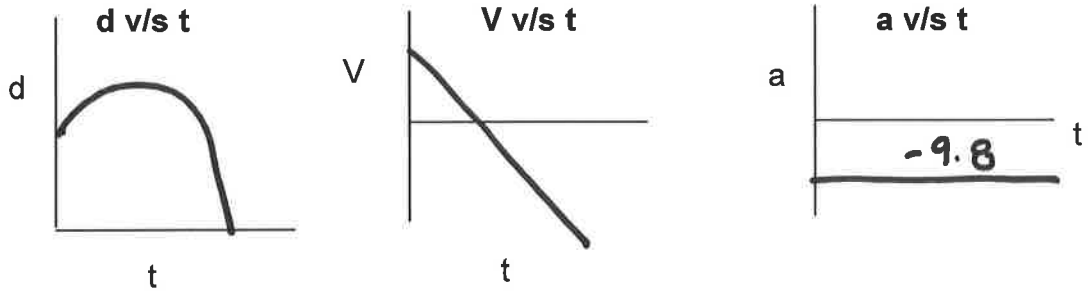
Name _____

More Kinematics + Freefall problems Part 2

5 A student throws a stone vertically upward with a velocity of 6.0 m/s from a 3rd story window that is 12m above the ground.

a. Draw the d-t, V-t and a-t graphs for the problem above.



V_i: 6
V_f 0
d *
a -9.8
t ?

b) Find the time that it takes for the stone to reach its highest point?

$V_f = V_i + at$ $\quad t = \frac{6}{9.8} = 0.61$ sec

$0 = 6 - 9.8t$

c) How high is the stone above the ground?

$d = V_i t - \frac{1}{2}at^2 = 0(t) - \frac{1}{2}(-9.8)(.61)^2 = 1.84m$

$h = 12 + d = 13.84\,m$

d) How long does it take the stone to reach the ground from its highest point?

$d = V_i t + \frac{1}{2}at^2$ $\quad t^2 = \frac{13.8}{4.9} = 2.82$

$-13.84 = 0 + \frac{1}{2}(-9.8)t^2$ $\quad t = \sqrt{2.82} = 1.68$ sec

$4.9t^2 = 13.84$

e) What is the speed of the stone just before it hits the ground?

$V_f = V_i + at$

$V_f = 0 - 9.8(1.68) = -16.4\,m/s$

c) What is the total time the stone was in the air?

$t = 0.61 + 1.68 = 2.28$ sec

up + down