

Physics 160

Extra Credit #21

9.2 $\omega = 1890 \text{ rev/min}$

a) $\frac{1890 \text{ rev}}{\text{min}} \times \frac{2\pi \text{ rad}}{\text{rev}} \times \frac{\text{min}}{60 \text{ s}} = 197.92 \text{ rad/s} = 198 \text{ rad/s}$

OR $\omega = 63\pi \text{ rad/s}$

b) How long until $\Delta\theta = 40^\circ = 40^\circ \times \frac{\pi \text{ rad}}{180^\circ} = \frac{2\pi}{9} \text{ rad}$

Constant $\omega \Rightarrow \omega = \frac{\Delta\theta}{\Delta t} \Rightarrow \Delta t = \frac{\Delta\theta}{\omega} = \frac{\frac{2\pi}{9} \text{ rad}}{63\pi \text{ rad/s}} = \frac{2}{567} \text{ s}$
 $= 0.0035 \text{ s}$

Visualizing Rotation

a) which HAVE initial positive \Rightarrow they way it was defined

Any disk that starts rotating counterclockwise

(Note: 1 started at rest so doesn't count) $\Rightarrow 4, 6$

b) 2 & 5 HAVE non-zero clockwise

c) Zero Angular Acceleration \Rightarrow Not speeding up or down.

$\Rightarrow 5 \& 6$ ~~are~~ ~~have~~ ~~constant~~ ~~ang.~~ ~~speed~~

d) Positive Ang. Acceleration \Rightarrow Rotating Counterclockwise faster
& faster OR Rotating clockwise
while slowing down

#1 WAS Rotating @ Counterclockwise & faster

#2 WAS Rotating clockwise & slowing

e) #4 ~~s~~ Rotated Counterclockwise while slowing down

\Rightarrow $\underbrace{\hspace{2cm}}$
 \swarrow
positive ω

\swarrow
 α opposite to ω

\Rightarrow Negative α