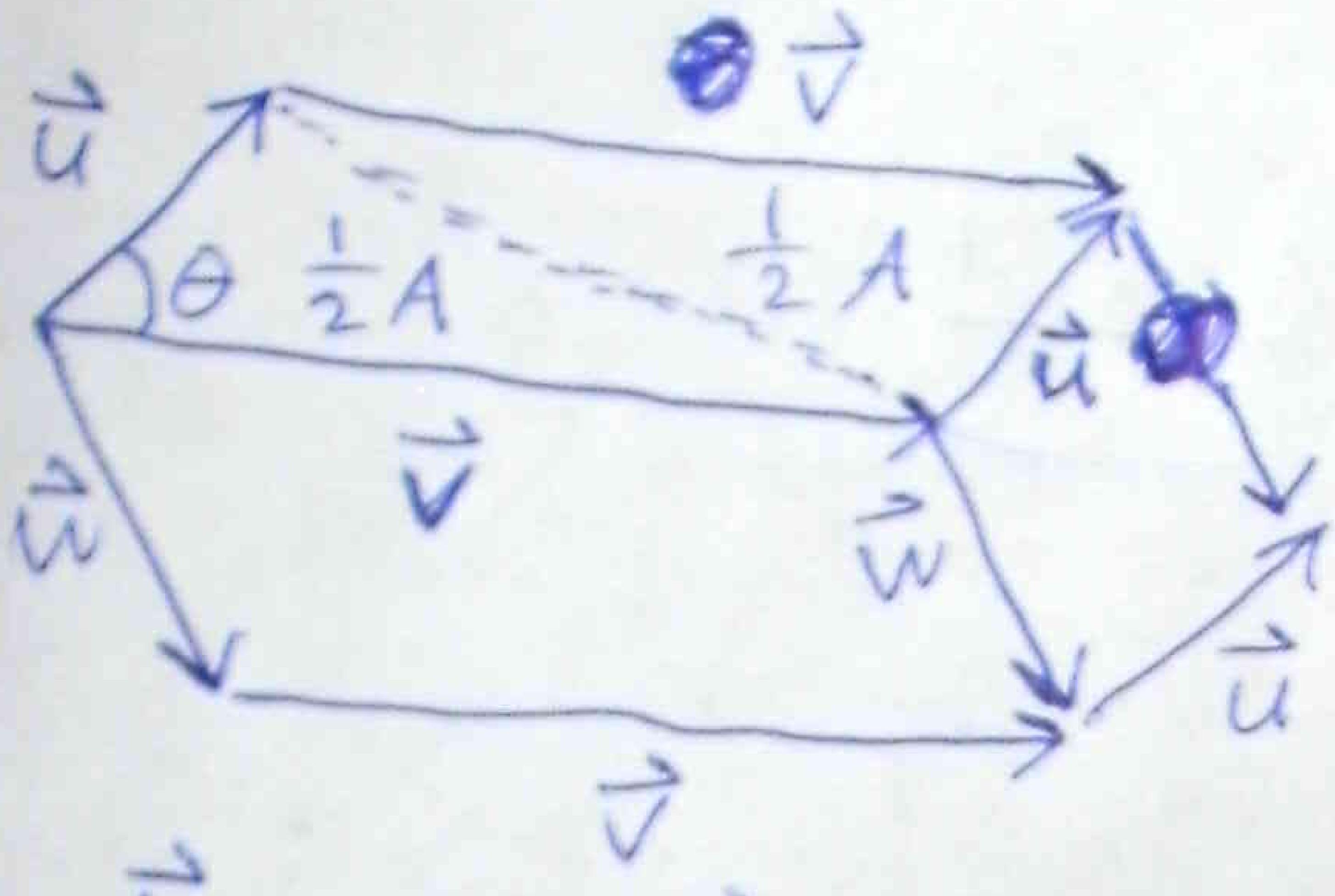

$A = |\vec{u} \times \vec{v}| = |\vec{u}||\vec{v}| \sin\theta$

volume $= \vec{u} \cdot (\vec{v} \times \vec{w})$

$\vec{u} \times \vec{v} \perp \vec{u}, \vec{v}$

$\vec{a} \perp \vec{b} \iff \vec{a} \cdot \vec{b} = 0$; $\vec{a} \cdot \vec{b} = |\vec{a}||\vec{b}| \cos \angle(\vec{a}, \vec{b})$

$\vec{r}_0 \in L$ line $\parallel \vec{v} \iff L = \{\vec{r}_0 + t\vec{v} : t \in \mathbb{R}\}$

$$\left.\begin{array}{l} x = pt + a \\ y = qt + b \\ z = rt + c \\ t \in \mathbb{R} \end{array}\right\} \iff \frac{x-a}{p} = \frac{y-b}{q} = \frac{z-c}{r}$$

$\vec{r}_0 \in P$ plane $\parallel \vec{u}, \vec{v} \iff P = \{\vec{r}_0 + s\vec{u} + t\vec{v} : s, t \in \mathbb{R}\}$

$$\left.\begin{array}{r} \vec{r} = \vec{r}_0 + s\vec{u} + t\vec{v} \\ s, t \in \mathbb{R} \end{array}\right\} \iff (\vec{r} - \vec{r}_0) \cdot (\vec{u} \times \vec{v}) = 0$$

$\vec{r}_0 \in P$ plane $\perp \vec{w} \iff P = \{\vec{r} : (\vec{r} - \vec{r}_0) \cdot \vec{w} = 0\}$

P_1 plane $\perp \vec{v}_1$ & P_2 plane $\perp \vec{v}_2$

$\Rightarrow \angle(P_1, P_2) =$ acute $\angle(\vec{v}_1, \vec{v}_2)$

$\cos(\text{acute}\ \angle(\vec{a},\vec{b}))$

$|\vec{a}\cdot\vec{b}| = |\vec{a}|\cdot|\vec{b}|\cdot\cancel{(\text{acute}\ \angle(\vec{a},\vec{b}))}$

P_1 plane $\perp \vec{v}_1$ & L_2 line $\parallel \vec{v}_2$

$\Rightarrow$ angle of incidence $\angle(P_1, L_2) = \text{acute}\ \angle(\vec{v}_1, \vec{v}_2)$

$\hat{v} = \vec{v}/|\vec{v}|$, $\text{comp}_{\vec{v}}\,\vec{u} = \vec{u}\cdot\hat{v} = |\vec{u}|\cos\angle(\vec{u},\vec{v})$

$\overrightarrow{\text{proj}}_{\vec{v}}\,\vec{u} = (\vec{u}\cdot\hat{v})\,\hat{v}$ is $\parallel \pm\vec{v}$.

$\overrightarrow{\text{orth}}_{\vec{v}}\,\vec{u} = \vec{u} - \text{proj}_{\vec{v}}\,\vec{u}$ is $\perp\ \vec{v}$.

$A = (a_1, a_2, a_3)$ $\quad$ $B = (b_1, b_2, b_3)$

$\overrightarrow{AB} = \langle b_1 - a_1, b_2 - a_2, b_3 - a_3\rangle$

$A \in L$ line $\parallel \vec{u}$; $B \in M$ line $\parallel \vec{v}$;

$C \in P$ plane $\perp \vec{p}$; D point

$d(D, L) = |\text{orth}_{\vec{u}}\,\overrightarrow{AD}|$

$d(L, M) = |\text{comp}_{\vec{u}\times\vec{v}}\,\overrightarrow{AB}|$

$d(D, P) = |\text{comp}_{\vec{p}}\,\overrightarrow{CD}|$