

The Amazing Khmer

5 The Khmer people of Cambodia ruled a kingdom in Southeast Asia from the 500s-1700s C.E. At its height of power, the Khmer Empire controlled Cambodia, Laos, and parts of Thailand and Vietnam. The capital city was Angkor, which meant “capital city.” This city grew to be the largest urban area in the world at the time. It covered nearly 400 square miles and had a population of up to 750,000 people. But of more importance than this are the feats of engineering and architecture that occurred in this empire.

10 Important buildings in Angkor, such as the royal palace and various temples, were constructed of stone. Two types of stone were used: laterite (a hard stone made from compressed soil) and sandstone. Both were quarried in the Kulen Hills, about 30-40 miles north of the city. Each block weighed between 400 and 700 pounds. They were transported to the city by canal, and then moved to the construction site over wooden rollers using elephants and manpower. At the site, they were smoothed and hoisted into place using bamboo scaffolding, ropes, and pulleys. No mortar was used to hold them in place. Rather, they used tenon and mortise joints (much like Legos), dovetail joints (wedge shaped grooves and projections that fit together), and gravity. The finished structure was then encased with the softer sandstone slabs on which sculptors carved intricate designs and scenes. Every inch of a building was decorated. The final step was to whitewash and paint the building and sometimes put gold gilt on the domes. This required a large labor force and it could take up to 60 days to carve just one block. It is believed that more stone was used in building Angkor than all of the monuments of Ancient Egypt combined.

25 The climate of Southeast Asia is dominated by monsoons. During the rainy season, May to October, heavy rains could cause flooding. The dry season, October to May, resulted in near drought conditions. Since the economy of Angkor was based on rice production, they needed to create a waterworks system that would both divert and store floodwater. This was achieved by creating an elaborate network of canals and reservoirs. During the rainy season, a system of canals diverted floodwaters from the Kulen Hills and Siem Reap River into temple moats and reservoirs called barays. If necessary, the water could be sent by a canal system south of the city to Tonle Sap Lake. In the dry season, water from the moats and barays could be sent to the rice fields south of Angkor. The canals used the slope of the land to move the water.

35 Construction of the canal system, temple moats, and barays was all done by hand. The soil removed was used to build embankments along and around them that were 6-7 feet tall. On these embankments, roads were constructed. The canals extended 20 miles or more north and south of Angkor. The canals were wide and 3-7 feet deep. Temple moats and barays were always square or rectangular in shape. They always faced east to west. They, too, were 3-7 feet deep. Their size varied with the largest baray being 3 miles wide and 5 miles long. All of these waterways and storage basins were unlined, allowing water to help replenish the water table of the area. Construction and maintenance of this vast waterworks system required a large labor force.

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With all of this knowledge and ability, Angkor and the Khmer Kingdom slowly collapsed. There are several theories for why this happened. One is that the building projects and waterway maintenance became too much to manage with the labor force available. As a result, some of the waterways began to silt up and became unusable. Another theory deals with climate change. There were two major droughts in the late 1300s and early 1400s that so depleted the water system that when the normal monsoon pattern returned, it was not enough to replenish the system. A third deals with a change in how the economy got its revenue. The Khmer switched from an income based on rice cultivation to one based on maritime (ocean) trade with China and India. This made maintaining a vast waterworks system less important. In reality, it was probably the combination of all three plus internal strife and outside invasion that brought about the end of the Khmer Kingdom and the city of Angkor. By the early 1700s, the kingdom had collapsed and the city had been abandoned. Rediscovered in the mid-1800s, the secrets of Khmer technological advances have slowly been revealed.

The Amazing Khmer-Teacher Script

Show Slide 1 Title Slide and introduce the topic.

Show Slide 2 The Khmer people of Cambodia ruled a kingdom in Southeast Asia from the 500's-1700s C.E. At its height of power, it controlled Cambodia, Laos, and parts of Thailand and Vietnam.

Show Slide 3 The capital city was Angkor, which meant "capital city". This city grew to be the largest urban area in the world at the time. It covered nearly 400 square miles and had a population of up to 750,000 people. But of more importance than this are the feats of engineering and architecture that took place.

Show Slides 4-6 Important buildings in Angkor, such as the royal palace and temples, were constructed of stone. Two types of stone were used: laterite (a hard stone made from compressed soil) and sandstone. Both were quarried in the Kulen Hills, about 30-40 miles north of the city. Each block weighed between 400 and 700 pounds.

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Show Slide 8-10 At the site, they were smoothed and hoisted into place using bamboo scaffolding, ropes, and pulleys. No mortar was used to hold them in place. Rather, they used tenon and mortise joints (much like Legos), dovetail joints (wedge shaped grooves and projections that fit together), and gravity. The finished structure was then encased with the softer sandstone slabs on which sculptors carved intricate designs and scenes. Every inch of a building was decorated. The final step was to whitewash and paint the building and sometimes put gold gilt on the domes. This required a large labor force and it could take up to 60 days to carve just one block. It is believed that more stone was used in building Angkor than all of the monuments of Ancient Egypt combined.

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Construction of the canal system, temple moats, and barays was all done by hand. The soil removed was used to build embankments along and around them that were 6-7 feet tall. On these, roads were constructed. The canals extended 20 miles or more north and south of Angkor. The canals were wide and 3-7 feet deep. Temple moats and barays were always square or rectangular in shape. They always faced east to west. They, too, were 3-7 feet deep. Their size varied with the largest baray being 3 miles wide and 5 miles long. All of these waterways and storage basins were unlined, allowing water to help replenish the water table of the area. Construction and maintenance of this vast waterworks system required a large labor force.

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Angkor Writing Prompt 1

Name _____

Directions: You are the Chinese diplomat Zhou Daguan. You have just returned to the Chinese imperial capital after living for a year in the Khmer capital city of Angkor. It is now your task to write a summary of what you observed and learned during that time. Be sure to include in your report information about the building techniques of the Khmer, their waterworks system, and what possible problems they face. Write your rough draft in the space provided on this paper. Then either write or type your final copy on a separate sheet of paper.

Scoring Information:

- Introduction (2 pts)
- Identified what natural resources the Khmer used to create their civilization (5 pts)
- Described the building techniques of the Khmer (5 pts)
- Described their waterworks system (5 pts)
- Describe what possible problems they face in sustaining their empire (5 pts)
- Conclusion (3 pts)
- Good grammar and spelling (5pts)

Angkor Writing Prompt 2

Name _____

You have just read about the Khmer empire. Pick one of the civilizations that we have already studied and compare the Khmer empire to this civilization in terms of:

1. Location of the civilizations at their height (give dates)
2. How each civilization used its natural resources/environment to sustain the people
3. What forms of technology were created or used to benefit from the natural resources/environment
4. Are both civilizations still thriving today

Scoring Guide

- Introduction (5 pts)
- Locations of the 2 civilizations (5 pts)
- Identified at least 2 natural resources found in the environment that sustained the growth of population (10 pts)
- Identified at least 2 forms of technology created or used to benefit from the natural resources/environment (10 pts)
- Described both civilizations today (5 pts)
- Conclusion (5 pts)
- Good grammar and spelling (5pts)

Scoring Guide Angkor Writing 1

Student Name _____

Requirements	Points Possible	Points Earned
Introduction	2	
Identified what natural resources the Khmer used to create their civilization	5	
Described the building techniques of the Khmer	5	
Described their waterworks system	5	
Describe what possible problems they face in sustaining their empire	5	
Conclusion	3	
Good Grammar and Spelling	5	
Total	30	

Scoring Guide Angkor Writing 1

Student Name _____

Requirements	Points Possible	Points Earned
Introduction	2	
Identified what natural resources the Khmer used to create their civilization	5	
Described the building techniques of the Khmer	5	
Described their waterworks system	5	
Describe what possible problems they face in sustaining their empire	5	
Conclusion	3	
Good Grammar and Spelling	5	
Total	30	

Scoring Guide Angkor Writing 2

Student Name _____

Requirements	Points Possible	Points Earned
Introduction	5	
Gave the locations of the 2 civilizations that will be compared	5	
Named at least 2 natural resources	10	
Identified at least 2 forms of technology created or used to benefit from the natural resources/environment	10	
Described both civilizations today	5	
Conclusion	5	
Good Grammar and Spelling	5	
Total	45	

Scoring Guide Angkor Writing 2

Student Name _____

Requirements	Points Possible	Points Earned
Introduction	5	
Gave the locations of the 2 civilizations that will be compared	5	
Named at least 2 natural resources	10	
Identified at least 2 forms of technology created or used to benefit from the natural resources/environment	10	
Described both civilizations today	5	
Conclusion	5	
Good Grammar and Spelling	5	
Total	45	