2022A F=ma Exam: Problem 15

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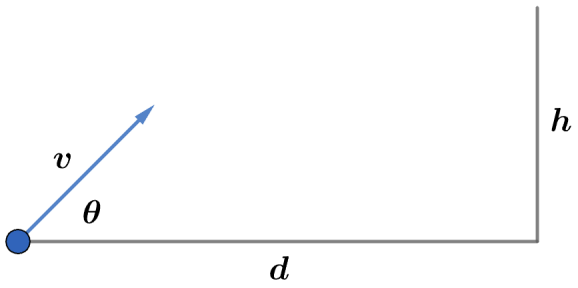

Recall from kinematics that the maximum range of a projectile is

$$R_{\max} = \frac{v^2}{g}$$

when launched at optimal angle $\theta_{\text{opt}} = \pi/4$. Thus if $v^2 = gd$, then we must have $\theta = \pi/4$ since it is the only angle for the egg to hit the wall. The eliminates all choices except B and E.

If the wall is brought closer $d \to 0$, then to maximize height we aim upwards $\theta \to \pi/2$. This eliminates E so the answer is $\boxed{\text{B}}$.