3-20-17

Aim: SWBAT compare experimental and theoretical probabilities.

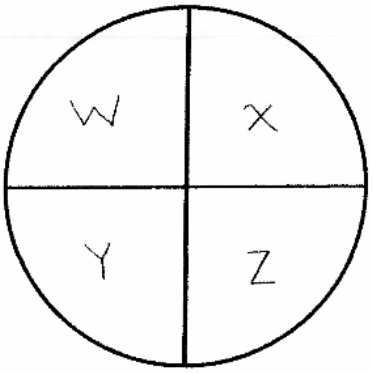
Do Now: Check hw.

HW: Worksheets

Quiz Wednesday or Thursday

Introduction to Probability

1. Kelly said that because there are four equal-sized sections on the spinner below, the probability of the spinner land on X is as likely as not. $\frac{1}{2}$



Explain why Kelly is wrong.

She is wrong because X is $\frac{1}{4}$ of the spinner, not $\frac{1}{2}$ of it. So the changes of landing on X is unlikely rather than equally likely.

2. Construct a spinner with the following characteristics:

It is certain to land on blue, yellow, green, or red.

It is twice as likely to land on red than green.

It is equally likely to land on blue or green.

It is more likely to land on yellow than not land on yellow.

majority

Experimental Probability

Write and solve a proportion to predict the results.

1. The number of 1s rolled in 250 rolls.

$\frac{1}{25} = \frac{x}{250}$ $\frac{25x}{25} = \frac{1750}{25}$ $x = 70$

2. The number of 2s rolled in 250 rolls.

$\frac{3}{25} = \frac{x}{250}$ $\frac{25x}{25} = \frac{750}{25}$ $x = 30$

3. The number of 3s rolled in 250 rolls.

$\frac{5}{25} = \frac{x}{250}$ $\frac{25x}{25} = \frac{1250}{25}$ $x = 50$

4. The number of 4s rolled in 250 rolls.

$\frac{3}{25} = \frac{x}{250}$ $\frac{25x}{25} = \frac{750}{25}$ $x = 30$

5. The number of 5s rolled in 250 rolls.

$\frac{3}{25} = \frac{x}{250}$ $\frac{25x}{25} = \frac{750}{25}$ $x = 30$

6. The number of 6s rolled in 250 rolls.

$\frac{4}{25} = \frac{x}{250}$ $\frac{25x}{25} = \frac{1000}{25}$ $x = 40$

*7. How many times did an odd number occur in the original experiment? 15

*8. Use your answer to #7 to predict how many times an odd number will occur in 3000 trials.

$\frac{15}{25} = \frac{x}{3000}$ $\frac{25x}{25} = \frac{45000}{25}$ $x = 1800$

9. In the cafeteria, there are 7 teachers, 48 girls, and 45 boys. What is the probability that the next person who enters the cafeteria is a boy?

$\frac{45}{100}$

A. $\frac{9}{20}$ B. $\frac{11}{20}$ C. $\frac{9}{11}$ D. $\frac{1}{3}$

HW

Experimental Probability

10. A spinner has a sun, moon, and a star section. Alice records her results from her spins in the table shown. Based on these results, predict how many times the pointer will land on the moon in 500 spins.

Shape	Number of Spins
Sun	11
Moon	18
Star	31

11. The owner of a deli recorded the number of customers who ordered each of the four sandwiches available. If the deli has 50 customers in the first hour it is open, predict how many customers will order turkey sandwiches.

Sandwich	Number of Customers
Ham	160
Cheese	100
Turkey	180
Veggie	60

12. Ryan has a bag with marbles. He selects a marble, records the color, and then puts the marble back in the bag. In 25 trials, he selects a green marble 10 times. He selects a blue marble the other times. Based on his results, which is the best prediction of how many times Ryan will select a blue marble in 100 trials?

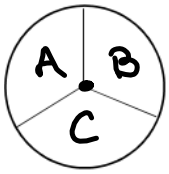
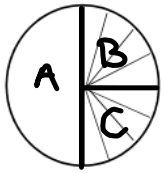
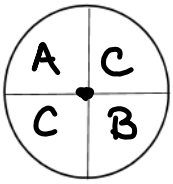
A. 35 B. 40 C. 50 D. 60

13. Students spin the pointer on a spinner 500 times. Based on the results of the table, which is a reasonable prediction for the number of times the pointer will land on blue in 100 spins?

Color	Number of Spins
Purple	100
White	200
Blue	150
Pink	50

Experimental vs. Theoretical Probability

1. A game at a carnival has three different spinners. The spinners are shown.

	Spinner 1	Spinner 2	Spinner 3
			
Sample Space	A, B, and C	A, B, and C	A, B, and C
Model Type	**Uniform** same size sections ∴ *equally likely outcomes*	**Non-uniform** different size sections ∴ *not equally likely outcomes*	**Uniform** same size sections ∴ *equally likely outcomes*
P(A) =	$\frac{\text{sections lettered A}}{\text{number of sections}}$ $\frac{1}{3}$	$\frac{\text{sections lettered A}}{\text{whole}}$ $\frac{1}{2}$	$\frac{\text{sections lettered A}}{\text{number of sections}}$ $\frac{1}{4}$

Is the pointer on Spinner 1 more likely to land on section A than on B or C? Explain.

No, each section is equally likely because they are the same size.

Is the pointer on Spinner 2 more likely to land on section A than on B or C? Explain.

Yes, because A is a larger section than either B or C.

What section is Spinner 3 most likely to land on? Explain.

Section C because it occupies half the spinner.

Explain how to use ratios to decide which spinner is most likely to land on section A.

Spinner 1 $P(A) = \frac{1}{3}$ Spinner 2 $P(A) = \frac{1}{2}$ Spinner 3 $P(A) = \frac{1}{4}$

Spinner 2 because $\frac{1}{2}$ is greater than $\frac{1}{3}$ and $\frac{1}{4}$.

Experimental vs. Theoretical Probability

2. A family has three girls. The family tossed a coin to represent the likelihood of a girl if they have another child. They let "heads" represent a girl and "tails" represent a boy. If the family has another child, predict whether the child will be a girl.

Coin Toss	Tally	Total
Heads (Girl)	𝍸 III	8
Tails (Boy)	𝍸 𝍸 II	12

Total: 20

Describe the sample space.

- Two possible equally likely outcomes: girl or boy
- The favorable outcome is girl.

Probability the next child is a girl	
Experimental: P(girl)	**Theoretical: P(girl)**
$\frac{\#\ of times\ the\ coin\ landed\ on\ heads}{number\ of\ trials} = \frac{8}{20}$	$\frac{\#\ of\ favorable\ outcomes}{total\ number\ of\ outcomes} = \frac{1}{2}$

Based on the results of the family experiment, predict whether the next child will be a girl. Explain. The family is less likely to have a girl than a boy.

Repeat the experiment by tossing a coin 20 times. Record your results in the chart.

Coin Toss	Tally	Total
Heads (Girl)	𝍸 IIII	9
Tails (Boy)	𝍸 𝍸 I	11

Based on your results, what is the experimental probability of a girl? $\frac{9}{20}$

Compare the experimental probability to the theoretical probability of having a girl. Will the experimental and theoretical probability of an event always differ? Why or why not?

Exp. Prop. $\frac{9}{20}$ 45%

Theoretical $\frac{1}{2}$ 50%

No, sometimes they are the same, but usually not. Generally, the experimental probability hovers around the theoretical.

HW

Experimental vs. Theoretical Probability

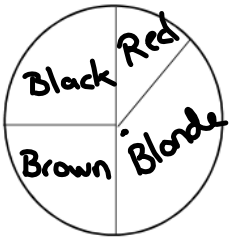
3. A baseball team has 3 left-handed hitters, 7 right-handed hitters, and 2 switch hitters. To find the probability of a switch hitter batting lead-off, Ty models the situation by putting 3 blue chips, 7 red chips, and 2 green chips into a bag. He randomly picks one chip from the bag 20 times, replacing the chip each time.

Color of Chip	Number of Times
Blue	6
Red	9
Green	5

Based on Ty's results, what is the probability of a switch hitter batting lead-off?

$$P(switch\ hitter) = \frac{green\ chips\ picked}{total\ number\ of\ chips} = \text{—} = \text{—}$$

4. Of the 20 students in Kendra's class, 5 have black hair, 8 have blonde hair, 5 have brown hair, and 2 have red hair. Kendra used the spinner to find the experimental probability that this week's class leader will have blonde hair. She spun the spinner 15 times and recorded her results.



Color	Number of Times
Black	2
Blonde	9
Brown	3
Red	1

What is the experimental probability that this week's class leader will have blonde hair?

5. On average, Ava makes 80% of her free throws. In the following random sample table, any number from 0 through 7 represents a make, and an 8 or 9 represents a miss. Start at the top left of the table and look at 20 consecutive number pairs as you move to the right to represent Ava's next two free throws. Based on the model, what is the experimental probability that Ava will make her next two free throws?

23894	55887	76938	66418	19267	59483	79445	30244
71015	49587	24440	05358	95457	78735	18544	39789
94730	89266	57662	16391	51709	06348	48464	53014

A. $\frac{1}{2}$ B. $\frac{11}{20}$ C. $\frac{13}{20}$ D. $\frac{4}{5}$