Unit 03 – Vocabulary and Equations – Vectors & Projectile Motion

Vocabulary:

previous vocabulary
scale
above (or below) the horizon
pythagorean theorem ("use Pythagoras")
soh-cah-toa
parabolic path
resolve
resultant
magnitude
direction
horizontal component (of a vector)
vertical component (of a vector)
horizon
ground speed
air speed
wind speed
range (Δx)

Symbols:

Δ, x, v, t, Δx, Δv, Δt, a, f, i

Equations & constants:

You get these on test:

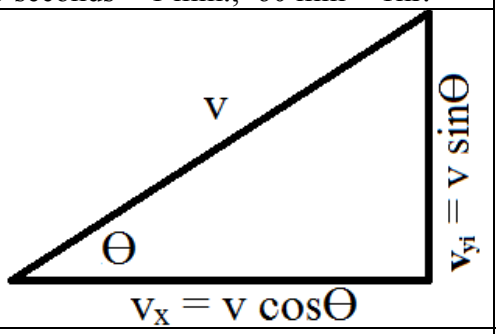
$$v = \frac{\Delta x}{\Delta t} \qquad a = \frac{\Delta v}{\Delta t}$$

$\Delta x = v_0 \Delta t + \frac{1}{2} a t^2$

$v = v_0 + a \Delta t$ (v means v_f), $v_f^2 = v_i^2 + 2a \Delta x$

60 mph = 27 m/s; 60 seconds = 1 min.; 60 min = 1hr.

You **don't** get these on the test:
$v_x = v \cos\Theta$
$\Delta x = v_x t$
$v_{yi} = v \sin\Theta$
Tneom chart



Unit Objectives - Williams

1. I understand all the vocabulary & math of this unit and all demos, videos, equations, and class assignments
2. I remember objectives & vocabulary from previous units.
3. I can scale things, use scales with representations like maps, and use arrows and length to represent vectors correctly
4. I can add and subtract vectors both mathematically and graphically using head-to-tail or parallelograms
5. I can use vector addition to find relative motions such as boats relative to shore or plane relative to ground
6. I can apply trig to resolve vectors and come up with resultants always using "degree mode"
7. I know which measurement types are vectors & which are scalars and the product of vector and scalar is a vector
8. I understand and apply trig to the individual problem and how it is depicted. For example: $v_x = v \cos\Theta$ is true only where Θ represents the angle relative to the horizon.
9. I know projectile motion assumptions, can contrast it with terminal velocity/freefall & know conceptually how air resistance or external forces beyond gravity alone would change the motion
10. I know for projectiles a_y and v_x are constant, a_x is zero, $v_{yf} = -v_{yi}$, and max height is when $v_y = 0$, but it doesn't "stop"
11. I know and can apply independence of X and Y motion to solve numeric and conceptual problems
12. I am aware of a projectile's constant X motion and constantly changing Y motion with time tying them together
13. I can make, explain, understand & use initial & final motion triangles for a projectile showing v, v_{yi}, v_{yf}, v_x ,Θ
14. I know angles that maximize range, hang time, maximum height, etc. & complementary angles have the same ranges
15. I know and can apply both the mapping and horizon methods for vectors
16. I can solve horizontal projectile problems
17. I can solve problems involving projectiles launched at angles

DuPage ROE Objectives

101. I can distinguish between scalar and vector quantities.
102. I can differentiate between accelerated and constant velocity motion.
103. I can describe and analyze motion based on graphs, numeric data, words, and diagrams.
104. I can differentiate between speeding up, slowing down, and change in direction, based on the direction of velocity and acceleration.
105. I can recognize the independence of X and Y variables in 2-dimension problems.
106. I can determine the range of a horizontally launched projectile given initial launch conditions.
107. I can justify that if the only force acting on an object is gravity, it will have the same constant downward acceleration regardless of mass, velocity or position.
108. I can apply the various kinematics equations in one and two dimension.