#1 a) 1) $\vec{EF}$ et $\vec{CO}$; $\vec{OP}$, $\vec{MN}$ et $\vec{KL}$ GH Mechants bons problème : VECTEURS

2) $\vec{EF}$ et $\vec{CO}$; $\vec{OP}$ et $\vec{KL}$

#2- $\vec{v} = (1,4)$ $\vec{w} = (-3,-2)$

#3- a) $\Delta x = 80 \cos 120 = -40$
$\Delta y = 80 \sin 120 = 69{,}28$

b) $\Delta x = 400 \cos 250 = -136{,}81$
$\Delta y = 400 \sin 250 = -375{,}88$

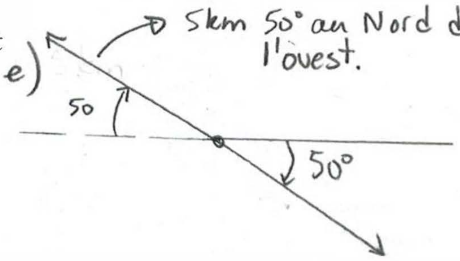
c) $\Delta x = 0$
$\Delta y = -3$

#4 a) $\vec{V_1} + \vec{V_2} = (5,2) + (1,-3) = (6,-1)$

b) $\vec{V_1} + \vec{V_2} + \vec{V_3} = (5,2) + (1,-3) + (-3,2) = (3,1)$

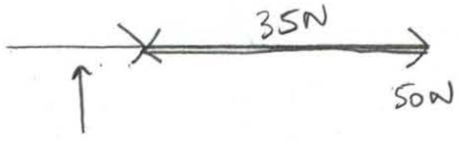
#5 a) vecteurs colineaires, opposés ou linéairement dependants
b) " orthogonaux
c) " lin. independants
d) voir a)
e) vecteurs colineaires ou lin. dépendants.
f) vecteurs equipollents ou colineaires ou lin. dependants

#6 a) $-\vec{v}$ b) $-\vec{AB}$ ou $\vec{BA}$ c) $-\vec{u} = (-3,2)$ d) 3cm S30 ouest (O) e) 5km 50° au Nord de l'ouest.



#7 a) $\vec{AB} - \vec{AD} = \vec{AB} + \vec{DA} = \vec{DA} + \vec{AB} = \vec{DB}$
b) $\vec{BA} - \vec{DA} = \vec{BA} + \vec{AD} = \vec{BD}$
c) $\vec{AC} + \vec{AD} - \vec{AD} = \vec{AC}$!
d) $\vec{AC} + \vec{CD} + \vec{DB} = \vec{AB}$
e) $\vec{CD} - \vec{AD} + \vec{AB} = \vec{CD} + \vec{DA} + \vec{AB} = \vec{CB}$
f) $\vec{AD} - \vec{CD} - \vec{BC} = \vec{AD} + \vec{DC} + \vec{CB} = \vec{AB}$

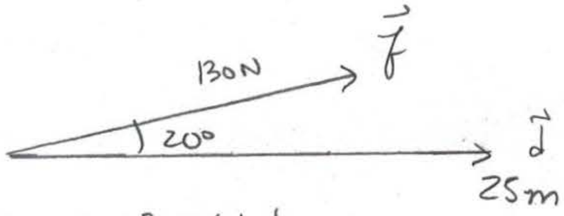
#8



$50N - 35N = 15N$

#9 $W = \|\vec{f}\| \, \|\vec{d}\| \cos\theta = 500 \cdot 500 \cos 60 = 125\,000$ Joules

#10



$W = 130 \cdot 25 \cos 20° = 3054$ Joules.

#11 a) $3(2\vec{a} + 3\vec{a}) = 3 \cdot 5\vec{a} = 15\vec{a} = 15(-2,3) = \underline{\underline{(-30, 45)}}$

b) $(2\vec{a} \cdot 3\vec{b})\vec{a}$

$[2(-2,3) \cdot 3(-1,-5)] \cdot (-2,3)$

$[(-4,6) \cdot (-3,-15)] \cdot (-2,3)$

$(12 + -90) \cdot (-2,3)$

$-78 \; (-2,3) = \underline{\underline{(156, -234)}}$

c) $(\vec{a} + 2\vec{b}) - 2(\vec{a} + \vec{b})$

$= \vec{a} + 2\vec{b} - 2\vec{a} - 2\vec{b}$

$= -\vec{a} = \underline{\underline{(2, -3)}}$

d) $(\vec{a} \cdot \vec{b})(\vec{a} + \vec{b}) + 2\vec{b} - 3\vec{a}$

$[(-2,3) \cdot (-1,-5)]\,[(-2,3) + (-1,-5)] + 2(-1,-5) - 3(-2,3)$

$(2 + -15)\;(-3,-2) + \underbrace{(-2,-10) + (6,-9)}$

$-13\;(-3,-2) + (4,-19)$

$(39, 26) + (4, -19)$

$\underline{\underline{(43, 7)}}$

#12 a) $\vec{w} = (-2, 3)$

$$\vec{w} = a\vec{u} + b\vec{v}$$

$$(-2,3) = a(2,-1) + b(-1,3)$$

$$(-2,3) = (2a, -a) + (-b, 3b)$$

$$(-2,3) = (2a-b, -a+3b)$$

$$\begin{array}{rl} 2a - b = -2 & \Rightarrow \quad 2a - b = -2 \\ 2(-a + 3b = 3) & \Rightarrow \; + \; -2a + 6b = 6 \\ \hline & \qquad 5b = 4 \end{array}$$

$b = 0{,}8 \Rightarrow a = ?$ $\quad 2a - 0{,}8 = -2$

$a = -0{,}6$

$$\vec{w} = -0{,}6\vec{u} + 0{,}8\vec{v}$$

b) $\vec{w} = (3,-4)$

$$\vec{w} = a\vec{u} + b\vec{v}$$

$$(3,-4) = \underbrace{a(3,-4) + b(-1,3)}_{\vdots \ \text{voir \#12a)}}$$

$$(3,-4) = (2a-b, -a+3b)$$

$$\begin{array}{rl} 2a - b = 3 & \Rightarrow \quad 2a - b = 3 \\ 2\cdot(-a + 3b = -4) & \Rightarrow \; + \; -2a + 6b = -8 \\ \hline & \qquad 5b = -5 \end{array}$$

$b = -1 \Rightarrow a = ?$ $\quad 2a + 1 = 3$

$a = 1$

$$\vec{w} = \vec{u} - \vec{v}$$

#13 $\vec{u} = (2,3)$ $\quad \frac{\Delta y}{\Delta x}$ de $\vec{u} = \frac{3}{2}$

$\vec{v} = (4,6)$ $\quad \frac{\Delta y}{\Delta x}$ de $\vec{v} = \frac{6}{4} = \frac{3}{2}$

ils sont // donc NON car ils doivent être lin. indépendants

#14

$\vec{V} = a\vec{s} + b\vec{r}$

$(3,4) = a(3,1) + b(2,4)$

$(3,4) = (3a, a) + (2b, 4b)$

$(3,4) = (3a+2b, a+4b)$

$3a + 2b = 3 \rightarrow 3a + 2b = 3$

$3(a + 4b = 4) \rightarrow 3a + 12b = 12$

$-10b = -9$

$b = 0,9$

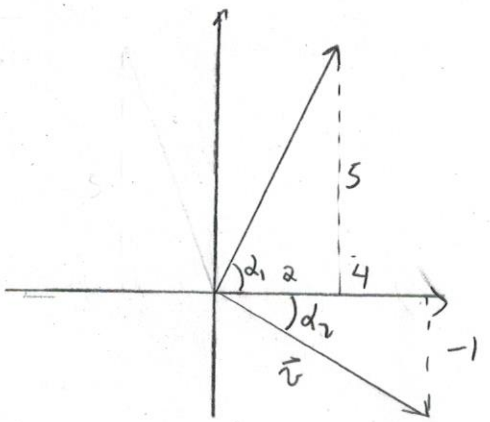
$a + 4(0.9) = 4$

$\vdots$

$a = 0,4$

$\vec{V} = 0,4\vec{s} + 0,9\vec{r}$

#15 $\vec{u} = (2,5)$ et $\vec{v} = (4,-1)$



$\alpha_1 = \tan^{-1}\frac{5}{2} = 68,2$

$\alpha_2 = \tan^{-1}\frac{1}{4} = 14,04$

$\theta = 68,2 + 14,04 = \underline{82,24°}$

ou $\vec{u} \cdot \vec{v} = \|\vec{u}\| \|\vec{v}\| \cos\theta$

$2\times4 + 5\times(-1) = \sqrt{2^2+5^2}\sqrt{4^2+1^2}\cos\theta$

$3 = \sqrt{29}\sqrt{17}\cos\theta$

$0,13... = \cos\theta$

$\underline{\theta = 82,23°}$

#16 $\vec{F}_1 : (-185, 0)$

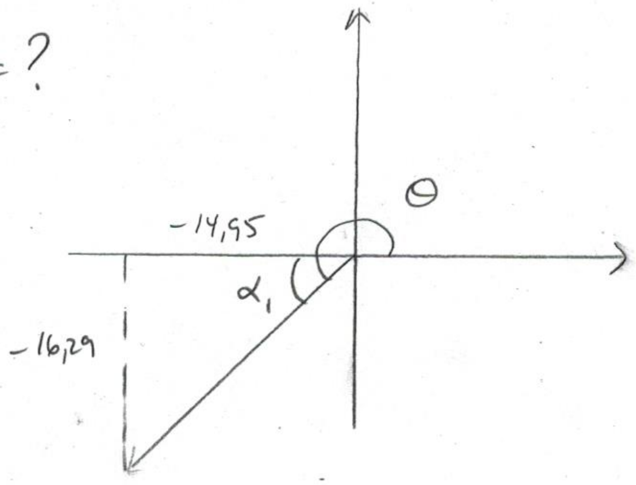
$\vec{F}_2 :$ $\Delta x = 90 \cos 22 = 83{,}45$, $\Delta y = 90 \sin 22 = 33{,}71$ $\Big\}$ $(83{,}45 , 33{,}71)$

$F_3 :$ $\Delta x = 100 \cos 330° = 86{,}60$, $\Delta y = 100 \sin 330° = -50$ $\Big\}$ $(86{,}6 , -50)$

Résultante $= \vec{F}_1 + \vec{F}_2 + \vec{F}_3 = (-14{,}95 , -16{,}29)$

$$\|\vec{F}_1 + \vec{F}_2 + \vec{F}_3\| = \sqrt{(-14{,}95)^2 + (-16{,}29)^2} = \underline{22{,}11 N}$$

$\theta = ?$



$$\alpha_1 = \tan^{-1} \frac{16{,}29}{14{,}95} = 47{,}46°$$

$$\theta = 180 + 47{,}46 = 227{,}46°$$

#17 $\vec{v} = (c, 8)$ $\vec{u} = (4, 3)$

$\frac{\Delta y}{\Delta x}$ de $\vec{u}$: $\frac{3}{4} \xrightarrow{\perp} -\frac{4}{3} = \frac{\Delta y}{\Delta x}$ de $\vec{v}$

$$-\frac{4}{3} = \frac{8}{c} \Rightarrow \underline{c = -6}$$

ou

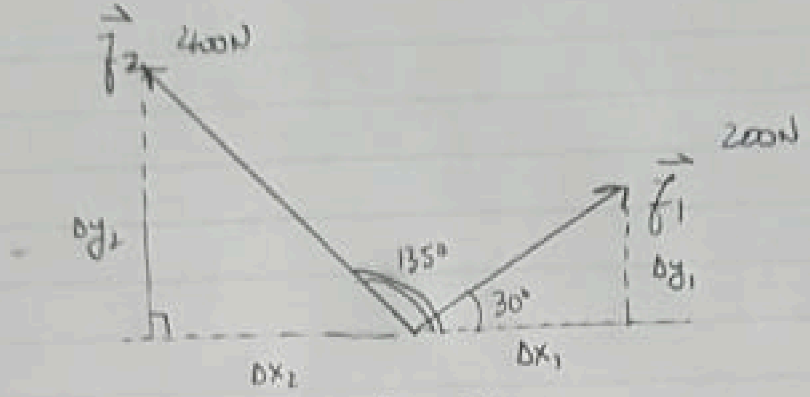
$\vec{u} \cdot \vec{v} = 0$ si $\perp$

$(4,3) \cdot (c, 8) = 0$

$4c + 24 = 0$

$\underline{c = -6}$

\# 18



$\vec{f_1}$: $\Delta x_1 = 200 \cos 30° = 173{,}21$

$\Delta y_1 = 200 \sin 30° = 100$

$\vec{f_2}$: $\Delta x_2 = 400 \cos 135° = -282{,}84$

$\Delta y_2 = 400 \sin 135° = 282{,}84$

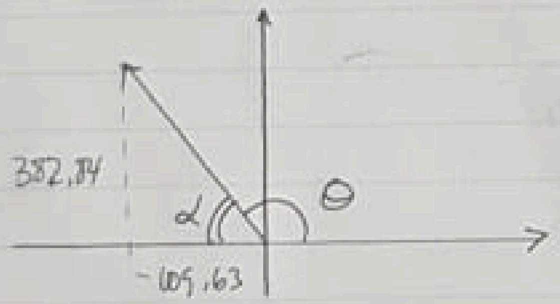
a) résultante : $\Delta x = 173{,}21 + -282{,}84 = -109{,}63$

$\Delta y = 100 + 282{,}84 = 382{,}84$

$\vec{r} = (-109{,}63 \,,\, 382{,}84)$

$\|\vec{r}\| = \sqrt{109{,}63^2 + 382{,}84^2} = \boxed{398{,}23\,N}$

b)

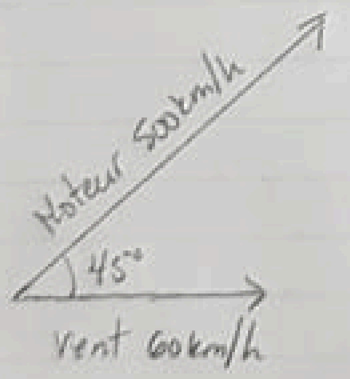


$\theta = 180 - \alpha$

$\theta = 180 - \tan^{-1}\left(\frac{382{,}84}{109{,}63}\right) = 180 - 74{,}02$

$= \boxed{105{,}98°}$

\#19



Moteur : $\Delta x = 500 \cos 45 = 353{,}55$

$\Delta y = 500 \sin 45 = 353{,}55$

vent : $\Delta x = 60$

$\Delta y = 0$

$\vec{r} = (413{,}55 \,,\, 353{,}55)$

$\|\vec{r}\| =$ <u>544,08 km/h</u>

\#20 $\vec{r} = 1\vec{g} - 2\vec{p}$

#21 $\vec{u} = (18, -12)$
$\vec{v} = (\Delta x, -4)$

Si $\vec{u} \parallel \vec{v} \Rightarrow$ pentes sont égales
$\downarrow$
$\frac{-12}{18} = \frac{-4}{\Delta x} \quad \Delta x = 6$

$\underline{\vec{v} = (6, -4)}$

$\vec{w} = (0, -10)$ car orienté SUD

$\vec{x} = \vec{v} - \vec{w} = (6, -4) - (0, -10) = \underline{\underline{(6, 6)}}$

$\vec{y} = (18, 8) = a(18, -12) + b(6, 6)$
$(18, 8) = (18a, -12a) + (6b, 6b)$
$(18, 8) = (18a + 6b, -12a + 6b)$

$$\begin{array}{r} 18a + 6b = 18 \\ - \quad -12a + 6b = 8 \\ \hline 30a = 10 \end{array}$$

$\underline{a = \frac{1}{3}}$ $\quad b = ?$ $\quad 18\left(\frac{1}{3}\right) + 6b = 18$
$\underline{b = 2}$

$$\vec{y} = \frac{1}{3}\vec{u} + 2\vec{x}$$

#22 Si $\vec{VQ} \perp \vec{QT} \Rightarrow$ produit de leurs pentes $= -1$

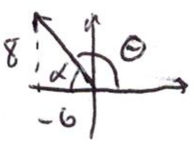
$\frac{3}{1} \cdot \frac{\Delta y}{-12} = -1 \Rightarrow \frac{3\Delta y}{-12} = -1 \Rightarrow \Delta y = 4$ $\quad \underline{\vec{QT} = (-12, 4)}$

$\vec{MT} = (5\sqrt{2}\cos 45, 5\sqrt{2}\sin 45) = \underline{\underline{(5, 5)}}$

$\vec{HV} = (8 - -2, 1 - -5) = \underline{\underline{(10, 6)}}$

$\vec{HM}$ = résultante $= \vec{HV} + \vec{VQ} + \vec{QT} + \vec{TM}$
$= \vec{HV} + \vec{VQ} + \vec{QT} + (-\vec{MT})$
$= (10, 6) + (1, 3) + (-12, 4) + (-5, -5) = \boxed{(-6, 8)}$

$\|\vec{HM}\| = \sqrt{(-6)^2 + 8^2} = \boxed{10\text{ km}}$ $\quad \theta_{\vec{HM}}$



$\alpha = \tan^{-1}\frac{8}{6} = 53{,}13°$
$\theta = 180 - \alpha = \boxed{126{,}87°}$

#23 $\vec{u} = (192 \cos 36{,}87^\circ, 192 \sin 36{,}87^\circ)$

$\vec{u} = (153{,}6, 115{,}2)$

$\vec{v} = (240 \cos 126{,}87, 240 \sin 126{,}87)$ $\quad \theta_{\vec{v}} = 180 - 53{,}13^\circ$ *

$= (-144, 192)$

$\vec{r}_{esultante} = (1200 \cos 73{,}7398^\circ, 1200 \sin 73{,}7398^\circ)$

$= (336, 1152)$

$\vec{r} = \boxed{a}\,\vec{u} + \boxed{b}\,\vec{v} = $ (combien de $\vec{u}$ + combien de $\vec{v}$)

force ouvrier $\quad$ force esclave

$(336, 1152) = a(153{,}6, 115{,}2) + b(-144, 192)$

$(336, 1152) = (153{,}6a, 115{,}2a) + (-144b, 192b)$

$(336, 1152) = (153{,}6a - 144b, 115{,}2a + 192b)$

$=$ $\quad$ $=$

$1{,}\overline{3} \cdot (153{,}6a - 144b = 336) \Rightarrow 204{,}8a - 192b = 448$

$115{,}2a + 192b = 1152 \Rightarrow 115{,}2a + 192b = 1152$

$320a = 1600$

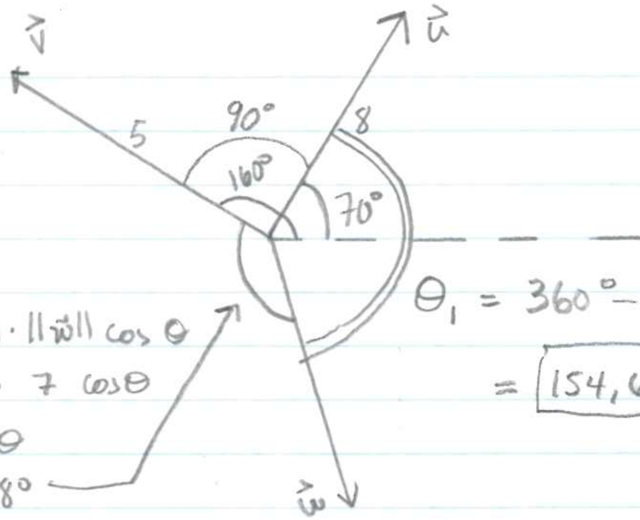
$\boxed{\begin{array}{l} a = 5 \text{ ouvrier} \\ b = 3 \text{ esclaves} \end{array}}$

$\Rightarrow 115{,}2(5) + 192b = 1152$

$\downarrow$

$b = 3$

#24



$\vec{v}\cdot\vec{w} = \|\vec{v}\|\cdot\|\vec{w}\|\cos\theta$

$-15 = 5\cdot 7\cos\theta$

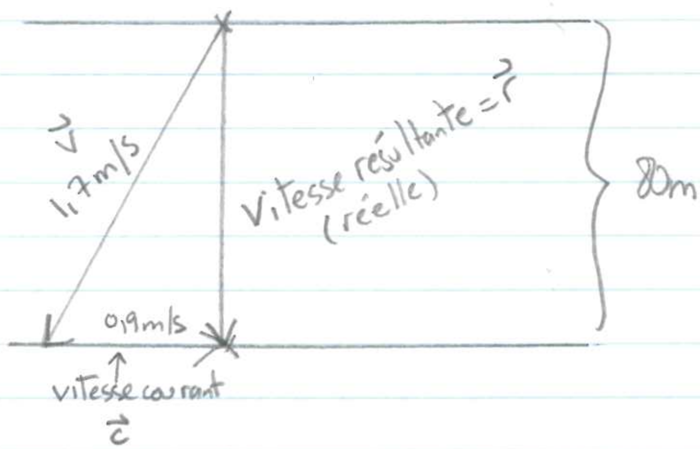
$-0,428\ldots = \cos\theta$

$\theta = 115,38°$

$\theta_1 = 360° - 90 - 115,38°$

$= \boxed{154,62°}$

#25



$\|\vec{r}\|^2 + 0,9^2 = 1,7^2$: pythagore

$\|\vec{r}\| = 1,44$ m/s

temps = $80m \div 1,4m/s = \boxed{55,47 \text{ sec}}$