MOTION

VARIOUS GRAPH RELATED TO MOTION

Graph

A graph is defined as a pictorial representation of information which is a two-dimensional drawing explaining the relationship between dependent and independent variables. Independent variables are represented on the horizontal line known as the x-axis, while the dependent variables are represented on the vertical line known as the y-axis.

We have already seen the mathematical approach toward speed, velocity, distance and displacement. But graphs actually give us a better understanding of the motion. From the point of view of physics, one should be able to interpret motion by looking at graphs. Here we will be talking mainly about velocity

Displacement Time Graph

The displacement of an object is defined as how far the object is from its initial point. In the displacement time graph, displacement is the dependent variable and is represented on the y-axis, while time is the independent variable and is represented on the x-axis. Displacement time graphs are also known as position-time graphs. There are three different plots for the displacement time graph, and they are given below:

The First graph explains that the object is stationary for a period of time such that the slope is zero, which means that the velocity of the object is zero.

the Second graph explains the velocity of the object, and hence the slope of the graph remains constant and positive.

Third graph explains that the acceleration is constant. The slope of the graph increases with time.

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The slope for the displacement time graph is given in the table below:

 Δd

 Δt

Therefore, the following are the takeaway from the displacement time graph:

Slope is equal to velocity.

Constant velocity is explained by the straight line, while acceleration is explained by the curved lines.

Positive slope means the motion is in the positive direction.

Negative slope means the motion is in the negative direction.

Zero slope means that the object is at rest.



Velocity Time Graph

In the velocity-time graph, velocity is the dependent variable and is represented on the yaxis, and time is the independent variable, represented on the x-axis. The slope of the velocity time graph is given as in the table:

Δv

 Δt

We see that the slope of the velocity-time graph is the definition of acceleration; therefore, it can be said that the slope is equal to acceleration. Therefore, the following are the points understood from the slope:

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Steep slope represents the rapid change in velocity.

Shallow slope represents the slow change in velocity.

If the slope is negative, then the acceleration will also be negative.

If the slope is positive, then the acceleration will also be positive.

The area under the velocity represents the displacement of the object.



Acceleration Time Graph

In the acceleration time graph, acceleration is the dependent variable and is represented on the y-axis, and time is the independent variable and is represented on the x-axis. The slope of the acceleration time graph is as given in the table:

Δa Δt

The slope of the acceleration time graph is known as jerk. The following are the points understood from the graph:

If the slope is zero, then the motion is said to have constant acceleration.

The area under the graph represents the change in velocity.

