Probability Around the World

This activity provides a review of probability.

Preparation:
- Copy the following pages (using card stock if you wish)
- Post the signs around the room, making sure to mix the order completely.

Directions to the students:
- Pick one partner with whom to work, and put both names on your answer sheet.
- Show all work in an organized fashion on a separate sheet. Attach your work to your answer sheet before turning them in.
- Move to one of the signs posted around the room.
- Work the probability problem on the bottom of the sign and write the answer on your answer sheet in the first space.
- Locate that answer on one of the other signs posted in the room. Go to that sign and work the probability problem on the bottom of that sign. Write the answer to this second problem on your answer sheet in the second space.
- Continue this routine until you have found all the probabilities.

Notes to the teacher:
- The answer sheets will all start with different answers, but the order will be the same. This makes the activity relatively easy to grade. You might want to have some prizes for the winners.
- The following page is the answer sheet for the students to use.
## Around the World with Probability!

**PARTNER_________________**   **PARTNER_________________**

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<td>1.</td>
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0.991

A consumer organization estimates that 29% of new cars have a cosmetic defect such as a scratch or a dent when they are delivered to car dealers. This same organization believes that 7% have a functional defect – something that does not work properly – and that 2% of new cars have both kinds of problems. If you notice a dent on a new car, what's the probability it has a functional defect?
A company’s human resources officer reports a breakdown of employees by job type and gender, shown in the table:

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Supervision</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Production</td>
<td>45</td>
<td>72</td>
</tr>
</tbody>
</table>

What’s the probability that a worker selected at random is female, if the person works in production?
Each year a company must send 3 officials to a meeting in China and 5 officials to a meeting in France. Airline ticket prices vary from time to time, but the company purchases all tickets for a country at the same price. Past experience has shown that tickets to China have a mean price of $1000 with a standard deviation of $150, while the mean airfare to France is $500 with a standard deviation of $100. Find the mean and standard deviation of the difference in price of a ticket to China and a ticket to France.
To play a game, you must pay $5 for each play. There is a 10% chance you will win $5, a 40% chance you will win $7, and a 50% chance you will win only $3. What are the mean and standard deviation of your winnings?
Safety engineers must determine whether industrial workers can operate a machine’s emergency shutoff device. Among a group of test subjects, 66% were successful with their left hands, 82% with their right hands, and 51% with both hands. What percent of these workers could not operate the switch with either hand?
A car insurance company believes that about 0.5% of drivers have at-fault accidents during a given year. Suppose the company insurances 1355 drivers in a certain city. What are the mean and standard deviation of the number of drivers who may have at-fault accidents?
In a board game you determine the number of spaces you may move by spinning a spinner and rolling a dice. The spinner has three regions: Half of the spinner is marked with a 5, and the other half is equally divided between 10 and 20. The six faces of the die show 0, 0, 1, 2, 3, and 4 spots. When it’s your turn, you spin and roll, adding the numbers together to determine how far you may move. Find the mean and standard deviation of the number of spaces you get to move. (Hint: think of all possible outcomes!)
Neurological research has shown that in about 80% of people language abilities reside in the brain’s left side. Another 10% display right-brain language centers, and the remaining 10% have 2-sided language control. Assume that a freshman comp class contains 25 randomly selected people. What’s the probability that no more than 15 of them have left-brain language control?
Given two independent random variables such that \( X \) has a mean of 50 and a standard deviation of 8 and that \( Y \) has a mean of 100 and a standard deviation of 6, find the mean and standard deviation of the variable \( X-Y \).
Since the stock market began in 1872, stock prices have risen in about 73% of the years. Assuming that market performance is independent from year to year, what’s the probability that the market will fall during at least 1 of the next 5 years?
The Centers for Disease Control say that about 30% of high school students smoke tobacco (down from a high of 38% in 1997). Suppose you randomly select high school students to survey them on their attitudes toward scenes of smoking in the movies. What's the probability that there are no more than 2 smokers among the 10 people that you chose?
Molly’s college offers two sections of Stat 101. From what she has heard about the two professors listed, Molly estimates that her chances of passing the course are 0.8 if she gets Professor Adams and 0.60 if she gets Professor Brown. The registrar uses a lottery to randomly assign the 120 enrolled students based on the number of available seats in each class. There are 70 seats in Professor Adam’s class and 50 in Professor Brown’s class. At the end of the semester we find out that Molly failed. What’s the probability that she was in Professor Brown’s class?
Given two independent random variables such that X has a mean of 50 and a standard deviation of 8 and that Y has a mean of 100 and a standard deviation of 6, find the mean and standard deviation of the variable X+50.
Neurological research has shown that in about 80% of people language abilities reside in the brain’s left side. Another 10% display right-brain language centers, and the remaining 10% have 2-sided language control. In the entire freshman class of 1200 students, what are the mean and standard deviation of the number of these freshmen who might be right-brained in language abilities?
Two stores sell watermelons. At the first store the melons weigh an average of 22 pounds, with a standard deviation of 2.5 pounds. At the second store the melons are smaller, with a mean of 18 pounds and a standard deviation of 2 pounds. You select a melon at random at each store. What’s the mean and standard deviation of the difference in weights of the melons?

120, 10.39
The 2000 Census revealed that 26% of all firms in the United States are owned by women. You call some firms doing business locally, assuming that the national percentage is true in your area. What’s the probability that the first three you call are all owned by women?
Every five years the Conference Board of the Mathematical Sciences surveys college math departments. In 2000 the board reported that 51% of all undergraduates taking Calculus I were in classes that used graphing calculators and 31% were in classes that used computer assignments.

Suppose that 16% used both calculators and computers. What percent used neither kind of technology?
In your sock drawer you have 4 blue socks, 5 grey socks, and 3 black socks. Half asleep one morning, you grab 2 socks at random and put them on. Find the probability that you end up wearing at least 1 black sock.
In a car rental company’s fleet, 70% of the cars are American brands, 20% are Japanese, and the rest are German. The company notes that manufacturers’ recalls seem to affect 2% of the American cars, but only 1% of the others. What’s the probability that if a randomly chosen car is recalled, that it is an American car?
Suppose that 70% of the women who, suspecting they may be pregnant and purchase an in-home pregnancy test, are actually pregnant. Further suppose that the test is 98% accurate. What’s the probability that a woman whose test indicates that she is pregnant actually is?