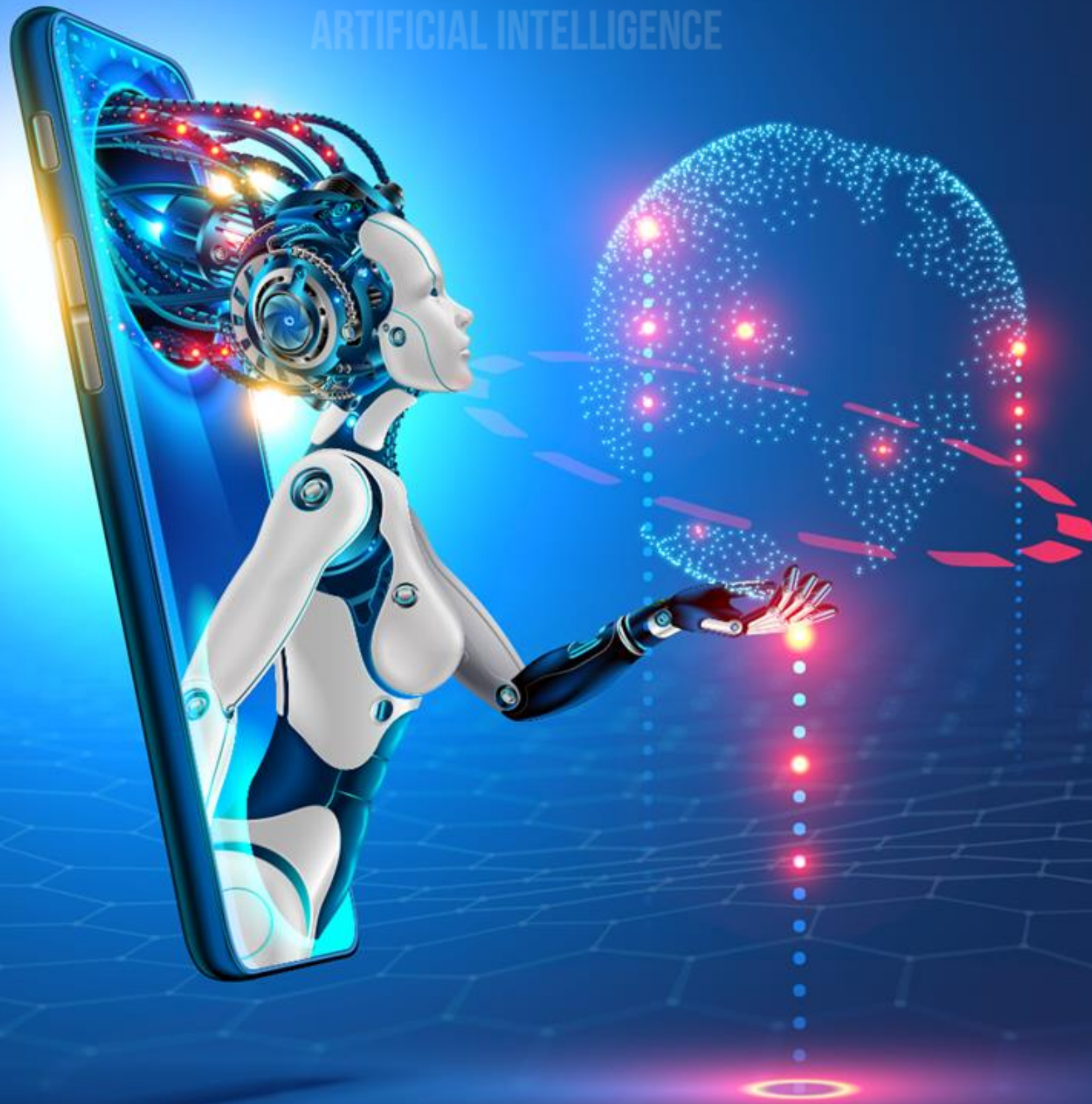


# DATA AND ARTIFICIAL INTELLIGENCE



## Math Refresher



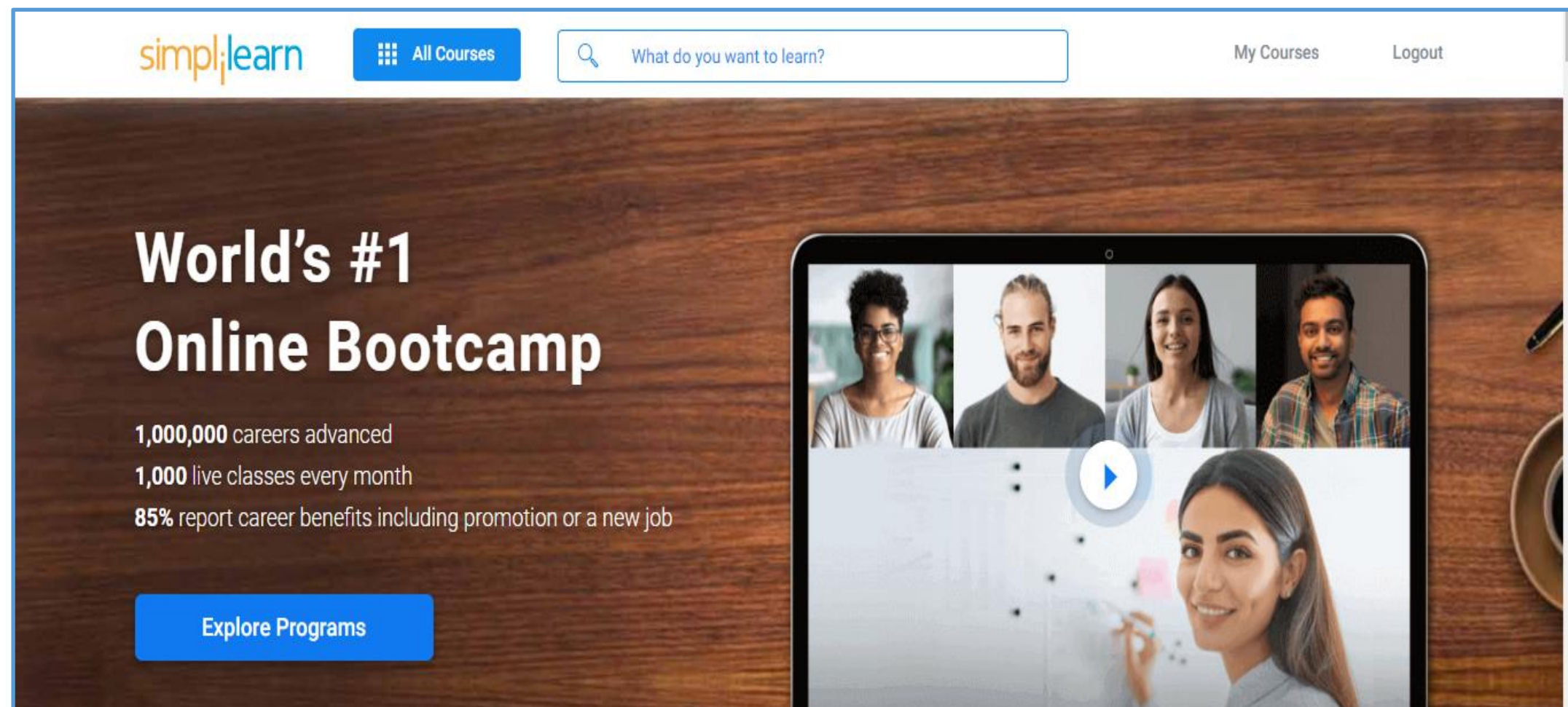
## Course Introduction



## About Simplilearn

# Simplilearn

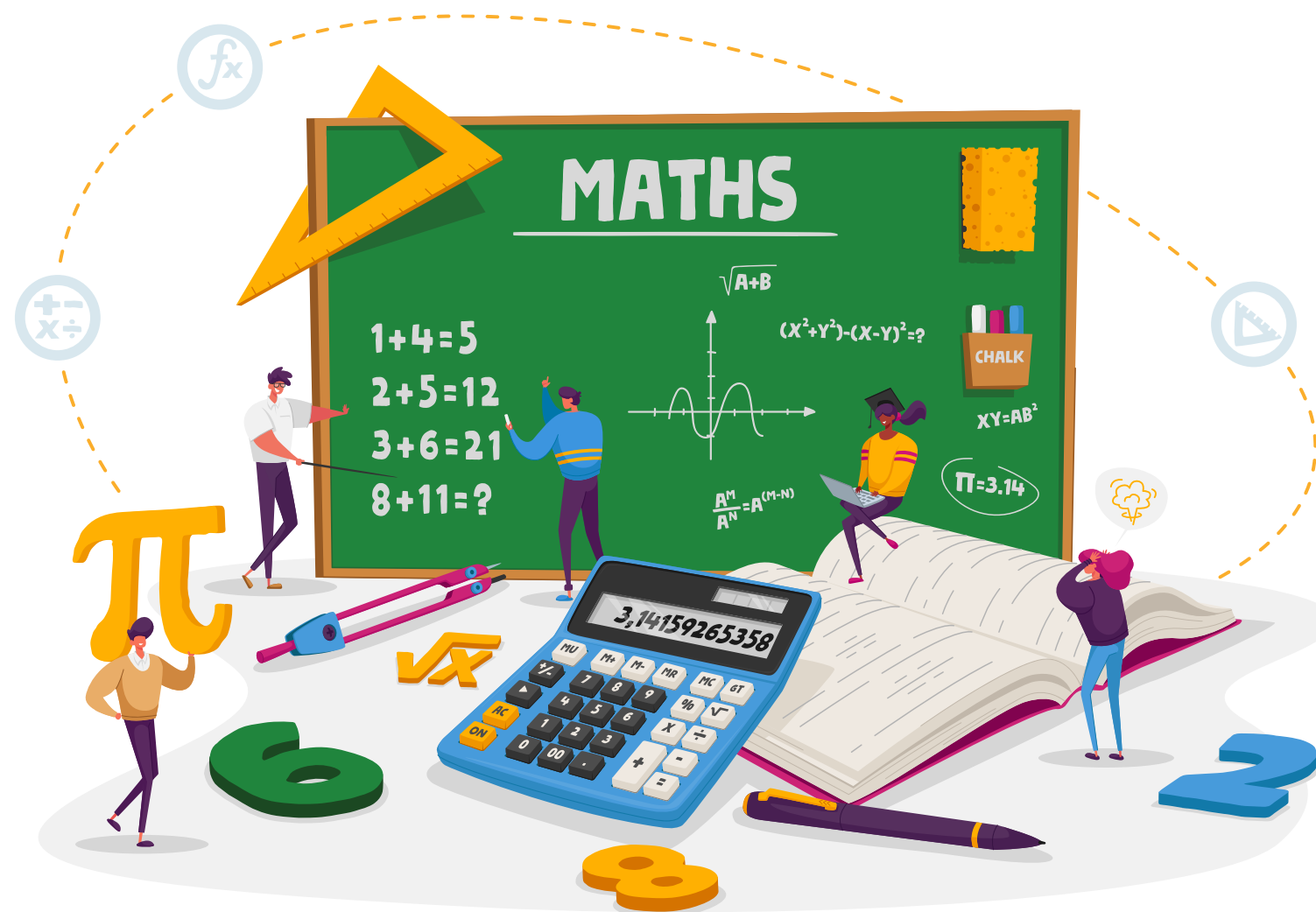
For over a decade, Simplilearn has focused on digital economy skills.  
Now, Simplilearn has become the **World's #1 Online Bootcamp**.



## Introduction to Mathematics

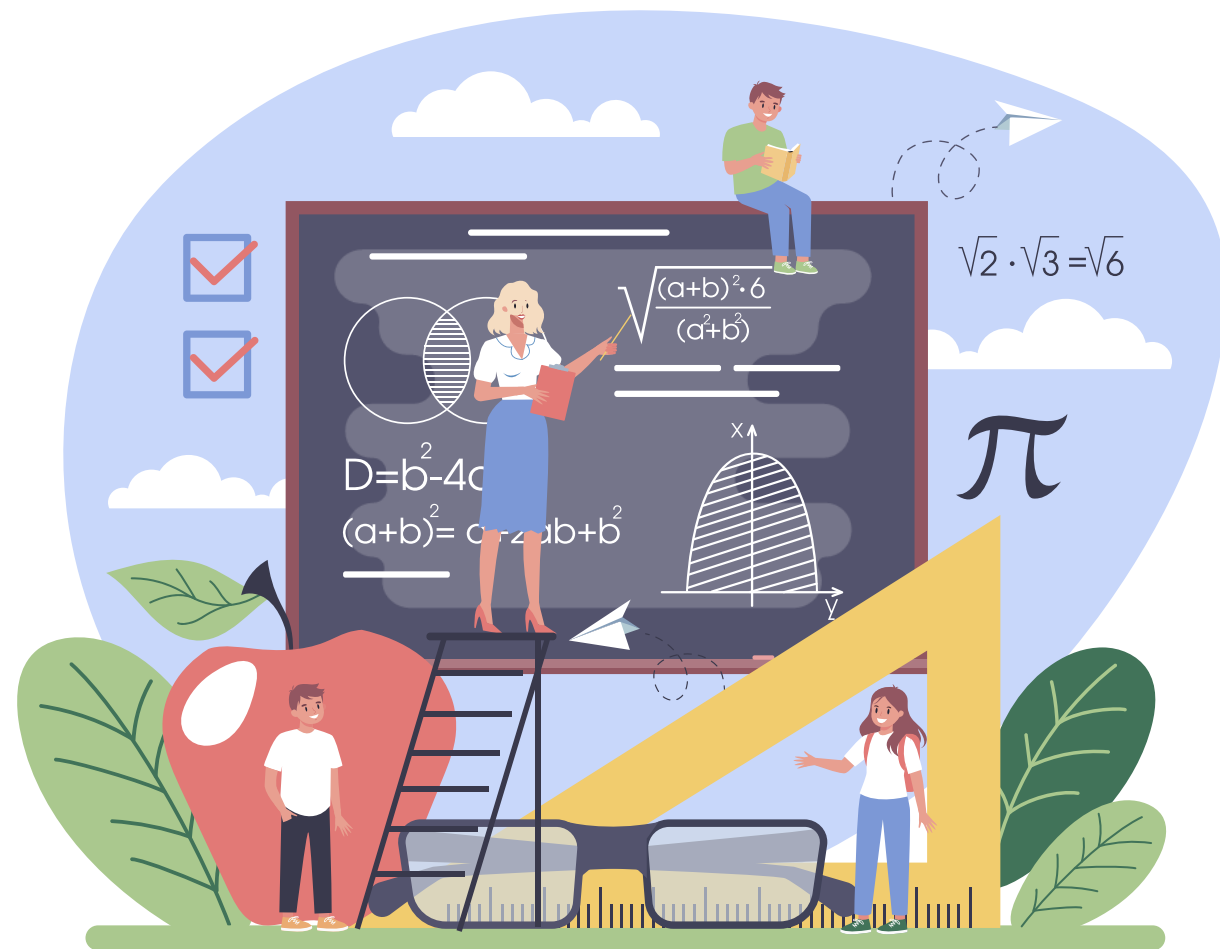
# What Is Mathematics?

Mathematics is the science that deals with the logic of shape, structure, space, quality, quantity, arrangement, and change.



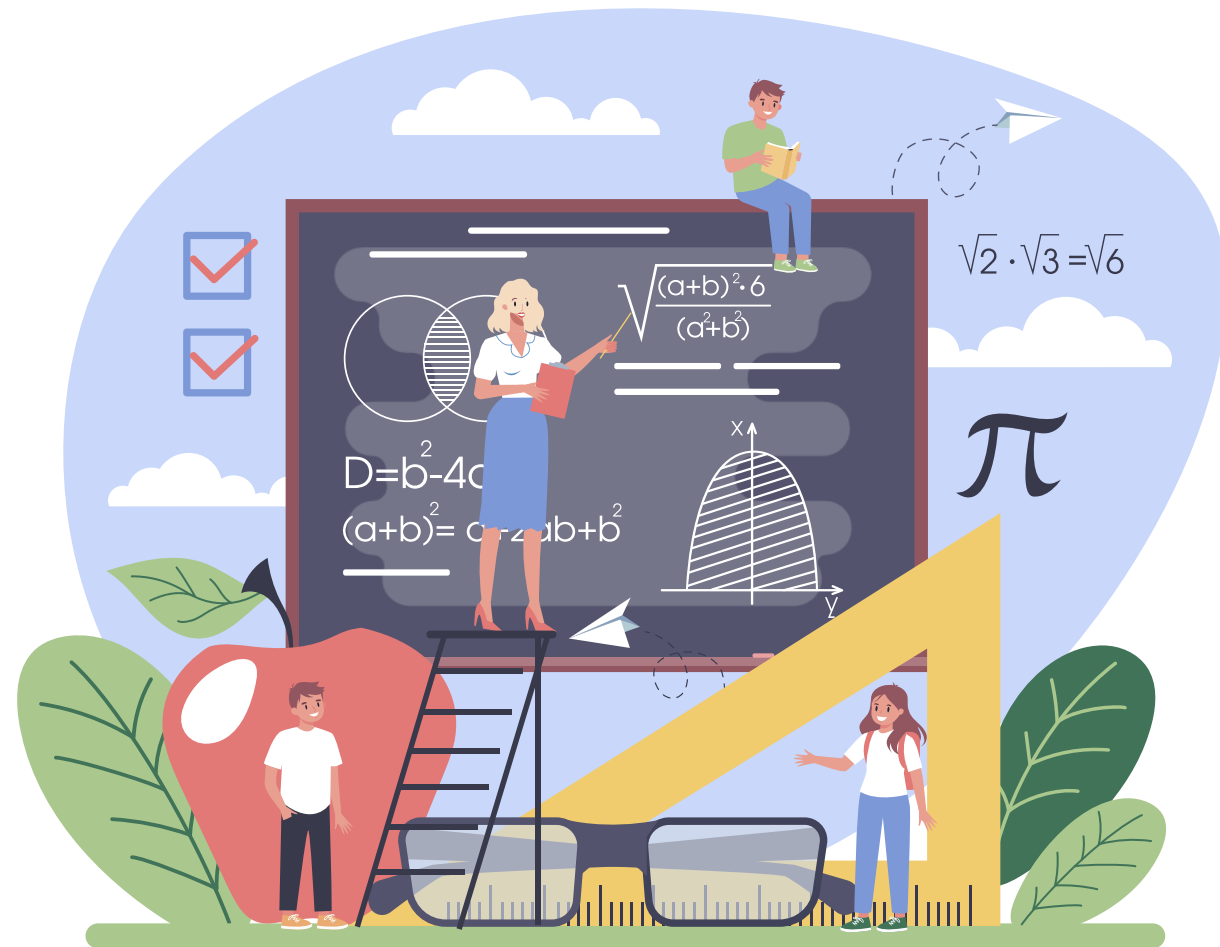


# What Is Mathematics?



- It is an area of knowledge that covers various topics, including arithmetic, number theory, algebra, geometry, calculus, and analysis.
- It involves discovering and proving the properties of abstract objects by pure reasoning.

# What Is Mathematics?



- It is used to find patterns in data, form new hypotheses, and establish the truth by rigorous deduction from appropriately chosen entities with specified properties.
- It is used as an essential tool in various domains, including data science, engineering, medicine, natural science, and social science.



# Importance of Math in Data Industry

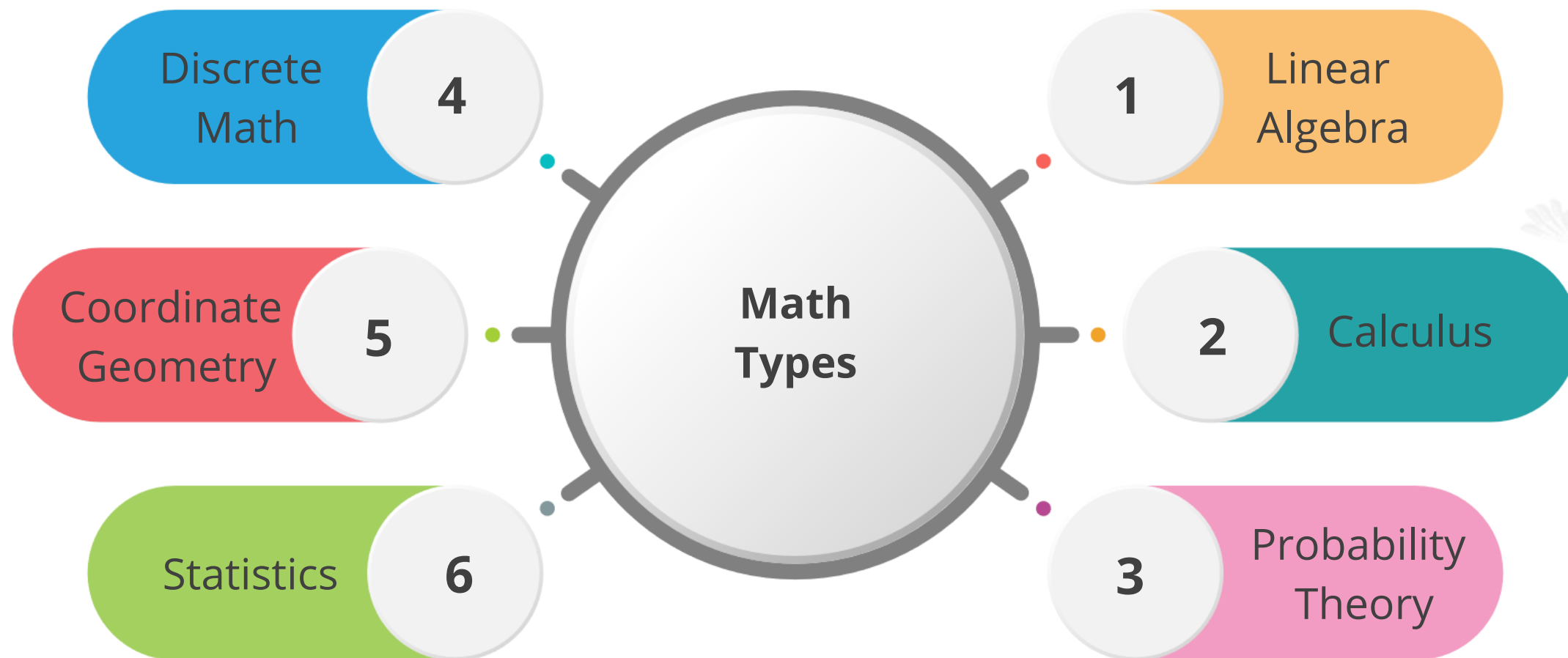


- Mathematics is a necessary component of the data industry and serves as the foundation for almost all data science techniques.
- A professional who deals with data must have strong knowledge in specific mathematical fields.

## Types of Mathematics

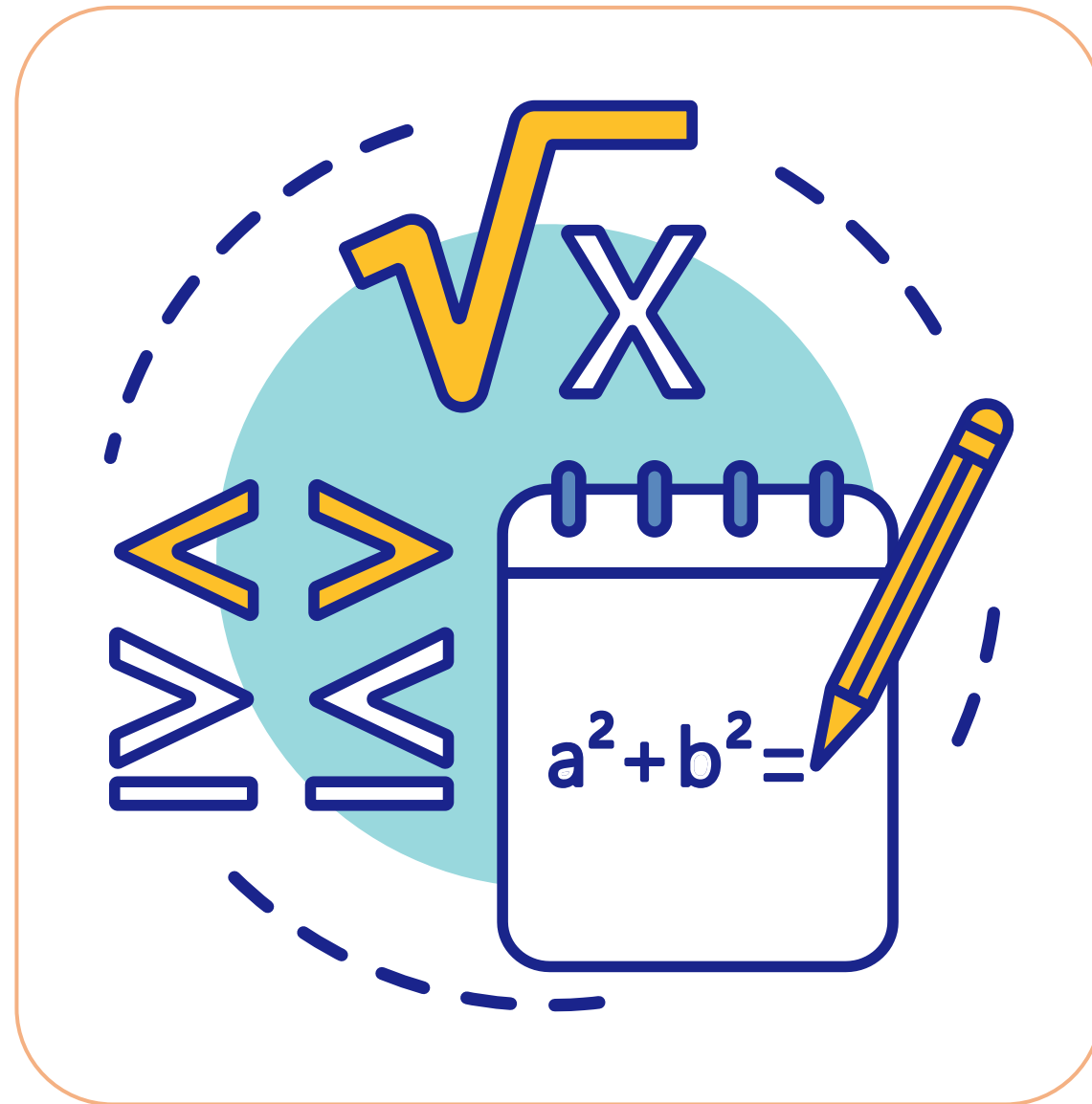
# Types of Mathematics

The different types of mathematics utilized in various data-centered job profiles are as follows:





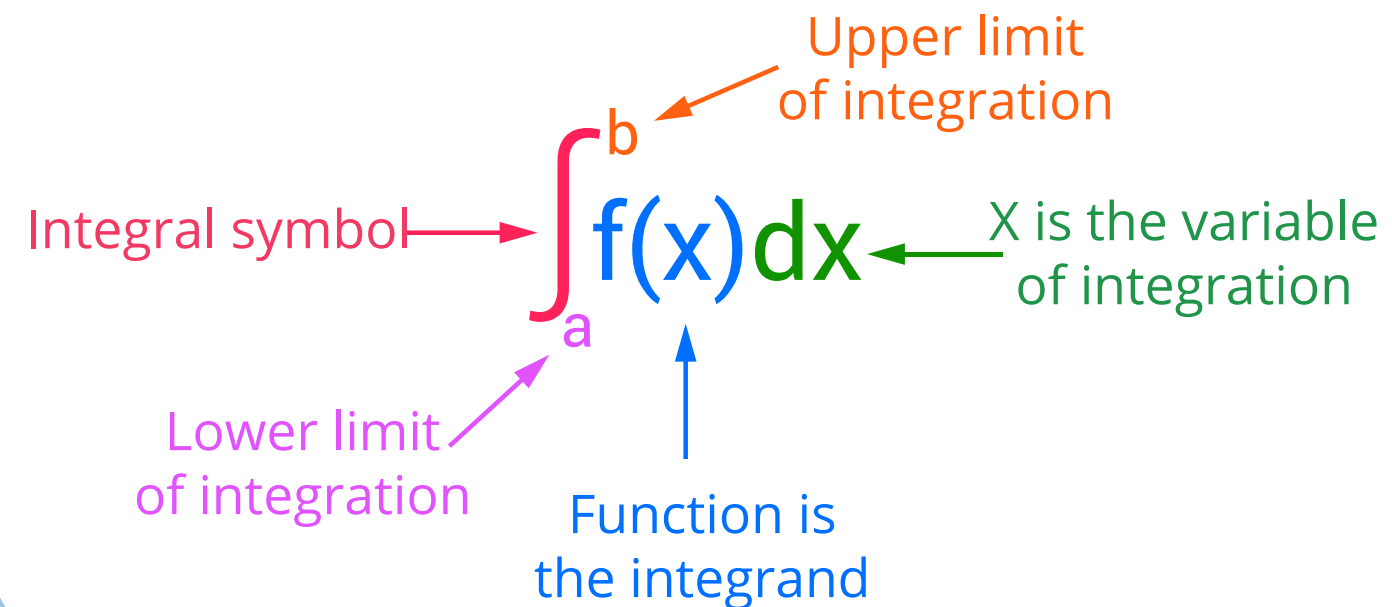
# Linear Algebra



- It is used for handling large datasets.
- The linear equation construction technique is an important component of machine learning algorithm development for examining and monitoring datasets.
- Linear algebra is used in machine learning for loss functions, regularization, covariance matrices, and support vector machine classification.

# Calculus

## Integral Notation



The diagram illustrates the components of the integral notation  $\int_a^b f(x) dx$ . It includes the following labels and arrows:

- Integral symbol**: A red arrow points to the integral symbol  $\int$ .
- Upper limit of integration**: An orange arrow points to the upper limit  $b$ .
- Lower limit of integration**: A purple arrow points to the lower limit  $a$ .
- Function is the integrand**: A blue arrow points to the function  $f(x)$ .
- x is the variable of integration**: A green arrow points to the differential  $dx$ .

- It is utilized in the training and optimization of mathematical models.
- Multivariate calculus is utilized in algorithm training and gradient descent.
- It is a combination of derivatives, curvature, divergence, and quadratic approximations.

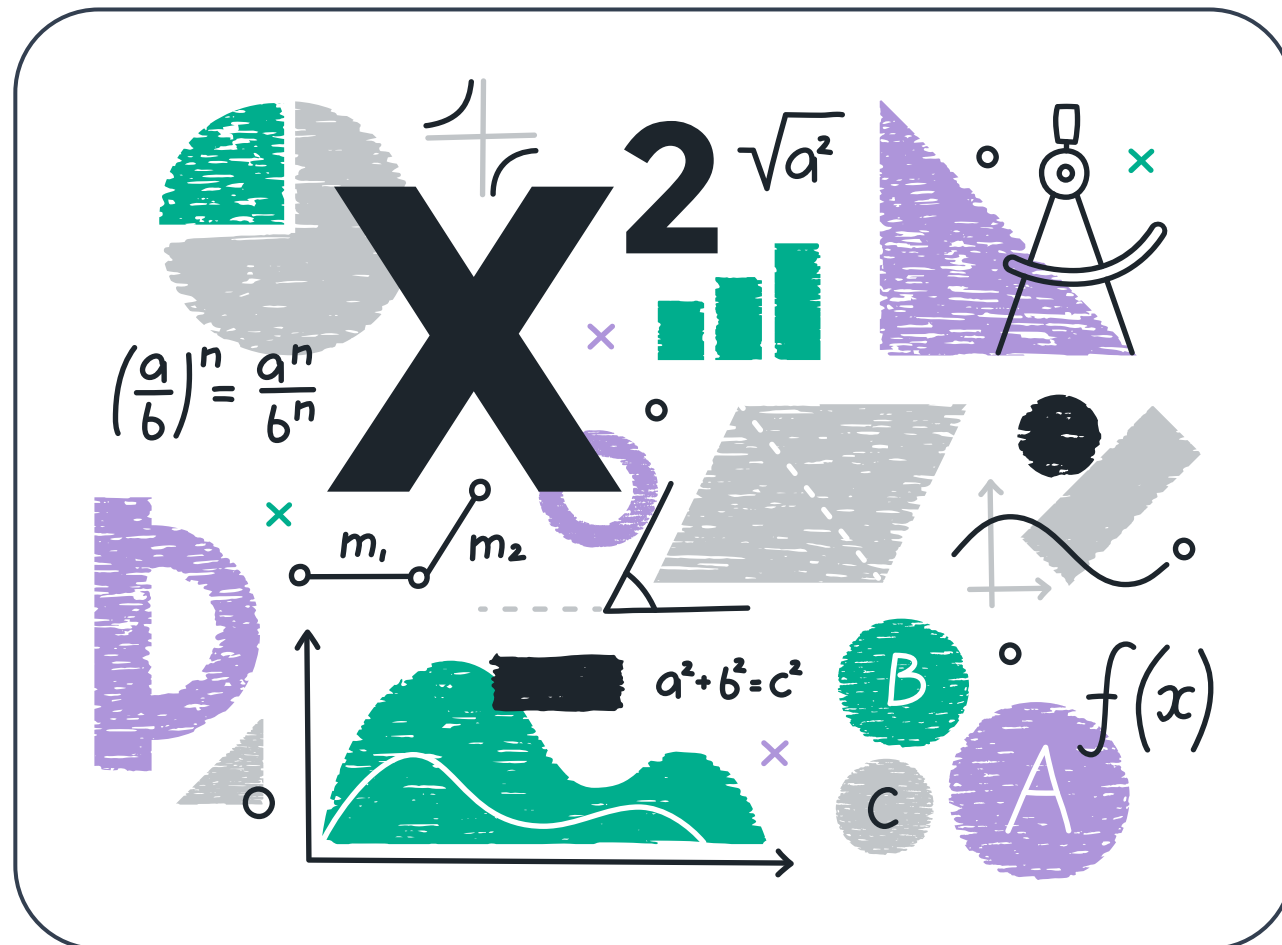
# Probability Theory



- It is a discipline of mathematics concerned with the study of random processes.
- It is used to estimate the likelihood of future events, often using a numerical scale of 0 to 1, with **0** signifying impossibility and **1** signifying certainty.
- It is essential for hypothesis testing as well as distributions such as the gaussian distribution and the probability density function.



# Discrete Math



- It is the study of mathematical constructs that can only be represented by discrete values.
- It is used for advanced computations to analyze data in deep learning models.
- It is utilized by Google Maps to determine the fastest driving routes and timing.

# Coordinate Geometry



- It is the combination of algebra and geometry in which algebra analyzes geometrical relationships and geometrical figures are represented by equations.
- It denotes points, lines, and curves using algebraic equations.
- It applies to the data that is analyzed with an ordered pair of coordinates.

# Statistics



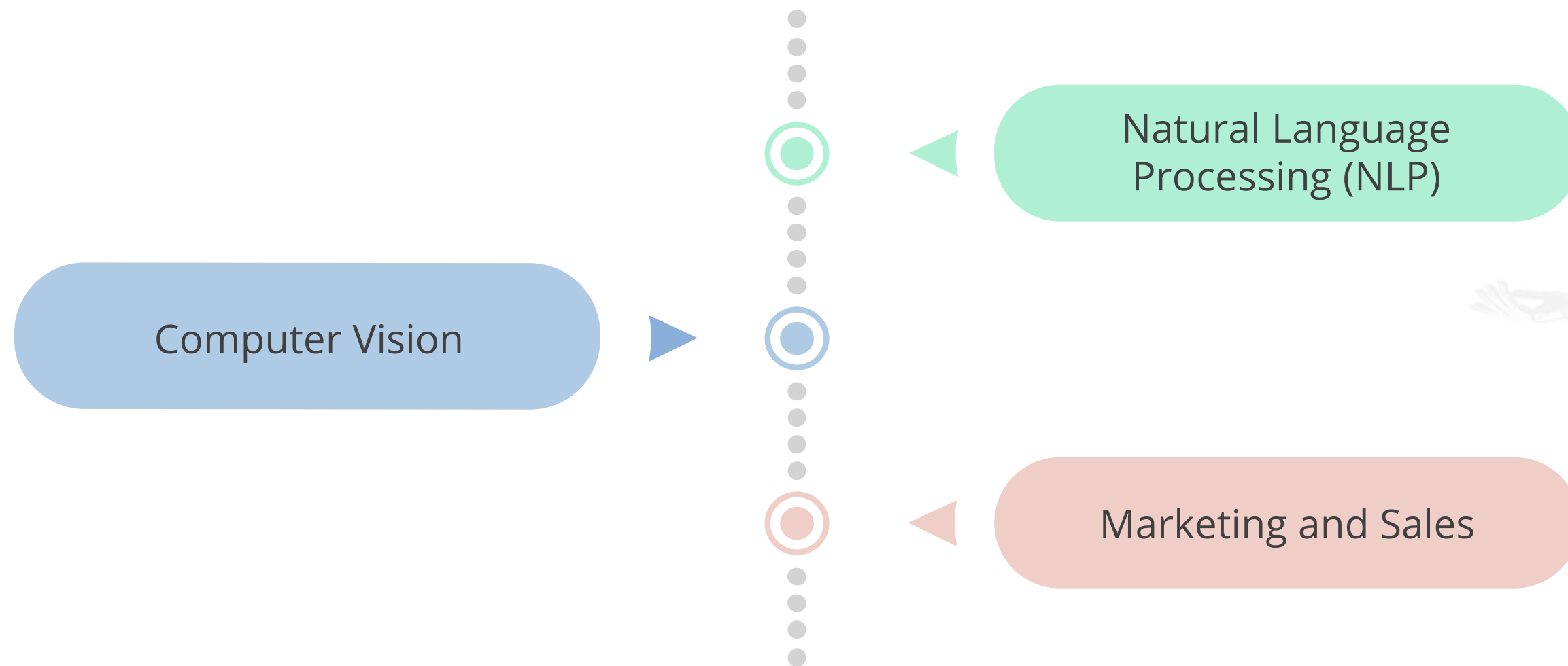
- It is concerned with the collection and processing of enormous amounts of data.
- Every model is built around statistical concepts.
- It is essential to use statistics in machine learning when working with classifications such as logistic regression, discrimination analysis, hypothesis testing, and distributions.



## Applications of Math in Data Industry

# Applications of Math in Data Industry

Some of the major applications of math in data-centered domains are as follows:



# Applications of Math in Data Industry

## Natural Language Processing (NLP)

It utilizes unsupervised learning approaches, such as topic modeling and predictive analytics, as well as linear algebra for word embeddings.

It is applied in chatbots, language translation, speech recognition, and sentiment analysis.



# Applications of Math in Data Industry

## Computer Vision

It utilizes linear algebra for image representation, image processing, increasing agricultural yields, classifying illnesses, and enhancing diagnosis.

It is applied in image recognition, the agricultural industry, and the healthcare industry.

# Applications of Math in Data Industry

## Marketing and Sales

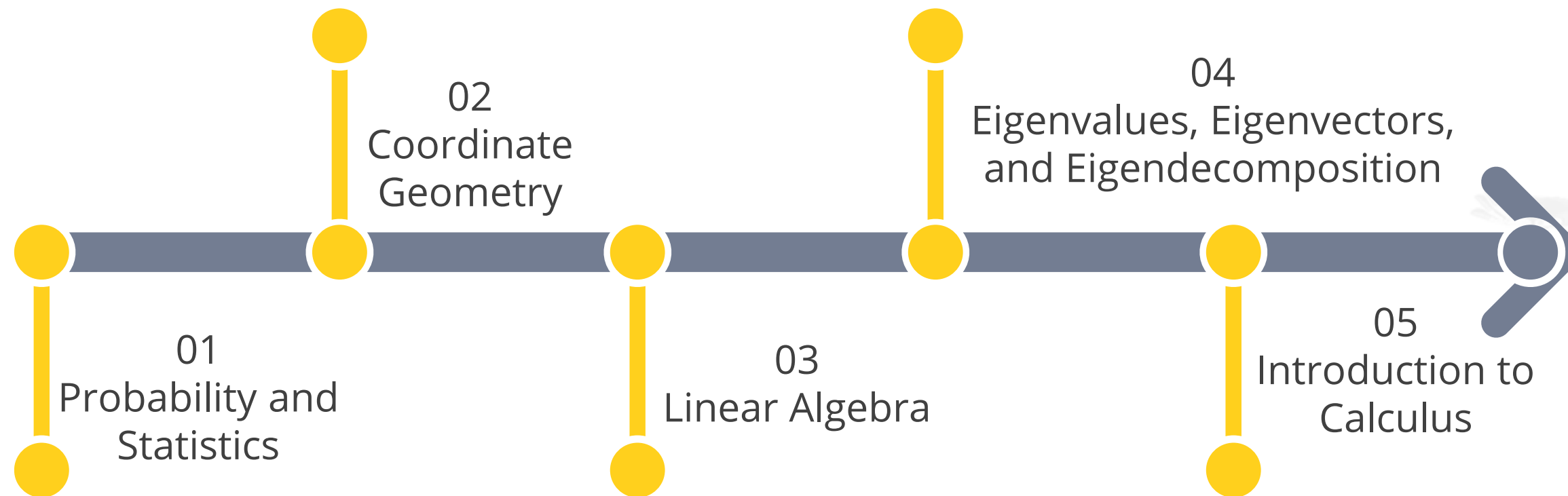
Marketing campaigns are evaluated using statistical approaches, such as hypothesis testing. It is also used to examine customer spending habits.

It is applied in customer analysis, providing personalization recommendations through predictive modeling or clustering.

## Learning Path

# Learning Path for Math Refresher

This course will provide you with the basic mathematical knowledge essential for all data science profiles.

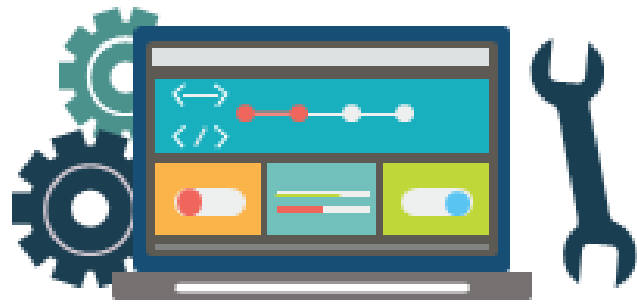


## Course Components



# Course Features

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Self-paced learning videos



Theoretical concepts



Examples



# Course Components

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E-books



Assessments



**Let's get started!**