



# ARCHI TREKS

ArchiTreks gets kids excited about architecture, science, engineering, and more through fun and educational adventures as they explore and discover their surroundings.

Age Range: Kindergarten - 5th Grade

Subject: Architecture



# Lesson 2: Structure

[Lesson based on "Architecture: It's Elementary" Kindergarten Lesson 5 pg. 61](#)

Lesson Intro:

How come a bench is able to support your weight and resist the gravity pulling it towards the earth? How do buildings manage to stay upright? And how do all of those shapes stick together? When you can find the smaller structures hidden inside a building's design, you can also see how the architect used them in the best way possible to make that building strong.

Lesson Duration: 60 minutes

Video Link:

<https://www.pbs.org/video/dptv-education-architreks-structures/>

Objectives:

- Introduce the structural principles of opposing forces tension and compression
- Develop knowledge of three-dimensional forms
- Develop a basic vocabulary of structural principles and components

Materials:

- Student Handout pages for each student
- Pencil
- Coloring materials

Vocabulary:

- Arch
- Beam
- Column
- Compression
- Dome
- Flying Buttress
- Forces
- Gravity
- Tension
- Vault

# Lesson 2: Structure (continued)

[Lesson based on "Architecture: It's Elementary" Kindergarten Lesson 5 pg. 61](#)

Activity:

1. Read and discuss intro with students "How come a bench is able to support your weight and resist the gravity pulling it towards the earth? How do buildings manage to stay upright? And how do all of those shapes stick together? When you can find the smaller structures hidden inside a building's design, you can also see how the architect used them in the best way possible to make that building strong."
2. Show video (see link above)
3. Display and discuss pictures of buildings with different types of structural systems (next page). Ask the class to think of more familiar structures that demonstrate the same principles; for example, the column and beam structure of playground equipment or the vault shape of a tunnel.
4. Take the students on a structure search in your neighborhood. Look for examples of these structures. Ask the students to discuss the function of each structure.
5. Give students a copy of the "Acting Out Structures" handout. Have the class "act out" different structural systems, calling attention to concepts such as the following:
  - a. Some structures, such as a column, can function independently.
  - b. Other structures, such as an arch, require cooperative effort or "opposing forces."
  - c. Notice how tension and compression forces can be used to oppose the force of gravity. Demonstrate tension using string or rubber band, and compression by pushing hands together.
6. Have students complete the "Explain It" section on their student handout.

Assessment Opportunity:

- A. Observe the students and their ability to act out and describe the function of different building structures.
- B. Review student's writing/drawing. Look for their understanding of the function of different building structures.

# Lesson 2: Structure

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Arch



Column & Beam



Flying Buttress



Vault / Tunnel



Column



Dome



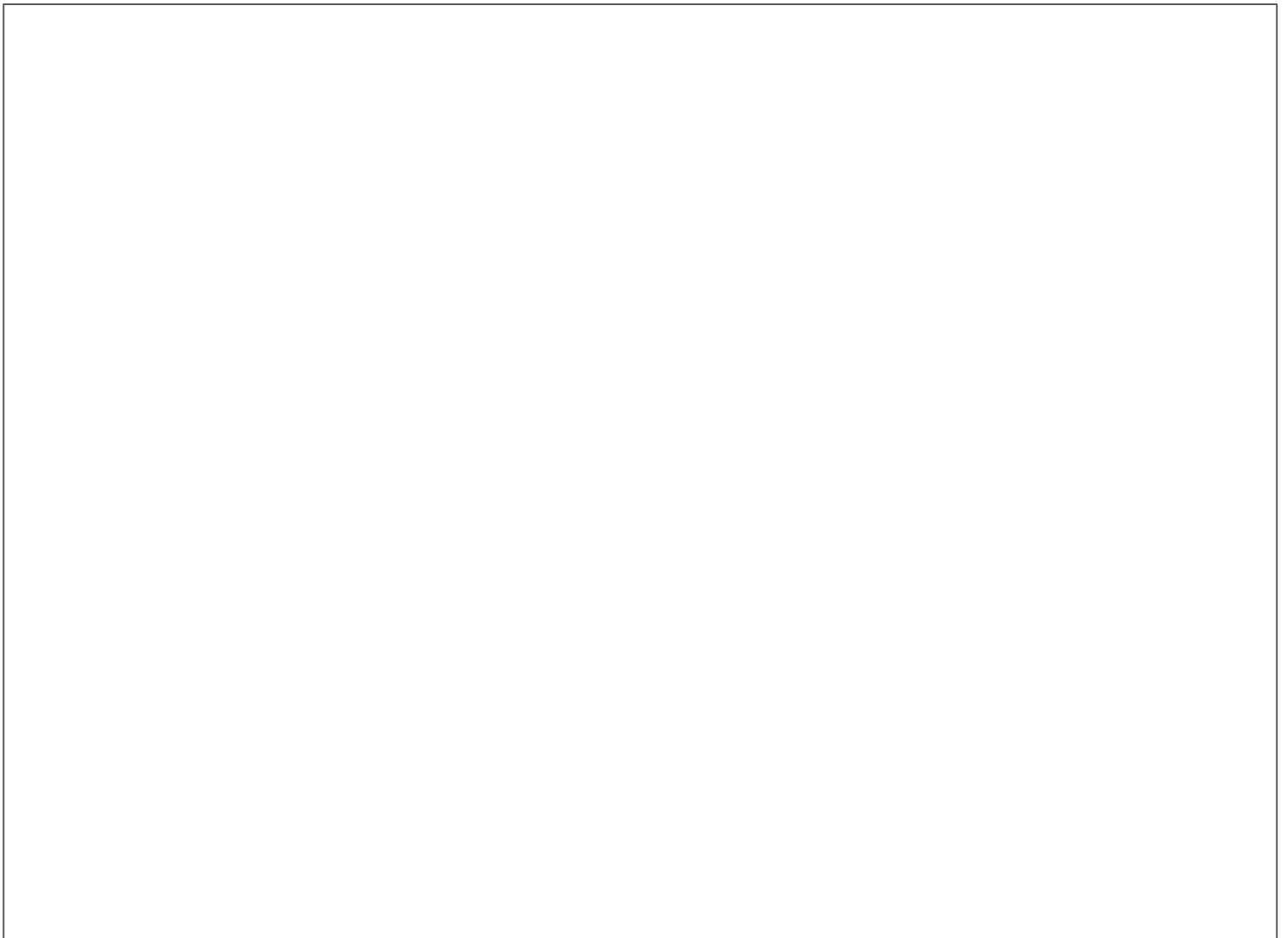
# Lesson 2: Structure

## Act It Out!

Act out each of the different building structure on the back of this sheet. Choose one and write or draw an explanation of how the design helps support the building.

## Explain It!!

Choose one structure and write or draw an explanation of how you think the design helps support the building.





# Acting Out Structures



Arch



Column & Beam



Flying Buttress



Vault / Tunnel



Column



Dome



# Glossary

**Adaptive Re-Use** (noun) - To take an existing building that had one purpose and renovate it to be used for a different purpose

**Arch** (noun) - A curved structure, as of masonry, that supports the weight of material over an open space as in a bridge, doorway or gateway

**Beam** (noun) - A piece of wood, metal or stone that spans from support to support and holds the weight of the floor, roof or material above it

**Circle** (noun) - A plane figure bounded by a simple curved line; every point is equally distant from the point at the center of the figure

**City** (noun) - In the United States, an incorporated municipality whose boundaries and powers of self-government are defined by a charter from the state in which it is located

**Civilization** (noun) - Advancement in social culture characterized by relative progress in the arts, sciences and statecraft

**Column** (noun) - A vertical support for supporting horizontal structural members

**Compression** (noun) - The state of being pushed together or squeezed together, which results in a decrease in volume

**Dilapidation** (noun) - The natural deterioration of a building due to neglect

**Dome** (noun) - A hemispherical roof or one formed by a series of rounded arches or vaults on a round or many-sided base

**Domesticate** (verb) - To tame, as to tame a wild animal; To accustom to home life

**Ecology** (noun) - The branch of biology that deals with the relationship between living organisms and their environment

**Environment** (noun) - All the conditions, circumstances and influences surrounding and affecting the development of human habitat for both shelter and community

**Flying Buttress** (noun) - An inclined masonry structure outside of the wall of a building; connected to the building by an arch designed to resist the outward pressure imposed by a vault or the building's roof; usually found in Gothic churches

**Forces** (noun) - Strength, energy, vigor and power

# Glossary

**Gravity (noun)** - The force that tends to draw all bodies in the Earth's sphere toward the center of the Earth

**Green Roofs (noun)** - A living roof that is partially or completely covered with vegetation, and which provides extra insulation and provides a habitat for wildlife.

**Historic (adjective)** - Referring to an example from the past

**Interrelate (adjective)** - To be interconnected

**Landmark (noun)** - Any prominent object marking a locality, often one of historical interest; Any object on land that serves as a reference point or a destination point

**Neighborhood (noun)** - A community or district composed of people living near one another

**Nomad (noun)** - People who travel from place, never permanently settling in one area

**Preservation (noun)** - Protection from harm and/or damage

**Rectangle (noun)** - A four-sided plane figure with four right (90-degree) angles; the opposite sides are parallel and equal

**Restoration (noun)** - The act of returning a building to its original condition

**Semicircle (noun)** - A circle cut in half

**Shape (noun)** - That quality of an object which depends on the relative position of all points composing its outline or external surface; physical or spatial form

**Square (noun)** - A two-dimensional figure having four equal sides and four right angles

**Sustainable (noun)** - Meeting present needs without preventing future generations from being able to meet theirs; includes respect for the environment and for people

**Tension (noun)** - The state or condition of being pulled or stretched

**Triangle (noun)** - A geometric figure having three angles and three sides

**Vault (noun)** - A masonry covering over an area which uses the principle of the arch