**Worksheet 1.4 Part I – *Intro to Vectors* – Vector Addition**

For each question, find the value of x, y, R and/or theta as needed (R is the resultant vector)

y = 3

x = 7

R

1. 2.

x

25˚

y

R =70



**x = 63.4 and y = 29.6 x = 14.4 and y = 39.5**

3. 4.

y1 = 2

R2

R1

y2 = 3

x2 = 1

x1 = 4

65˚

R1 = 5

R2 = 6

15˚

**R = 7.6 and  = 23.2˚ R = 56.4 and  = 52.9˚R = 6.19 and x = 5.41 R = 10.6 and y = 3.64**

 Find Rresultant

 **R1 = 4.47 and R2 = 3.16 R = 9.98**

Break up the following vectors into their vertical and horizontal components i.e. the Rx and Ry. The length of each vector R is 10.0 cm.

1. 2. 3. 4.

45˚

70˚

80˚

60˚

R

**Rx = 1.74, Ry = 9.85 Rx = 3.42, Ry = 9.40 Rx = 5.00, Ry = 8.66 Rx = 7.07, Ry = 7.07**

**Rx = 8.66, Ry = 5.00 Rx = 9.40, Ry = 3.42 Rx = 9.85, Ry = 1.**Break up the following vectors into their components that are perpendicular and parallel to the slope components i.e. the R and R. The length of each vector R is 4.0 cm.

5. 6.

60˚

30˚

R = 4

**R = 2.0 and R = 3.46 R = 3.46 and R = 2.00R = 1.37 and R = 3.76 R = 0.69 and R = 3.9**

***Vector Addition by Components: Trig. and Vectors***

1. Draw these three vectors

A = 5.5 cm [20o] B = 1.8 cm [160o] C = 2.5 cm [295o]

**Follow these as in a coordinate plane – start in right quadrant and rotate counterclockwise**

2. Using trigonometry, find the x and y components of the three vectors (above)

Ax = **5.17 cm** Bx = **1.69 cm** Cx = **1.06 cm**

Ay = **1.88 cm** By = **0.62 cm** Cy = **2.27 cm**

3. Find the resulting x component

 Rx = Ax + Bx + Cx **= 5.17 + (-1.69) + 1.06 = 4.54 cm**

4. Find the resulting y component

Ry = Ay + By + Cy **= 1.88 + 0.62 + (-2.27) = 0.23 cm**

5. Add Rx and Ry vectorally and draw the resultant.

**Rx = 4.54 cm, Ry = 0.23 cm lead to a right angled triangle**

6. Use trig and Pythagoras to find the magnitude and direction of R.

**R = 4.55 cm (by pythagoras)**

**θ = 2.9˚ (by trig)**

***Draw and add the vectors***

1. 8 m N & 5 m 30o N of E 2. 200 m/s 20o W of S & 15 m/s 20o W of N

**R = 11.36 m 67.6˚ N of E 188.7 m/s 22.9˚ W of S**

**Worksheet 1.4 ANSWERS**

1) x = 63; y = 30. 2) R = 7.6; θ = 23o 3) R1 = 4.47; R2 = 3.16 4) Rresultant = 10.0

1) Rx = 1.7 cm; Ry = 9.8 cm 2) Rx = 3.4 cm; Ry = 9.4 cm 3) Rx = 5.0 cm; Ry = 8.7 cm 4) Rx = 7.1 cm; Ry = 7.1 cm

5) Rpara = 2 cm; Rperp = 3.5 cm 6) Rpara = 3.5 cm; Rperp = 2 cm

*Vector Addition by Components*
1) A B C

2) Ax = 5.17 cm; Ay = 1.88 cm; Bx = -1.69 cm; By = 0.62 cm; Cx = 1.05 cm; -2

3) 4.53 cm 4) 0.5 cm 5) R

6) R = 4.6 cm θ = 6.0o

*Draw and Add Vectors*

1) 11.3 m 22o E of N 2) 188 m/s 23o W of S

*Change in Quantity*

1) 10 m/s2 53o W of S 2) 15 m/s2 68o E of S 3) 9.8 m/s2 down 4) 367m/s2 back

6) 9.7 m/s2 30o S of E