such as astronomy and mathematics also moved across Asia.

## Before Your Visit

### Class Discussion: What is Technology?

Discuss with students why technology is important. Ask: What technologies are critical for your life today? Which could you live without? How are technological innovations shared and spread? (*Answers may vary.*) Then ask students to discuss and define “technology.” (*Definition: the application of scientific knowledge for a variety of purposes, which has given rise to innovations ranging from stone tools to silk making to semiconductors.*) Tell students that they’ll encounter a variety of technological innovations in the *Traveling the Silk Road* exhibition, including sericulture (silk making), papermaking, and metalworking, along with scientific instruments such as an astrolabe and a water clock.

### Activity: Sketch a Gadget

[mos.org/sln/Leonardo/SketchGadgetAnatomy.html](http://mos.org/sln/Leonardo/SketchGadgetAnatomy.html)

Have students practice their observational drawing skills using simple gadgets or machines gathered from your classroom or homes.

## During Your Visit

### Traveling the Silk Road Exhibition

#### 3rd floor (30-45 minutes)

Have students explore the exhibition and select one technology to focus on for their **student worksheet** investigation. Remind students that technology is more than recent inventions such as the microchip and the internet.

### Stout Hall of Asian Peoples

#### 2nd floor (15-20 minutes)

After leaving the Silk Road exhibition, descend the staircase one flight and enter the Stout Hall of Asian Peoples through the door to your left. Towards the center of the hall, visit the China section (yellow walls) to explore Chinese inventions, such as the compass, crossbow, scissors, abacus, and objects made from kingfisher feathers and silk.

## New York State Social Studies Standards

### Standard 2—World History

#### Performance Indicator 2.2e

Investigate key events and developments and major turning points in world history to identify the factors that brought about change and the long-term effects of these changes.

**Plan how your students will explore *Traveling the Silk Road*.** In the exhibition, students will investigate one technology (e.g. sericulture, papermaking, astrolabe, water clock). You may wish to assign students the technology before coming to the Museum, or you may prefer to give them the choice once they’re in the exhibition.

Distribute copies of the **student worksheets** to students before coming to the Museum.

In *Traveling the Silk Road*, students can stamp Passports as they enter each of the four cities. Pick up the Passports at the exhibition entrance.

## Back in the Classroom

### Class Discussion: Technology Then & Now

Use these open-ended questions to help students reflect on what they learned during their visit.

- Why do you think the particular technologies represented in the exhibition were selected? *(Answers may vary.)*
- Which of these technologies continue to be of importance today? *(Answers may include: Paper, metal, glass, ceramics, and textiles.)*
- Think of a modern parallel to the technology that you explored in the exhibition. How has it transformed life in the 21st century? *(Parallels may include: papermaking/computers, silk/high tech fabrics, glass/silicone, astrolabe/ modern navigational counterpart such as a Global Positioning System.)*
- How has technology changed the way we live and communicate both in the past and today? *(Answers may vary.)*
- What invention would you like to see developed in your lifetime? How might it affect the lives of your family and friends? *(Answers may vary.)*

### Activity: Design Your Own Innovations

#### [popsci.com/scitech/gallery/2009-08/gallery-scouting-guide-top-high-school-inventors](http://popsci.com/scitech/gallery/2009-08/gallery-scouting-guide-top-high-school-inventors)

Have students read this article from the September 2009 issue of *Popular Science* that features eight high-school inventors. Have students work in small groups to brainstorm inventions they'd like to see developed or to develop themselves. Have groups present their ideas to the class.

## Additional Resources

### Chinese Inventions: Can You Name Them?

[afe.easia.columbia.edu/song/readings/inventions\\_ques.htm](http://afe.easia.columbia.edu/song/readings/inventions_ques.htm)

A list of China's contributions to the West and a timeline of Chinese inventions and when they spread to Europe.

### China Institute: "East-West Exchange: Silk, Paper, Porcelain"

[chinainstitute.org/\\_data/n\\_0002/resources/live/fromsilktooil\\_pdfs.pdf](http://chinainstitute.org/_data/n_0002/resources/live/fromsilktooil_pdfs.pdf)

This curriculum unit explores the importance of East-West cultural exchange. Paper, silk, and porcelain were all invented in China and exported to the West. Students will evaluate the impact of these technologies along the Silk Road.

### Astrolabe: A User's Guide

[saudiaramcoworld.com/issue/200703/the.astrolabe.a.user.s.guide.htm](http://saudiaramcoworld.com/issue/200703/the.astrolabe.a.user.s.guide.htm)

Students who focused on the astrolabe can explore this technology further with this additional information about how to use an astrolabe.

### Rediscovering Arabic Science

[saudiaramcoworld.com/issue/200703/rediscovering.arabic.science.htm](http://saudiaramcoworld.com/issue/200703/rediscovering.arabic.science.htm)

General information about Islamic science from the 8th-16th centuries.

### The Spread of Ideas and Technologies Along the Silk Road

Imagine you're traveling along the Silk Road. You can make a significant contribution to your own culture by carefully observing the technologies you encounter and bringing the information back to your homeland.

SELECT the Silk Road technology that interests you the most. What is it called?

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DESCRIBE why you think this technology is particularly interesting and/or innovative.

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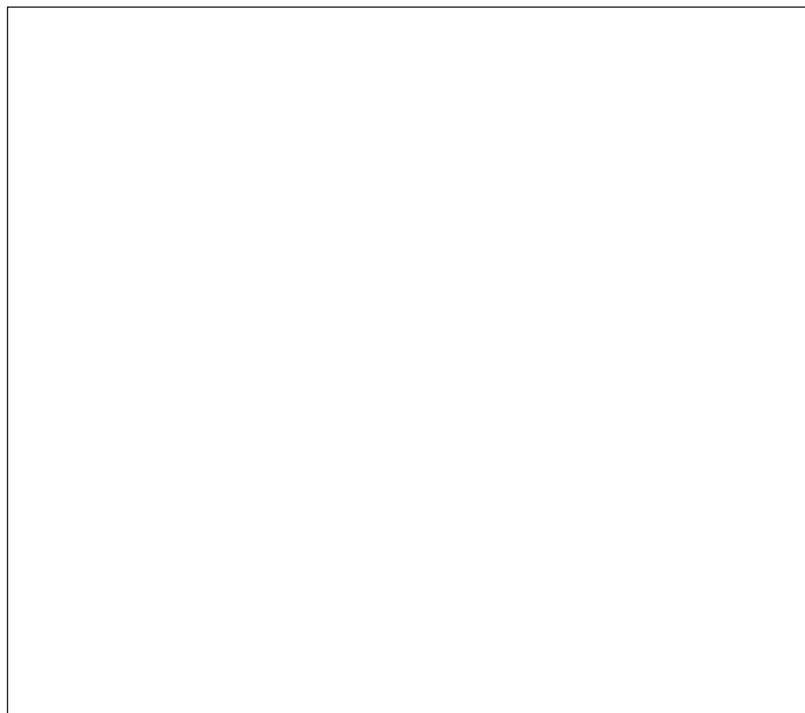
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**Draw an illustration** that captures the most important features of the technology. **Label the illustration** so that you can explain it on your return home. **Explain** how the technology works.

What **questions** do you have about this invention?



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## ANSWER KEY

### The Spread of Ideas and Technologies Along the Silk Road

Imagine you're traveling along the Silk Road. You can make a significant contribution to your own culture by carefully observing the technologies you encounter and bringing the information back to your homeland.

SELECT the Silk Road technology that interests you the most. What is it called?

*(Answers may include: silk making, papermaking, metalworking, ceramics, textiles, astrolabe, water clock.)*

DESCRIBE why you think this technology is particularly interesting and/or innovative.

*(Answers may vary.)*

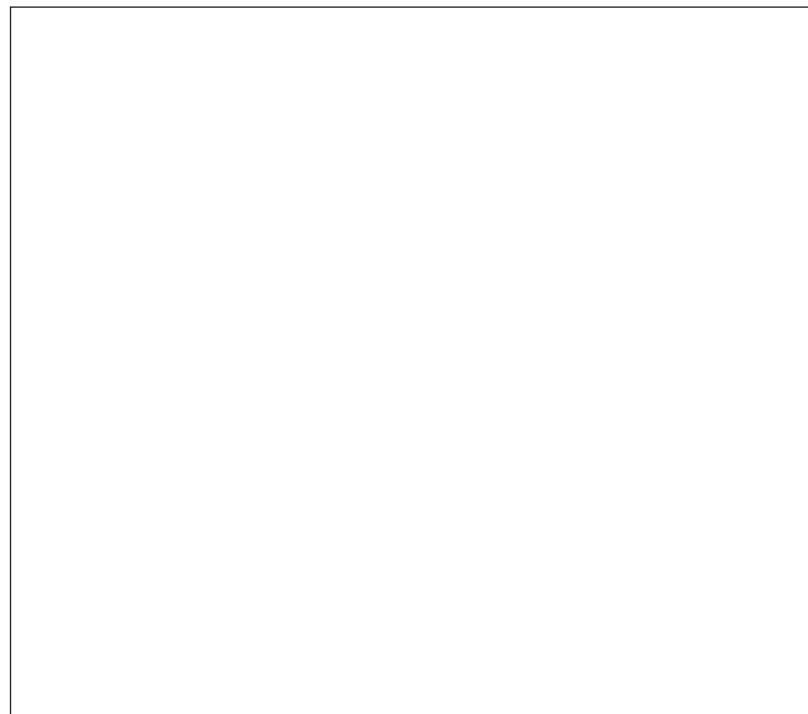
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**Draw an illustration** that captures the most important features of the technology. **Label the illustration** so that you can explain it on your return home. **Explain** how the technology works.



What **questions** do you have about this invention?

*(Answers may vary.)*

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# *New York State* **STANDARDS**

## **NEW YORK STATE SOCIAL STUDIES STANDARDS FOR LEARNING**

### **Elementary**

#### Standard 2: World History

##### Students:

- 2.1c study about different world cultures and civilizations focusing on their accomplishments, contributions, values, beliefs, and traditions.
- 2.2c compare important events and accomplishments from different time periods in world history.
- 2.3a understand the roles and contributions of individuals and groups to social, political, economic, cultural, scientific, technological, and religious practices and activities.
- 2.3b gather and present information about important developments from world history
- 2.4a consider different interpretations of key events and developments in world history and understand the differences in these accounts.
- 2.4b explore the lifestyles, beliefs, traditions, rules and laws, and social/cultural needs .and wants of people during different periods in history and in different parts of the world
- 2.4c view historic events through the eyes of those who were there, as shown in their art, writings, music, and artifacts.

#### Standard 3: Geography

##### Students:

- 3.1a study about how people live, work, and utilize natural resources.
- 3.1d identify and compare the physical, human, and cultural characteristics of different regions and people.
- 3.1e investigate how people depend on and modify the physical environment.
- 3.2a ask geographic questions about where places are located; why they are located where they are; what is important about their locations; and how their locations are related to the location of other people and places.

#### Standard 4: Economics

##### Students:

- 4.1a know some ways individuals and groups attempt to satisfy their basic needs and wants by utilizing scarce resources.
- 4.1d study about how the availability and distribution of resources is important to a nation's economic growth.
- 4.1e understand how societies organize their economies to answer three fundamental economic questions: What goods and services shall be produced and in what quantities? How shall goods and services be produced? For whom shall goods and services be produced?
- 4.1f investigate how production, distribution, exchange, and consumption of goods and services are economic decisions with which all societies and nations must deal.

## New York State STANDARDS (cont'd)

### Middle School

#### Standard 2: World History

Students:

- 2.1b know some important historic events and developments of past civilizations.
- 2.1c interpret and analyze documents and artifacts related to significant developments and events in world history.
- 2.2c study about major turning points in world history by investigating the causes and other factors that brought about change and the results of these changes.
- 2.3a investigate the roles and contributions of individuals and groups in relation to key social, political, cultural, and religious practices throughout world history.
- 2.3b interpret and analyze documents and artifacts related to significant developments and events in world history.
- 2.4c view history through the eyes of those who witnessed key events and developments in world history by analyzing their literature, diary accounts, letters, artifacts, art, music, architectural drawings, and other documents.

#### Standard 3: Geography

Students:

- 3.1a map information about people, places, and environments.
- 3.1c investigate why people and places are located where they are located and what patterns can be perceived in these locations.
- 3.1d describe the relationships between people and environments and the connections between people and places.

#### Standard 4: Economics

Students:

- 4.1a explain how societies and nations attempt to satisfy their basic needs and wants by utilizing scarce capital, natural, and human resources.
- 4.1b define basic economic concepts such as scarcity, supply and demand, markets, opportunity costs, resources, productivity, economic growth, and systems.

### High School

#### Standard 2: World History

Students:

- 2.1b understand the development and connectedness of Western civilization and other civilizations and cultures in many areas of the world and over time.
- 2.1d understand the broad patterns, relationships, and interactions of cultures and civilizations during particular eras and across eras.
- 2.2e investigate key events and developments and major turning points in world history to identify the factors that brought about change and the long-term effects of these changes.
- 2.3a analyze the roles and contributions of individuals and groups to social, political, economic, cultural, and religious practices and activities.
- 2.3b explain the dynamics of cultural change and how interactions between and among cultures has affected various cultural groups throughout the world.
- 2.3c examine the social/cultural, political, economic, and religious norms and values of Western and other world cultures.
- 2.4b interpret and analyze documents and artifacts related to significant developments and events in world history.

## New York State STANDARDS (cont'd)

### Standard 3: Geography

#### Students:

- 3.1a understand how to develop and use maps and other graphic representations to display geographic issues, problems, and questions.
- 3.1d understand the development and interactions of social/cultural, political, economic, and religious systems in different regions of the world.
- 3.1e analyze how the forces of cooperation and conflict among people influence the division and control of the Earth's surface .
- 3.1f explain how technological change affects people, places, and regions.

### Standard 4: Economics

#### Students:

- 4.1a analyze the effectiveness of varying ways societies, nations, and regions of the world attempt to satisfy their basic needs and wants by utilizing scarce resources.
- 4.1f explain how economic decision making has become global as a result of an interdependent world economy.

## NEW YORK STATE SCIENCE CORE CURRICULUM

### Elementary

LE7.1a Humans depend on their natural and constructed environments.

LE 7.1b Over time humans have changed their environment by cultivating crops raising animals, creating shelter, using energy, manufacturing goods, developing transportation, changing populations, and carrying out other activities.

### High School

#### Living Environment Standard 1

1.1b Learning about the historical development of scientific concepts or about individuals who have contributed to scientific knowledge provides a better understanding of scientific inquiry and the relationship between science and society.

#### Living Environment Standard 4

1.1b An ecosystem is shaped by the nonliving environment as well as its interacting species. The world contains a wide diversity of physical conditions, which creates a variety of environments.

7.3a Societies must decide on proposals which involve the introduction of new technologies. Individuals need to make decisions which will assess risks, costs, benefits, and trade-offs.

7.3b The decisions of one generation both provide and limit the range of possibilities open to the next generation.