

```

# The 0th elements of velocities, positions, and times are already filled in, so start with 1
for i in range(1, simulation_time_steps):
    # get all the before values
    # velocities
    before_velocity = velocities[i - 1]
    # positions
    before_position = positions[i - 1]
    # time
    before_time = times[i - 1]
    # fundamental change for 2nd-order Runge-Kutta -- first estimate the mid_position!!
    #
    mid_position = before_position + 0.5 * delta_t * before_velocity
    # calculate the acceleration -- using the estimated mid_position!
    #
    mid_acceleration = acceleration_of_gravity(mid_position)
    # calculate after_velocity mid_acceleration
    #
    after_velocity = before_velocity + delta_t * mid_acceleration
    # calculate after_position using the democratic combination of after_velocity and before_velocity.
    #
    after_position = before_position + delta_t * 0.5 * (after_velocity + before_velocity)
    # update time
    #
    after_time = before_time + delta_t
    # assign the after values into their lists
    #
    velocities[i] = after_velocity
    positions[i] = after_position
    times[i] = after_time

```