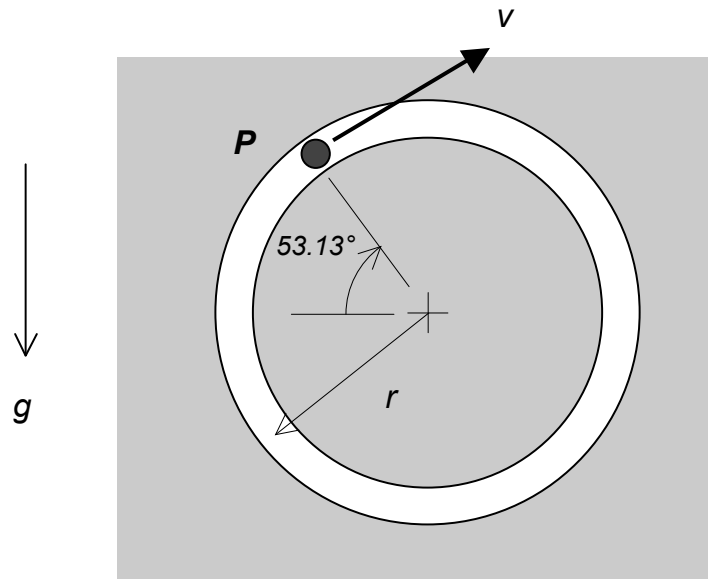


ME 274 - Fall 2024 - Quiz 6

Particle P travels in a vertical plane within a smooth, circular slot, where the radius of the slot is  $r = 0.5$  m. At the position shown below, the speed of P is known to be  $v = 3$  m/s. For this position:

- (a) P is in contact with the outer surface of the slot.
- (b) P is in contact with the inner surface of the slot.
- (c) P is in contact with neither surface of the slot.
- (d) More information is needed to answer this question

Provide a justification for your answer.



$$\begin{aligned} \sum F_n &= mg \sin \theta + N = ma_n = m \frac{v^2}{r} \\ \hookrightarrow N &= m \left( \frac{v^2}{r} - g \sin \theta \right) \\ &= m \left[ \frac{3^2}{0.5} - (9.806)(0.9) \right] \\ &> 0 \end{aligned}$$

Since  $N > 0 \Rightarrow$  outer surface

