Ryerson University

Dept. of Physics

PCS 211 – Fall 2021
Tutorial Report Cover Page

Group's Students Info

Student Full Name	Student # (Last 4 digits)
Amaan Asim	6887
Hamza Ejaz Malik	2545
Christian Blainey	1201
Daniel Spahn Vieira	2103

Tutorial Number : section 36 #1

Tutorial Date : Sept 14, 2021

Tutorial TA Name : Matt

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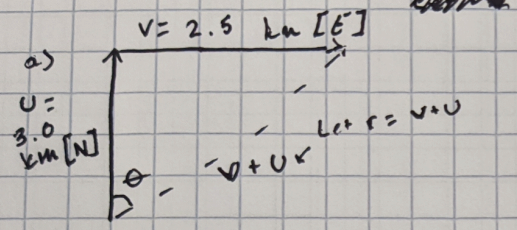
5 mph

#1

a)



b) G: above diagram

R: resultant vector

A: pythagorean theorem

S: $r = \sqrt{(3.0\,km)^2 + (2.5\,km)^2}$

$= \sqrt{9.0\,km^2 + 6.25\,km^2}$

$= \sqrt{15.25\,km^2}$

$= 3.905124838\,km$

$\theta = \tan^{-1}\left(\frac{2.5\,km\,[E]}{3.0\,km\,[N]}\right)$

$= 39.80557109$

P: Josie travels 3.9 km in the direction of 4.0x10 degrees east of north

#2a) SI units for density: kg/m^3

$$\frac{3.78 \pm 0.02\ g}{1\ cm^3} \times \frac{1\ kg}{1000\ g} \times \frac{1000000\ cm^3}{1\ m^3} = \boxed{3780 \pm 20\ \frac{kg}{m^3}}$$

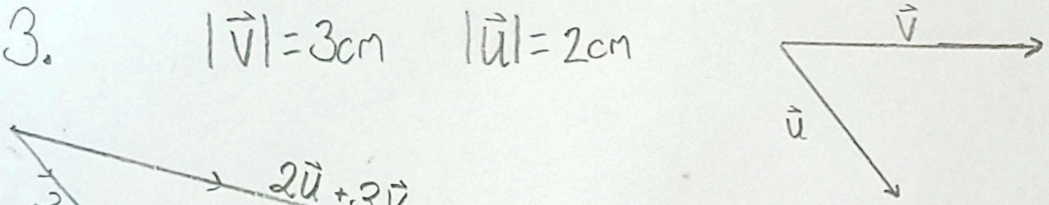
b) convert volume to m^3

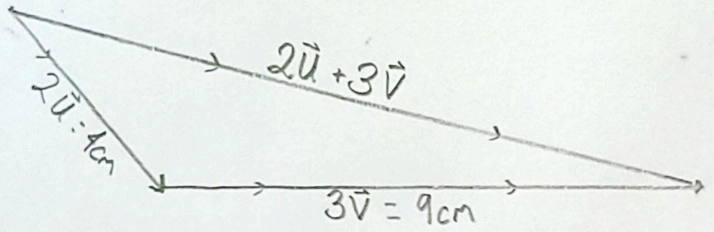
$$0.1\,\mu m^3 \times \frac{1\ m^3}{1.0\times10^{18}\,\mu m^3} = 1.0\times10^{-19}\ m^3$$

calculate mass by doing density • volume

$$1.0\times10^{-19}\ m^3 \left(3780\ \frac{kg}{m^3}\right) = \boxed{3.78\times10^{-16}\ kg}$$

3. $|\vec{v}| = 3cm$ $|\vec{u}| = 2cm$





4.

$$E_y' = \frac{E_y}{1+(E_y \cdot m_e c^2)(1-\cos\theta)}$$

$$\frac{kg \cdot m^2}{s^2} = \frac{\frac{kg \cdot m^2}{s^2}}{1+\left(\frac{kg \cdot m^2}{s^2} \cdot \frac{kg \cdot m^2}{s^2}\right)(1-\cos\theta)}$$

$$\frac{kg \cdot m^2}{s^2} = \frac{1}{\frac{kg \cdot m^2}{s}}$$

dimensional analysis

$$m^1 \cdot L^2 \cdot T^{-2} = m^{-1} \cdot L^{-2} \cdot T^2$$

The equation does not hold because when you do dimensional analysis you get the inverse of the other side.

5 E_k dimensions: $M \cdot \frac{L^2}{T^2}$

$= M^1 L^2 T^{-2}$

mass dimensions: $M^1 L^0 T^0$

velocity dimensions: $M^0 L^1 T^{-1}$

$$[M^1 L^2 T^{-2}] = [M^1 L^0 T^0]^a [M^0 L^1 T^{-1}]^b$$
$$= [M^a L^0 T^0][M^0 L^b T^{-b}]$$
$$= [M^a L^b T^{-b}]$$

$\therefore a = 1$

$b = 2$