A Different Look at Scale Factors and Similar Figures

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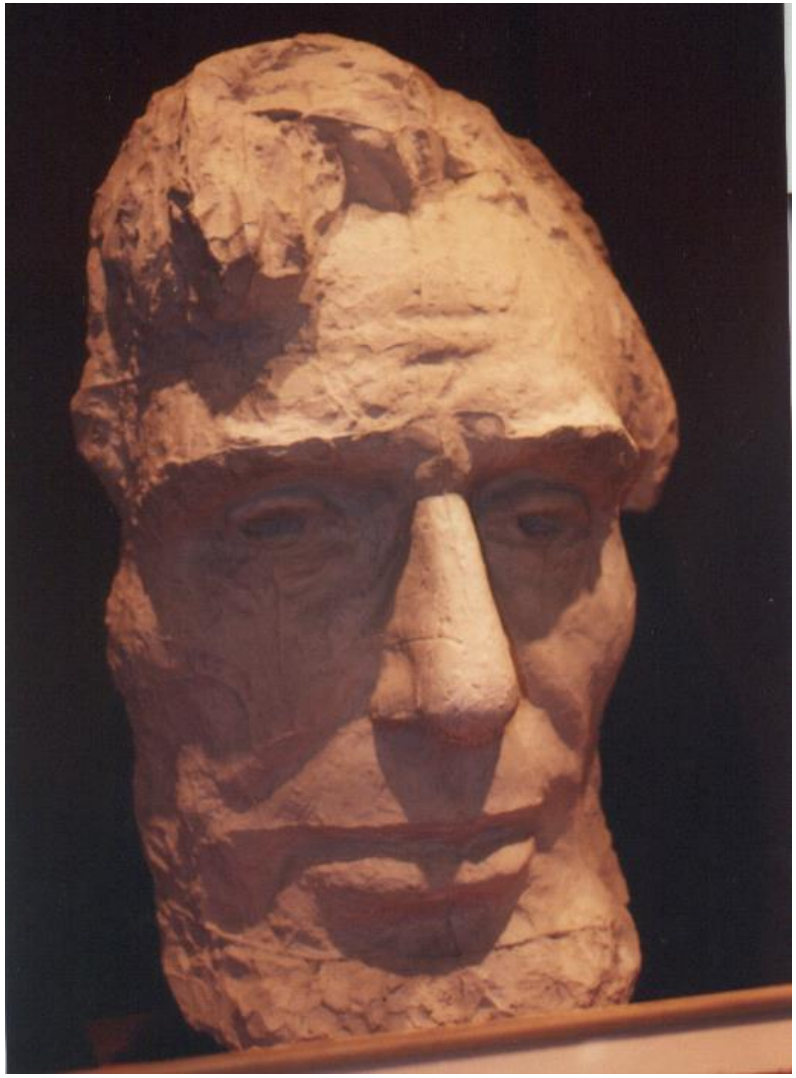
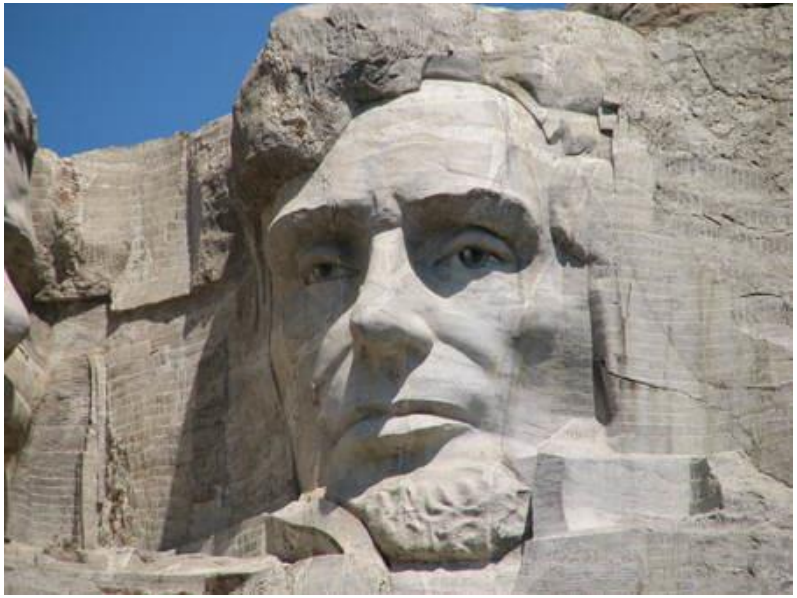


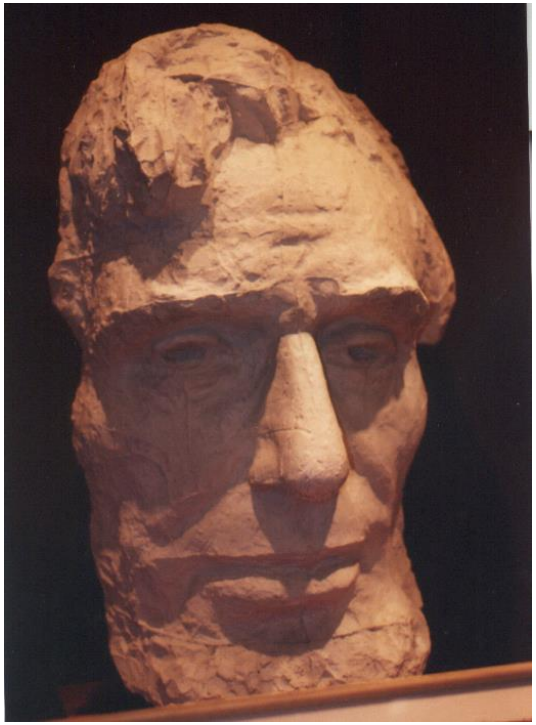


On Mount Rushmore, President Lincoln's mouth is 18 feet wide. Using that same scale factor, if his image were to have been carved head-to-toe, how tall would his carving be on the mountain?

$$\frac{\text{Mouth (real life)}}{\text{Mouth (mountain)}} = \frac{\text{Height (real life)}}{\text{Height (mountain)}}$$

$$\frac{2.5}{18} = \frac{76}{m}$$

$$m = 547.2 \text{ feet}$$



What scale factor would take President Lincoln's head (in real life) to his head on the model? How about as it is carved on the mountain?

Assume President Lincoln's head was nine inches (or .75 feet) in height.

$$(.75)\,(t) \quad = \quad 5$$

$$t \quad = \quad 6.666666\ldots$$

$$(.75)\,(e) \quad = \quad 60$$

$$e \quad = \quad 80$$

This is a picture of Spaceship Earth, an attraction at Epcot in Walt Disney World. Spaceship Earth is 180 feet tall and looks (sort of) like a golf ball.

If Spaceship Earth were a golf ball, how tall would be the golfer who hits it?

How long would be the club the golfer uses to hit the “ball”?

How wide and how deep would be the hole on the green, in order for this “ball” to drop?

How much dirt would have to be moved in order to make the hole?

What is the scale factor that takes a regulation golf ball to the size of Spaceship Earth?

The Statue of Liberty's index finger is eight feet long. If she were sculpted to scale, how tall would she be on the pedestal?

111 feet, 1 inch, heel to top of head

Invisible to tourists, the Statue of Liberty's 25-foot-long (7.6-meter-long) left foot, pictured in 1984, brushes against a little-known detail that nevertheless loomed large in sculptor Frederic Bartholdi's design. Broken chains beneath the statue's toga symbolize freedom from oppression in general and the United States' abolition of slavery—just 20 years prior to the statue's dedication—in particular. (Historic American Engineering Record, Library of Congress)

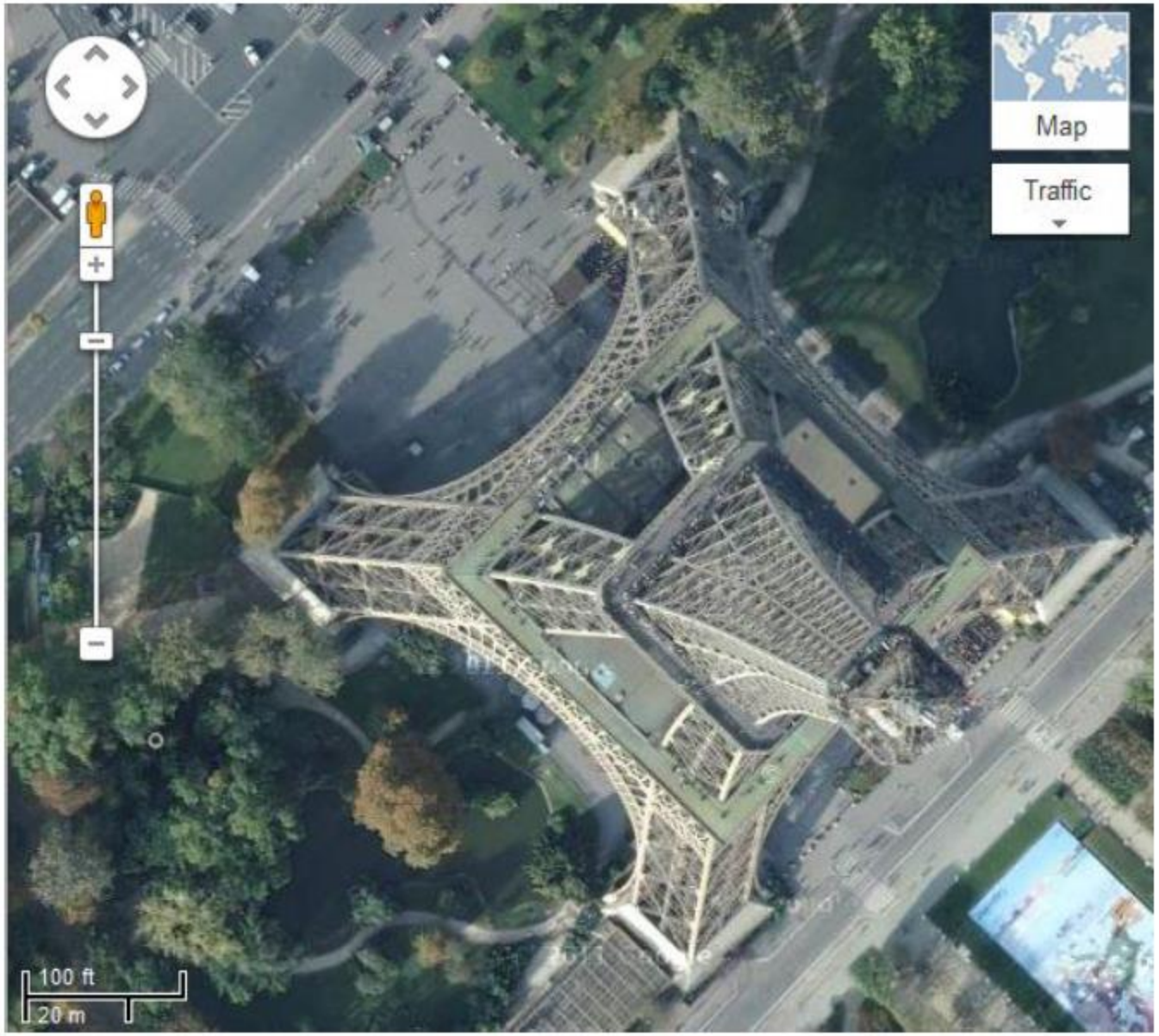
Google Earth – a great tool!

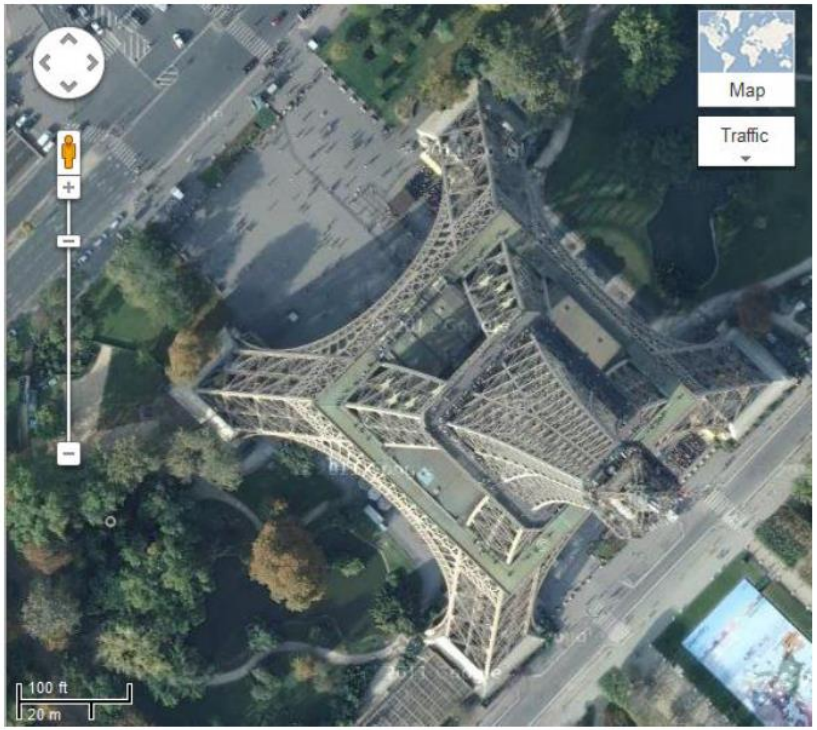

500 ft

What is the object in the center of the picture? For a hint, look at its shadow.

What is the scale factor of this picture? What does that mean?

Approximately how long is it from the outside of one “leg” to the outside of the other?


Map
Traffic
100 ft
20 m

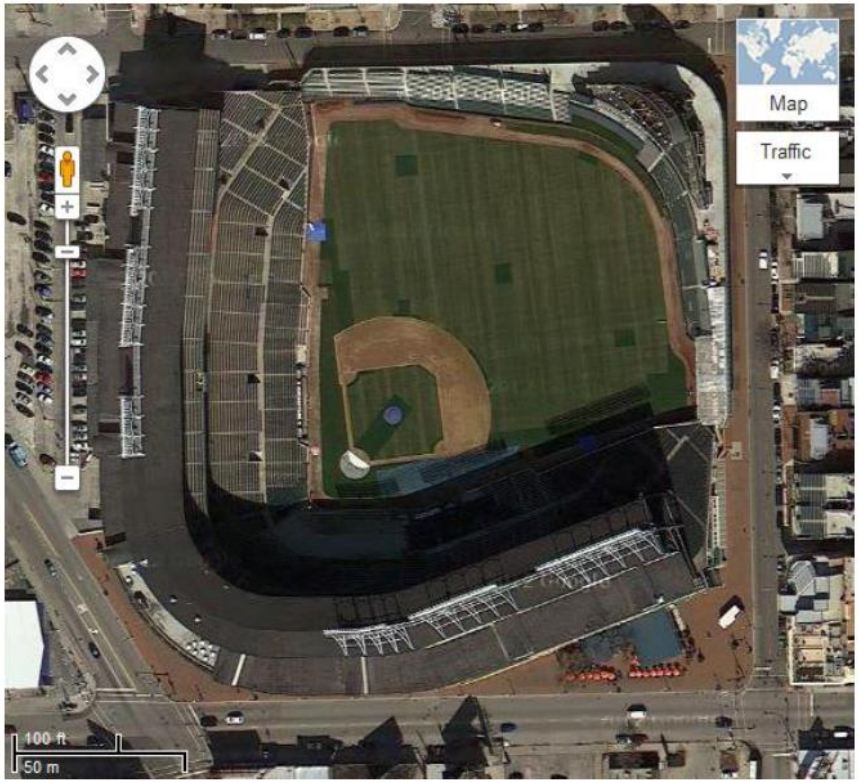


What is this building?

In what city is it located?

Approximately how long is it from one “corner” to the next?

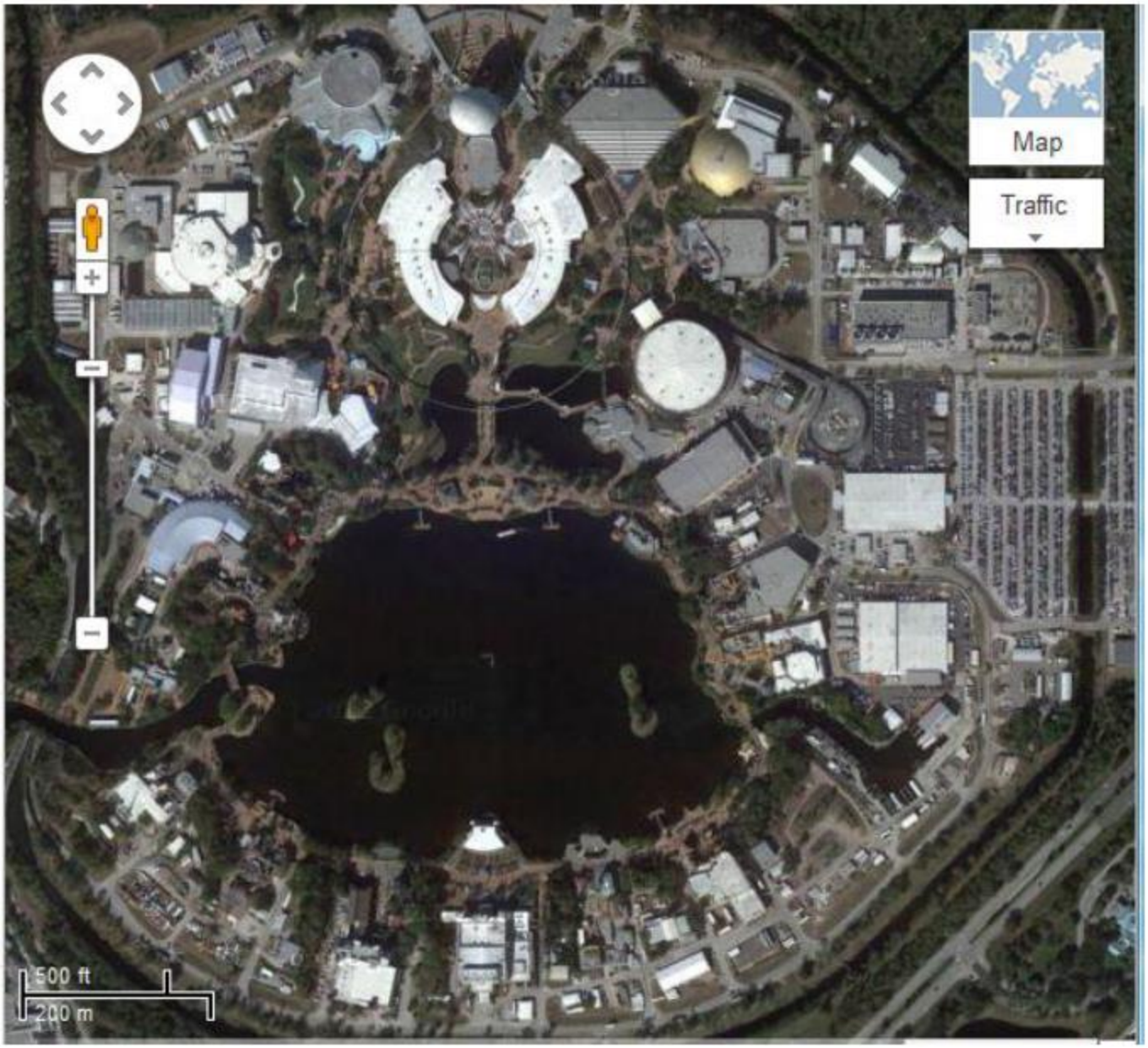

Map
Traffic
100 ft
50 m

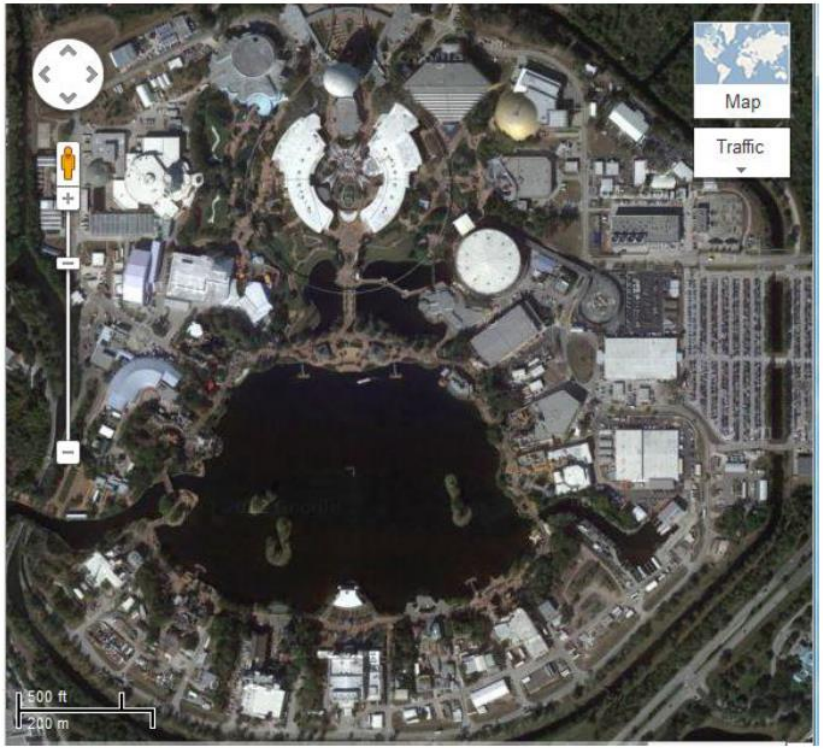


What stadium is shown here? (Hint: It's in Chicago, Illinois.)

What is the scale factor of this picture?

Approximately how far is it from home plate to the deepest part of center field?


Map
Traffic
500 ft
200 m



This is the picture of an amusement park. Which one? (Hint: It's near Orlando, Florida.)

What are the approximate dimensions?

An acre is 43,560 square feet. Approximately how many acres are covered by this park?

Answers:

Gateway Arch: 630 feet between the legs (also 630 feet tall)

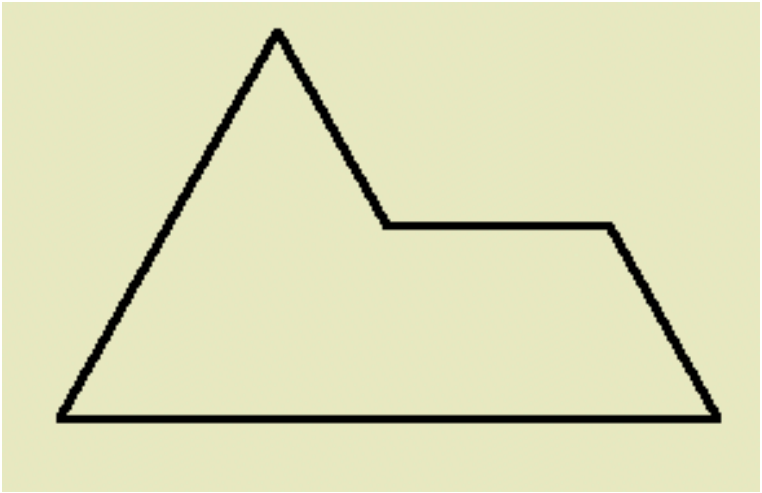
Eiffel Tower: 328 feet (100 meters) on each side

Wrigley Field: 400 feet to deepest center field

Epcot: I don't know.

(But… the area is approximately 300 acres. Let's work from there.)

Sphinx



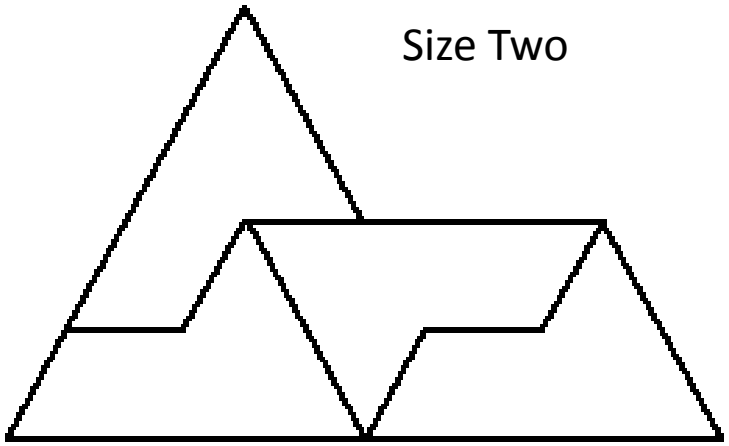
You will receive an envelope with “a bunch of sphinxes” in it. Use (some number) of them to create a sphinx that is similar to the original.

How many sphinxes are in the new shape, which is similar to the original?

What is the ratio of the segments of the two?
What is the ratio of the areas of the two?

How many sphinxes would be needed in order to make the next-largest similar sphinx? How do you know?

How many sphinxes would be needed in order to make the next-largest similar sphinx after that? How do you know?



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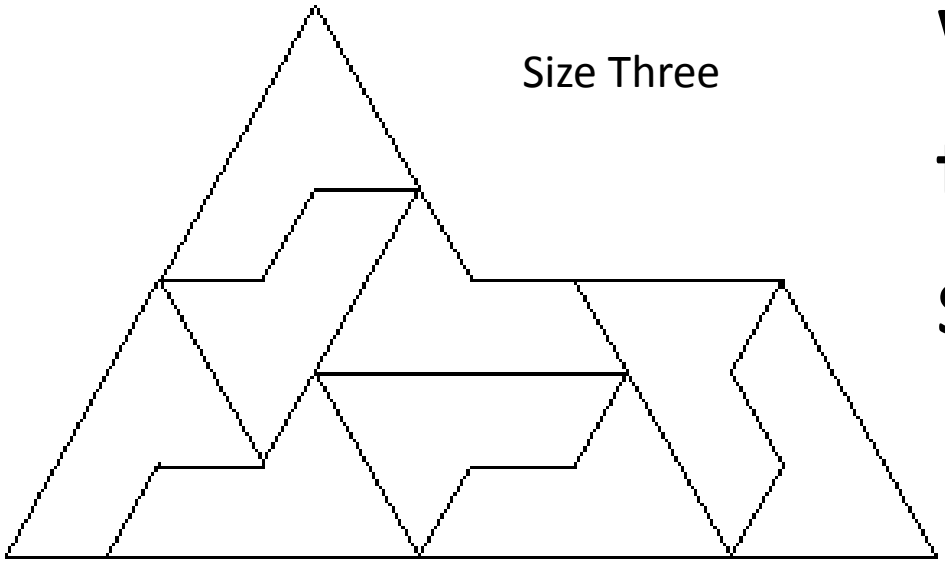
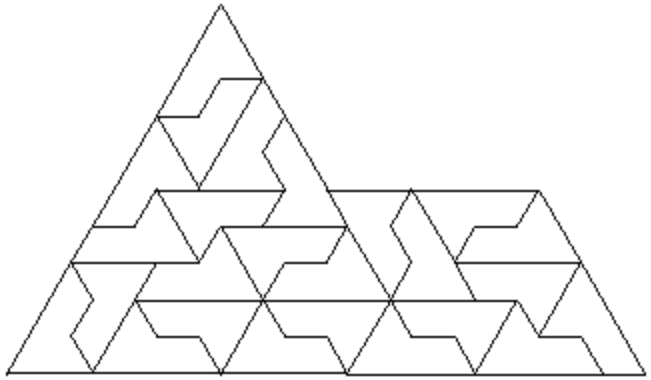
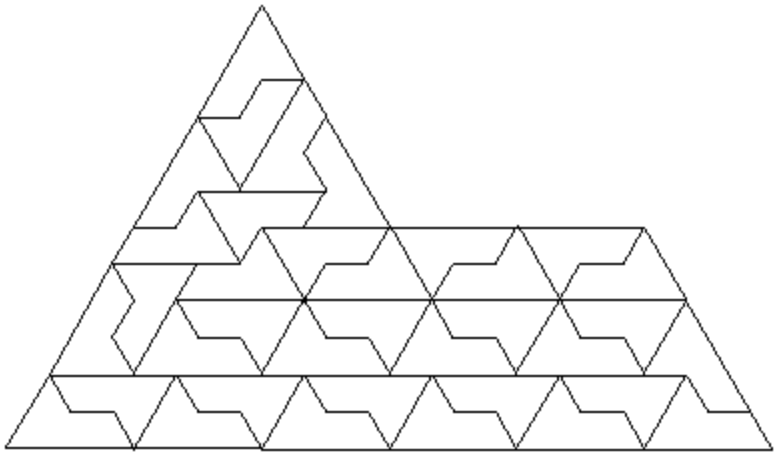


What could you do to put together a sphinx of size four?

Sizes five, six and seven





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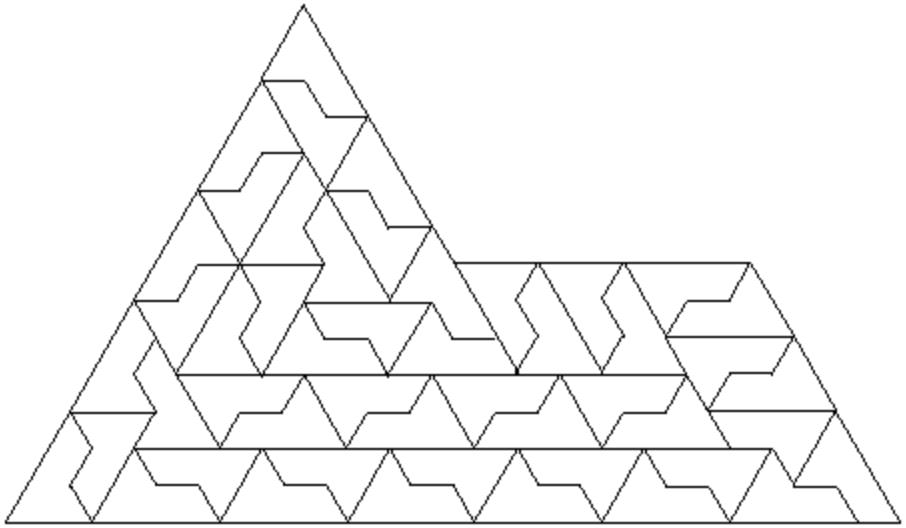

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