Probability: Part 2

- Topics: Experimental Probability and Making Predictions

- Objective: Students will be able to calculate probabilities of simple situations, compare those probabilities, and understand sample spaces and set notation.

- Standards: CCSS Math: 7.SP.C.6, 7.SP.C.7, 7.SP.C.7a, HSS.CP.B.7, AP Stats: UNC-2 (EU), UNC-2.A (LO), UNC-2.A.4 (EK), UNC-2.A.5 (EK)

Experimental Probability

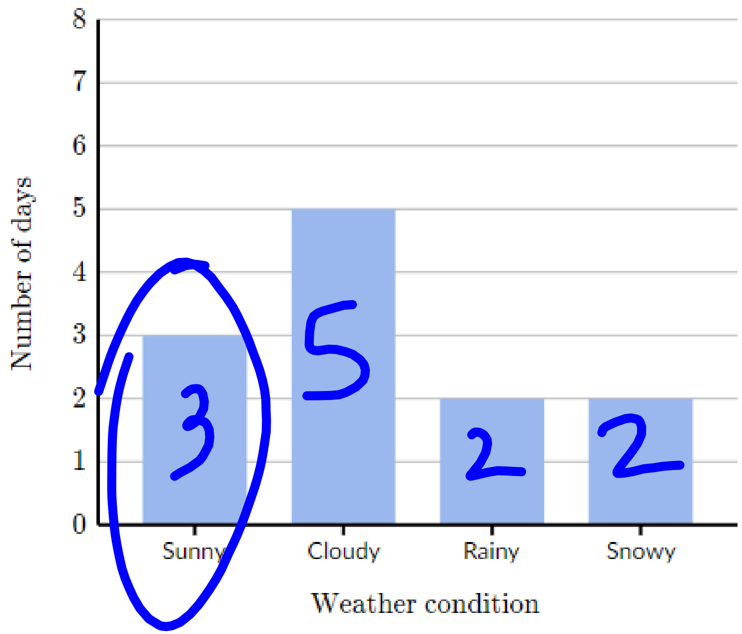
Definition: Probability is simply how likely something is to happen. Probability can be written as a fraction, decimal, or a percent.

Example 1: The winter clothing drive has received donations of 5 coats, 23 pairs of gloves, 19 scarves, and 3 hats so far. Based on this data, what is a reasonable estimate of the probability that the next donation is not a pair of gloves?

$$P(notGloves) = \frac{\# notGloves}{TotalItems} \qquad \frac{27}{50}$$

Experimental Probability

Example 2: The following bar graph summarizes the weather conditions in Crayonton for each day this month so far. Based on this data, what is a reasonable estimate of the probability that it is sunny tomorrow?



$$P(Sunny) = \frac{\# Sunny}{TotalDays}$$

$\frac{3}{12}$

$\frac{1}{4}$

Making Predictions with Probability

Using a sample to make a prediction.

***NOTE: Mathematics can not predict the future, but it can tell you what is more likely to happen.

Beware of the words, ***EXACTLY*** and ***ALWAYS!***

Making Predictions with Probability

Example: Jose is going to use a random number generator 500 times. Each time he uses it, he will get a {1, 2, 3,4.} Complete the following statement with the best prediction. Jose will get something other than a 2...

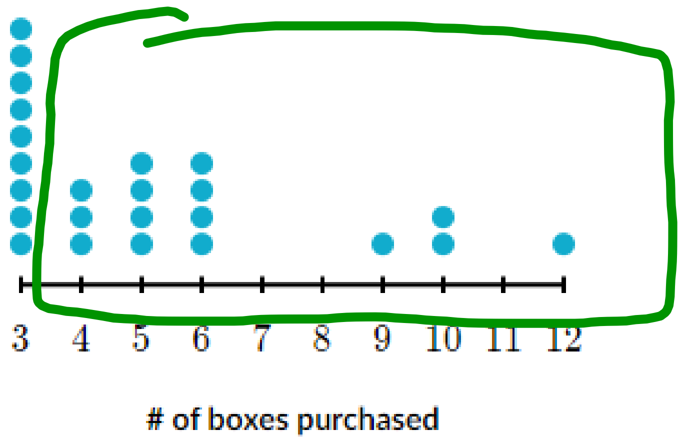
$$P(not2) = \frac{\#\,not2}{TotalOutcomes} \times Iterations$$

$\frac{3}{4} \cdot 500 = 375$

- Exactly 250 times
- Close to 250 times but probably not exactly 250 times
- Exactly 375 times
- Close to 375 times but probably not exactly 375 times

SS_Interpreting Results of Simulations

Example: A cereal company is putting 1 of 3 prizes in each box of cereal. The prizes are evenly distributed so the probability of winning any given prize is always 1/3. Mohammed wonders how many boxes he should expect to buy to get all 3 prizes. He carried out 24 trials of a simulation and his results are shown below. Each dot represents how many boxes it took to get all 3 prizes in that trial.



P(more than 3 boxes)≈ $\frac{15}{24}$

Adding Probabilities

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

Example 1: A standard deck of 52 cards contains 4 suits: hearts, clubs, diamonds, and spades. Each suit consists of cards numbered 2 through 10, a jack, a queen, a king, and an ace.

Bashir decides to pick one card at random from a standard deck of 52 cards. Let ***A*** be the event that he chooses a face card (a jack, queen, or king of any suit) and ***B*** be the event that he chooses a spade.

What is P(A or B), the probability that the card Bashir chooses is either a face card or a spade?

12+13−3

P(A) = face card = 12/52
P(B) = spade = 13/52
P(A and B) = face card and spade = 3/52
P(A or B) = face card or spade = 22/52

Adding Probabilities

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

Example 2: Iman's favorite colors are blue and pink.

She has 1 blue shirt, 1 pink shirt, 1 blue hat, 1 blue belt, 1 blue pair of pants, and 1 pink pair of pants.

Iman selects one of these garments at random. Let ***A*** be the event that she selects a pink garment and ***B*** be the event that she chooses a shirt.

What is P(***A or B***), the probability that the garment Iman chooses is pink or a shirt?

P(A) = 2/6
P(B) = 2/6
P(A and B) = 1/6
P(A or B) = 3/6

$2 + 2 - 1 = 3/6$

Two-way Tables, Venn Diagrams, & Probability

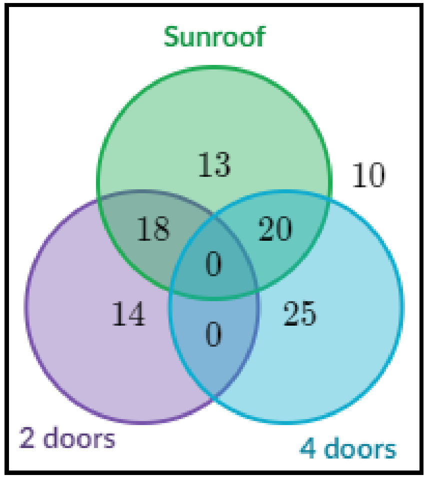
Definitions:

1. Mutually exclusive is a statistical term describing two or more ever that cannot coincide. It is commonly used to describe a situation where the occurrence of one outcome supersedes the other.

2. Events are ***independent*** if the occurrence of one event does not influence (and is not influenced by) the occurrence of the other(s).

Two-way Tables, Venn Diagrams, & Probability

Example 1: A business owner noted the features of the 100 cars parked at the business. Here are the results:



In this sample, are the events "2 doors" and "4 doors" mutually exclusive?

What is the P(2-door or 4-door)?

Two-way Tables, Venn Diagrams, & Probability

Example 2: The theater director offered every member of the drama one vote for which play they preferred to perform. The director found that 35% voted for The Oddems Family, that 57% voted for Thirteenth Night, and that 8% did not vote.

In this group, are the events "Oddems Family" and "Thirteenth Night" mutually exclusive?

Find the probability that a randomly selected person from this group voted for Oddems Family OR Thirteenth Night.

P(Oddems Family OR Thirteenth Night)=

Displaying and Comparing Quantitative Data

You should be working on the following skills:

1. Experimental probability
2. Making predictions with probability
3. Interpreting results of simulations
4. Adding probabilities
5. Two-way tables, Venn diagrams, and probability

Attachments

Ztable.pdf