Unit 3 Physics Study Guide: Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**1. What is the difference between vector and scalar?**

Vector- Magnitude and direction

Scalar- magnitude only

**2. What are 3 examples of a vector quantity?**

Velocity, acceleration, displacement

**3. What are the 3 components used to draw a vector correctly?**

Dot tail, straight line, arrow head

**4. Draw a vector**

**5. Add or subtract the following vectors:**

 **a. 5 m positive & 8 m positive**

13 m positive

 **b. 7 m north & 3 m north**

10 m north

 **c. 6 m negative & 3 m positive**

3 m negative

 **d. 12 m north & 3 m south**

9 m north

 **e. 6 m positive, 3 m positive, 2 m negative**

7 m positive

**6. Add the following right angle vectors using Pythagorean Theorem to find the magnitude of the hypotenuse**

 **a. 10 km south & 35 km west**

36.4 km

**b. 50 m north & 28 m east**

57.3 m

**c. 7 m north, 8 m east, 10 m south & 5 m west**

3 m south, 3 m east = 4.24 m

**7. Solve the following word problems:**

**a. A plane is flying at 400 m/s horizontally and the wind is pushing it down at 100 m/s. What is the total speed of the plane?**

Total speed = 400² + 100² = 412.3 m/s

**b. A boat is traveling across a river at 45 m/s vertically, but the water is pushing it horizontally at 15 m/s. What is the total speed of the boat?**

Total speed = 45² + 15² = 47.43 m/s

**8. If you are given the angle at which an object is traveling and the total speed of the object, you can find the horizontal and vertical components using COS and SIN in your calculator.**

**a. The plane is flying at a 45ᴼ angle to the horizontal and has a total speed of 350 m/s. How fast is the plane traveling horizontally and vertically?**

Horizontal= cos(45)(350)= 247.5 m/s

Vertical = sin(45)(350) = 247.5 m/s

**b. The boat is traveling at a 15ᴼ angle on the river with a total speed of 50 m/s. How fast is the boat moving horizontally and vertically?**

Horizontal = cos(15)(50) = 48.3 m/s

 Vertical= sin(15)(50) = 12.9 m/s

**9. Define projectile motion**

Objects that are thrown or launched into the air and have a horizontal and vertical motion. The vertical motion is accelerated by gravity and the horizontal motion stays constant.

**10. The path of a projectile is called \_\_\_\_\_\_\_**Parabola**\_\_\_\_\_\_\_\_\_\_ and it is \_\_\_**Symmetrical**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**11. The horizontal and vertical motions of a projectile are \_\_\_\_\_\_\_\_**independent**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of each other.**

**12. \_\_\_**Gravity**\_\_\_\_\_\_\_\_\_\_\_\_\_ only affects motion in the vertical direction. It does not affect the motion in the horizontal direction.**

**13. Since we think about the horizontal and vertical motions of a projectile independently from one another, we must use different formulas for each motion.**

|  |  |
| --- | --- |
| Horizontal Motion | Vertical Motion |
| Δx = vtv = Δx / tt = Δx / v | Δy = Vi(t) + ½ gt² |
| Vf = Vi +gt |
| Δy = ½ gt² |