Practice Pigeon Hole Principle

Name:_____   Date:_____

1. Daniel has 7 pairs of socks in his drawer,
    one of each color of the rainbow. How many
    socks does he have to draw out in order to
    guarantee that he has grabbed at least one full
    pair?

2. Explain why among any 13 people, at least two
    people are guaranteed to share a birth month.

3. If Mary has an infinite amount of cherry, raspberry, and watermelon jelly beans, and she wants to draw 3 of the same flavor. What is the minimum amount of times Mary must draw a jelly bean in order to ensure she has 3 of the same flavor?

4. Gary has 12 blue socks and 12 pink socks in his drawer. If Gary takes a sock out at random, How many socks must he take out to be sure that he has at least one pink pair.

Answer:

   1. **8**

In the worst case, Daniel will draw 7 socks, one of
each color. Therefore, on his 8th draw, Daniel must
draw a duplicate to form a pair.

In this case, the different colors represent the
holes and the socks represent the pigeons

   2. **Example statement** - there are 12 possible
       birth months. If the first 12 people have a
       different birth month, then the 13th person
       must share a birth month with someone else

   3. **7**

       First of all, it does not matter if Mary has an
       infinite number of jelly beans. This is because
       in the worst case, Mary will draw 6 jelly
       beans, 2 of each flavor, and her 7th draw will
       ensure that she has drawn 3 of each flavor.

   4. **14**

       If Gary takes out all 12 blue socks, then his
       next 2 draws will definitely be Pink.