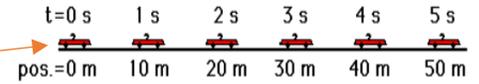


KINEMATICS

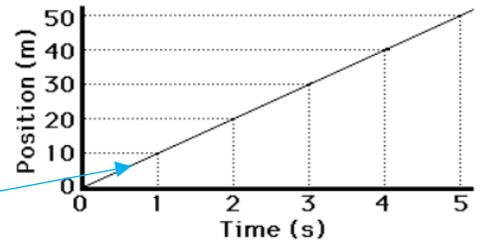
The geometrically possible motion of a body or system of bodies
Does not take into consideration the cause or effect forces.

Position vs Time graphs:

☒ Analyze the motion of a car with constant rightward (+) velocity, assume your analysis yields the following results:

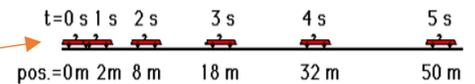


✓ If you were to graph this data using a position vs time graph it would look like the following:

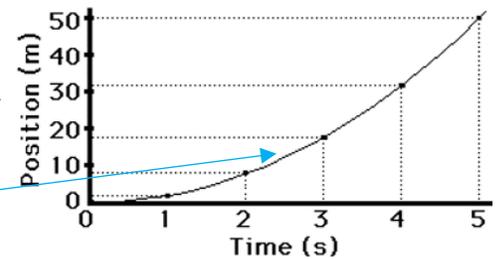


- ✓ Note that the Δ in position is constant in respect to a Δ in time.
- ✓ A constant change in position over time is a constant velocity.
- ✓ Constant positive velocity and will be represented as positive sloped line.

☒ Analyze the motion of a car with a rightward (+), changing velocity. Assume your analysis yields the following results:



✓ If you were to graph this data using a position vs time graph it would look like the following.



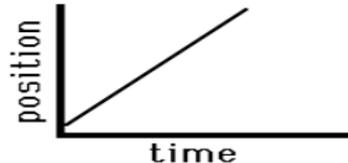
- ✓ Note the Δ in position with respect to time, is increasing with each passing time interval (1 second).
- ✓ The slope of the line is changing as the car accelerates.

☒ **Below:** Consider the graphs below as example applications of this principle concerning the slope of the line on a position versus time graph. The steepness of the slope indicates the rate of change (speed) and the direction of the slope represents the direction of travel. **Velocity = Speed & Direction**

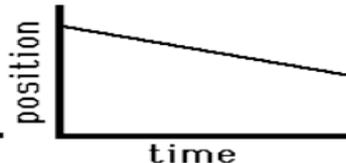
**Slow, Rightward(+)
Constant Velocity**



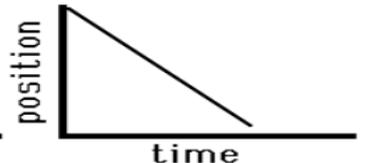
**Fast, Rightward(+)
Constant Velocity**



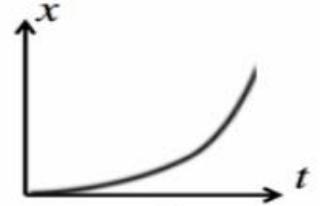
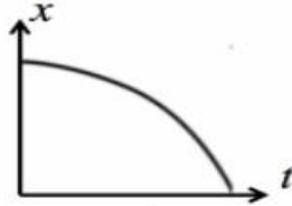
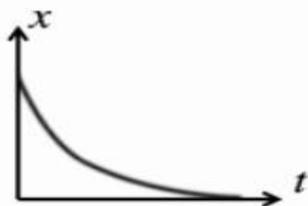
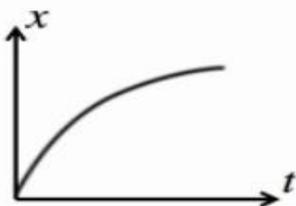
**Slow, Leftward(-)
Constant Velocity**



**Fast, Leftward(-)
Constant Velocity**



☒ **Below:** As a final application of this principle of slope, consider the four graphs below. All graphs show plotted points forming a curved line. Curved lines have changing slope; they may start with a very small slope and begin curving sharply (either upwards or downwards) towards a large slope. In either case, the curved line of changing slope is a sign of accelerated motion (i.e., changing velocity).



☒ **Types of Acceleration: ANY Δ in Velocity**

- ✓ Positive Acceleration: an increase in velocity over time
- ✓ Negative Acceleration: a decrease in velocity over time
- ✓ Change in Direction: an active change in the course of navigation.
- ✓ Uniform Motion: When a body in motion covers equal distances per unit of time.
- ✓ Non-Uniform Motion: When a body in motion covers unequal distances per unit of time.