

Motion, Speed and Velocity

Changes in Space and Time

Description

Mechanical engineers are often engaged in the creation, modification and maintenance of machines and mechanisms. Machines transform energy, or change the direction and rate of applied forces in order to produce useful amounts of work. The term Work refers to the application of force through a given distance. Expressed as an algebraic statement, $\text{Work} = \text{Force} \times \text{Distance}$. Since this implies movement, it is clear that motion is an essential component of mechanical assemblies. This lesson serves as an introduction to basic concepts and the technical literacy associated with motion.

Terms, Concepts and Definitions

Review and Define These Terms

Position	Distance	Position-Time Graph
Vector	Displacement	Constant Velocity
Average Velocity	Speed	Velocity
Slope	Instantaneous Position	Speed-Time Graph
Instantaneous Velocity	Scalar	Work

Materials/Equipment/Supplies/Software

Pen/Pencil	Paper (graphing)	Tape Measure
Calculator	Spreadsheet Program (optional)	Selected GEARS-IDS Components
		Stop Watches (4-8)

Objectives

Students who participate in this lesson will

- Discriminate between speed and velocity
- Measure and calculate speed and velocity
- Evaluate and create speed and time graphs
- Understand and use the technical vocabulary of motion.

Mechanisms in Motion

Machines are designed to produce useful work by changing (transforming) energy from one form to another, or by changing the direction of forces and movement. The term **Work** is a scientific concept, it does not refer to your after school job or the chores you are asked to do at home. Work is the product of a force (*A Push or a Pull*) acting over a specified distance. $\text{Work} = \text{Force} \times \text{Distance}$.