# This is only one of the exam problems. You must read the full instructions on problem 1 before starting the exam.

Instructions: Solve this problem and submit it to Blackboard before 1 PM Syracuse time (Eastern Daylight Time) on Wednesday, April 8. You will submit all four problems as separate submissions to help us grade more efficiently.

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A spring launcher fires a ball with a mass of $2.7\,\mathrm{g}$ at an angle $\theta = 45°$ above the horizontal. The energy comes from a spring with spring constant $k = 80\,\mathrm{N/m}$ that is compressed by $5\,\mathrm{cm}$. You can ignore the height difference between the ground and where the ball is fired.

launcher not to scale
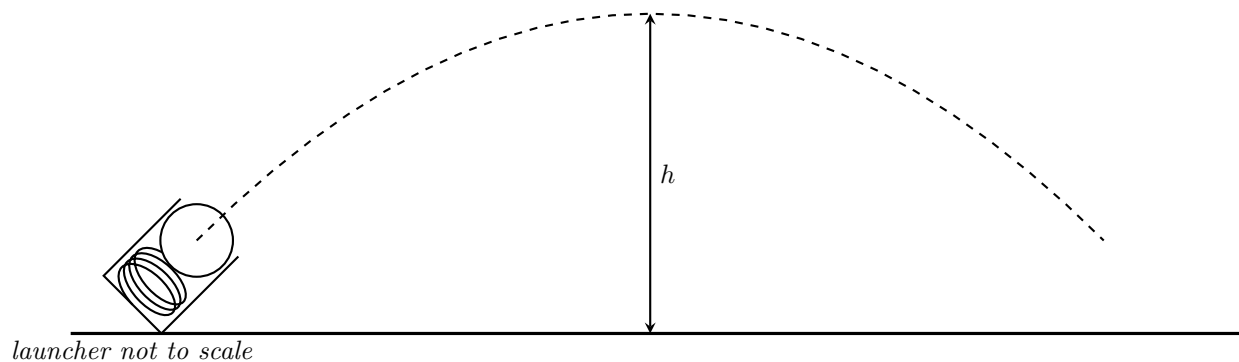
(a) (10 points). What will the velocity of the ball (magnitude and direction) be just as it leaves the launcher?

(b) (15 points). What is the maximum height above the ground that the ball will reach?