

MathWalk in the Shaefer Center

S1) The Schaefer Center – Balcony

The Schaefer Center for the Performing Arts is a 1,673-seat multi-use auditorium located on the campus of Appalachian State University in Boone, North Carolina. The Center features orchestra and balcony level seating and a proscenium stage. The Schaefer Center is also home to the Smith Gallery.

<http://theschaefercenter.org/about/>



[highcountryhost](#)

Look up, and you will see a balcony/rotunda on the second floor above you. Above it on the ceiling, you will also see lights designed to look like sculptures.



Tasks:

Grades K-2:

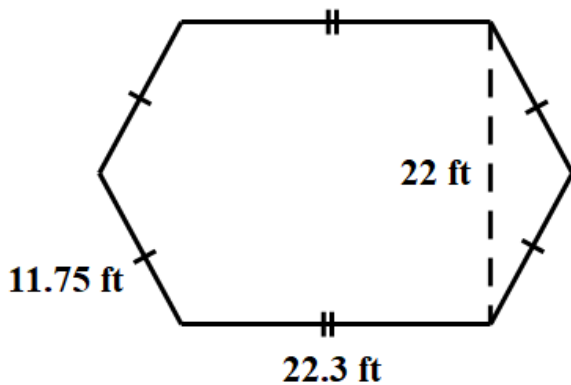
- If you look past the balcony to the ceiling, you see a group of lights. How many are there?
- What shape do the railings on the balcony form?

Grades 3-5:

- c) Notice that the balcony has 4 short sides and 2 long sides. Now, look at the glass panels on the railings. How many glass panels are on a short side? A long side? Use your answers to find how many panels were used to build the balcony.
- d) If you look at the railings, you should see a group of metal circles. These are called rivets, and they hold the panel together to keep it from falling or breaking. How many rivets are on one panel? Use this amount and your answer from part c) to find how many rivets were used to build the balcony.
- e) Given the diagram and measurements below, what is the perimeter of the balcony in feet?
- f) If this design of railing cost \$50 per foot, how much did the railing cost?

Grades 6-8:

- g) Given the diagram and measurements below, determine the amount of 2nd floor area (in square feet) that had to be removed to create the balcony.
- h) If the height from the 1st floor ceiling to the top of the railing is 97 inches, find the volume of the space surrounded by the balcony in cubic feet.



S2) Water Bottle Refill Stations

There are four water bottle refill stations in the Schaefer Center located next to the auditorium doors – two upstairs and two downstairs. These stations are called ezH2O Bottle Filling Stations which manufactured by the Elkay company. On the top of each station you will find the number of plastic water bottles as a result of people using the station for refills. This number resets whenever the filter is changed.



Tasks:

Grades K-2:

- Imagine that the display showed that 426 plastic bottles had been saved as a result of people using the filter. Write this number in expanded form.
- Decompose the number 426 in two other ways using hundreds, tens, and ones.

Grades 3-5:

- Go to each of the four water fountains and write down the number of plastic bottles saved. How many bottles of water have Schaefer Center visitors saved in total?
(note: you may use the numbers on the fountains or use our sample values in the table below)
- Create a bar graph for the amount of water saved at each of the four water fountains.

Grades 6-8:

- Go to each of the four water fountains and write down the number of plastic bottles saved. What are the mean and median numbers of bottles saved for all four fountains? (note: you may use the numbers on the fountains or use our sample values in the table below)

Grades 9-12:

Assume the total number of refills for all of the four stations in the Schaefer Center for a month is 15,000. This means that we saved 15,000 plastic bottles from going to landfills.

- If we line up all these bottles, could they reach a mile? You may use the following information for your calculations:
The height of an average bottle: 20 cm

1 ft = 30.48 cm and 1 mile = 5280 ft.

g) To be able to answer the above question, what assumptions must be made?

Sample Values (recorded on 11/13/19)

Fountain	Bottles Saved
Downstairs Fountain 1	10,358
Downstairs Fountain 2	4,837
Upstairs Fountain 1	1,902
Upstairs Fountain 2	1,911