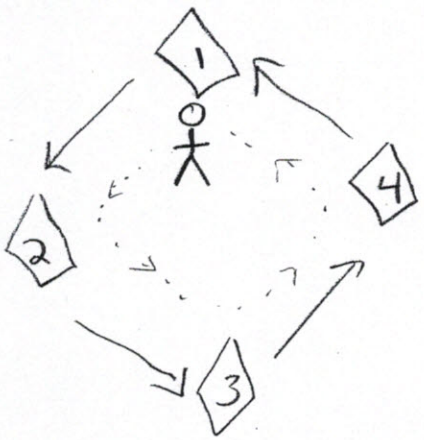
7.2

Q 1,3 P 11, 13, 55

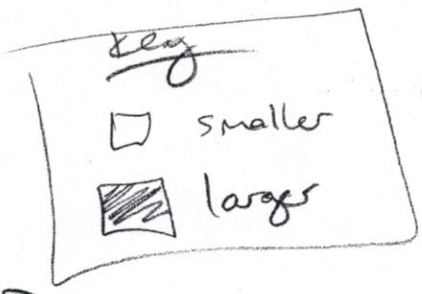
Q1

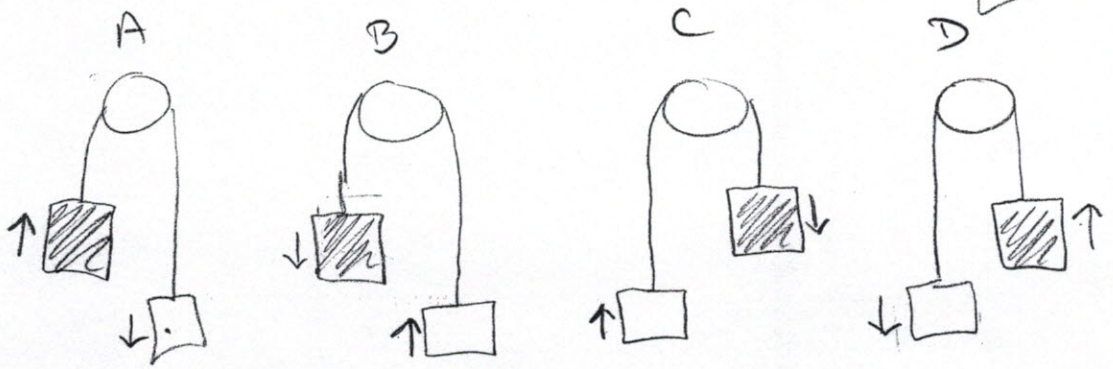


positive

(he is moving counter-clockwise)

Q 3





A: $\omega = -$ (clockwise) $\quad \alpha = +$ (lg. left) slowing

B: $\omega = +$ (counter clockwise) $\quad \alpha = +$ (lg. left) speeding up

C: $\omega = -$ (clockwise) $\quad \alpha = -$ (lg. right) speeding up

D: $\omega = +$ (counter clockwise) $\quad \alpha = -$ (lg. right) slowing

Notes:

α that decreases/increases a negative angular velocity (ω) is positive/negative

α that decreases/increases a positive angular velocity (ω) is negative/positive

P11

clock — circle — time equivalent

$$1\frac{rev}{min} = \left(1\frac{\cancel{rev}}{\cancel{min}}\right)\left(\frac{2\pi\ rad}{1\ \cancel{rev}}\right)\left(\frac{1\ \cancel{min}}{60\ s}\right) = 0.105\ rad/s$$

tip of the hand

$$V = \omega R$$

converted from cm

$$V = (0.105\ rad/s)(0.0100\ m)$$

$$V = 0.00105\ m/s$$

P 13

$D = 1.8\,m$ $\quad (r = \frac{1}{2}D)$ $\quad r = 0.90\,m$

$t = 1.0\,s = \frac{1\,rev}{1.0\,s}$

$\Delta\theta = 1.0\,rev = 2\pi\,rad$ (circle)

$\Delta\theta = \frac{1}{2}\alpha(\Delta t)^2$ ← derived from $\Delta\theta = \omega_0^{\,0} + \frac{1}{2}\alpha(\Delta t)^2$

$$\alpha = \frac{2(\Delta\theta)}{(\Delta t)^2}$$

$$\alpha = \frac{2(2\pi\,rad)}{(1.0\,s)^2}$$

$$\alpha = 12.6\,rad/s^2$$

$$\omega_f = \omega_0 + \alpha(\Delta t)$$

$$\omega_f = 0\,rad/s + (12.6\,rad/s^2)(1.0\,s)$$

$$\omega_f = 12.6\,rad/s$$

$$v_f = r\,\omega_f$$

$$v_f = (.90\,m)(12.6\,rad/s)$$

$$v_f = 11\,m/s$$

P55

$$\omega = \frac{\Delta\theta}{\Delta t}$$

a)

- from $t = 0s$ to $t = 1s$ particle rotates clockwise from the angular position $+4\pi$ rad to -2π rad. [clockwise]

$\Delta\theta = \omega_f - \omega_i$

$\Delta\theta = -2\pi - (+4\pi) = -6\pi$ rad/s $= \omega$

- from $t = 1s$ to $t = 2s$

$\omega = 0$ rad/s (not moving)

- from $t = 2s$ to $t = 4s$ particle rotating counter-clockwise from the angular position -2π rad to 0 rad.

$\Delta\theta = 0 - (-2\pi) = 2\pi$ rad [counterclockwise]

$\omega = +\pi$ rad/s

b)