Physics Honors
2014-15

Projectiles

Name Key
Period

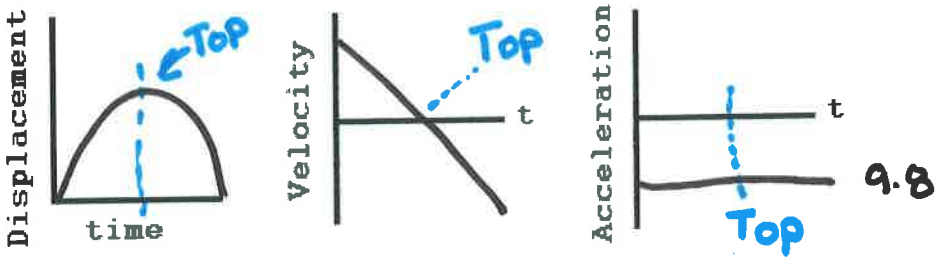
Freefall Review

Show all your work, drawings, givens formulas, substitutions and answer with units

1. For a ball that is thrown straight up:
   a. What is the vertical velocity of the ball when it reaches its highest point? 0

   b. What is the vertical acceleration of the ball when it reaches its highest point? -9.8

   c. Draw the D-t, V-t, & a-t graphs for the ball.



2. A freely falling object is dropped from a height of 100m.
   a. How long will the object take to reach the ground if the initial height is 100m?

$d = \frac{1}{2}at^2$
$-100 = \frac{1}{2}(-9.8)t^2$ → $-4.9t^2 = -100$
$t^2 = 100/4.9$
$t = 4.52\,s$

$V_i = 0$
V_f *
d -100
a -9.8
t ?

   b. What velocity does the object reach after 4.0 seconds if it starts from rest?

$V_f = V_i + at$
$V_f = 0 - 9.8(4) = -39.2\,m/s$

V_i 0
V_f ?
d *
a -9.8
t 4.0

   c. How far has the object fallen after 4 seconds?

$d = \frac{V_i + V_f}{2} \cdot t = \frac{-39.2(4)}{2} = -78.4\,m$

3. A girl uses a slingshot and fires a stone straight up at 24 m/s.
   a. What is the maximum height that the stone reaches?

$V_i = 24$
$V_f = 0$
$d = ?$
$a = -9.8$
$t = *$

$V_f^2 = V_i^2 + 2ad$
$0 = 24^2 + 2(-9.8)d$
$19.6d = 576$
$d = 576/19.6 = 29.4\,m$

   b. What is the hang-time of stone in the air?

$V_f = V_i + at$
$0 = 24 - 9.8t$
$t = \frac{24}{9.8} = 2.45$ Sec

Total $= 2(2.45) = 4.9\,s$

4. A really poor football kickoff (it goes straight up) has a hang time of 5 seconds. Assuming that the ball started on the ground and ends up on the ground:
   a. determine the initial velocity of the football

$V_i = ?$
$V_f = 0$
$d = *$
$a = -9.8$
$t = 2.5$

$V_f = V_i + at$
$0 = V_i - 9.8(2.5)$
$V_i = 24.5\,m/s$

   b. What is the maximum height. $d = \frac{V_i + V_f}{2} \cdot t = \frac{24.5 + 0}{2}(2.5) = 30.6\,m$