



PARTHENON EDUCATIONAL RESOURCES

STEAM EXPEDITION TO THE PARTHENON

ARCHITECTURE CHALLENGE: RULES & DIRECTIONS

Dear Team Chaperone,

You are leading your team of students on the Architecture Challenge to learn more about ancient Greek architecture. The rules and tips are listed here to help you lead your group.

You will read everything out loud. Begin by reading the Rules and Directions out loud. Continue to read out the Architecture Challenge at each stop.

Italicized = tips • Underlined = vocabulary • Red = safety info

STEAM Architecture Challenge Rules:

- Stay with your Team.
- Complete as much of the Architecture Challenge as possible in approximately 30 minutes.
- Be ready for your next STEAM experience on time.

STEAM Architecture Challenge Directions:

- Gather on the porch of the Parthenon (above museum entrance).
- During this entire station, we will be outside. If you are cold, try to stay in the sun. If you are wet, try to stay up in the colonnade under the roof. Do some jumping jacks for warmth!
- Team chaperones have the Architecture Challenge guide on their clipboard (this is it!).
- Chaperones will be leading your team through the Architecture Challenge.
- Parthenon staff Katie will be roving around to help all teams with any questions!
- Quick Architecture Challenge overview:
 - The Architecture Challenge has 4 Stops.
 - Stop 1 is right here—you made it, yay!
 - Stop 2 is up the middle steps, over at a corner column.
 - Stop 3 is halfway down the long side of the Parthenon.
 - Stop 4 is all the way down at the other corner.
 - Hint: At Stop 4, we will be looking for the sign that says "Can You See Me?" Does everyone see this sign on the Parthenon base over at the corner? At Stop 4 you will be all the way down the other end of the Parthenon playing peek-a-boo with this sign.

**CAN YOU
SEE ME?**



PROGRAM IN PROGRESS
DO NOT MOVE THIS SIGN

Let the Architecture Challenge begin!

Start reading:

Stop 1

Welcome to the Architecture Challenge!

There is a lot of STEAM hidden in the architecture of the Parthenon. Our mission today is to discover the engineering feats of the Parthenon, built over 2,400 years ago in Athens, Greece! We will study this exact replica here in Nashville, Tennessee, to learn about how ancient Athenians solved problems in construction.

From here, look up to find a big, long triangle. This is called a pediment.

What gods do you see in this pediment? Hint: look in the middle of the triangle to see two famous Greek gods!

Next, I need everyone to notice long lines on the building. Can you see:

- The long horizontal line at the base of this triangular pediment?
- The long horizontal lines of the base steps of the building?
- The vertical lines of the columns?

These long lines are actually curved! There are ZERO straight horizontal lines in the Parthenon.

The Athenians used advanced architectural refinements to trick our eyes. They understood STEAM concepts and designed the Parthenon to have corrections to correct how human eyes see lines. You are seeing very slight curves-- everywhere! The Parthenon curves up in the middle—very slightly—to help it look exactly, perfectly straight to our human eyes.

Come gather around me to see an example.

On my clipboard, I have a laminated page full of drawings so you can see these curves for yourself.

(show laminated page--the image to right)

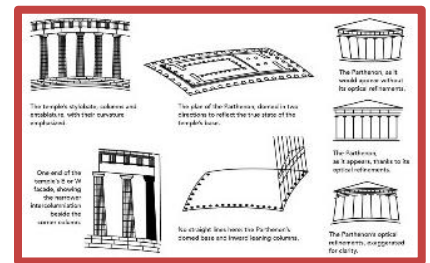
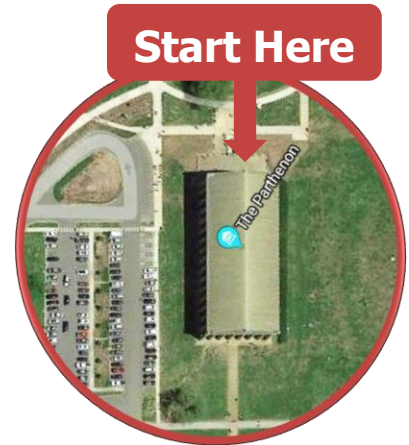


Image credit: www.greece-is.com/the-optical-illusions-that-make-the-parthenon-perfect/

Let's look to our left and right to find tall buildings in the distance. Do they look like they are slightly sagging in the middle? They are not curved like the Parthenon.

We must stay together and walk together up only one flight of steps to Stop 2 near the corner columns.

*Proceed to Stop 2— walk up ONE set of steps *human-sized steps are in the middle* to the colonnade and walk to the corner. Gather inside the corner columns.*

Stop 2

We are now at a corner of the Parthenon. Are these Doric columns larger or wider than you expected? Where do they look the widest to you?

Give your group a minute to make observations out loud.

These Doric columns are widest about 1/3 of the way up. It can be hard for our eyes to notice this small curve. I have a test to find the widest part.

Here's how you do this test:

- Look at a column that is far away.
- Use both hands to divide the column in three equal parts.
- Your lower hand will be at the widest part of the column!

These curves in architecture is called entasis (EN-tah-siss). We just discovered entasis on the columns!

Now let's think about the distance between columns. Do you think all the columns are the same distance apart? We must find a way to measure the distance between this corner column and its neighbor, then later we will measure the distance between two columns on the long side.

Let's start measuring! We have 0 tools and need to figure out what we to use as a unit of measurement. What can we use to measure? How can we get this done? You have two minutes to decide what you will use to measure and get the first measurement done.

Give students the time they need-- this is hard. This is key problem solving for students-- try NOT to suggest anything. They CANNOT use the "Can You See Me?" sign—it must stay in place. Note: common measurement units students come up with are feet/shoes, body length, arm length, stick, jacket, etc. Give the students some time reminders to keep them on track.

One minute left... 30 seconds... Come gather near me!

Who has a measurement number, and what unit or item did you use to make your measurement?

Let's move toward the middle of the long side to get our measurement between two middle (non-corner) columns. Let's pick two columns near Stop 3 to measure as our comparison.

Walk to Stop 3 location. Stop 3 is located in the middle area of the colonnade along the long side of the building. Any middle area is fine—choose one that does not already have another team working in it.

You need to measure again, this time between any of the two columns in the middle of this side! Use the same exact measurement unit you did before, and see if the measurement is the same-- or different!

Come gather near me! This is important, so please listen up. You just did two great tests, getting two different measurements. What is the difference between the corner column and middle column measurements? So, as a group, we now have proof. What did we discover about the columns-- are they all equally spaced apart?

Well done! We just did some creative thinking to answer that question.

Let's get ready for Stop 3 and our next test-- we are already in the right spot.



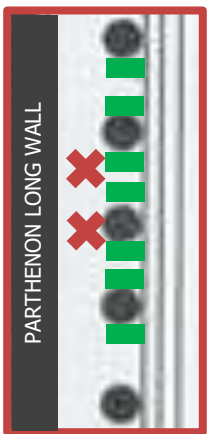
Stop 3

Stop 3 is located in the middle area of the colonnade along the long side of the building. Any middle area is fine—choose one that does not already have another team working in it.

The Doric columns of the Parthenon lean slightly inward. We're going to test this to see how they tilt toward the walls of the building.

I need two volunteers to try this next test.

Each volunteer needs to find a column and stand exactly at its side, not at an angle, but exactly in the middle of the side of the column.



Example:

Each green rectangle on this example represents good spot for a student to stand.

Students stand exactly between columns (not in the colonnade/walkway where the red X's are on this map) and face the column, so that their nose is almost touching the concrete.

Call for Katie with questions—she will do her best to be available for questions and to show the exact placement needed between the columns at this station.

Here's how you do this test:

- Stand up against the column, without touching it or leaning on it.
- Face the column.
- Standing up as straight and tall as you can.
- Raise your arms as straight and tall as you can.
- The palms of your hands should be facing each other, almost as if you are clapping your hands.
- Move your palms wider, just wider than your shoulders.
- Tilt your head back, and notice how the columns narrow at the top.
- Slowly move your palms toward each other. Slowly.
- Does one palm visually hit a side of the column before the other? This may be a visual clue that the column is slightly leaning toward the interior of the building.

If anyone else would like to try it, feel free. The student volunteers who did this first can help you see this visual clue.

Moving on to our final stop, #4!

*Proceed to Stop 4: The whole group will walk down the colonnade to the far corner, then walk to the middle of the short side. Use the human-sized stairs to go down to ground level. ***Using extra care and caution, you can step down the giant steps at the corner.***

Stop 4

Once on the ground, bring the whole group over to the corner of the lowest giant step. Make sure you are at the corner on sidewalk level, as shown in the Stop 4 image.

Our final stop will show us the curvature of the base, which is made out of three giant steps.

The stylobate (STY-low-bate) is the highest giant step.
The stereobate (STARE-ee-oh-bate) is the lowest step.

From corner to corner on the long side of the Parthenon, the stylobate and stereobate slope up 7 inches higher in the middle than on the sides. Did anyone feel this while walking over here?

To see this with our own eyes, we are going to get down to eye level with the stereobate, this lowest step. We are going to look down the length of this giant step toward that special "Can You See Me?" sign and observe how much of it we can see, and how much is blocked by the curvature of the stylobate.

Here's how you do this test:

- Approach the stereobate.
- Squat down to place your eyes to be even with the step, almost as if you are playing peek-a-boo.
- When your eyes are low enough, look down the stereobate to find that sign that you know is there.
- How much of the "Can You See Me?" sign do you see?

Take turns and try this out one at a time. Help the person after you, show them how you did it. Can anyone see part of the sign? After everyone has a look, let's go find it up close.

Use the sidewalk to walk back toward Parthenon entrance along the long side toward that sign. Do not walk on the stereobate or stylobate—other students may still be using it. You will end up near Stop 1, where we started.

This is a regular-sized piece of paper, 8.5 inches wide by 11 inches tall. How much of it could you see? The 7-inch curve of the stereobate can prevent you from seeing most or all of the sign when you are down at eye level!

Congratulations! Together, we have finished today's Architecture Challenge. Take a minute to think if you have any questions about the Parthenon and its architecture? Anything-- from its purpose or its sculpture to columns or curvature? We can ask the Parthenon staff person, Katie.

Find Katie near somewhere nearby Stop 1 and ask any questions.
Return the Architecture Challenge kit (clipboard, paper, laminated page).
Stay in your small team and prepare for the next STEAM Expedition station.
Gather at the wood benches near the front museum entrance.

Stop 4



**CAN YOU
SEE ME?**

THE
PARTHENON

PROGRAM IN PROGRESS
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Can You See Me Sign

