Algebra 2/Pre-Calculus

Name_____

Repeated Experiments (Day 7, Statistics)

In this handout, you will practice the ideas and techniques developed thus far in the statistics unit.

1. Consider the following spinners

Spinner A: {1, 5, 5, 6, 6, 6, 9} **Spinner B:** {10, 50, 50, 60, 60, 60, 90}

a. Find the mean, variance, and standard deviation for Spinner A.

b. Find the mean, variance, and standard deviation for Spinner B.

c. How are the mean and the standard deviation related for the two spinners? Is the variance related in the same way?

Answers a. mean = 5.4286 , variance = 4.8163, standard deviation = 2.1946

b. mean = 54.286, variance = 481.627, standard deviation = 21.946

c. The mean and standard deviation are both multiplied by 10, whereas the variance is multiplied by 100.

2. Consider the following spinners

Spinner C: {3, 3, 3, 4, 4} **Spinner D:** {13, 13, 13, 14, 14}

a. Find the mean, variance, and standard deviation for Spinner C.

b. Find the mean, variance, and standard deviation for Spinner D.

c. How are these spinners related? How (if at all) does this effect the mean, the variance, and the standard deviation?

Answers a. mean = 3.4, variance = 0.24, standard deviation = 0.4899

b. mean = 13.4, variance = 0.24, standard deviation = 0.4899

c. Each of the values on Spinner D is 10 more than the corresponding value on Spinner C. This causes the mean to increase by 10. The variance and the standard deviation are unchanged.

3. In this problem, we will use Spinner A (from problem **1**) and Spinner C (from problem **2**).

Spinner A: {1, 5, 5, 6, 6, 6, 9} **Spinner C:** {3, 3, 3, 4, 4}

Suppose both spinners are spun at the same time. What are the mean, variance, and standard deviation for the sum of the two spinners?

Answers mean = $5.4286 + 3.4 = 8.8286$, variance = $4.8163 + 0.24 = 5.0563$, standard deviation = 2.2486

4. Continue using Spinners A and B.

Spinner A: {1, 5, 5, 6, 6, 6, 9} **Spinner C:** {3, 3, 3, 4, 4}

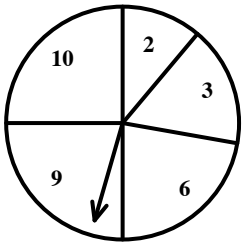
a. Suppose Spinner C is spun 20 times. What are the mean, variance, and standard deviation for the sum of the 20 spins?

b. Suppose Spinner A is spun 6 times and spinner C is spun 4 times. Find the mean, variance, and standard deviation for the sum of all 10 spins.

Answers a. mean = $3.4(20) = 68$, variance = $0.24(20) = 4.8$, standard deviation = 2.1909

b. mean = $5.4286(6) + 3.4(4) = 46.1716$, variance = $4.8163(6) + 0.24(4) = 29.8578$, standard deviation = 5.464

5. Consider Spinner E, pictured below. Not all outcomes are equally likely for this spinner, as shown on the table at the right.



number	probability
2	40/360
3	60/360
6	80/360
9	90/360
10	90/360

Find the mean, variance, and standard deviation for this spinner.

Answers mean = $\frac{40}{360}(2)+\frac{60}{360}(3)+\frac{80}{360}(6)+\frac{90}{360}(9)+\frac{90}{360}(10)=6.8056$

Variance =
$\frac{40}{360}(2-6.8055)^2+\frac{60}{360}(3-6.8055)^2+\frac{80}{360}(6-6.8055)^2+\frac{90}{360}(9-6.8055)^2+\frac{90}{360}(10-6.8055)^2=8.8789$

Standard deviation = 2.9898

6. Suppose a coin is bent so that it lands heads 30% of the time.

a. Find the mean, variance, and standard deviation for the number of heads from a single flip of the coin.

b. Find the mean, variance, and standard deviation for the number of heads if the coin is flipped 1000 times.

Answers a. mean = $0.3(1)+0.7(0)=0.3$, variance = $0.3(1-0.3)^2+0.7(0-0.3)^2=0.21$, standard deviation = 0.4583 b. mean = $0.3(1000)=300$, variance = $0.21(1000)=210$, standard deviation = 14.4914

7. Suppose you flip a fair coin 8 times and count the number of times you get heads. Fill in the table below. Then make a histogram showing the # of heads on the x-axis and the probability on the y-axis. Just make a rough sketch. Don't worry about making it perfect. ***Note:*** The answers for the table are provided on the next page.

# of heads	# of ways	probability
0		
1		
2		
3		
4		
5		
6		
7		
8		

8. Here's the table for the fair coin from the last problem.

# of heads	# of ways	probability
0	1	1/256
1	8	8/256
2	28	28/256
3	56	56/256
4	70	70/256
5	56	56/256
6	28	28/256
7	8	8/256
8	1	1/256

Now suppose we are flipping an unfair coin that lands heads only 30% of the time. Suppose we flip this coin 8 times. Fill in the following table for the unfair coin. Then make a histogram showing the # of heads on the x-axis and the probability on the y-axis. ***Be careful:*** The highest value of the histogram is no longer exactly in the middle.

# of heads	# of ways	probability
0		
1		
2		
3		
4		
5		
6		
7		
8		