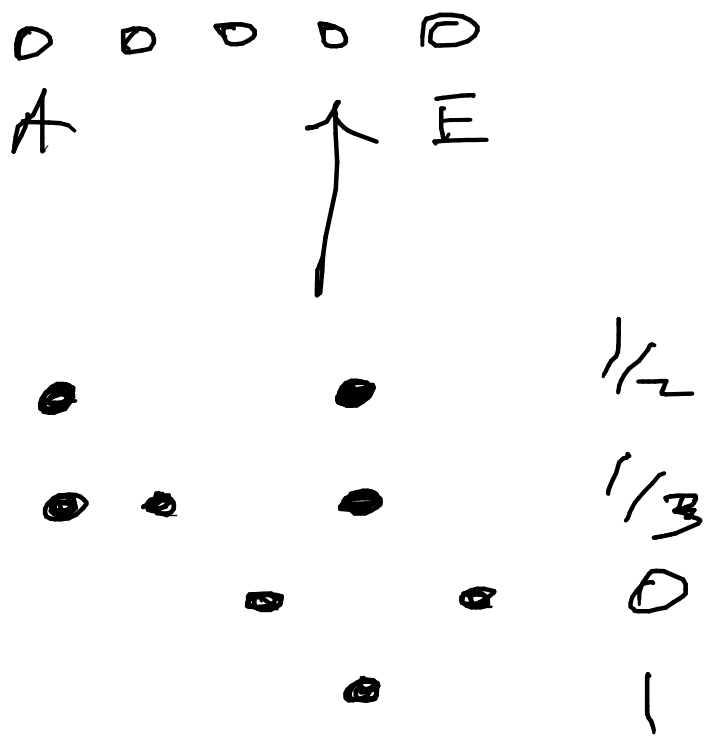
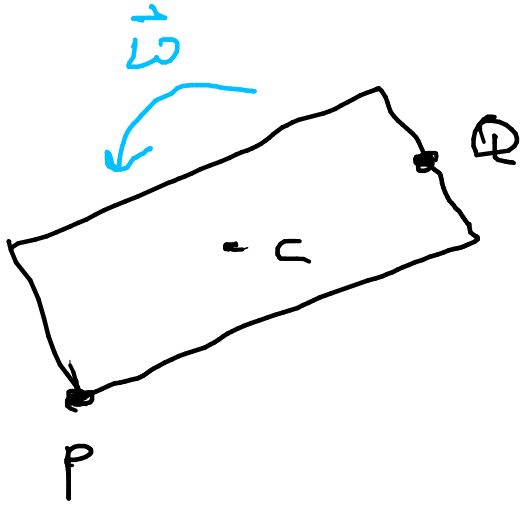
Conflict signup by Friday 27th.

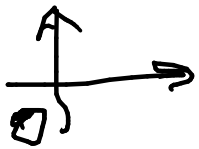
Partial credit for MC. ✓



Exam study → <u>all</u> the PL.

Recap



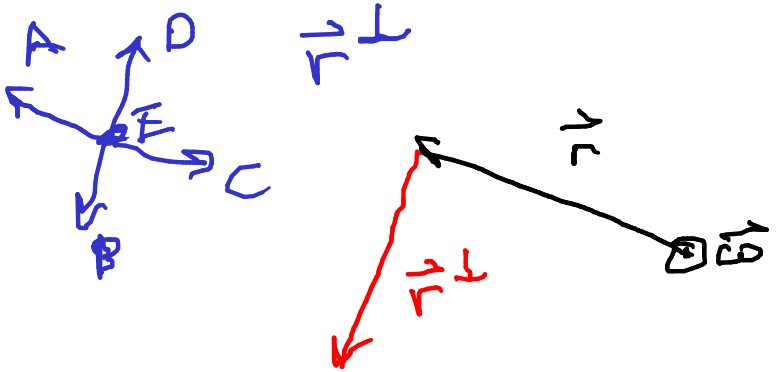


$$\vec{r}_Q = \vec{r}_P + \vec{r}_{PQ}$$

$$\vec{v}_Q = \vec{v}_P + \vec{\omega} \times \vec{r}_{PQ}$$

$$\vec{a}_Q = \vec{a}_P + \vec{\alpha} \times \vec{r}_{PQ} + \vec{\omega} \times (\vec{\omega} \times \vec{r}_{PQ})$$

Cross product in 2D



$$\vec{\omega} \times \vec{r}$$

$$\vec{\omega} = \omega_z \hat{k}$$

$$\vec{r} = r_x \hat{i} + r_y \hat{j}$$

$$\vec{\omega}\times\vec{r} = \underline{-\omega r_y \hat{i}} + \underline{\omega_z r_x \hat{j}} = \omega_z\underbrace{(-r_y\hat{i} + r_x\hat{j})}_{\vec{r}^{\perp}}$$

A. $\omega_z r_x$

B. $-\omega_z r_x$

C. $\omega_z r_y$

(D) $-\omega_z r_y$

$\vec{r}^{\perp}$: ccw 90° rotation of $\vec{r}$

$$\vec{\omega}\times\vec{r} = \omega_z \hat{k}\times(r_x\hat{i} + r_y\hat{j})$$

$$= \omega_z r_x(\hat{k}\times\hat{i}) \to \hat{j}$$

$$+ \omega_z r_y(\hat{k}\times\hat{j}) \to -\hat{i}$$

in 2D

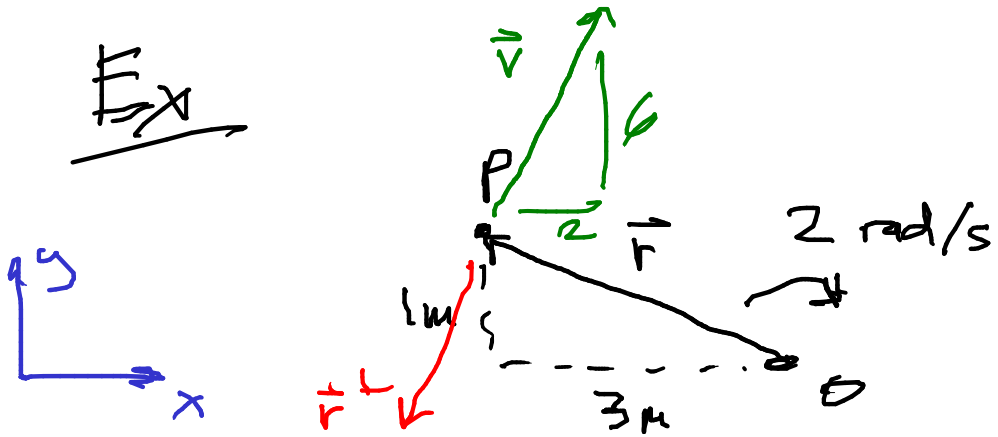
$$\vec{\omega} = \omega_z\hat{k}$$

$$\vec{r} = r_x\hat{i} + r_y\hat{j}$$

$$\Big\} \quad \vec{\omega}\times\vec{r} = \omega_z\vec{r}^{\perp}$$

$$-\omega_z r_y\hat{i} + \omega_z r_x\hat{j}$$

Ex



$\vec{v}_P = \underline{7}\,\hat{i} + \underline{6}\,\hat{j}$

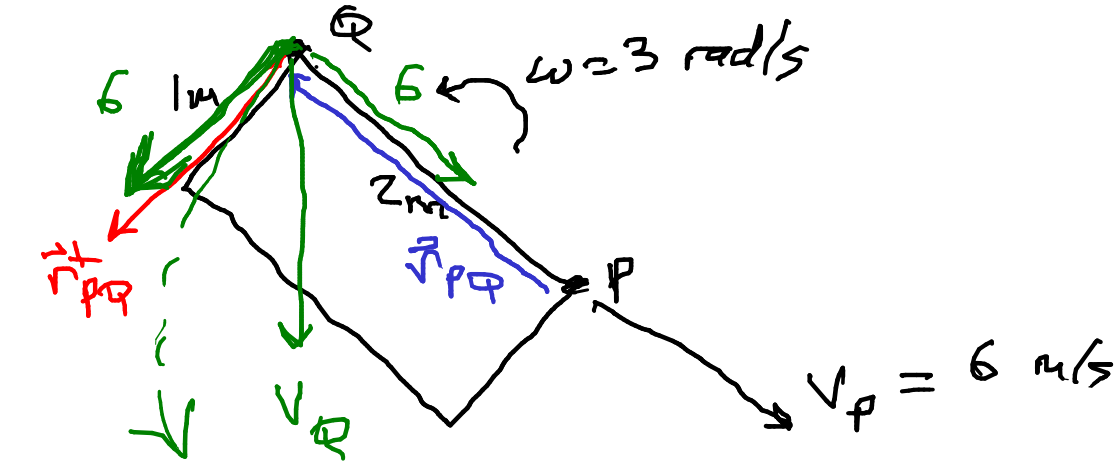
A. 6
B. 2
C. 0
D. −2
E. −6

$\omega_z = -2$

$\vec{\omega} = -2\hat{k}$

$\vec{r} = -3\hat{i} + \hat{j}$

$\vec{r}_t = -\hat{i} - 3\hat{i}$



$$\vec{V}_Q = \vec{V}_P + \vec{\omega} \times \vec{r}_{PQ}$$

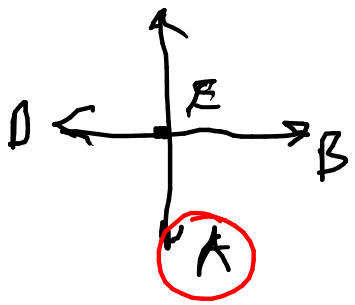
V_Q m/s → P

ω ⊥ $\vec{r}_{PQ}$

+ve

dir $\vec{V}_Q$

C



$6\sqrt{2}$

V_Q closest to

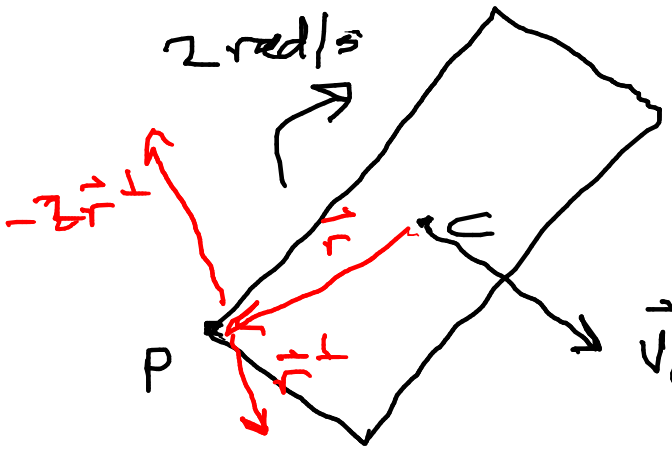
A. 0 m/s

B. 3 m/s

C. 6 m/s

D. 9 m/s

E. 12 m/s



	x	y
C	13	-6
P	11	-7

$\vec{v}_P = \_\_\_\hat{i} + \_\_\_\hat{j} = \vec{v}_C + \vec{\omega} \times \vec{r}_{CP}$

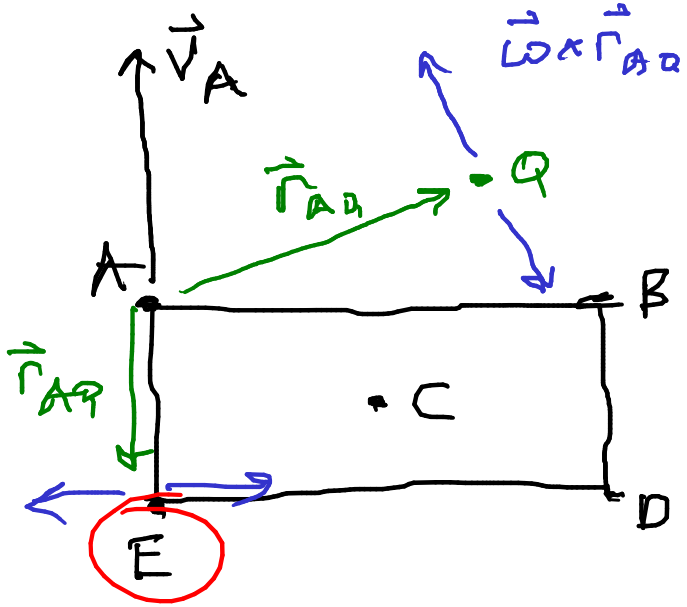
$\vec{r}_{CP}^{\perp} = \hat{i} - 2\hat{j}$

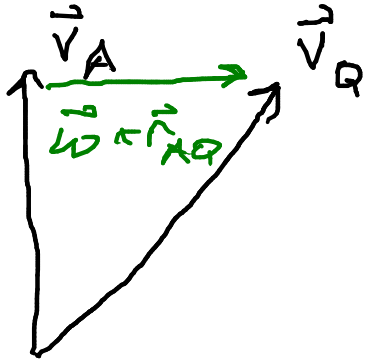
$-2\vec{r}_{CP}^{\perp} = -2\hat{i} + 4\hat{j}$

$\vec{\omega} \times \vec{r}_{CP}$

A. 4
B. 2
C. 0
D. -2
E. -4

A. 6 m/s
B. 2
C. 0
D. -2
E. -6





Which is point Q ?

$$\vec{v}_Q = \vec{v}_A + \vec{\omega} \times \vec{r}_{AQ}$$

$\vec{v}_{Q}$ of Q rel to A