3-29-18

Aim: SWBAT determine the probability of a single event AND explore the difference between experimental and theoretical probability.

HW: Packet Page 42

Do Now: Turn to Packet Page 39

Aim: SWBAT determine the probability of a single event AND explore the difference between experimental and theoretical probability.

Now: Take out your homework and answer the questions below:

I tossed my coin 50 times and I got _____ heads and _____ tails.

If you did the same experiment again, would you expect to get the same results? No

Why or why not? _____

_____

Notes.

Probability is the likelihood an event will happen; written as a ratio (fraction).

***** All probabilities are theoretical unless an experiment is discussed *****

Simple Probability – the probability of a single event.

$$\text{Probability of an event} = \frac{number\ of\ favorable\ outcomes}{number\ of\ possible\ outcomes}$$

What is an outcome? An outcome is the possible result of an action.
For example: You roll a die. There are 6 possible outcomes.

What is a sample space? A sample space is list of all the possible outcomes.
For example: You roll a die (number cube). The sample space is 1, 2, 3, 4, 5, 6

Practice Problems: Let's look at some examples of simple probability:
If you roll a die (number cube), P (1) **means** "What is the probability of rolling the die and getting a 1"? When what you want includes more than one item, you think about all of the items together.

1) **Find each probability** The sample space is: 1, 2, 3, 4, 5, 6

a) P (1) = $\frac{1}{6}$

b) P (even number) = $\frac{3}{6} = \frac{1}{2}$

c) P (1 or 2) = $\frac{2}{6} = \frac{1}{3}$

d) P (5 or 8) = $\frac{1}{6}$

* e) P (prime number) = $\frac{3}{6} = \frac{1}{2}$

f) P (a number less than 10) = $\frac{6}{6} = 1$ certain

g) P (7) = $\frac{0}{6} = 0$ impossible

h) P (not a 4) = $\frac{5}{6}$

i) P (factor of 12) = $\frac{5}{6}$

j) P (5 or 6) = $\frac{2}{6} = \frac{1}{3}$

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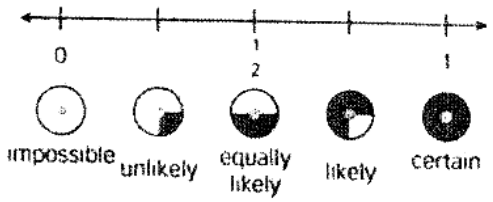
- When an event will definitely happen, the probability of the event is said to be **certain**. A certain event has a probability equal to 1.
- When an event will definitely not happen, the probability of the event is said to be **impossible**. An impossible event has a probability equal to 0.
- Other ways to describe probabilities using words include "more likely than not," "as likely as not," and less likely than likely.

Let's see how these words apply to tossing a die (number cube)

Outcome	Probability
number less than 10	certain
number 7	impossible
even number	as likely as not
factor of 12	more likely than not
number 5 or 6	less likely than likely

Numbers between 0 and 1 describe probabilities.

Look at the diagram below. It shows how the words used to describe probabilities relate to numbers used to describe probabilities.



When an outcome is impossible, the outcome has a probability of 0.

When an outcome is as likely as not, the outcome has a probability of $\frac{1}{2}$.

When an outcome is certain, the outcome has a probability of 1.

Outcomes with probabilities between 0 and $\frac{1}{2}$ are less likely than likely.

Outcomes with probabilities between $\frac{1}{2}$ and 1 are more likely than not.

If the names Jessica, Joshua, Jill and Jimmy are written on slips of paper and are placed in a bag.

Name an outcome that is impossible. picking not a "J"

Name an outcome that is certain. picking a "J" name

Name an outcome that is as likely as not. picking a "J" name

Name an outcome that is more likely than not. a name with an "i"

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You Try! You have a jar of gumballs. In the jar are 7 blue gumballs, 5 red gumballs and 3 white gumballs. Find each of the following probabilities *as fractions in simplest form.*

total: 15

1) P (red) = $\frac{5}{15} = \frac{1}{3}$

2) P (blue) = $\frac{7}{15}$

3) P (white) = $\frac{3}{15} = \frac{1}{5}$

4) P (red or white) = $\frac{8}{15}$

5) P (blue or white) = $\frac{10}{15} = \frac{2}{3}$

6) P (red or blue or white) = $\frac{15}{15} = 1$

7) P (green) = $\frac{0}{15}$

8) P (white or green) = $\frac{3}{15} = \frac{1}{5}$

Experimental Vs. Theoretical Probability

What is **theoretical probability**?

Theoretical probability is what SHOULD happen in an experiment. It describes how likely it is than an event will happen based on all the possible outcomes and uses the ratio:

$$P(\text{event}) = \frac{\text{Number of favorable outcomes}}{\text{Number of possible outcomes}}$$

Example) When you toss a coin 50 times, you SHOULD get 25 heads and 25 tails.

- The theoretical probability of tossing a coin and getting heads is $\frac{1}{2}$.
- The theoretical probability of tossing a coin and getting tails is $\frac{1}{2}$.

What is **experimental probability**?

Experimental probability is the probability based on experimental data that are found by repeating the experiment several times (like your homework assignment on tossing the coin) and using the ratio:

$$P(\text{event}) = \frac{\text{Number of times an event happens}}{\text{\# of times experiment was performed}}$$

Example) If when I tossed my coin 50 times, I got 20 heads and 30 tails.

- The experimental probability of tossing the coin and getting heads is $\frac{20}{50}$ *or* $\frac{2}{5}$.
- The experimental probability of tossing the coin and getting tails is $\frac{30}{50}$ *or* $\frac{3}{5}$.

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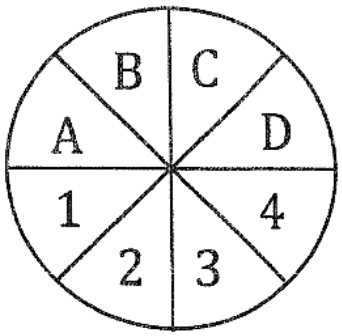
Homework - Introduction to Probability

Use the spinner to answer questions 1 - 10



1) P (3) _____ 2) P (9) _____

3) P (#) _____ 4) P (not C) _____

5) P (Prime #) _____ 6) P (3 or B) _____

7) P (A, 2, or 5) _____ 8) P (consonant) _____

9) P (not a 1 or B) _____ 10) P(# less than 4) _____

A bag has 24 marbles: 6 green, 6 red, 12 blue. Lucy reaches in the bag and picks 1 marble.

11) What is the total number of marbles? _____

12) What is half the total number of marbles? _____

13)Name an outcome that is impossible. _____

14) Name an outcome that is certain. _____

15) Name an outcome that is as likely as not. _____

16) Name an outcome that is more likely than not. _____

17) Name an outcome that is less likely than likely. _____

You randomly draw a tile from a bag that contains 10 A-tiles, 7 E-tiles, 6 I-tiles, 5 O-tiles and 2 U-tiles. Find the theoretical probability of the each event. Write as a fraction in simplest form.

18) P (you draw an A)

19) P (you draw an I)

20) P (you draw an I or an O)

21) P (you draw an E or a U)

22) P (you draw a Z)

23) P (you draw a vowel)

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