



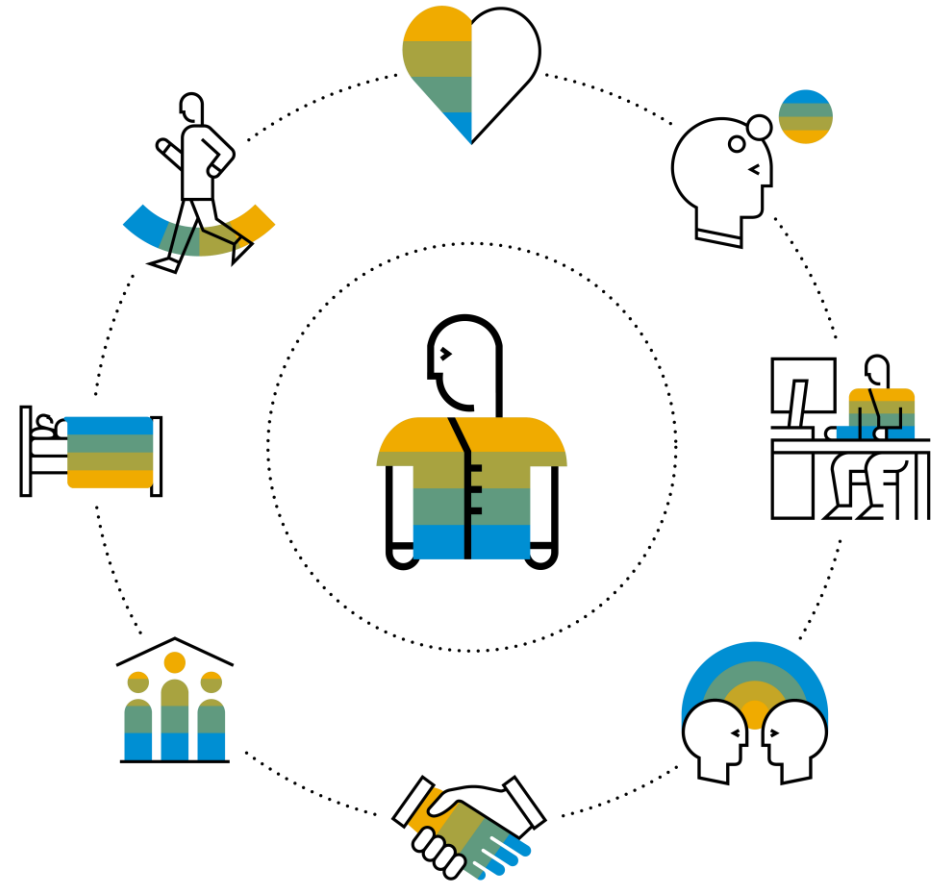
Week 4: Introduction to Probability

## Unit 1: Introduction to Probability

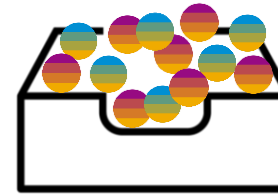
# Introduction to Probability

## Introduction

- There are many times in modern life where you would like to predict the likely outcome of an event or series of events.



## Introduction – More complex examples

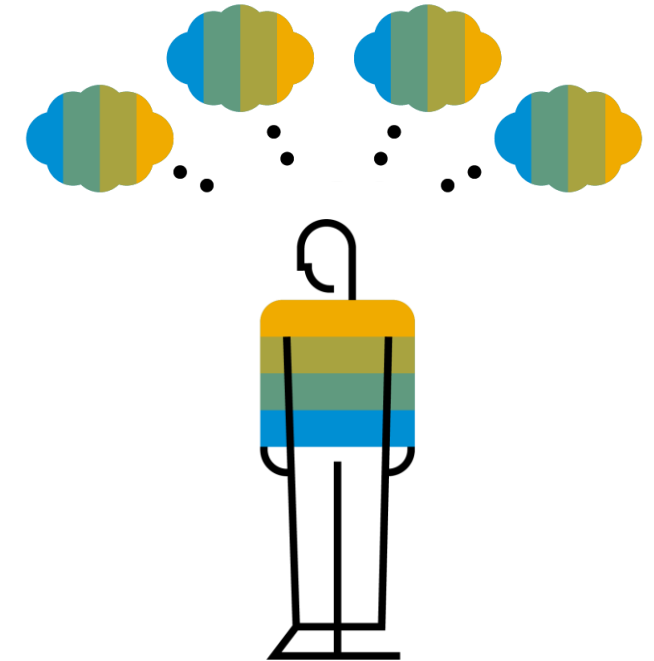


A bar chart with four colored segments: blue, green, yellow, and red. There are two empty rectangular boxes above the bar, one above the blue segment and one above the yellow segment.
$$\text{probability} = \frac{\text{event/s}}{\text{number of outcomes}}$$

### Some symbols

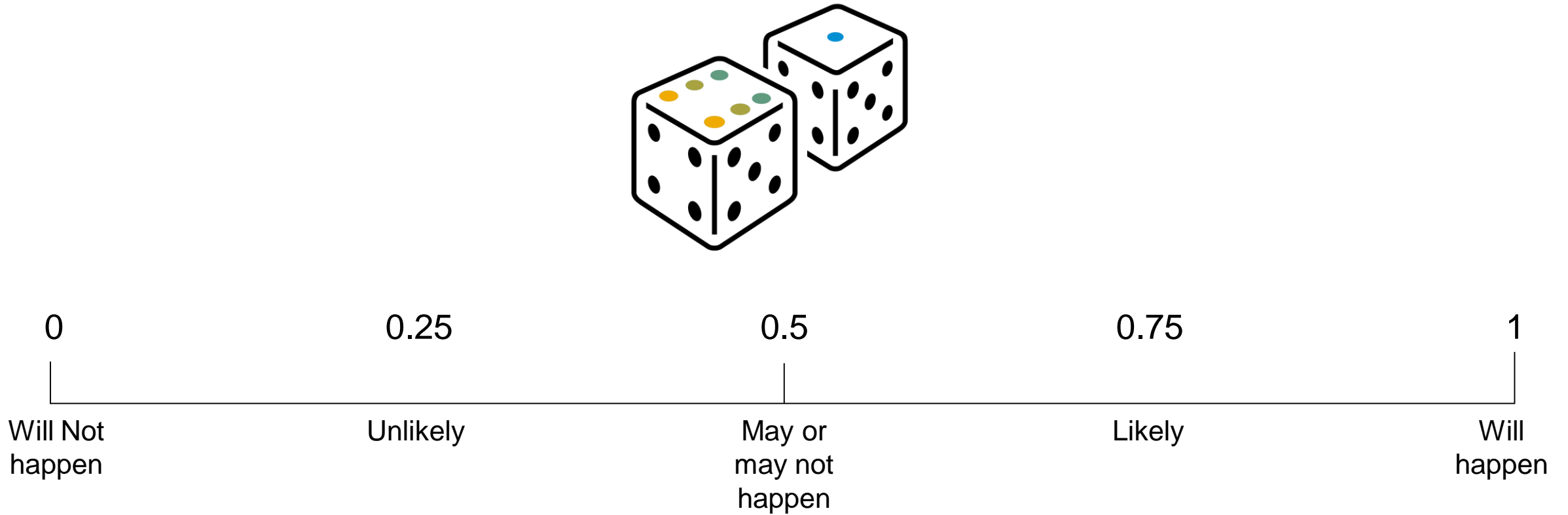
Here are some commonly used symbols and conventions:

- $P(A)$  – The probability of event A
  - The probability of throwing a six with a die –  $P(6)$
- $P(A \cap B)$  – The probability of event A and B
  - The probability of throwing 2 sixes –  $P(6 \cap 6)$
- $P(A \cup B)$  – The probability of event A or event B
  - The probability of choosing one card from a standard deck and getting either a Queen of Hearts or King of Hearts
- $P(A|B)$  – The probability of A given prior event B
  - The probability of being diagnosed with cancer given that the patient is a smoker



# Introduction to Probability

## What is probability?



## How do I calculate the probability of an event?

Calculate all possible outcomes for an event (the “sample space”).

- For example, there are 6 possible events (outcomes) when throwing one die:
- $S = \{1, 2, 3, 4, 5, 6\}$

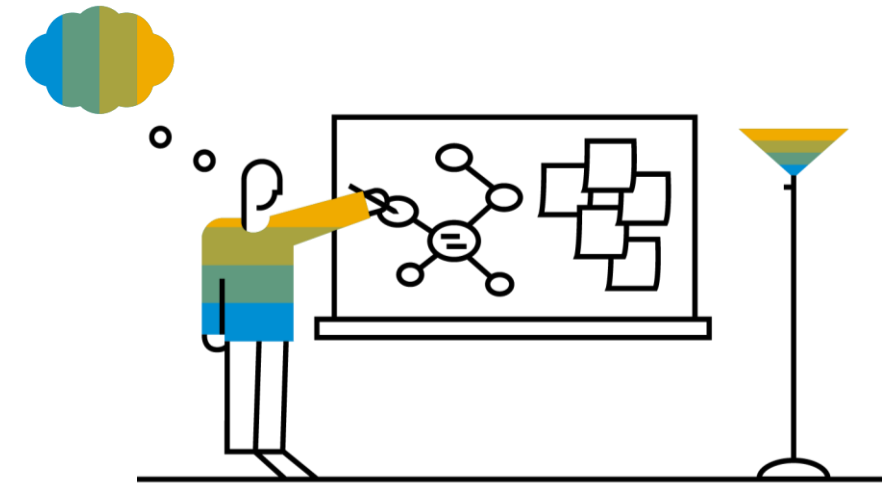


### How do I calculate the probability of an event?

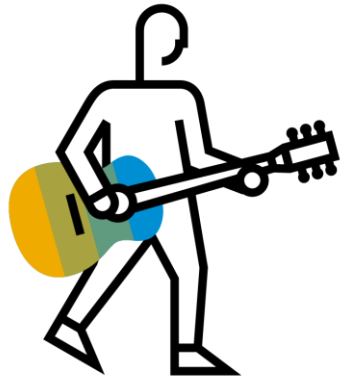
- To calculate the probability of an event you use the following formula:

$$P(E) = \frac{\text{Total Number of Outcomes for the Event}}{\text{Total Number of Outcomes in the Sample Space}}$$

- What is the probability of throwing a six?
  - $P(E) = 1/6 = 0.16$  or 16%
- What is the probability of throwing an even number?
  - $P(E) = 3/6 = 0.5$  or 50%



## How do I calculate the probability of an event?



Music style	# of people who prefer
Rock	20
Disco	10
Hip Hop	15
Reggae	25
Classical	30
<b>Total</b>	<b>100</b>



If you choose a random person, what is the likelihood that they like classical music?

$P(E) = \text{Frequency for classical} / \text{Total frequencies in table}$

$P(E) = 30/100 = 0.3$



# Introduction to Probability

## Summary

- You can calculate the likelihood of an event or series of events using probability.
- You need to understand all possible outcomes in the “sample space” and the particular event or group of events you are analyzing.



# Thank you.

**Contact information:**

**open@sap.com**

Follow all of SAP



[www.sap.com/contactsap](http://www.sap.com/contactsap)

© 2019 SAP SE or an SAP affiliate company. All rights reserved.

No part of this publication may be reproduced or transmitted in any form or for any purpose without the express permission of SAP SE or an SAP affiliate company.

The information contained herein may be changed without prior notice. Some software products marketed by SAP SE and its distributors contain proprietary software components of other software vendors. National product specifications may vary.

These materials are provided by SAP SE or an SAP affiliate company for informational purposes only, without representation or warranty of any kind, and SAP or its affiliated companies shall not be liable for errors or omissions with respect to the materials. The only warranties for SAP or SAP affiliate company products and services are those that are set forth in the express warranty statements accompanying such products and services, if any. Nothing herein should be construed as constituting an additional warranty.

In particular, SAP SE or its affiliated companies have no obligation to pursue any course of business outlined in this document or any related presentation, or to develop or release any functionality mentioned therein. This document, or any related presentation, and SAP SE's or its affiliated companies' strategy and possible future developments, products, and/or platforms, directions, and functionality are all subject to change and may be changed by SAP SE or its affiliated companies at any time for any reason without notice. The information in this document is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. All forward-looking statements are subject to various risks and uncertainties that could cause actual results to differ materially from expectations. Readers are cautioned not to place undue reliance on these forward-looking statements, and they should not be relied upon in making purchasing decisions.

SAP and other SAP products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of SAP SE (or an SAP affiliate company) in Germany and other countries. All other product and service names mentioned are the trademarks of their respective companies.

See [www.sap.com/copyright](http://www.sap.com/copyright) for additional trademark information and notices.