Sabrina Fox

Physics 20 Unit A - Assignment C: Vectors

Due: Oct 9, 2012

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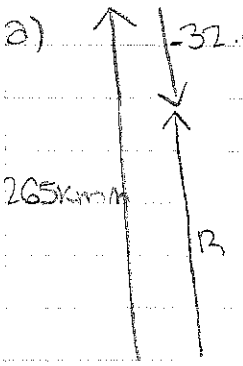
1. a)

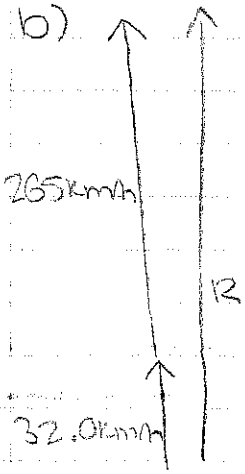


$R = a + b$

$R = 265\,km/h + -32.0\,km/h$

$R = 233\,km/h$

b)

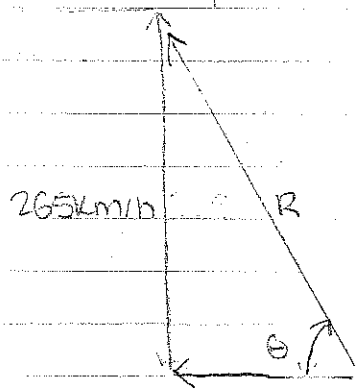


$R = a + b$

$R = 265\,km/h + 32.0\,km/h$

$R = 297\,km/h$

c)



$R^2 = a^2 + b^2$

$R^2 = (265\,km/h)^2 + (32.0\,km/h)^2$

$R^2 = 71249$

$R = 267\,km$

$\theta = \tan^{-1}(a/b)$

$\theta = \tan^{-1}\left(\frac{265\,km/h}{32.0\,km/h}\right)$

$\theta = 83.1°$ N of W

$R = 267\,km\ [83.1°\ N\ of\ W]$

$R^2 = a^2 + b^2$

$R^2 = 11km + -20km$

$R^2 = 533\ km$

$R = \sqrt{23}\ km$

$\theta = \tan^{-1}\left(\frac{opp}{adj}\right)$

$\theta = \tan^{-1}\left(\frac{20\ km}{11\ km}\right)$

3

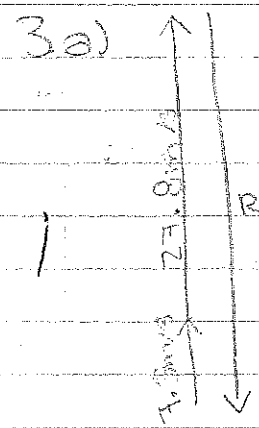
$\theta = 61°$

$365° - 61° = \theta$

$299° = \theta$

Answer = 23km[299°]

3a)



100km/h ÷ 3.6 =

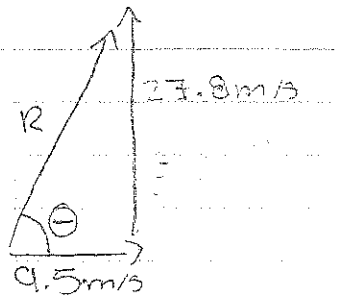
$R = a + b$

$R = 27.8m/s + 7.5m/s$

$R = 35m/s[N]$

1

b)



$R^2 = a^2 + b^2$

$R^2 = (9.5m/s)^2 + (27.8m/s)^2$

$R^2 = 862\ m^2/s^2$

$R = 29m/s$

$\theta = \tan^{-1}\left(\frac{opp}{adj}\right)$

$\theta = \tan^{-1}(27.8m/s \div 9.5m/s)$

$\theta = 71°$

29m/s[71° NorE]

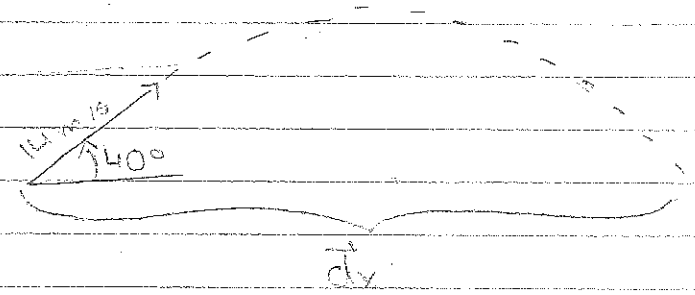
1

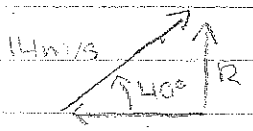
$t = \frac{-2(12.6\,m/s)}{-9.81\,m/s^2}$

$t = 2.58\,s$

2 $t = 2.58\,s$

7.





$R = \sin(\theta)$ hypotenuse

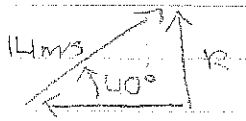
$R = \sin(40°)\,14\,m/s$

$R = 9.0\,m/s$

$t = \frac{-2\vec{v}_{iy}}{\vec{g}}$

$t = \frac{-2(9.0\,m/s)}{-9.81}$

$t = 1.83\,s$ (B)



$R = \cos(\theta)$ hypotenuse

$R = \cos(40°)\,14\,m/s$

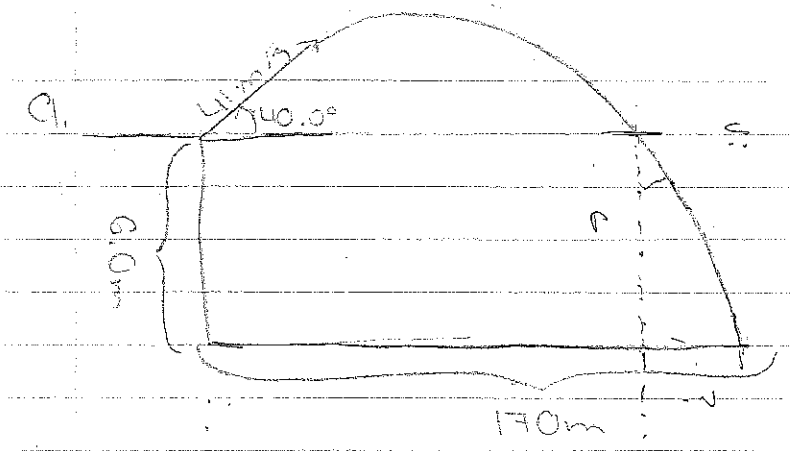
$R = 10.7\,m/s$ (A)

2 $\vec{d}_x = \vec{v}_x t$

$\vec{d}_x = (10.7\,m/s)(1.83\,s)$

$\vec{d}_x = 20\,m$

$\vec{d}_x = 20\,m$ - the shot put goes 20m.



$R = \sin(\theta)\,\text{hypotenuse}$

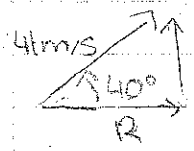
$R = \sin(40°)\,\text{hypotenuse}$

SHCAHTOA $R = 26.4\,m/s = \vec{v}_{iy}$

$$t = \frac{-2\vec{v}_{iy}}{\vec{g}}$$

$$t = \frac{-2(26.4\,m/s)}{-9.81\,m/s}$$

$t = 5.4\,s$ ✓



$R = \cos(\theta)\,\text{hypotenuse}$

$R = \cos(40°)\,41\,m/s$ ✓

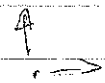
$R = 31.4\,m/s = \vec{v}_x$ ✓

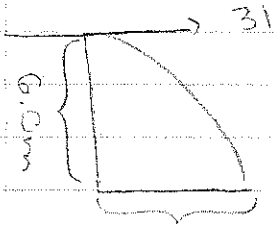
$$\vec{v}_x = \frac{d_x}{t}$$

$d_x = \vec{v}_x t$

$d_x = (31.4\,m/s)(5.4\,s)$ ✓

$d_x = 168.8\,m$





$\vec{v}_f^2 = \vec{v}_i^2 + 2\vec{a}\vec{d}$ ← 6m

$\vec{g} = \frac{\vec{v}_f - \vec{v}_i}{t}$

assume $\vec{v}_{i,y} = 0$

$\vec{v}_{i,y} = 26.3543\ m/s$

$\vec{v}_{fy}^2 = \vec{v}_{iy}^2 + 2\vec{a}\vec{d}$

$\vec{v}_{fy}^2 = (26.4\ m/s)^2 + 2(-9.81\ m/s^2)(6.0\ m)$

$\vec{v}_{fy}^2 = 579.24\ m^2/s^2$

$\vec{v}_{fy} = 24.1\ m/s$

$\vec{g} = \frac{\vec{v}_{fy} - \vec{v}_i}{t}$

$-9.81\ m/s^2 = \frac{24.1\ m/s - 26.4\ m/s}{t}$

$t = \frac{24.1\ m/s - 26.4\ m/s}{-9.81\ m/s^2}$

$t = 0.23\ s$

$\vec{v}_x = \frac{\vec{d}}{t}$

$\vec{d}_x = \vec{v}_x t$

$\vec{d}_x = (31.4\ m/s)(0.23\ s)$

$\vec{d}_x = 7.32\ m$

$\vec{d}_{total} = 168.8 + 7.32\ m$

$\vec{d}_{total} = 176.12$

$\vec{d}_{total} = 1.8 \times 10^2\ m$

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