2015 F=ma Exam: Problem 5

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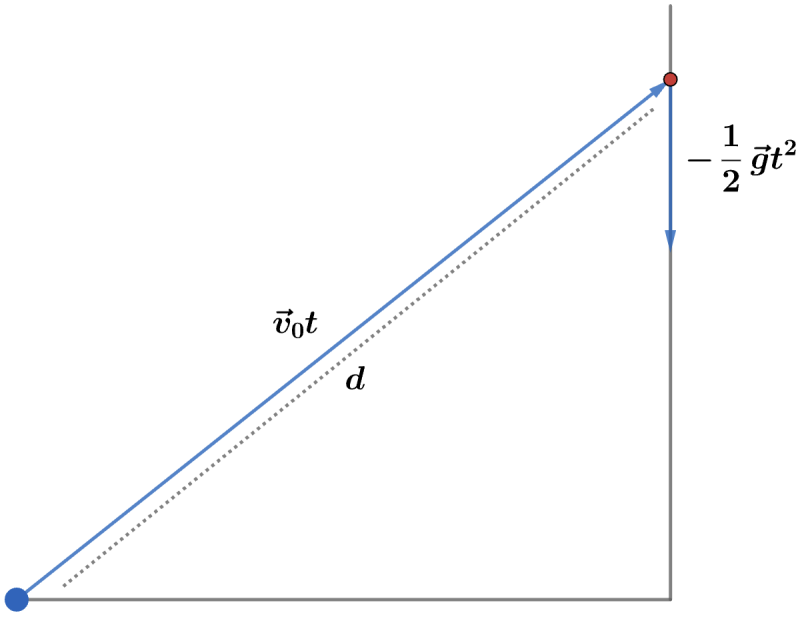

Recall for projectile motion, we have

$$\vec{r} = \vec{v}_0 t - \frac{1}{2}\vec{g}t^2$$

where the first term describes straight line motion if the particle was free and the second term accounts for the deflection by gravity. Since the distance between the ball and target is $d = 150\,\text{m}$, the time taken to reach the wall is

$$d = v_0 t$$
$$t = \frac{d}{v_0} = \frac{150\,\text{m}}{100\,\text{m/s}} = 1.5\,\text{s}$$

The deflection is then

$$y = \frac{1}{2}gt^2 = \frac{1}{2}(10\,\text{m/s}^2)(1.5\,\text{s})^2 = 11\,\text{m}$$

so the answer is $\boxed{\text{E}}$.