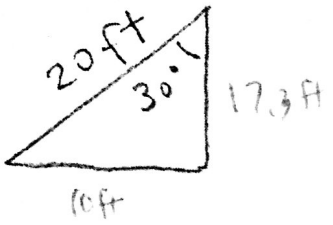
Physics Key

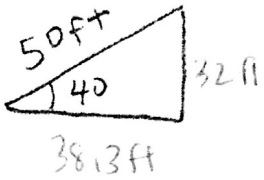
Name _____ Date _____ Period _____ #

Basic trig and Vector Components WS 05

1. Find the x and y components of a vector with magnitude 50.0 at an angle of 33 degrees South of East.

2. Calculate the x and y components for the following triangles.





3. Calculate the resultant vector using the following instructions. What is there final position relative to their initial position? The resultant vector needs both a distance and a direction.

a. **Walk 13 ft North.**
b. **Walk 20.5 ft 47 degrees North of West.**
c. **Walk 10. ft East.**

	x	y
1.	0	13
2.	-14	15
3.	10	0
	-4ft	28ft

total distance = 28.3ft

8.1 degrees ↑ of N

4. A football is thrown with a speed of 8.00 m/s at an angle of 30 degrees relative to the horizontal.

a. **How long will the football be in the air before returning to the ground?**
b. **How far will the football travel horizontally before returning to the ground?**
c. **What other angle will result in the same horizontal distance traveled?** ← didn't actually talk about this concept so don't worry about it.

$V_{iy} = 4 m/s$

$V_x = 6.9 m/s$

to max height → $V_{fy} = V_{iy} + a\Delta t$

$0 = 4 m/s + (-9.8 m/s^2)(\Delta t)$

$\Delta t = 0.41 sec$

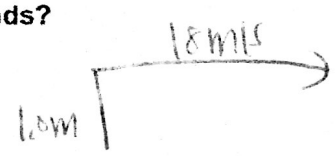
a) total $\Delta t = 0.82 sec$

b) $V_x = \frac{\Delta x}{\Delta t}$ $(6.9 m/s)(0.82 sec) = \Delta x = 5.66 m$

WS5

5. Tad drops a cherry pit out the car window 1.0 m above the ground while traveling down the road at 18 m/s.

a. **How far out horizontally from the initial dropping point will the pit hit the ground?**
b. **Draw a picture for the situation.**
c. **If the car continues to travel at the same speed, where will the car be in relation to the pit when it lands?**



$\Delta y = v_{iy}\Delta t + \frac{1}{2}a\Delta t^2$

$-1m = 0\Delta t + \frac{1}{2}(-9.8 m/s^2)(\Delta t)^2$

$\frac{-1m}{-4.905 m/s^2} = \Delta t = 0.45 \text{ seconds}$

$v_x = \frac{\Delta x}{\Delta t} \Rightarrow 18 m/s\,(0.45 sec) = \Delta x = 8.1 m$

car will be right on top of the pit

6. While skiing, Ellen encounters an unexpected icy bump, which she leaves horizontally at ~~12.0~~ 15.0 m/s. How far out horizontally from her starting point will Ellen land if she drops a distance of ~~8.00~~ 8.50 m in the fall? Draw a picture.

$\Delta y = -8.50m$

$-8.50m = \frac{1}{2}at^2$

$-8.50m = \frac{1}{2}(-9.8 m/s^2)(\Delta t)^2$

$\Delta t = 1.32 sec$

$\Delta x = 15.0 m/s \cdot 1.32 sec = 19.8m$

7. A seal swims toward an inlet with a speed of 5.0 m/s as a current of 1.0 m/s flows in the opposite direction. How long will it take the seal to swim 100. m?

total speed = 4m/s

$\frac{100m}{4m/s} = 25 sec$