Vertical motion of a projectile:

- $S_V$: Position as a function of time ($t$).
- $v_V$: Velocity as a function of time ($t$), with a slope of $-9.81 \text{ m/s/s}$.
- $a_V$: Acceleration as a function of time ($t$), with a value of $-9.81 \text{ m/s}^2$. 
Uniform motion: velocity = constant
Uniformly accelerated motion: acceleration = constant
Variably accelerated motion: acceleration changes

Equations of uniformly accelerated motion:

\[ v = v_0 + a \cdot t \] \hspace{1cm} [1]

\[ S = S_0 + v_0 \cdot t + \frac{1}{2} a \cdot t^2 \] \hspace{1cm} [2]

\[ v^2 = v_0^2 + 2 \cdot a \cdot (S - S_0) \] \hspace{1cm} [3]

\( v_0 = \) initial velocity
\( v = \) final velocity
\( a = \) acceleration
\( S_0 = \) initial location
\( S = \) final location
\( t = \) time between the beginning and the end of the studied motion

Recipe:

(1) What do you want to know?
(2) What do you already know?
(3) Select equation.
(4) Substitute values.
(5) Solve.
Sample problem: Toppling dive