CHAPTER 12
ARCHITECTURE
ART MEETS ENGINEERING

- Architecture: 3D art that creates interior spaces AND wraps space in an expressive shape.

- Three Key Issues:
  1. **Function**: How is the building to be used?
  2. **Form**: How does it look?
  3. **Structure**: How is it going to stand up?
**Structural Systems in Architecture**

- **Shell system**: one building material provides both structural support and outer skin (sheathing).

  - Adobe (mud-brick)
  - Stone buildings
  - Log Cabins

- This was the primary way of making buildings prior to the 19th century.
Structural Systems in Architecture

- **Skeleton and skin system**: Framing system supports the building and the exterior sheathing serves to keep the elements out.

  - Balloon frame
  - Cast Iron
  - Steel and Reinforced Concrete

- The majority of buildings and homes today use these techniques.
Dry Masonry: no mortar is used, the weight of the stones themselves holds the structure up.

- Walls are constructed in layers. Lower layers are the thickest at the bottom, and become thinner as the structure rises.

- This type of architecture has few or no windows.

- When construction is done with a consistent pattern in stone, it is called masonry.
POST AND BEAM/LINTEL CONSTRUCTION

- Two upright elements (posts) support a horizontal crosspiece (beams/lintels).

- Commonly made of wood and stone.

- Earliest posts and beams may have been bundles of reeds.

**Round (Roman) Arch**

- A method of spanning space (making windows/openings) in a wall without compromising the buildings strength.

- Decreases the needed amount of materials.

- Not able to support itself until the keystone (the topmost stone) is put into place.

- Must be a semi-circle to be a round or Roman arch.

*Pont du Gard, France. Figure 12.9. Combined height is 161 feet. Built about 2,000 years ago. This attests to its excellence in design and construction.*
Round Arch.

- During Construction, temporary wooden supports carry the weight of the stones. When the keystone is in place the wood support is removed.
BARREL VAULTS AND GROIN VAULTS

The area underneath the intersection of two vaults is referred to as the bay.
Pointed (Gothic) Arch and Vault

- A taller type of arch that allows for larger openings.
- Used by Gothic architects as a means of allowing more light into a building.
- Walls of stained glass supported on the exterior of the building by flying buttresses and piers.

*Notre Dame de Chartres. 1145–1513.*
Height 122', width 53', length 130'.
Dome

- An arch rotated at 180 on degrees on its vertical axis.

- Form perfected by the Romans.

- Some domes are meant to be appreciated from the interior of the structure; others meant to be viewed exclusively from the exterior.

- Come in a variety of shapes: round, pointed, semi-hemispherical.
Hagia Sophia, exterior. 532–535.

Hagia Sophia, interior. 532–535.