5 page summanary of physics engine

jintaeks

position

$s = vt$

velocity

$v = at$

acceleration

a

force

$F = ma$

momentum

$p = mv$

impulse

$I = Ft$

$$\begin{aligned} \Delta I &= F\Delta t \\ &= ma\Delta t \\ &= m\Delta v \\ &= \Delta p \end{aligned}$$

rotation

$\theta = \omega t$

angular velocity

$$\begin{aligned} \omega &= v_T / r \\ &= (r \times v)/r^2 \end{aligned}$$

(see Fig. 1)

angular acceleration

$\alpha = (r \times a)/r^2$

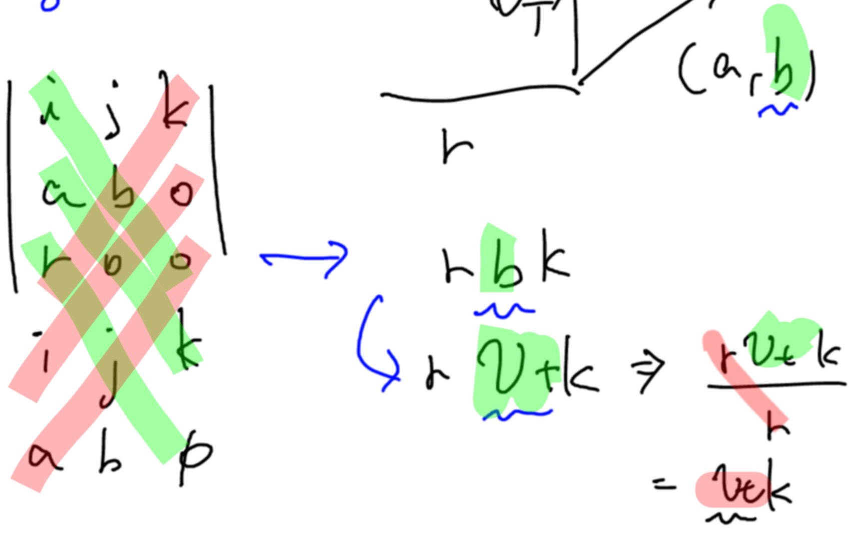
torque **inertia**

$\tau = r \times F = I\alpha$

angular momentum

$L = r \times P = I\omega$

Fig. 1



$s = vt$ | $\theta = \omega t$

$v = at$ | $\omega = v_T / r$ (fig 1) $= (r \times v)/r^2$

a | $\alpha = (r \times a)/r^2$

$F = ma$ | $\tau = r \times F = I\alpha$

$p = mv$ | $L = r \times p = I\omega$

$I = Ft$

$$\boxed{\begin{aligned} \Delta I &= F\Delta t \\ &= ma\Delta t \\ &= m\Delta v \\ &= \Delta p \end{aligned}}$$

Fig. 1

$$\begin{vmatrix} i & j & k \\ a & b & 0 \\ r & 0 & 0 \end{vmatrix}$$

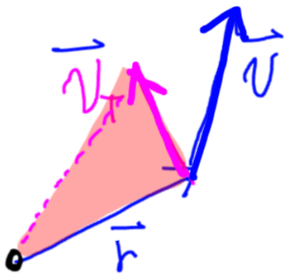
$$\begin{matrix} i & j & k \\ a & b & 0 \end{matrix}$$

$\rightarrow r\,b\,k$

$\hookrightarrow r\,v_t\,k \Rightarrow \dfrac{\cancel{r}\,v_t\,k}{r} = v_t k$

$s = vt$ $\qquad$ $\theta = \omega t$

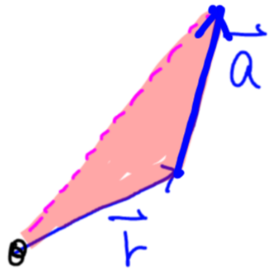
$v = at$



$\omega = v_T / r$

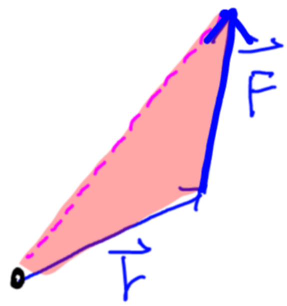
$= (r \times v)/r^2$ [Fig. 1]

a



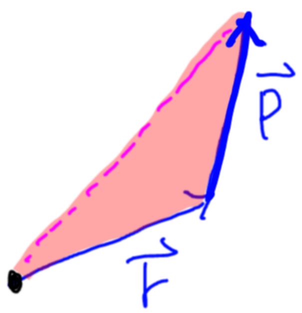
$\alpha = (r \times a)/r^2$

$F = ma$



$\tau = r \times F = I\alpha$

$p = mv$



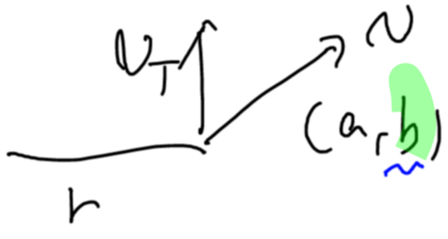
$L = r \times p = I\omega$

$I = Ft$

$$\Delta I = F\Delta t$$
$$= ma\Delta t$$
$$= m\Delta v$$
$$= \Delta p$$

Fig. 1

$$\begin{vmatrix} i & j & k \\ a & b & 0 \\ r & 0 & 0 \end{vmatrix}$$
$$\begin{matrix} i & j & k \\ a & b & 0 \end{matrix}$$



$\longrightarrow r\,b\,k$

$\hookrightarrow r\,v_t\,k \Rightarrow \dfrac{\cancel{r}\,v_t\,k}{\cancel{r}}$

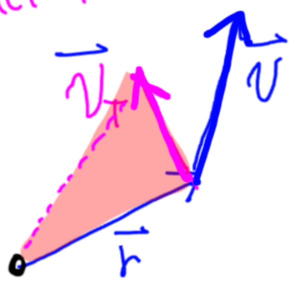
$= v_t k$

$s = vt$ $\theta = \omega t$

① differentiation   ④ integration t

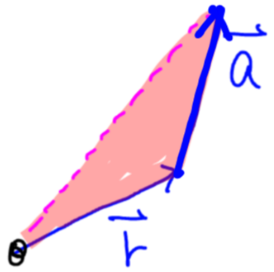
$V = at$

② differentiation   ③ integration t



$w = v_T / r$
$= (r \times v)/r^2$ [Fig.1]

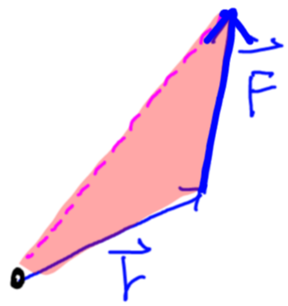
a



$\alpha = (r \times a)/r^2$

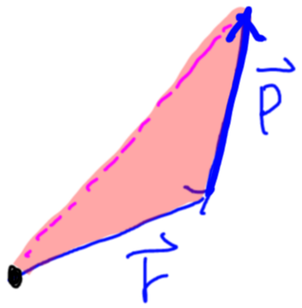
③ ②

$F = ma$



$\tau = r \times F = I\alpha$

$p = mv$



$L = r \times p = I\omega$

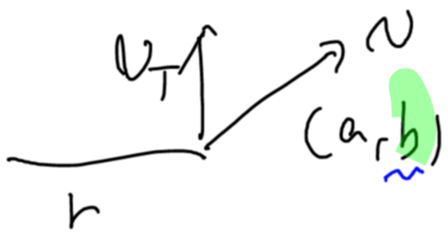
①

$I = Ft$

$$\Delta I = F\Delta t = ma\Delta t = m\Delta v = \Delta p$$

Fig. 1

$$\begin{vmatrix} i & j & k \\ a & b & 0 \\ r & 0 & 0 \end{vmatrix} \quad \begin{matrix} i & j & k \\ a & b & p \end{matrix}$$



$\longrightarrow r b k$

$\hookrightarrow r v_t k \Rightarrow \dfrac{\cancel{r} v_t k}{\cancel{r}} = v_t k$

① differentiation

⑤ ④ $s = vt$

$/t$ integration

$v = at$

② ③ differentiation

t integration

a

③ ②

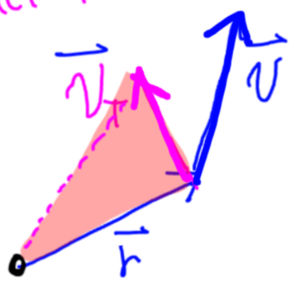
$F = ma$

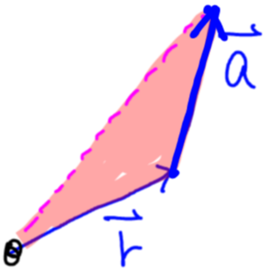
$p = mv$

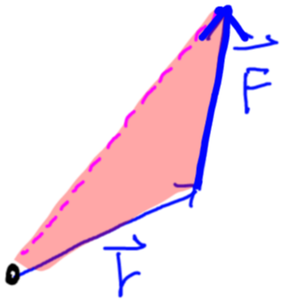
①

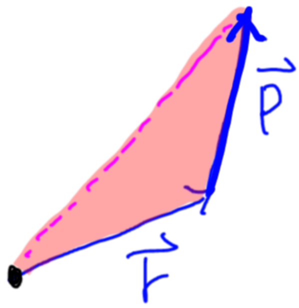
$I = Ft$

$$\boxed{\begin{aligned}\Delta I &= F\Delta t\\ &= ma\Delta t\\ &= m\Delta v\\ &= \Delta p\end{aligned}}$$









⑤ ④

$\theta = \omega t$

$$w = v_T / r = (r \times v)/r^2 \quad \text{[Fig.1]}$$

$$\alpha = (r \times a)/r^2$$

$$\tau = r \times F = I\alpha$$

③

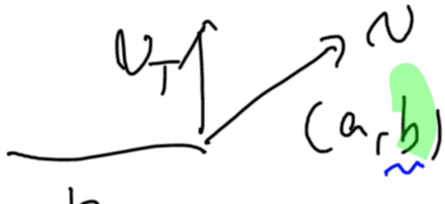
$w = L/I$

②

$L = r \times p = I w$

①

Fig. 1



$$\begin{vmatrix} i & j & k \\ a & b & 0 \\ r & 0 & 0 \end{vmatrix} \longrightarrow rbk$$

$$\hookrightarrow r v_t k \Rightarrow \frac{r v_t k}{r} = v_t k$$