

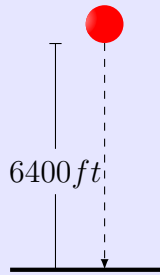
Note: Show all work, clearly and in order, if you want to get full credit.

Q1 Solve: $2xy \frac{dy}{dx} = y^2 - 2x^3, \quad y(1) = 2.$

Solution:

Q2 An object is dropped from a height of 6400 ft . (We assume that no air resistance and gravity $g = -32 \text{ ft/s}^2$)

1. Set up a differential equation for this problem.
2. Find the velocity of the object after 3 seconds.
3. When will the object reach ground level?



Q3 Find the general solution of the ODE: $y''' - 3y'' + 3y' - y = 0$

Solution:

Q4 Use variation of parameters to find a particular solution of

$$y'' - 2y' + y = 14x^{\frac{3}{2}}e^x.$$

Solution: