**The Influence of the Arch (Predicting)**

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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.

**Directions for Close Read of Technology and Engineering Example**

**“The Influence of the Arch”**

Directions to teachers:

* During planning stage, read the text carefully, choosing key words/phrases that will help the students predict the content of the article.
* If possible, underline the chosen words in the article.
* Create a hand out or post the list of words on the board.
* Introduce the text before handing it out.
* Have students discuss how these words/phrases might be used in the text. (This may be as a whole-class activity or in small groups.)
* Ask students to use the words in a paragraph.
* Have students read the article in small groups, as a class, or individually.
* After reading, discuss with students how their predictions compared with the text.

Directions to students: Use the words below, in the order that they appear, to write a brief paragraph. You may change the words slightly (for example, Rome to Romans), but you must include all the words.

ancient Rome

arch (curved opening in a wall)

keystone

widespread use

bridges, gates, sewers

precision of the stonework

vault (arched overhead structure creating a ceiling)

cultures around the world

Middle Ages

over time

U. S. Capitol Building in Washington, D.C.