

# The Influence of the Arch

## By ReadWorks



The lasting influence of ancient Rome is apparent in many areas of our contemporary society. Sophisticated elements of law, engineering, literature, philosophy, architecture, and art can all be traced back to the Roman Empire. But perhaps one of the most lasting contributions from Roman civilization is something we see nearly every day: the Roman arch.

An arch is a curved structure designed to support or strengthen a building. Arches are traditionally made of stone, brick, or concrete; some modern arches are made of steel or laminated wood. The wedge-shaped blocks that form the sides of an arch are called voussoirs, and the top center stone, called the keystone, is the last block to be inserted. During construction, the arch is supported from below before the keystone is put in. The curve of an arch may take different shapes, but it is often a rounded or pointed semicircle.

Although the Romans revolutionized the arch, the structure has been around since before them. The Assyrians used arches to construct vaulted chambers or underground drains. However, these early arches were only suitable for small structures. The designs weren't sophisticated enough to support larger edifices, like palaces or government buildings.

The Romans, however, improved the arch and made it strong enough for large-scale, widespread use. By developing an arch capable of supporting huge amounts of weight, they laid the groundwork for some of the most important advancements in architectural history. The arch became a vital feature of bridges, gates, sewers, and aqueducts, which in turn were integral to the modernization of cities.

So how did the Romans do it? With their vast knowledge of engineering and design, Roman architects developed a very strong type of concrete by mixing lime and volcanic sand. Arches made of this material could support extremely heavy weights. In most cases, the Romans didn't use mortar, but instead relied on the precision of their stonework to ensure the sidewalls of the arch could withstand the pressure from the keystone.

After the arch, Roman architecture continued to evolve with improvements on the vault. A vault is an arched overhead structure that provides a space with a ceiling or roof. Like the arch, the vault has been around since ancient times. But it was the Romans who created a rigid, solid structure that didn't need any external buttresses or supports. This advancement allowed the Romans to easily construct vaults over vast spaces to create

amphitheaters and basilicas. The vault also led to the development of the copula and the dome, proving just how far-reaching the arch's influence goes.

An arch is more supportive than a horizontal beam due to the downward pressure on an arch. The development of the arch and the vault were also crucial to the construction of what may be one of the most recognizable structures on earth: the Roman Coliseum. Its vaulted arches made the ceilings much stronger than a flat ceiling. In construction, there are many benefits to using arches instead of straight beams. Arches are advantageous to horizontal beams (known as lintels) because they're made of small blocks of brick or stone, and therefore can span wider openings.

It wasn't long before cultures around the world adopted the new and improved Roman arch. Muslims from the Arab world modified the Roman design and created pointed, scalloped and horseshoe arches in their magnificent palaces and mosques. These unique arches came to be emblematic of Islamic art and architecture. In Europe, the pointed arch was used extensively in Gothic architecture. Not only did pointed arches increase a structure's strength and stability, but they also created the soaring, spacious feel characteristic of many Gothic churches. By the Middle Ages, more complex arch and vault structures were introduced.

The Roman Arch also set the foundation for the magnificent triumphal arch. These imposing structures are generally built over large thoroughfares to commemorate important military victories. They're often ornately decorated and detailed with inscriptions. It's estimated that at one time, Rome alone had over 50 triumphal arches.

Today only a handful remain, and the Arch of Constantine in Rome and the Arc de Triomphe in Paris are two of the most recognizable triumphal arches.

Centuries after the fall of the Roman Empire, modern arches use the same basic blueprint. Over time, the arch has come to define some of the most impressive buildings around the world. From the Taj Mahal in India to the U.S. Capitol Building in Washington, D.C., the arch gives many buildings a sense of elegance, grandeur, and sophistication.

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. What is the arch designed to do?

- A improve the look of a building
- B support or strengthen a building
- C provide a foundation for a building
- D protect the exterior of a building

2. How does the author compare the arch to the horizontal beam?

- A The arch is heavier than the horizontal beam.
- B The arch costs less money than the horizontal beam.
- C The arch is less supportive than the horizontal beam.
- D The arch is more supportive than the horizontal beam.

3. Read the following sentences: "The Assyrians used arches to construct vaulted chambers or underground drains. However, these early arches were only suitable for small structures.... With their vast knowledge of engineering and design, Roman architects developed a very strong type of concrete by mixing lime and volcanic sand. Arches made of this material could support extremely heavy weights."

Based on this information, what can be concluded about the material the Assyrians used to make their arches?

- A It was most likely not as strong as the material the Romans used.
- B It was most likely stronger than the material the Romans used.
- C It was most likely the same material the Romans used.
- D It was most likely similar to the material the Romans used.

4. The ability of arches to support huge amounts of weight is due to improvements in what?

- A the design of the arches only
- B the material of the arches only
- C neither the design nor the material of the arches
- D both the design and the material of the arches

5. What is this passage mainly about?

- A improvements and uses of the arch
- B architectural designs of different societies
- C the difference between Assyrian and Roman architecture
- D famous buildings and stadiums

6. Read the following sentence: "The designs weren't sophisticated enough to support larger **edifices**, like palaces or government buildings."

As used in this sentence, what does the word "**edifices**" most nearly mean?

- A civilizations
- B innovations
- C materials
- D structures

7. Choose the answer that best completes the sentence below.

\_\_\_\_\_ the Romans improved the arch, the Muslims made modifications to the Roman design.

- A Before
- B However
- C After
- D Because

8. According to the passage, what are some of the structures that use arches?

---

---

---

---

9. According to the passage, how did the ancient Romans improve the arch?

---

---

---

---

---

10. Explain at least two ways improvements to the arch led to advancements in architecture. Use information from the passage to support your answer.

---

---

---

---

---

## Teacher Guide &amp; Answers

Passage Reading Level: Lexile 1110

1. What is the arch designed to do?

- A improve the look of a building
- B support or strengthen a building**
- C provide a foundation for a building
- D protect the exterior of a building

2. How does the author compare the arch to the horizontal beam?

- A The arch is heavier than the horizontal beam.
- B The arch costs less money than the horizontal beam.
- C The arch is less supportive than the horizontal beam.
- D The arch is more supportive than the horizontal beam.**

3. Read the following sentences: "The Assyrians used arches to construct vaulted chambers or underground drains. However, these early arches were only suitable for small structures.... With their vast knowledge of engineering and design, Roman architects developed a very strong type of concrete by mixing lime and volcanic sand. Arches made of this material could support extremely heavy weights."

Based on this information, what can be concluded about the material the Assyrians used to make their arches?

- A It was most likely not as strong as the material the Romans used.**
- B It was most likely stronger than the material the Romans used.
- C It was most likely the same material the Romans used.
- D It was most likely similar to the material the Romans used.

4. The ability of arches to support huge amounts of weight is due to improvements in what?

- A the design of the arches only
- B the material of the arches only
- C neither the design nor the material of the arches
- D both the design and the material of the arches**

5. What is this passage mainly about?

- A improvements and uses of the arch**
- B architectural designs of different societies
- C the difference between Assyrian and Roman architecture
- D famous buildings and stadiums



6. Read the following sentence: "The designs weren't sophisticated enough to support larger **edifices**, like palaces or government buildings."

As used in this sentence, what does the word "**edifices**" most nearly mean?

- A civilizations
- B innovations
- C materials
- D **structures**

7. Choose the answer that best completes the sentence below.

\_\_\_\_\_ the Romans improved the arch, the Muslims made modifications to the Roman design.

- A Before
- B However
- C **After**
- D Because

8. According to the passage, what are some of the structures that use arches?

**Suggested answer:** Student answers may vary. Structures students may mention include:

- vault chambers
- underground drains
- palaces and government buildings
- bridges
- gates
- sewers
- aqueducts
- the Roman Coliseum
- the Taj Mahal
- the U.S. Capitol Building

9. According to the passage, how did the ancient Romans improve the arch?

**Suggested answer:** The Romans improved the design of the arch and developed a lime- and volcanic-sand-based material to be used to build arches which could support extremely heavy weights.

10. Explain at least two ways improvements to the arch led to advancements in architecture. Use information from the passage to support your answer.

**Suggested answer:** Student answers may vary and should be supported by the passage:

- Students should indicate that the Roman improvements to the arch allowed the arch to support huge amounts of weight. As a result, the arch became a vital feature of bridges, gates, sewers, and aqueducts.
- Improvements to the vault, which is an arched overhead structure that provides a space with a ceiling or roof, were made after improvements to the arch. This allowed Romans to easily construct vaults over vast spaces to create amphitheatres and basilicas. The development of the arch and the vault were crucial to the Roman Coliseum. The vault also led to the development of the cupola and the dome.
- Muslims modified the Roman arches to make magnificent palaces and mosques. Arches were used in Gothic architecture, creating soaring, spacious churches.
- The Roman arch set the foundation for the magnificent triumphal arch.
- Modern arches use the same basic blueprint of arches established by the Romans.