# Problem of the Week
Problem B and Solution
A Jarring Thought

Problem

Chan and Mira are working at their school fun fair. They are responsible for filling a jar with candy, so people can guess how many candies are in the jar.

They buy 10 bags of candy. Each bag contains four types of candy, each with a different flavour: orange ( ), grape ( ), blueberry ( ), and watermelon ( ).

While they were filling the jar one of the bags broke open and spilled on the floor. The following is a picture of the spilled candy.
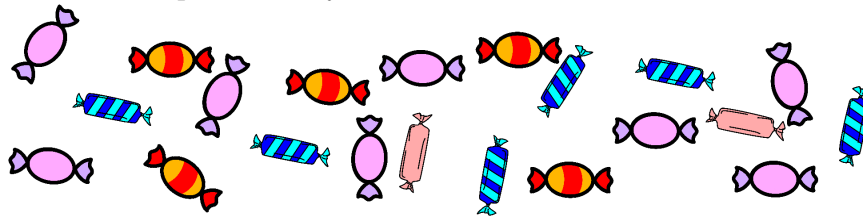
Chan and Mira enjoy a challenge, so they designed the following questions to be answered by their classmates.

(a) Each bag has the same distribution of candy as the bag that was spilled. Once all of the bags have been entered into the jar, what is the total number of each type of candy in the jar, and the total number of candies?

(b) After thoroughly mixing the candies, you stick your hand in the jar and randomly pull out one candy. What is the theoretical probability that it will be a blueberry candy?

(c) Chan found a bag of candy with the same number of candies as the other bags. However, this bag only had grape candies. They added these candies to the jar and the candies are thoroughly mixed. If you now randomly remove one candy from the jar, what is the theoretical probability that it will be a grape candy?

Solution

(a) Since the entire quantity of candies in the jar is ten times what is shown, with the same distribution of types as shown, there will be ten times as many candies of each type. Since there are 5 orange candies, 8 grape candies, 6 blueberry candies, and 2 watermelon candies in one bag, then in total there are 50 orange candies, 80 grape candies, 60 blueberry candies, and 20 watermelon candies in the jar.
Thus, there are a total of $50 + 80 + 60 + 20 = 210$ candies in the jar.

(b) The theoretical probability that a candy will be a blueberry candy is $\frac{60}{210} = \frac{2}{7}$.
Alternatively, since the bags have the same ratio of the types of candy, we could have used the probability of pulling out a blueberry candy from the spilled bag, which is $\frac{6}{21} = \frac{2}{7}$.

(c) Since we are adding 21 grape candies to the jar, then there are a total of $80 + 21 = 101$ grape candies, and the total number of candies is $21 + 210 = 231$. Therefore, the theoretical probability that it will be a grape candy is $\frac{101}{231}$.