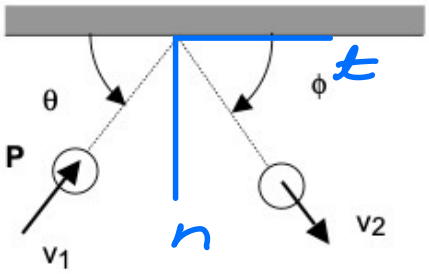
ME 274 – Fall 2024 – Quiz 8 **Name** SOLUTION

Question Q1



Pool ball P moves toward a fixed bumper at an angle of θ. After impact with the bumper, the ball rebounds at an angle of ϕ. For a coefficient of restitution for the impact being $0 < e < 1$, choose the correct response below:

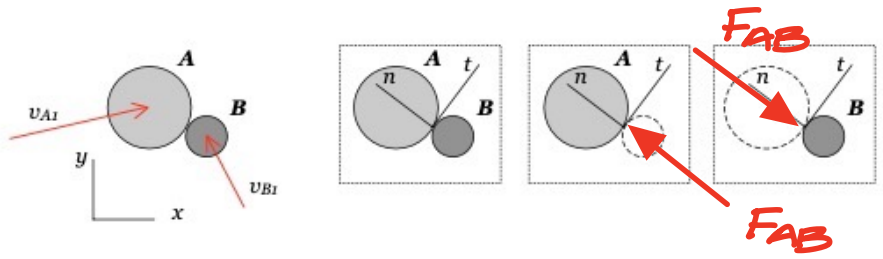
a) $\phi < \theta$
b) $\Phi = \theta$
c) $\Phi > \theta$
d) $\Phi = 0$
e) $\Phi = 90°$

- $\Sigma F_t = 0 \Rightarrow V_{2t} = V_{1t}$
  - (1) $\hookrightarrow V_2 \cos\phi = V_1 \cos\theta$
- $e = -\frac{V_{2n}}{V_{1n}} = -\frac{V_2 \sin\phi}{(-V_1 \sin\theta)}$
  - (2) $\hookrightarrow V_2 \sin\phi = e V_1 \sin\theta$
- Divide (2) by (1):

$$\frac{V_2 \sin\phi}{V_2 \cos\phi} = e \frac{V_1 \sin\theta}{V_1 \cos\theta}$$

$\hookrightarrow \tan\phi = e \tan\theta \Rightarrow \phi < \theta$

Question Q2



Particles A and B collide. Choose the correct responses below (more that one correct response may exist).

For system of B alone: $\Sigma F_t = 0$

a) Linear momentum in the x – direction is conserved.
b) Linear momentum in the y – direction is conserved
c) Linear momentum in the n – direction is conserved
d) Linear momentum in the t – direction is conserved
e) None of the above.

For system of A+B: $\Sigma \bar{F} = \bar{0}$ (all directions)

a) Linear momentum in the x – direction is conserved.
b) Linear momentum in the y – direction is conserved
c) Linear momentum in the n – direction is conserved
d) Linear momentum in the t – direction is conserved
e) None of the above.