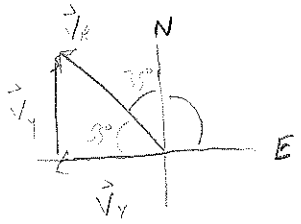
Vector Resolution

- Sketch the original given vector with its tail placed in a compass to mark the origin.
- Sketch the horizontal (x-component) and vertical (y-component) vectors that would add to give the original vector. Label these vectors.
- Calculate the actual x and y components for the original vector using mathematics.

a) $\vec{V}_R$ = 450 m/s [N 35° W]



$\theta = 35° + 90° = 125°$

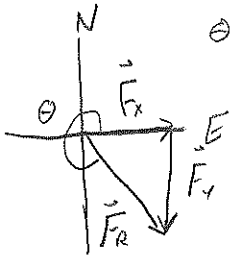
$\vec{V}_x = V_R \cos(\theta) = (450 m/s) \cos(125°)$

$= -258.11 m/s = \boxed{-260 m/s \ [E]}$

$\vec{V}_y = V_R \sin(\theta) = (450 m/s) \sin(125°)$

$= 368.62 m/s = \boxed{370 m/s \ [N]}$

b) F_R = 28.94 N [295°]



$\theta = 295°$

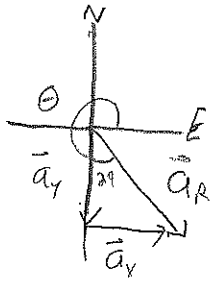
$\vec{F}_x = F_R \cos(\theta) = (28.94 N) \cos(295°)$

$= 12.231 N = \boxed{12.23 N \ [E]}$

$\vec{F}_y = F_R \sin(\theta) = (28.94 N) \sin(295°)$

$= -26.229 N = \boxed{-26.23 N \ [N]}$

c) a_R = 23.9 m/s² [S 29° E]



$\theta = 270° + 29° = 299°$

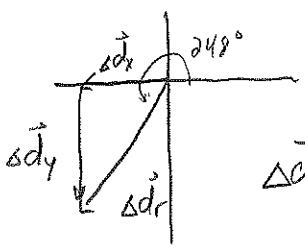
$\vec{a}_x = a_R \cos(\theta) = (23.9 m/s^2) \cos(299°)$

$= 11.587 m/s^2 = \boxed{11.6 m/s^2 \ [E]}$

$\vec{a}_y = a_R \sin(\theta) = (23.9 m/s^2) \sin(299°)$

$= -20.903 = \boxed{-20.9 m/s^2 \ [N]}$

d) $\Delta d_R = 4.8 \times 10^5$ km [248°]

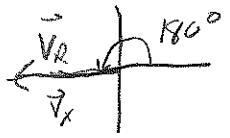


$\Delta \vec{d}_x = \Delta d_r \cos(\theta) = (4.8 \times 10^5 km) \cos(248°) = -1.798 \times 10^5 km$

$= \boxed{-1.8 \times 10^5 km \ [E]}$

$\Delta \vec{d}_y = \Delta d_r \sin(\theta) = (4.8 \times 10^5 km) \sin(248°) = -4.450 \times 10^5 km$

$= \boxed{-4.5 \times 10^5 km \ [N]}$



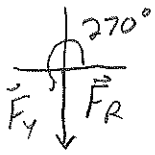
e) $\vec{V}_R = 62.8$ m/s [W]

$\vec{V}_x = V_R \cos(\theta) = (62.8 \text{ m/s}) \cos(180°) =$ -62.8 m/s [E]

$\vec{V}_y = V_R \sin(\theta) = (62.8 \text{ m/s}) \sin(180°) =$ 0 m/s [N]

f) $F_R = 3 \times 10^6$ N [S]

$\vec{F}_x = F_R \cos(\theta) = (3 \times 10^6 \text{ N}) \cos(270°) =$ 0 N [E]



$\vec{F}_y = F_R \sin(\theta) = (3 \times 10^6 \text{ N}) \sin(270°) =$ -3×10^6 N [N]

Answers: a) - 258 m/s [E], 369 m/s [N]
b) 12.23 N [E] , - 26.23 N [N]
c) 11.6 m/s^2 [E], -20.9 m/s^2 [N]
d) - 1.8 x 10^5 km [E], -4.4 x 10^5 km [N]
e) -62.8 m/s [E], 0 m/s [N]
f) 0 N [E], -3 x 10^6 N [n]