المملكة العربية السعودية
وزارة التعليم
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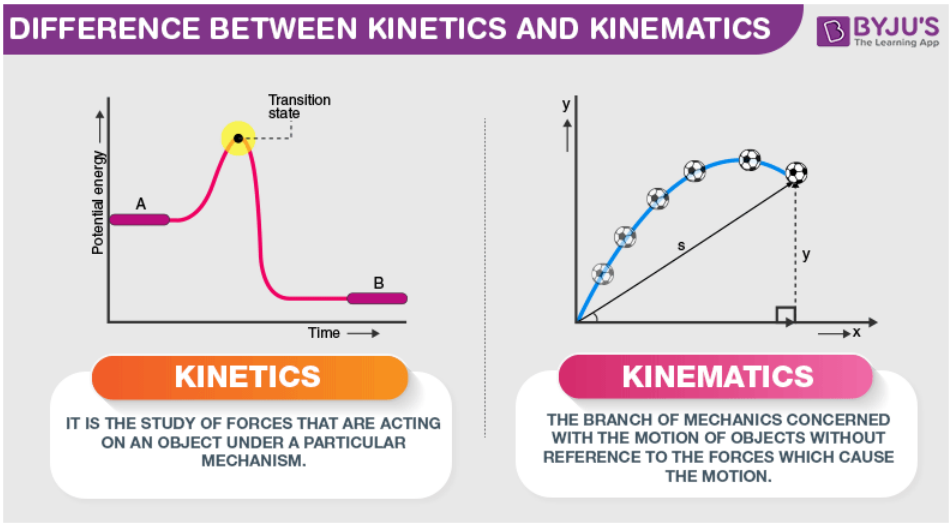
Explain Kinetics and Kinematics movement



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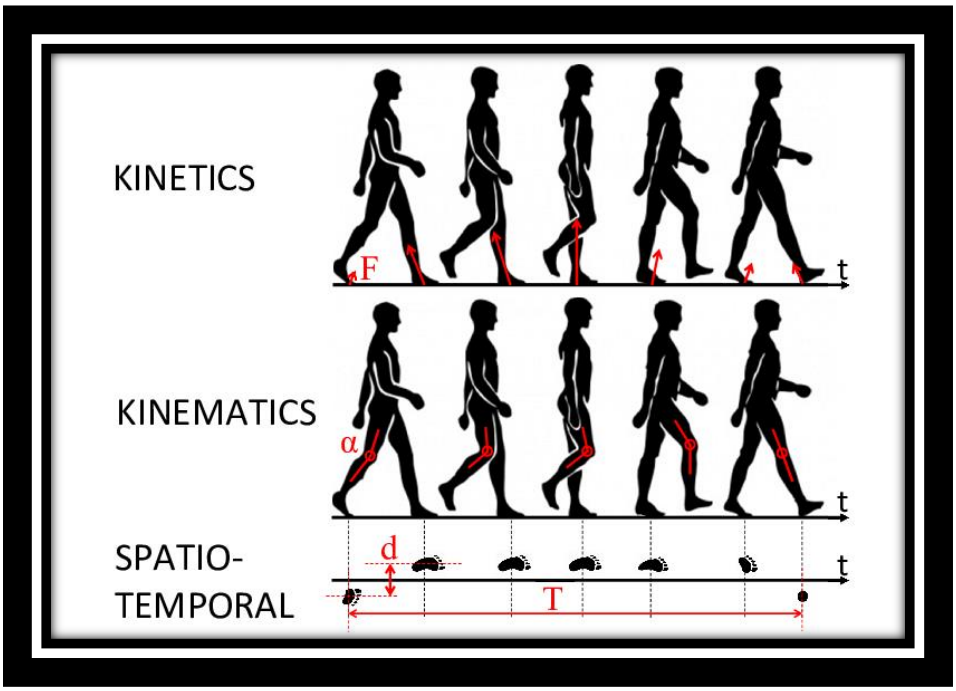
Introduction

Kinetics and Kinematics are two of the main branches of dynamics, that is, the study of forces and motion. Kinetics deals with forces and motion only and reveals how forces affect motion. Kinematics deals with motion only–or how an object moves through space–without reference to any associated force. The information in this article will help you understand the difference between Kinetics and Kinematics as well as what each branch entails.



What is Kinetics?

Kinetics deals with the absolute motion of an object. It explains how a body responds when a force or torque is applied to the body. It is the study of forces that are acting on an object under a particular mechanism.

Kinetics focus on the different types of motion such as rotational motion in which the object experiences force or torque. e.g. When a car is moving, in this case, it possesses some amount of kinetic energy.

Kinetic energy is defined as the energy of motion or movement of an object, rather than in its position. The faster the motion of an object, the higher will be the kinetic energy. Kinetic energy can be calculated as,

$$\textbf{K.E.} = \textbf{1/2 mv}^2$$

where,

- K.E. = Kinetic energy,
- m = mass of the object (kg or g),
- V = velocity of the object.(m/sec),

The Units of K.E = Kg (m/sec) or joules. Therefore kinetic energy is directly proportional to the mass of the object and to the square of its velocity

What is Kinematics?

Kinematics is a branch of dynamics that deals with motion of objects (bodies), points or group of objects, considering the mass and force, ignoring the cause of its motion. Some refers to the study of kinematics as the "Geometry of motion".It deals with any type of motion of a particular object.

To know the motion of the object it focuses on the trajectories of the points, lines, and various other geometric objects. It also focuses on the

various different properties like velocity and acceleration. The study of kinematics is mostly used in astrophysics, mechanical engineering, robotics, and biomechanics.

Formulas of Kinematics:

It has 4 formulas in which they are related to displacement, time, velocity and acceleration.

1. a = (v – u)/t
2. (v + u)/2 = d/t
3. d = ut + 1/2 at2
4. $v^2 = u^2 + 2ad$

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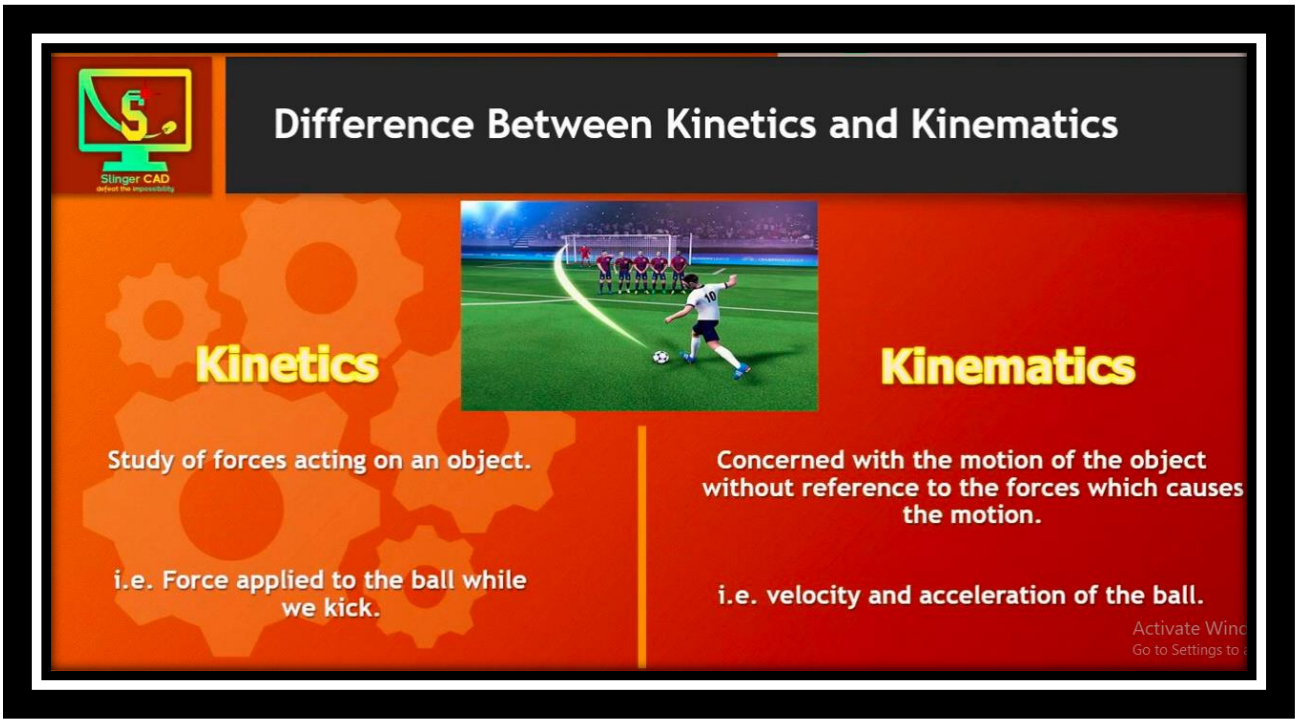
- a = acceleration,
- d = displacement,
- t = time interval,
- u = initial velocity,
- v = final velocity.

Kinetics and Kinematics



What is Kinetics?

Kinetics, also called dynamics, is a vital part of mechanics that deals with the function of different forces and torques on an object in motion. As a matter of fact, an object moves only when these forces create movement.

For instance, when you spin a top, it rotates in a circular motion. In this case, you apply energy on the top, and that converts the top's stored potential energy into_kinetic energy. Besides, they also have some parameters that are seen in real life as well.

Along with that, you also need to learn about kinematics as well to find a difference between kinetics and kinematics.

What is Kinematics?

Kinematics refers to the study of how motion is working, instead of explaining the reasons for this motion. More specifically, kinematics describes the motion of an object, considering the factors like position, acceleration and_velocity. It gives an answer to the different positions of a body in a particular space. It also has some significant parameters that are associated with the position, speed and other factors.

Thus, before knowing about kinetics and kinematics differences, students need to learn the definitions of them.

What is The Difference Between Kinematics and Kinetics?

The table mentioned below elucidates the kinetics and kinematics difference clearly.

Specifications	Kinetics	Kinematics
Motion Nature	It explores the causes of the motion.	It focuses on the acceleration, speed and position of an object.
Mass Consideration	It involves mass consideration.	It does not involve mass consideration.
Nomenclature	Also called dynamics	Known by the same name
Mathematical Expression	Do not have complicated mathematical expressions.	Includes various mathematical expressions.
Force	It considers forces majorly	It does not consider majorly
Application Areas	Mainly in automobile designing.	Mainly studies the movement of an object.
Other Areas	Relevant in several streams of science including chemistry and biology.	Limited to physics and more specifically in mechanics.

Difference Between Kinetics and Kinematics with Example

Following are some of the factors that differentiate between kinematics and kinetics further.

1. Causes of Motion

A major kinetic and kinematic difference is that kinetics explains concepts like

- Different forces
- Torques

Where kinematics explains

- Speed
- Accelerations
- Final position of an object in motion.

For instance, when you throw a ball in the air, kinetics explains the_friction that causes the throw. Kinematics explains the acceleration, speed and final position of the ball when it falls in the ground.

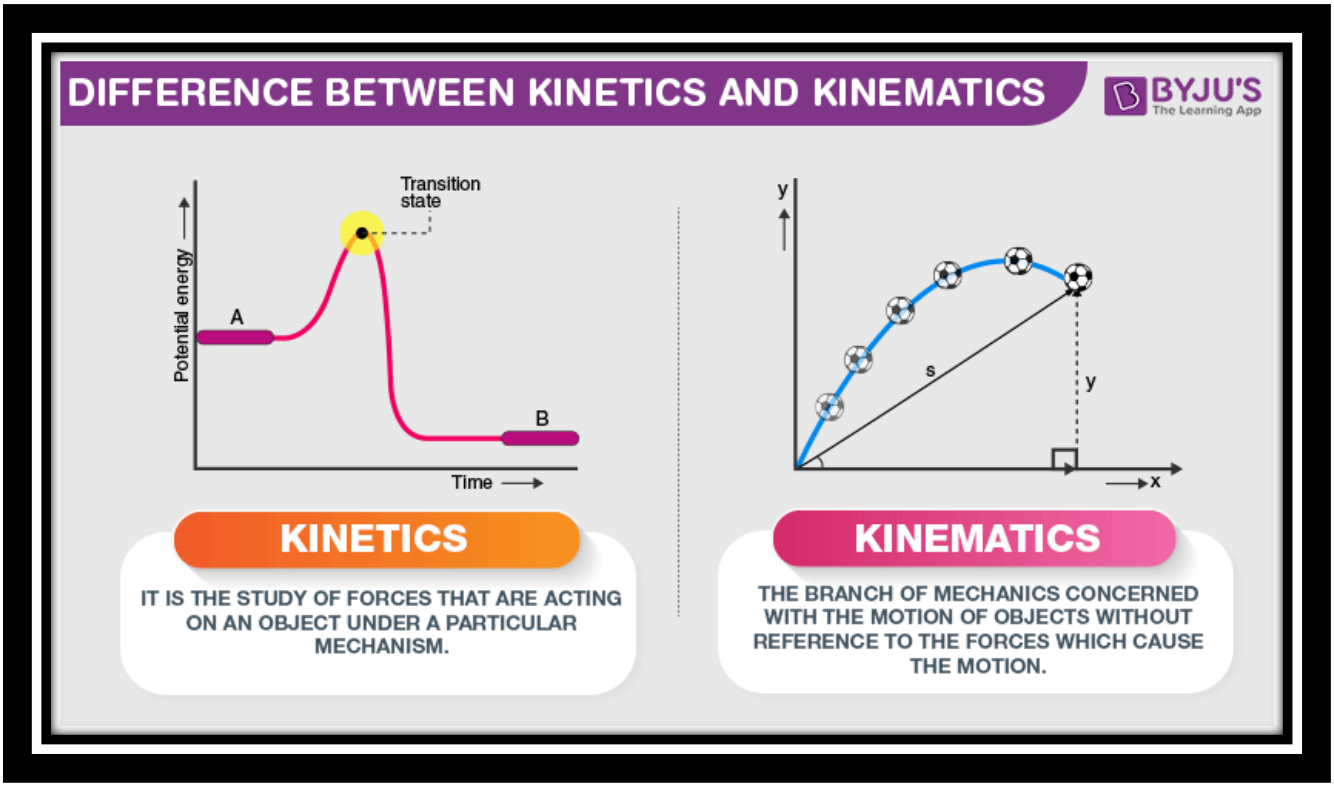
2. Particle Mass Inclusion

Kinematics includes influences of different forces like_gravitational forces that work between two systems. Kinetics consists of the masses of particulars while explaining a phenomenon.

3. Mathematics or Physics

While kinematics is applicable to physics and other streams of study, kinematics is restricted to mechanics only. However, some scientists also connect kinematics to mathematics as it only deals with physics. Thus, it is also called "geometry of motion" which is not applicable for kinetics.

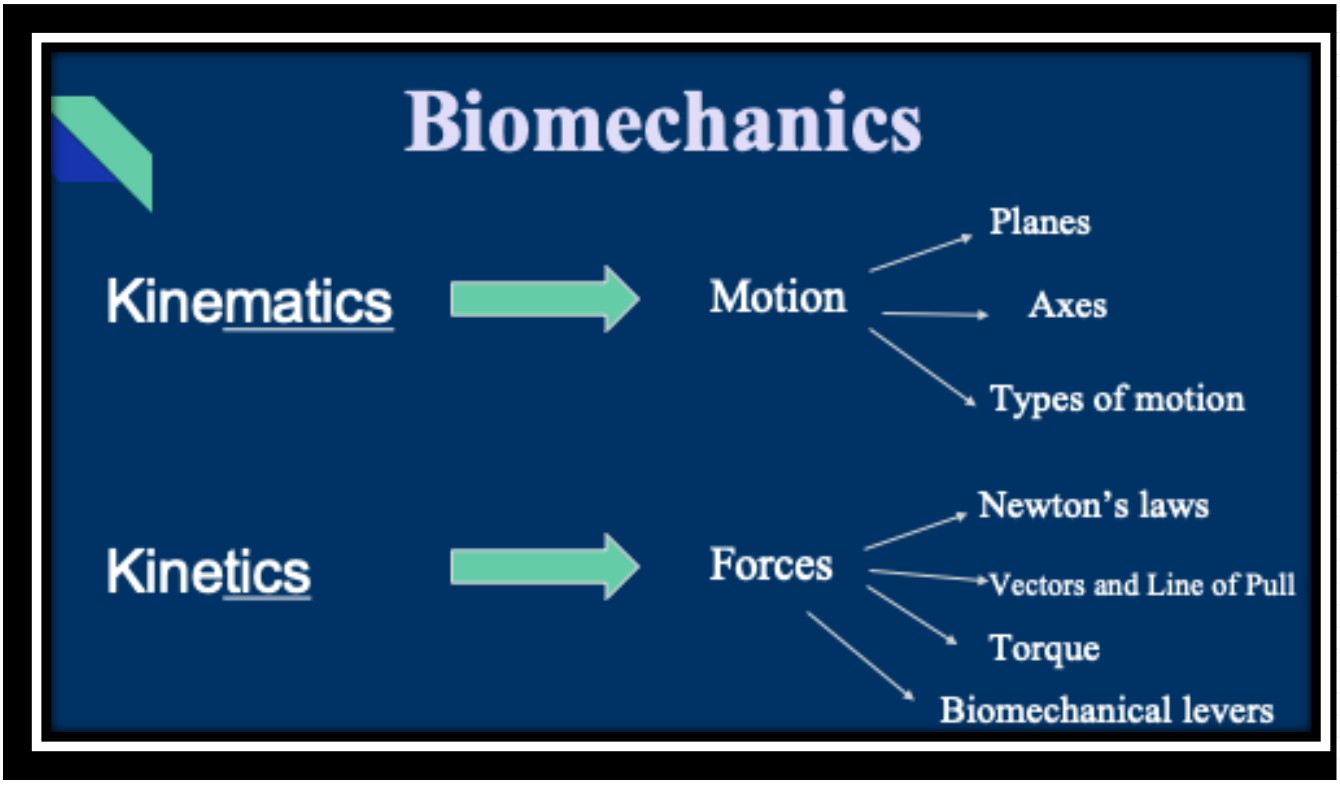
Students can also note down other kinematics and kinetics differences as well from their understanding of these concepts. However, they need to get it checked by the subject teacher for accuracy.

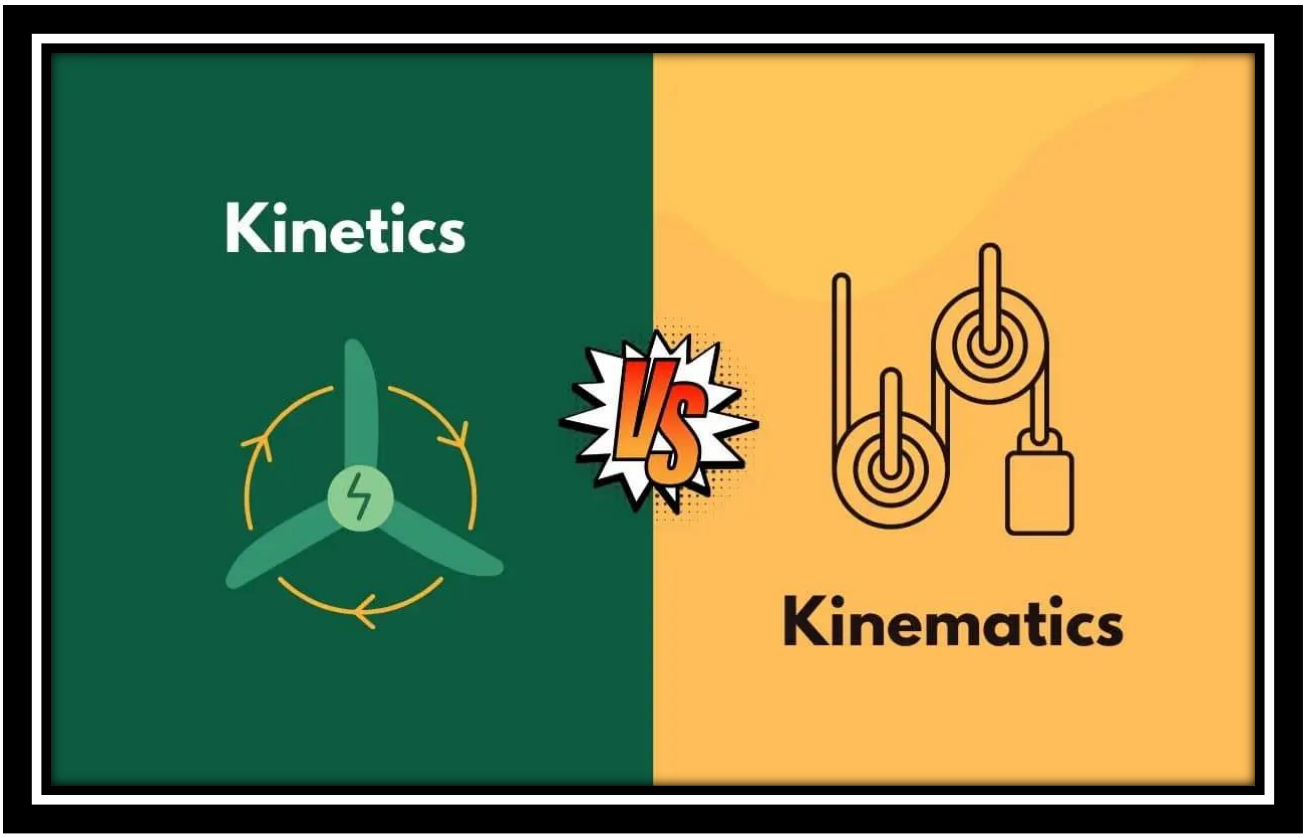


Why Kinetics and Kinematics Matters

Both kinetics and kinematics are important branches of classical mechanics. They allow us to understand the nature of motion in different ways and to calculate different values depending on what they are studying.

Kinematics might answer more of the "what" questions that specifically describe the motion of an object: its velocity, acceleration, position, time and the like. But without kinetics, physicists wouldn't also be able to answer the "why" questions, such as what caused the object to begin moving in the first place, and why doesn't that motion continue forever? Where does the acceleration pulling a thrown ball back to the Earth come from?





Summary

- Kinetics and kinematics are used in the field of biomechanics
- Kinetics studies motion as well as forces that are involved, whereas kinematics studies motion without taking into account forces that cause it.
- The study of kinetics has practical applications in designing automobiles whereas kinematics finds applications in the study of the movement of celestial bodies

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