

March 28, 2017

Test #3: start at warning bell

Report Cards:

interviews Thurs 5-8

Error

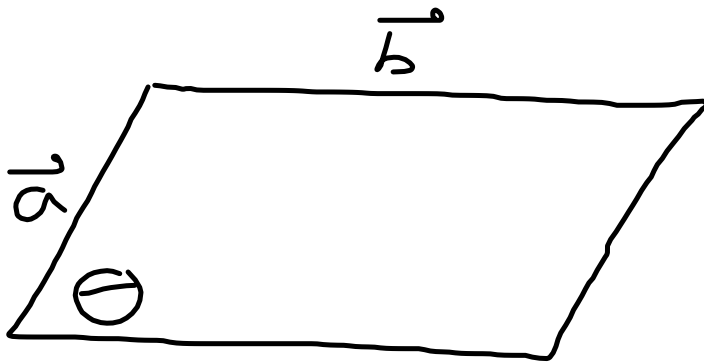
$$\text{proj}_u v = \left(\frac{\vec{v} \cdot \vec{u}}{\vec{u} \cdot \vec{u}} \right) \vec{u}$$

↳ "projection of \vec{v}
onto \vec{u} "

Test Review

Parallelogram

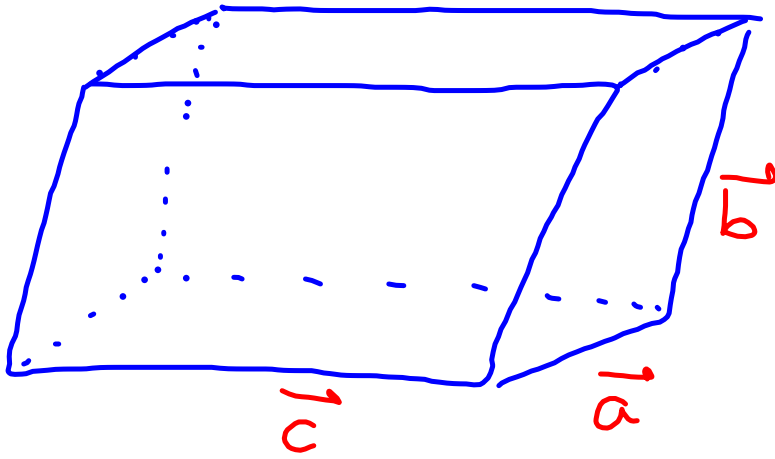
Two vectors (even 3D vectors are possible)



$$\begin{aligned} \text{Area} &: |\vec{a} \times \vec{b}| \\ &= |\vec{a}| |\vec{b}| \cos \Theta \end{aligned}$$

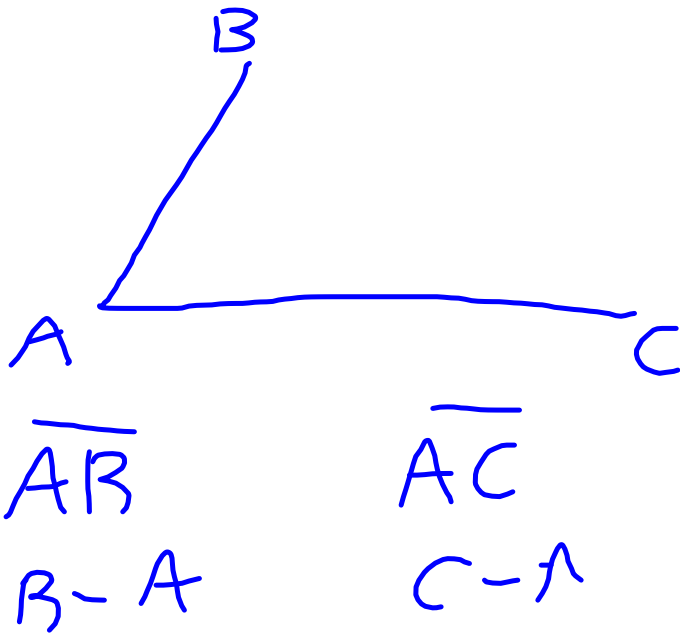
Parallelepiped

Three 3D vectors



$$\text{Volume} = a \cdot b \times c$$

Ex. 1 · Find the volume
of a parallelepiped with
vectors $\vec{a} = [-2, 6, 1]$
 $\vec{b} = [3, 0, 4]$
 $\vec{c} = [5, -2, -3]$



$$\vec{b} \times \vec{c}$$

i	j	k	i	j	k
3	0	4	3	0	4
5	-2	-8	5	-2	3

$$0i + 20j - 6k + 8i + 9j + 0k$$

$$8i + 29j - 6k$$

$$\vec{b} \times \vec{c} = [8, 29, -6]$$

$$\vec{a} \cdot \vec{b} \times \vec{c}$$

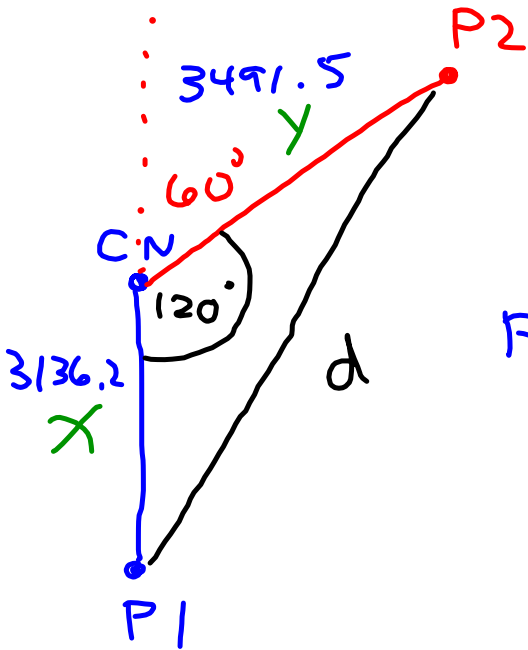
$$= (-2)(8) + 6(29) + (-6)(1)$$

$$= -16 + 174 - 6$$

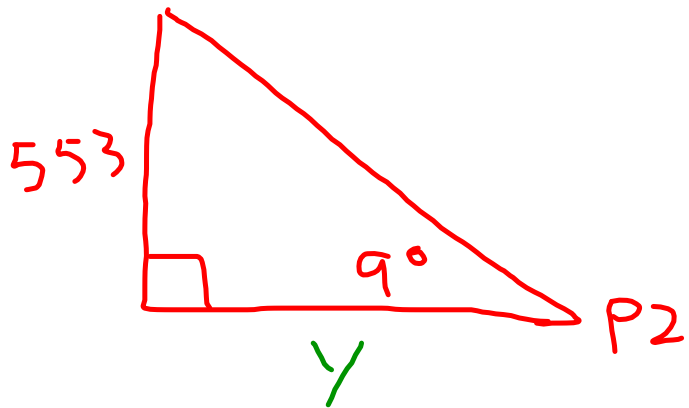
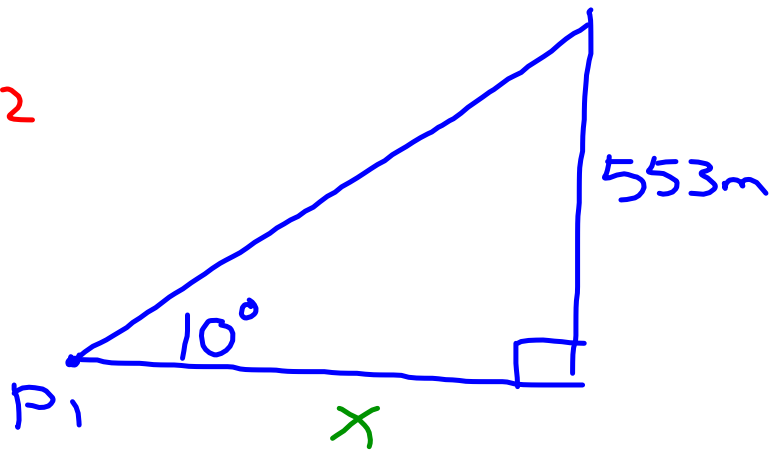
$$\boxed{V = 152}$$

36
p. 401

CN Tower
top (bird's)



side view



$$\tan 10^\circ = \frac{553}{x}$$

$$x = \frac{553}{\tan 10^\circ} = \boxed{3136.2 \text{ m}}$$

$$\tan 9^\circ = \frac{553}{y}$$

$$y = \frac{553}{\tan 9^\circ} = \boxed{3491.5 \text{ m}}$$

$$d^2 = a^2 + b^2 - 2ab \cos C$$

$$d^2 = 3136.2^2 + 3491.5^2 - 2(3136.2)(3491.5) \cos 120$$

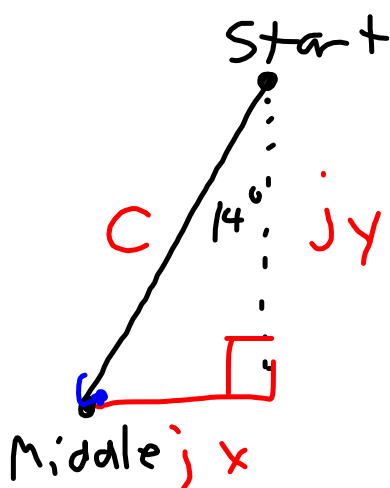
$$d^2 = 32976560.27 \dots$$

$$\boxed{d = 5742.5 \text{ m}}$$

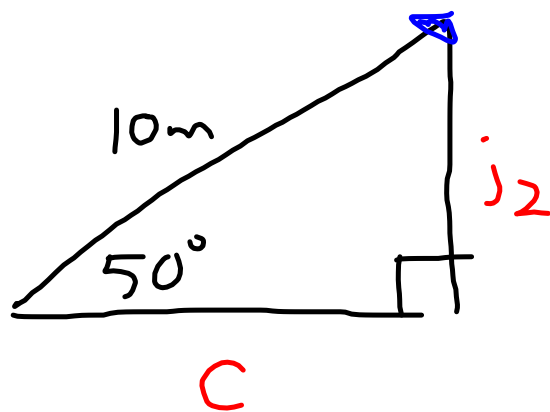
Ex. 3: Wolverine jumps 10m

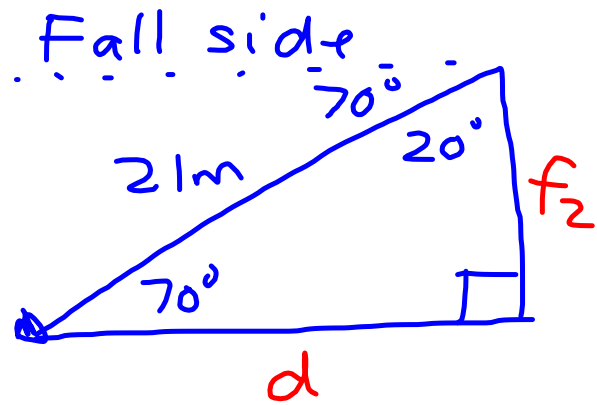
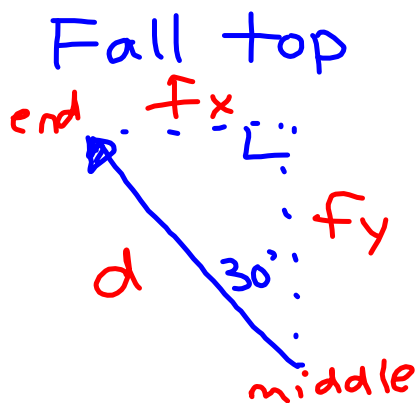
[S 14° W] at an angle of elevation of 50°. He misses his jump and falls 21m [N 30° W] at an angle of depression of 70°. What is his change in distance?

Jump top



Jump Side





- ① find all components
- ② add components
- ③ find magnitude of components

$$\sin 50 = \frac{j_2}{10}$$

$$j_2 = 7.66 \text{ m [up]}$$

$$\sin 70 = \frac{f_2}{21}$$

$$f_2 = 19.7 \text{ m [down]}$$

$$r = j + fl$$

$$r_2 = 7.66m \text{ [up]} + 19.7m \text{ [down]}$$

$$r_2 = 12m \text{ [down]}$$

$$\cos 50 = \frac{c}{10} \quad \cos 70 = \frac{d}{21}$$

$$c = 6.4m$$

$$d = 7.2m$$

$$\sin 14 = \frac{j_x}{6.4}$$

$$\sin 30 = \frac{f_x}{7.2}$$

$$j_x = 1.5m \text{ [W]}$$

$$f_x = 3.6m \text{ [W]}$$

$$r_x = 5.1m \text{ [W]}$$

$$\cos 14 = \frac{j_y}{6.4}$$

$$j_y = 6.2 \text{ m [S]}$$

$$\cos 30 = \frac{f_y}{7.2}$$

$$f_y = 6.2 \text{ m [N]}$$

$$\bar{r}_y = 0 \text{ m}$$

$$\vec{r} = [-5.1, 0, -12]$$

$$|\vec{r}| = \sqrt{(-5.1)^2 + (0)^2 + (-12)^2}$$

$$|\vec{r}| = 13.0 \text{ m}$$

\therefore Wolverine travels 13.0m.