GRAPES AND CHERRIES

Games you can play at home

Equipment:

1) 12 grapes and 12 cherries (If you don't have grapes and cherries you can use pennies and nickels or blue and red marbles. Any pair of objects of similar sizes will work.)

2) two identical opaque containers

3) a wooden spoon (or other spoon large enough to hold at least 3 or 4 grapes or cherries)

How to play:

1) Count 9 grapes and 3 cherries and put them into one container. This is the "Mostly Grapes Container"

2) Count 9 cherries and 3 grapes and put them in the other container. This is the "Mostly Cherries Container"

3) Have your partner take the spoon and close her eyes.

4) Choose one of the two containers. Put it in front of your partner and tell her to take one spoonful out of the container while keeping her eyes closed. Because your partner closed her eyes you know she got a **random sample**. She can put the sample on the table.

5) The container is the **population** from which the sample was drawn. Put the two containers side by side so she can't tell which one you used.

6) Have your partner open her eyes to look at the sample. See if your partner can guess whether the sample came from the Mostly Grapes container or the Mostly Cherries container.

7) If she guesses correctly, she gets a point. Then pour the sample back in the container. Now it's your partner's turn to choose the container your turn to scoop!

Things to discuss:

I bet you're pretty good at this game! You can probably guess the population from the sample most of the time. This is true for scientists as well. Scientists can't test ALL the butterflies or bacteria or Martian rocks that they are interested in, but they can take a small sample of (of butterflies, bacteria, or Martian rocks) and make pretty good guesses about the population as a whole.

More things to try:

1) Now empty out your containers and this time try putting 7 grapes and 5 cherries in the Mostly Grapes container and 7 cherries and 5 grapes in the Mostly Cherries container.

2) Now play the game again.

Things to discuss:

It's a lot harder to tell whether the sample came from the Mostly Grapes or Mostly Cherries container now isn't it? This is true in science as well. If two populations are very similar to each other, then it can take a lot of samples to tell them apart.

Even more things to try:

1) Close your eyes and take a scoop from the Mostly Cherry container.

2) Count how many cherries you get and how many grapes you get.

3) Now put cherries and grapes back and take another scoop. Count again. Try this three more times.

4) Did you get exactly the same number of cherries and grapes *every* time or did the samples differ?

Things to discuss:

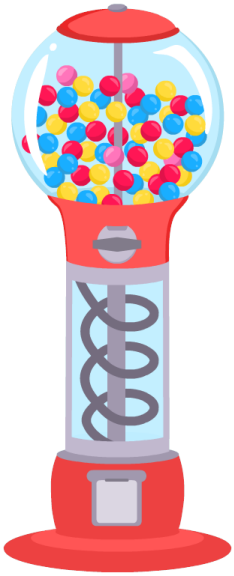
You probably won't get exactly the same sample every time you try. This is true in science as well. Randomly drawn samples often differ from each other in small ways. In fact, if you keep taking samples often enough, one time just by chance, you might put your spoon into the Mostly Cherry container and get mostly grapes! That's why it's important that scientists repeat their experiments a few times. The more samples we take, the more confident we can be that whatever is true of the sample is true of the population.

One more thing to try:

1) This time don't close your eyes. Look into the Mostly Cherry container and put only cherries in your spoon. Now your sample has only cherries, right?

2) Now look into the Mostly Grapes container -- but again, be sure to put only cherries in your spoon. Your sample has only cherries again! If you saw this sample, you would think it came from the Mostly Cherry container!

Things to discuss:



This is true in science as well. You can only be confident that your population resembles your sample if you draw the sample at random. If you deliberately select some items to be in your sample instead of sampling randomly, then the sample might not look like the population. Scientists actually call this "cherry picking"! If you "cherry pick" your sample, you can't tell much about the population it came from. It's important to take random samples if you want to make judgments about the population as a whole.