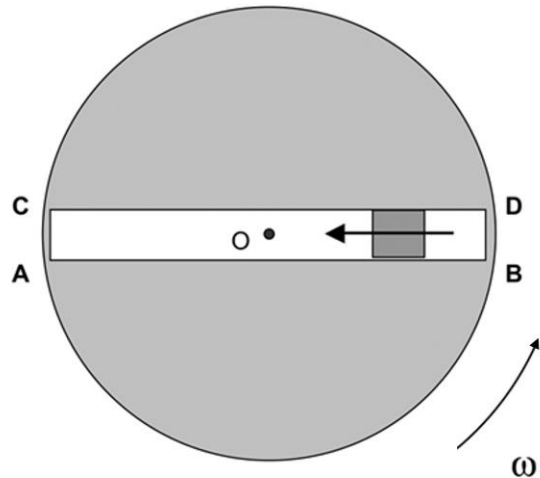


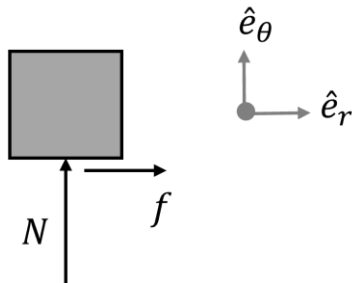
You may work in groups. You may use your book. You may not use the internet.

A disk in a horizontal plane rotates counterclockwise with a constant rate of  $\omega$  about a shaft that passes through the center of the disk. A particle is moving radially inward towards the shaft at O. On which surface of the slot does the particle make contact? Provide justification for your answer by drawing a FBD and writing down the relevant kinetics and kinematic equations.

- a) Surface AB.
- b) Surface CD.
- c) Neither surface.
- d) More information is needed to answer this question.



FBD of particle (assuming contact with AB)



Kinetics:  $\sum F_\theta = ma_\theta = N$

Kinematics:  $a_\theta = r\ddot{\theta} + 2\dot{r}\dot{\theta}$

Solve:  $N = m(r\ddot{\theta} + 2\dot{r}\dot{\theta})$

$\ddot{\theta} = 0$

$\dot{\theta} = \omega > 0$

$\dot{r} < 0$

Therefore:  $N < 0$  and assumption in FBD is wrong