

# DID YOU KNOW?

The Dallas Arts District viewed through a mathematical lens

1

## PEROT MUSEUM OF NATURE AND SCIENCE:

The building's outer skin is made up of 656 textured precast concrete panels, totaling 4 million pounds – the equivalent of 12 blue whales or 30 sauropods (the biggest dinosaurs to walk the earth). What's the average weight of each concrete panel?

## KLYDE WARREN PARK:

Performance stages and trees are heavy, and when your park is suspended above a busy freeway, minimizing weight is key! But the engineers had a secret weapon to minimize weight – using geo-foam in places where planting soil wasn't necessary. At half the weight of soil, geo-foam helped the engineers lose a lot of weight. How did they go about calculating the weight of plants that had not even grown yet?

2

3

## NASHER SCULPTURE CENTER:

Walk under the Richard Serra Sculpture in the garden, *My Curves Are Not Mad*. The sculpture consists of 2 Cor-Ten steel plates that are 44 feet long, 14 feet tall and 2 inches thick. Each weighs about 50,000 lbs. The massive Cor-Ten steel plate is actually very fragile because it has an incredibly long-term material memory. So if you make any mark on the surface, it stays for a long, long time. When the Nasher team had to transport this sculpture from the DMA just two blocks away, this was a nerve racking task! Read more about this on our blog when we spoke to Chief Curator, Jed Morse.

## MORTON H. MEYERSON SYMPHONY CENTER:

The Lay Family organ is made up of 4,535 pipes of varying length and diameter.

How does this create and affect the music that's produced?

4

## THE DONOR REFLECTING POOL AT SAMMONS PARK:

5

The water depth is  $\frac{1}{16}$ "- $\frac{1}{8}$ " deep. The area of the pool is 3,972 sq. ft. How many gallons of water is that? From the Taj Mahal to the Lincoln Memorial Reflecting Pool in the National Mall in DC, reflecting pools have been built because they are beautiful. If you were designing such a pool, think about which materials to use, color, size, volume of water? Why does water reflect light? How do you maximize the amount of reflection?

6

## MARGOT AND BILL WINSPEAR OPERA HOUSE:

The main stage of the Winspear Opera House is so big you could park a Boeing 737 on it! The "falling stars" chandelier is the centerpiece of the Winspear Opera House. Light radiates from suspended, internally lit acrylic rods – over 300 of them forming a constellation above the audience. With a diameter of 40 feet and a height of the same, the randomly spaced rods do look like falling stars.

## BOOKER T. WASHINGTON HIGH SCHOOL FOR THE PERFORMING AND VISUAL ARTS:

7

This was the first institution in the Dallas Arts District and the only school. As noted on the school's website: "Mathematics has spread its influence far beyond the realm of numbers. ... Views about human nature, religion, truth, space and time, and much more have been shaped and honed by the ideas and practices of this vital scientific field." How has your life been influenced by math?

## DALLAS BLACK DANCE THEATRE:

8

How are math and dance related? From tango to tap, ballet to breakdancing, dance draws heavily on concepts of symmetry, geometry (think shapes, lines, angles, arcs), patterns, and proportion – not to mention speed and patterns of music and movement. Here's another interesting fact: Dallas Black Dance Theatre has performed across the globe in 31 states, 14 countries and 5 continents!

9

## ONE ARTS PLAZA:

The main façade of this building is a square made up of continuous  $10' \times 10'$  ribbon windows! If there are 17 windows across and 17 windows down, can you do the math on how many windows are in the front face of this building?

## DALLAS CITY PERFORMANCE HALL:

The large LED curtain on stage provides endless possibilities for set design. The curtain is 60' wide and 32' tall. What math concepts did the designers of this LED curtain need to consider? Here are some: screen area, aspect ratio, luminous flux density, fraction of light lost...what do these terms mean and how do they relate to the screens you use? Speaking of light, when you walk by the DCPH, take a look at the three fused glass windows by artist Octavio Medellín and consider, how did the artist create those colors? What are the slopes of the different lines you see? What other questions come to mind?

12

### HALL ARTS:

John Henry's iconic yellow sculpture, *Tatlin's Sentinel*, stands at 101 feet tall! How does knowledge about material science, engineering, geometry and physics help you see this sculpture in different ways? Go for a stroll down the Texas Sculpture Walk, and use your mathematical lens. What math do you see?

13

### CATHEDRAL SHRINE OF THE VIRGIN OF GUADALUPE:

This is the oldest Catholic parish in Dallas, and the second busiest Catholic cathedral in the nation! Over 13,000 people file through the cathedral during the weekend. How many people would that be, on average, per hour?

### DEE AND CHARLES WYLY THEATRE:

Totally tubular. The exterior of the Wyly is composed of 466 aluminium tubes with widths ranging from 3" to 10". The tubes are only attached at the top. Why is this?

14

### BELO MANSION:

Belo Mansion is the former home of Colonel H.A. Belo, founder of The Dallas Morning News. Built in 1890 in the neo-classical revival-style, the mansion shows features of classical symmetry. What can you point out that is symmetrical in the front of the mansion?

16

### DALLAS MUSEUM OF ART:

Check out Sol Lewitt's *Wall Art #398* (Contemporary Art - Barrel Vault, Level 1). In math, a sequence is an ordered list of objects. If we think of this work as a sequence, what would the next shape look like?

11

### CROW COLLECTION OF ASIAN ART:

The Eastern architecture of Hinduism and Buddhism considered the circle, the square, and the triangle to be the most perfect of building forms. Do you notice one of these shapes featured prominently on the outside of this building?

15

17

### HUNT CONSOLIDATED HEADQUARTERS:

Admire the majestic glass sail and ellipse facade fronting the north end of the building. The glass of the sail is curved top to bottom. Can you name other ellipses in the natural and built world? How can you draw an ellipse accurately? Walk into the lobby and take a look at the Foucault Pendulum. What does the motion of the pendulum prove? How would it move differently at the equator? South Pole?

10

### MARGARET HUNT HILL BRIDGE:

This is not the Arts District but it is a very mathematical structure not too far away! The dramatic 400-foot parabola supports 58 cables, which are intertwined on either side of the central arc. What's a parabola and how do you draw one? If all of these cables were laid end to end, how many miles would they stretch for?

18



# WALK ON!

## Map Legend

1. Perot Museum of Nature and Science
2. Klyde Warren Park
3. Nasher Sculpture Center
4. Morton H. Meyerson Symphony Center
5. Elaine D. and Charles A. Sammons Park
6. Margot and Bill Winspear Opera House
7. Booker T. Washington High School for the Performing and Visual Arts
8. Dallas Black Dance Theatre
9. One Arts Plaza
10. Dallas City Performance Hall
11. Dee and Charles Wylie Theatre
12. Hall Arts
13. Cathedral Shrine of the Virgin of Guadalupe
14. Belo Mansion
15. Crow Collection of Asian Art
16. Dallas Museum of Art
17. Hunt Consolidated Headquarters
18. Margaret Hunt Hill Bridge

### Note:

All information about these sites is courtesy of the institutions in the Dallas Arts District and their staff. We appreciate their collaboration! Vancouver artist, Julie McLaughlin, created our map. We hope it helps you appreciate the beauty, form and function of our Arts District — and perhaps even see it in a new light.

