The Shoe Design Challenge (Area and Perimeter of Irregular Objects)

<u>Perimeter</u> is the distance around a 2-dimensional figure. <u>Area</u> is the amount of space it takes to cover a 2-dimensional figure.

A shoe is an excellent <u>irregular object</u> to study. Shoes have all sorts of designs and shapes, many for function, some just for style.

For instance, look at the following examples:





Each shoe has a different amount of area and a different perimeter for its tread. Searching Google images for "shoe soles" shows a huge variety of shapes/designs

We can also estimate the area and perimeter of shoe soles.

1. Trace the bottom of your shoe on a piece of ½ inch graph paper (if you have a big foot, try fitting it diagonally)

2. <u>Estimate</u> of the area of your shoe sole by:

a) count all the full squares inside the area. Full =

b) count every partial square your shoe enters Partial =

c) Use this formula to find the area of your shoe...it will be in²

 $Area = 0.25 \cdot \left(Full + \frac{Partial}{2}\right)$ Area = in^2

3. Try to estimate of the perimeter of your shoe (remember, the graph paper is $\frac{1}{2}$ inch squares)

Perimeter= in

- 4. How would your Area & Perimeter be different if you used smaller graph paper?
- 5. Suppose you need to design a shoe. What types of shoes are there?

6. What are the top 5 features you'd chose for a shoe?

7. On a piece of graph paper, design a shoe (draw it 2d from the side, top, bottom, front, & back). Use some of the top 5 features. Be sure to use colored pencils to add color.

8. Now, build your shoe using cardboard & paper

