Anisa has been playing a board game called Azul, which she highly recommends. In this game, there are 100 tiles in a bag, which are pink, blue, orange, white, or black (20 of each color.) Players frequently draw tiles out of the bag without looking during this game.

1. It is the beginning of the game and all 100 tiles are in the bag. What is the probability that the first tile you draw out will be blue?

   0.2 or $\frac{1}{5}$

2. It is the beginning of the game and all 100 tiles are in the bag. What is the probability that the first tile you draw out will be orange?

   0.2 or $\frac{1}{5}$

3. It is the beginning of the game and all 100 tiles are in the bag. What is the probability that the first tile you draw out will be either blue or orange?

   0.4 or $\frac{2}{5}$

4. You have drawn out one tile and it was blue. The other 99 tiles are still in the bag. What is the probability that the next tile you draw out will be blue?

   $\frac{19}{99}$

5. You have drawn out one tile and it was blue. The other 99 tiles are still in the bag. What is the probability that the next tile you draw out will be orange?

   $\frac{20}{99}$

6. It is the beginning of the game and all 100 tiles are in the bag. What is the probability that the first tile you draw out will be blue and the second tile you draw out will be orange?

   $\frac{1}{5} \cdot \frac{20}{99} = \frac{4}{99}$

7. It is the beginning of the game and all 100 tiles are in the bag. What is the probability that the first two tiles you draw out will both be blue?

   $\frac{1}{5} \cdot \frac{19}{99} = \frac{19}{495}$

8. It is the beginning of the game and all 100 tiles are in the bag. What is the probability that the first two tiles you draw out will be one blue and one orange?

   $2 \cdot \frac{1}{5} \cdot \frac{20}{99} = \frac{8}{99}$

9. What is the probability that you will draw a blue tile at the beginning of this game and an orange tile at the beginning of the next game?

   $\frac{1}{5} \cdot \frac{1}{5} = \frac{1}{25}$

10. Are these two probabilities *dependent* or *independent*: the probability that the first tile you draw will be blue and the probability that the second tile you draw will be blue?

    dependent

11. Are these two probabilities *dependent* or *independent*: the probability that the first tile you draw in this game will be blue and the probability that the first tile you draw in the next game will be blue?

independent

12. Ok, so that's not actually how you play Azul. You actually draw lots of tiles at the beginning of the game and put them on these "factory display" mats. Each mat contains four tiles. It is the beginning of the game, and you draw out four tiles to put on the first mat. What is the probability that all of those tiles are blue?

$$\frac{1}{5} \cdot \frac{19}{99} \cdot \frac{18}{98} \cdot \frac{17}{97} = \frac{5814}{4705470}$$

13. It is the beginning of the game, and you draw out four tiles to put on the first mat. What is the probability that all of those tiles are the same color?

$$5 \cdot \frac{5814}{4705470} = \frac{29070}{4705470}$$

14. It is the beginning of the game, and your friend draws out four tiles to put on the first mat, but you don't see them. You draw out four tiles to put on the second mat. What is the probability that all four tiles you draw are blue?

$$\frac{5814}{4705470}$$

15. It is the beginning of the game, and you draw out four tiles to put on the first mat. What is the probability that three of those tiles are blue and one is orange?

$$4 \cdot \frac{1}{5} \cdot \frac{19}{99} \cdot \frac{18}{98} \cdot \frac{20}{97} = \frac{27360}{4705470}$$

16. It is the beginning of the game, and you draw out four tiles to put on the first mat. What is the probability that two of those tiles are blue and two are orange?

$$6 \cdot \frac{1}{5} \cdot \frac{19}{99} \cdot \frac{20}{98} \cdot \frac{19}{97} = \frac{43320}{4705470}$$

17. What is the probability that (at the beginning of the game) the four tiles on the first mat are the same color, and the four tiles on the second mat are the same color (but maybe a different color from the first mat)?

$$5 \cdot \frac{5814}{4705470} \left(4 \cdot \frac{20}{96} \cdot \frac{19}{95} \cdot \frac{18}{94} \cdot \frac{17}{93} + \frac{16}{96} \cdot \frac{15}{95} \cdot \frac{14}{94} \cdot \frac{13}{93} \right)$$