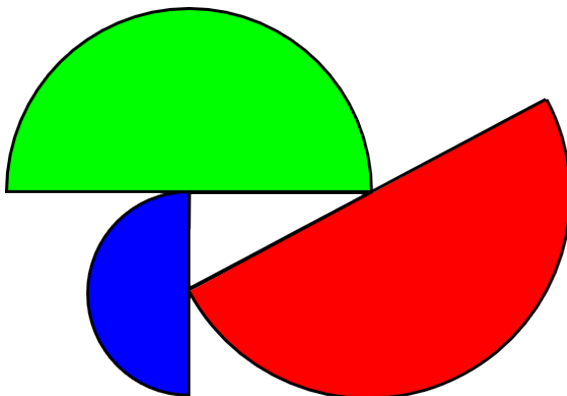


Warm-up problems . . .
Dave Auckly

1. How many congruent pyramids can you fit in a cube to fill it? What is the smallest number you can do this with?
2. What is the relationship between the areas of three semi-circles in the following diagram:



3. Describe why the formulas for the area of a circle, volume of a pyramid, volume of a cone, volume of a sphere and surface area of a sphere are what they are.
4. Put three dots on a page near the vertices of an equilateral triangle. Now put between two and ten additional dots inside the triangle. Play the following game with a colleague: Take turns drawing curves connecting dots so that no two curves cross. The person to make the last move wins.
 - (a) Decide who will win.
 - (b) Make a table listing the total number of vertices, edges and faces at the end of each game played (count the region "outside" of the triangle as a face).
 - (c) Write down any patterns that you see.
 - (d) Prove your answers.