

Toothpick/Gumdrop Pattern Problems

The filled-in circles below represent gumdrops and the segments represent toothpicks. Assume that the patterns continue as shown (i.e. adding one additional triangle or square or other polygon, as the figure number increases by 1).

1.

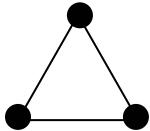


Figure 1
3 toothpicks
3 gumdrops

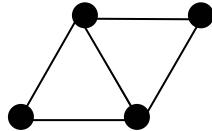


Figure 2
5 toothpicks
4 gumdrops

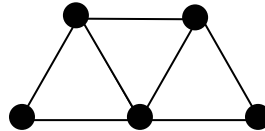


Figure 3
7 toothpicks
5 gumdrops

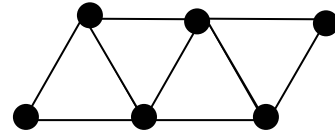


Figure 4
9 toothpicks
6 gumdrops

- How many toothpicks/gumdrops will there be in Figure 5?
- In figure 10?
- In figure 100?
- Which is the first figure that uses over 400 toothpicks?
- How many toothpicks/gumdrops will there be in figure n ?
- Justify your result in part e. Give a “convince a skeptic” argument that refers to the geometry of the figures, not just to the number patterns.

2.

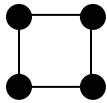


Figure 1
4 toothpicks
4 gumdrops

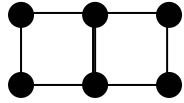


Figure 2
7 toothpicks
6 gumdrops

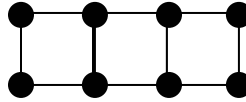


Figure 3
10 toothpicks
8 gumdrops

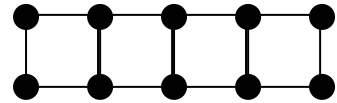


Figure 4
13 toothpicks
10 gumdrops

- How many toothpicks/gumdrops will there be in Figure 5?
 - In figure 10?
 - In figure 100?
 - Which is the first figure that uses over 400 toothpicks?
 - How many toothpicks/gumdrops will there be in figure n ?
 - Justify your result in part e. Give a “convince a skeptic” argument that refers to the geometry of the figures, not just to the number patterns.
 - Compare the first and second problems. How does changing from triangles to squares change your results?
- Make up a toothpick/gumdrop problem with hexagons and answer questions similar to the ones above. You can use yellow pattern blocks to model your problem.
 - Make up another toothpick/gumdrop problem. Make it interesting! Answer similar questions...

Copyright 2005, Debra K. Borkovitz. You may copy or edit this material for non-profit, educational use only.