



## Handout #1

**Rocio**, this handout covers **probability**: the odds or the likelihood that something will happen.

You've probably ran into this before if you've ever entered a raffle or bought a lottery ticket.

The probability of winning was your **chance** of winning.



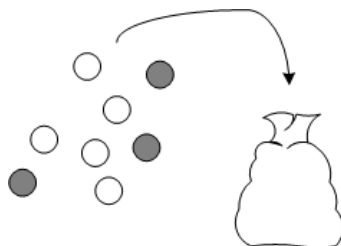
## Definition: Probability

A number expressing the likelihood that a specific event will occur, expressed as the ratio of the number of actual occurrences to the number of possible occurrences.

But remember, there's lots of ways of saying the same thing. You can say,

- 1 What's the probability of that happening.
- 2 What are the odds of that happening.
- 3 What's the chance of that happening.
- 4 At what rate will that event happen.

Put 3 grey balls and 5 white balls into a bag and then shake the bag. What's the probability that you'll pick out a grey ball?



$$\text{Probability} = \frac{\text{\# of grey balls}}{\text{\# of balls}} = \frac{3}{8}$$

Probability is defined as:

$$\text{Probability} = \frac{\text{\# of selected events}}{\text{\# of total events}}$$

You see, the probability of a thing or an event happening is just the **number of those things or events** divided by the **total number of events or things that will happen**.



*Rocio and four of Rocio's friends put their names into a hat. A name is then drawn at random.*

*What's the probability that Rocio's name is drawn?*

*What's the odds that Rocio's name is drawn?*

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### Ratios and Fractions and Percents and Decimals . . . Oh My!

The probability of something happening is the same as the rate that something will happen.

And you know that a rate can be expressed as a:

- 1 Ratio (ex. 1 : 4 )
- 2 Fraction (ex. 1 / 4 )
- 3 Percentage (ex. 25% )
- 4 Or Decimal (ex. 0.25 )

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### Survey Says . . .

Given a **representative sample** from a set or population, you can:

- 1 Find the probability of something happening on the sample set/population.
- 2 And then apply that probability to a larger population **that includes the smaller population**.



### Remember!

For the results to be valid, the sample population or sample set must be **representative**.

That means that the sample set is large enough and the samples were picked at random with no bias.

For example, let's say you want to survey the people of Minneapolis so you can predict who will win the mayoral race. You can't just ask people you know: you've got to randomly pick people from the city of Minneapolis or else your survey will be biased and incorrect.

Complete this problem with you tutor:



You pick a card from a 52-card deck and put it back in the deck. You then pick a card at random from the deck.

What are the odds that you pick your card expressed as a

Ratio:

Fraction:

Decimal:

Percentage:

The population of a high school is 213 students. A random survey of 5 students asked each student who they would vote for on election day:

Student	Candidate
Mohammed	Sam
Joe	Shukri
Jill	Sam
June Ping	Shukri
Carlos	Sam

First, determine the probability:



Assuming this survey is **representative**, what's the probability that Sam will win the race:

What's the probability that Shukri will win:

What's the probability that Susan will win:

Now, to find the total number of people that will vote for a candidate you multiply the probability you got from the survey (sample) by the total student population.



On election day, about how many people will vote for Shukri:

How many will vote for Sam:

How many will vote for Susan:



## Questions

The Culinary Institute (a non-profit dedicated to the pursuit of great taste!) surveyed 2,600 Americans at random and asked them 'What's your favorite food?' The results are printed below:

Food	# of people
Hummus	250
Pad Thai	100
Pizza	1000
Bangers and Mash	50
Tamales	500
Other	700

- Q1 What percentage of people like 'Bangers and Mash'?
- Q2 If you ran into a random stranger on the street, what's the probability their favorite food would be 'Pizza'?
- Q3 What's the probability their favorite food would be 'Hummus'?
- Q4 What are the odds that you won't be able to tell what their favorite food is?
- Q5 Assume the survey is accurate. At a dinner hosting 785 random Americans, how many people at the dinner have a favorite food of 'Pizza'?
- Q6 Assume the survey is accurate and the population of the entire country is 300 million. About how many people in America have a favorite food of 'Pad Thai'?
- Q7 Based on this survey, can you determine the number of people that like 'Pizza' in the country of Italy (population 58 million)?

**Handout #1**

-- scratch paper --