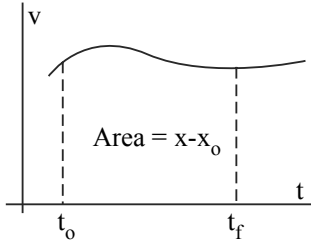
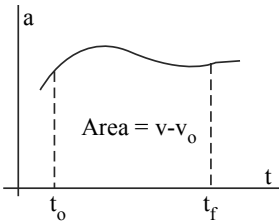


Comparing Velocity and Acceleration

| VELOCITY | ACCELERATION |
|--|---|
| $v_{ave} = \frac{\text{displacement}}{\text{elapsed time}} = \frac{\Delta x}{\Delta t}$ | $a_{ave} = \frac{\text{change in velocity}}{\text{elapsed time}} = \frac{\Delta v}{\Delta t}$ |
| $v = \frac{dx(t)}{dt}$ | $a = \frac{dv(t)}{dt}$ |
| Rate of change of position with respect to time. | Rate of change of velocity with respect to time. |
| Slope of tangent line to a <u>x vs. t</u> curve. | Slope of tangent line to a <u>v vs. t</u> curve. |
| When $v = \text{constant}$, <u>x vs. t</u> curve is a straight line. | When $a = \text{constant}$, <u>v vs. t</u> curve is a straight line. |
| In a <u>v vs. t</u> graph, the area between the curve and the time axis equals the <u>displacement</u> of a particle between the corresponding time interval. | In a <u>a vs. t</u> graph, the area between the curve and the time axis equals the <u>change in velocity</u> of a particle between the corresponding time interval. |
| <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $x - x_o = \int_{t_o}^{t_f} v dt$ </div> Displacement | <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $v - v_o = \int_{t_o}^{t_f} a dt$ </div> Change in Velocity |
|  <p>A graph with velocity (v) on the vertical axis and time (t) on the horizontal axis. A smooth curve starts at a point on the v-axis, rises to a peak, and then gradually descends. Two vertical dashed lines are drawn from the t-axis at times t_o and t_f up to the curve. The region bounded by the curve, the t-axis, and these two vertical lines is shaded. The text 'Area = x - x_o' is written inside the shaded region.</p> |  <p>A graph with acceleration (a) on the vertical axis and time (t) on the horizontal axis. A smooth curve starts at a point on the a-axis, rises to a peak, and then gradually descends. Two vertical dashed lines are drawn from the t-axis at times t_o and t_f up to the curve. The region bounded by the curve, the t-axis, and these two vertical lines is shaded. The text 'Area = v - v_o' is written inside the shaded region.</p> |