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Introduction

Researchers in the field of archaeology have made important discoveries about innovations in ancient China. These finds include porcelain and pottery decorated with lustrous glazes. Other finds include elaborate bronze and jade statues. One tomb even contained an “army” of life-sized figures! These and other excavated artifacts continue to tell us new stories of China’s past.

This book will examine innovations in ancient China in the fields of government, philosophy, science and technology, and writing and papermaking. To better understand the development of these innovations, let’s examine China’s ancient history.

The World of Ancient China

Many of the archaeological finds researchers have made are from two of China’s most significant early dynasties: the Qin (chin) and Han dynasties. But China’s long history precedes these two dynasties. Chinese civilization actually dates back more than 3,500 years. China is an enormous country with a variety of geographic features. Rugged mountains, harsh deserts, and lush forests are just some of its different landscapes. At first, these mountains and deserts isolated China from other civilizations. Over time, a major trade route was created that would eventually transport people, goods, and ideas to other cultures.
Shang and Zhou Dynasties

The first dynasty, or ruling family, to make lasting changes in China was the Shang. The Shang’s rule began thousands of years ago and lasted 500–700 years. The Shang built large city-states along the Huang He (Yellow River). These city-states had several different classes. The Shang also established a bureaucracy — a government organized into levels. This system would serve as a model for China’s future governments.

Ancient China’s Early Dynasties

[Map showing the regions of Shang, Zhou, and Qin dynasties]
In about 1050 B.C.E., a people called the Zhou (joh) overthrew the Shang. In order to convince people to accept them, Zhou rulers invented a new, more dignified philosophy of government called the “Mandate of Heaven.” It stated that the god of Heaven determined who should rule China.

China’s geography made it difficult to unite the country. Independent states often fought the Zhou for their lands. This time became known as the “Warring States Period.” In the midst of this conflict, early Chinese literature and several schools of philosophy began to develop and spread. The best-known philosopher of this time was named Confucius.

Confucius proposed that people and governments should follow a moral and ethical code. He traveled to many areas of China, advising leaders and taking on students. After Confucius died, some of his students continued to spread his ideas. Eventually, his ideas developed into a distinct belief system known as Confucianism.

**The Qin Dynasty**

In 221 B.C.E., the Qin dynasty took power. The Qin used a strong army to conquer several independent states in northern China. Their leader called himself the First Emperor, or Qin Shihuang (chin shir hwong). His 15-year reign began a long tradition of emperors ruling over China.

Qin Shihuang outlawed Confucianism and created a new form of government based on a philosophy called Legalism. This philosophy of government said that people were evil by nature. As a result, the only way to control them was
through strict laws and punishments. In turn, these laws led to a strong central government, military, and economy — all under the control of Qin Shihuang.

Although Qin Shihuang wanted to control China, he also wanted the country to run more smoothly. He created an elaborate bureaucracy, dividing and subdividing all the areas of the empire. Each subdivided area had a governor, a military leader, and an imperial inspector. Each one had to send reports to the emperor and owed their positions to him. These innovations helped to unify the empire.

Despite these innovations, Qin Shihuang proved to be a brutal leader, with a fierce temperament. During his reign, the government tried to control people’s lives and punished them severely for breaking any laws. It also taxed people heavily to pay for public projects, such as the building of the Great Wall. Many others were forced to work on these projects, often for long periods of time.

The Han Dynasty

After Qin Shihuang’s death, the Qin dynasty collapsed. A nomadic people from western China, the Han, led by Liu Bang gained control of the Qin empire. The Han dynasty (202 B.C.E.–220 C.E.) would usher in an era of creativity lasting almost 400 years.

Liu Bang moved away from the Qin’s strict legal code and restored the ideas of Confucius. While the Han embraced these ideas to some degree, they still maintained power and control within a strong, central government.
The Han dynasty can be divided into two periods: the Early and Later Han. During the Early, or Western, Han dynasty (206 B.C.E.–8 C.E.), leaders instituted changes in both government and education to better reflect Confucian ideals. Han government officials took tests to determine how well they understood the lessons of Confucius. Schools taught his teachings, students became Confucian scholars, and the government then recruited them to fill bureaucratic jobs. In the Later, or Eastern, Han dynasty (25–220 C.E.), Han rule led to significant innovations in science and technology.

**Science and Technology**

One key need that Qin Shihuang had identified was for an improved transportation system. Although the roads of ancient China may not measure up to our superhighways, they helped Qin Shihuang rule over his empire.
The Great Wall of China is the largest human-made structure in the world.
China’s Great Wall

The Great Wall’s ultimate purpose was defense — to protect China from invasion by its hostile northern neighbors. But it also served another purpose: to keep Chinese subjects from fleeing across the border to escape cruel rulers.

Before the Qin dynasty, there really was no “great wall.” Instead, there were a series of many smaller, separate walls. The Great Wall’s construction, designed to unify and improve upon these older walls, was never finished during Qin Shihuang’s reign. Other dynasties, including the Ming dynasty (1368 – 1644 C.E.), were left to complete and extend the Wall. Ironically, it proved of little real defensive value, as northern invaders would later overrun it.

Today, the Great Wall runs about 1,500 miles across China and is about 25 feet tall. However, damage has occurred in several parts, while others have disappeared completely. The Chinese government has passed laws to protect the Great Wall and is working to educate people about its history, as a way to help gain their support in preserving it. The new laws make it illegal to take bricks, carve into the Wall, or even build a house next to it.

Archaeologists trying to preserve the Great Wall have also uncovered previously unknown sections of it. One such find is located near China’s northern border with Mongolia. These discoveries may mean that even more sections — and more clues to China’s past — remain to be found!
People often used wooden carts to transport their goods. By creating a system of weights and measures, Qin Shihuang ensured that the carts’ axles would all be the same length. Since the wheels made ruts in the roads, having carts with the same axle length improved travel. Road building could then be standardized, improving efficiency.

Qin Shihuang also established a uniform monetary system. He instituted the use of a round copper coin with a square hole in the center. This standardized currency allowed people to buy and sell goods at consistent prices, again improving efficiency.

During the Later Han dynasty, innovators developed more new products. The Chinese belief in life after death prompted some people to research how to prolong life. This research, according to a school of philosophy known as Taoism (or Daoism), was called alchemy. The people who performed these experiments were called alchemists.

Alchemists often mixed chemicals together for their experiments. In one experiment, they heated and dried chemicals into a fine black powder. Then they ignited the powder, which caught fire and exploded. One of the alchemists wrote down the chemical combination to this explosive concoction. This mixture became the basis for what we know as gunpowder.

During the Han dynasty, people in China placed a small amount of the black powder into hollow bamboo sticks. They threw the sticks into a fire, where they crackled loudly as they exploded. This was the beginning of firecrackers, and later, fireworks. The Chinese people began using firecrackers and
fireworks to celebrate happy occasions such as weddings, believing that the crackling noise scared away evil spirits.

Alchemists also invented a spoon-shaped disc made of lodestone. Lodestone is a mineral that lines up facing north or south, depending on its location in relation to Earth’s magnetic field. The disc also had an iron needle in the center. The alchemists knew that iron and lodestone worked together. If a person faced a certain way, the iron needle would point toward the north, perhaps to a constellation in the northern sky. If the person faced the opposite way, the needle pointed south, toward stars in the southern sky. Their innovation became the first magnetic compass, a device we still use today.

Initially, alchemists used the compass for fortune telling, or their attempts to accurately predict the future (which we now know is impossible!). Pictures and markings on the compass symbolized heaven, earth, and the Big Dipper.

The compass became part of the Confucian practice of respecting one’s ancestors. Alchemists believed that the compass could help them figure out the best times and locations to bury their relatives — an important way to honor them. Only later would other people determine that the best use for the compass was to help ships navigate the oceans.
Writing and Papermaking

Some innovations were developed over several dynasties. One of the Shang’s major achievements was an early writing system. Like other ancient civilizations, this system used pictographs, or pictures that looked like the words they represented.

Chinese writing and language changed during the Qin dynasty. Both writing and language varied from place to place, making communication difficult. As a result, Qin Shihuang ordered Chinese pictographs to be the same to make reading government reports easier. This change led to a new form of Chinese writing called calligraphy.

The Chinese wrote on silk or bamboo stalks. Neither material worked well. An official in the Han government is said to have experimented with different materials to try to solve the problem. He soaked pieces of plants in water to weaken their fibers. Then he beat the soft material into pulp. After he poured the pulp into a mold to shape it, he dried it on a flat frame. The result is considered the first true paper ever made. The official repeated this process, combining other materials, including bamboo, tree bark, and even fishing nets. In time, other combinations were tested, leading to a better type of paper.

This official is said to have reported his creation to the Han emperor in about 105 c.e. However, recent archaeological discoveries of ancient paper remains suggest its invention may have happened earlier in the Han dynasty.
Seismographs and Wheelbarrows: 
Shake, Rattle, and Roll

China lies near the “Ring of Fire,” an earthquake-prone zone that runs around the Pacific Ocean. As a result, many parts of China experience frequent earthquakes. The unpredictable nature of earthquakes led a Han inventor named Zhang Heng to take action. He invented the world’s first seismograph, or earthquake detector.

This device used a large bronze vat with several bronze dragons in the middle. Each of these mythical creatures faced a different direction and had a ball in its mouth. When an earthquake struck, the ball fell from the mouth of a dragon, indicating the direction of the tremor.

Another Han inventor, said to be named Ko Yo, figured out a way to combine a wheel and a lever to move loads. By centering the load slightly behind one wheel, he could push or roll the load. This invention made it much easier for workers. It saved them the effort of lifting or carrying heavy loads — and the expense of keeping a farm animal to handle this chore. This invention became known as the wheelbarrow.

Even today, we use both types of innovations. While modern seismographs are much more sophisticated than the first one, the design of the wheelbarrow remains largely the same. Some ideas are so simple and effective that there’s no reason to change them!
The Silk Road

The emperors who succeeded the Han’s Liu Bang encouraged trade outside of China’s borders. For example, Emperor Wudi (141–87 B.C.E.) heard rumors of a strong and wealthy country to the west. In 119 B.C.E., he sent an official there, seeking to form a mutual alliance against invaders.

The official eventually reached India after a difficult journey of many years. When he returned to China, he told the emperor about the vast distance between the countries, which made a defensive pact impossible. However, the emperor suggested trading Chinese goods for Indian goods. So, the official returned to India along the same route with silk and other Chinese products. This route became one of the world’s first global trading routes, the Silk Road. Eventually, it would reach all the way to Europe.
Other trade routes developed between China and India. In addition to goods, the Silk Road helped to spread a new religion called Buddhism to China. Buddhism would become a major religion during China’s later dynasties.

The Silk Road established a permanent connection between China and the West. Although the Han dynasty fell in 220 C.E., many traders continued to carry its innovations—including paper, gunpowder, and silk, which were now valuable trade items—out of China along the Silk Road.

Paper would spread throughout eastern Asia and eventually to Europe. As societies grew more complex, people began using paper to write books and record official documents. The introduction of Buddhism and the desire to record its teachings also increased the demand for paper.
By the 900s, paper had reached India, Egypt, Syria, and Morocco. It took almost another 200 years for it to reach Europe. By the 1400s, the use of the moveable-type printing press (another innovation from China) made paper even more valuable.

Like paper, gunpowder also spread to other cultures via the Silk Road. For many centuries following its discovery, gunpowder remained almost exclusively in the hands of the Chinese.

From fireworks, the Chinese developed early types of bombs and cannons. Later, they developed early versions of firearms.

Today, we use replicas of China’s first fireworks to celebrate happy events.
Then in the 1200s, an Italian explorer named Marco Polo became one of the first Europeans to visit China. As he returned home, he carried Chinese goods, including fireworks, to many Middle Eastern countries. There, Europeans probably acquired these fireworks and brought them home with them.

Modern Impact of Ancient Innovations

Now that you’ve read about innovations in ancient China, think about their impact on your life today. Consider the lanes on our interstate highways. Would you be surprised to learn that they are roughly the same width as the rutted roads of the Qin dynasty? Reflect on the ancient Chinese compass. That basic device has evolved into the global positioning system (GPS). Consider also how most modern governments depend on a bureaucracy, some more effective than others, of course!

Now, try to remember all the different kinds of paper you have used just today. For a school report perhaps? To wrap, or unwrap, a favorite food? To print out a photograph from a digital camera? Modern paper comes in many forms and is very different from the first paper made in China, yet it is still made following similar steps to those perfected by the ancient Chinese.

Although the ancient Chinese may not have been able to predict the future, they likely wouldn’t have been surprised to learn how long their innovations would last. Will today’s innovations — ones you yourself may create — last as long?
Glossary

alchemists *n.* people who performed the experiments that led to the discovery of gunpowder and the magnetic compass

bureaucracy *n.* a government that is organized into levels

Confucianism *n.* a belief system that emphasizes leading an honorable life by respecting one’s family members and ancestors

dynasty *n.* a series of rulers from a single family

Great Wall *n.* a 25-foot tall wall that runs about 1,500 miles across northern China

Han dynasty *n.* a long dynasty that followed the Qin dynasty and lasted nearly 400 years (202 B.C.E. – 220 C.E.)

Mandate of Heaven *n.* a philosophy of government that stated that the god of Heaven determined who should rule China

Qin dynasty *n.* a relatively short dynasty that replaced the Zhou dynasty and lasted 15 years (221 B.C.E. – 206 C.E.)

seismograph *n.* an earthquake detector

Shang dynasty *n.* the first ruling family to making lasting changes in China

Silk Road *n.* a major trade route that transported people, goods, and ideas

Zhou *n.* a people who overthrew the Shang dynasty and created the “Mandate of Heaven”
Responding

**TARGET SKILL** Fact and Opinion Which statements in *Innovations from Ancient China* are facts? Which are opinions? Copy and complete the chart below.

<table>
<thead>
<tr>
<th>Fact</th>
<th>Opinion</th>
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<tbody>
<tr>
<td>?</td>
<td>The wheelbarrow made life much easier for workers.</td>
</tr>
<tr>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

**Write About It**

**Text to Self** Write two paragraphs explaining the information on pages 7–11 about innovations in science and technology. Be sure to include the main ideas of the section.
In a famous quotation, Aung San Suu Kyi said, “Please use your freedom to promote ours.”

What freedoms do you value most? Why? Write a letter to the editor of a Burmese newspaper explaining the freedoms you have and why they are important to you.

###TARGET SKILL

**Fact and Opinion** Decide whether an idea can be proved or is a feeling or belief.

**TARGET STRATEGY** **Question** Ask questions about a selection before you read, as you read, and after you read.

**GENRE** **Informational Text** gives facts and examples about a topic.

###TARGET VOCABULARY

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###EXPAND YOUR VOCABULARY

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