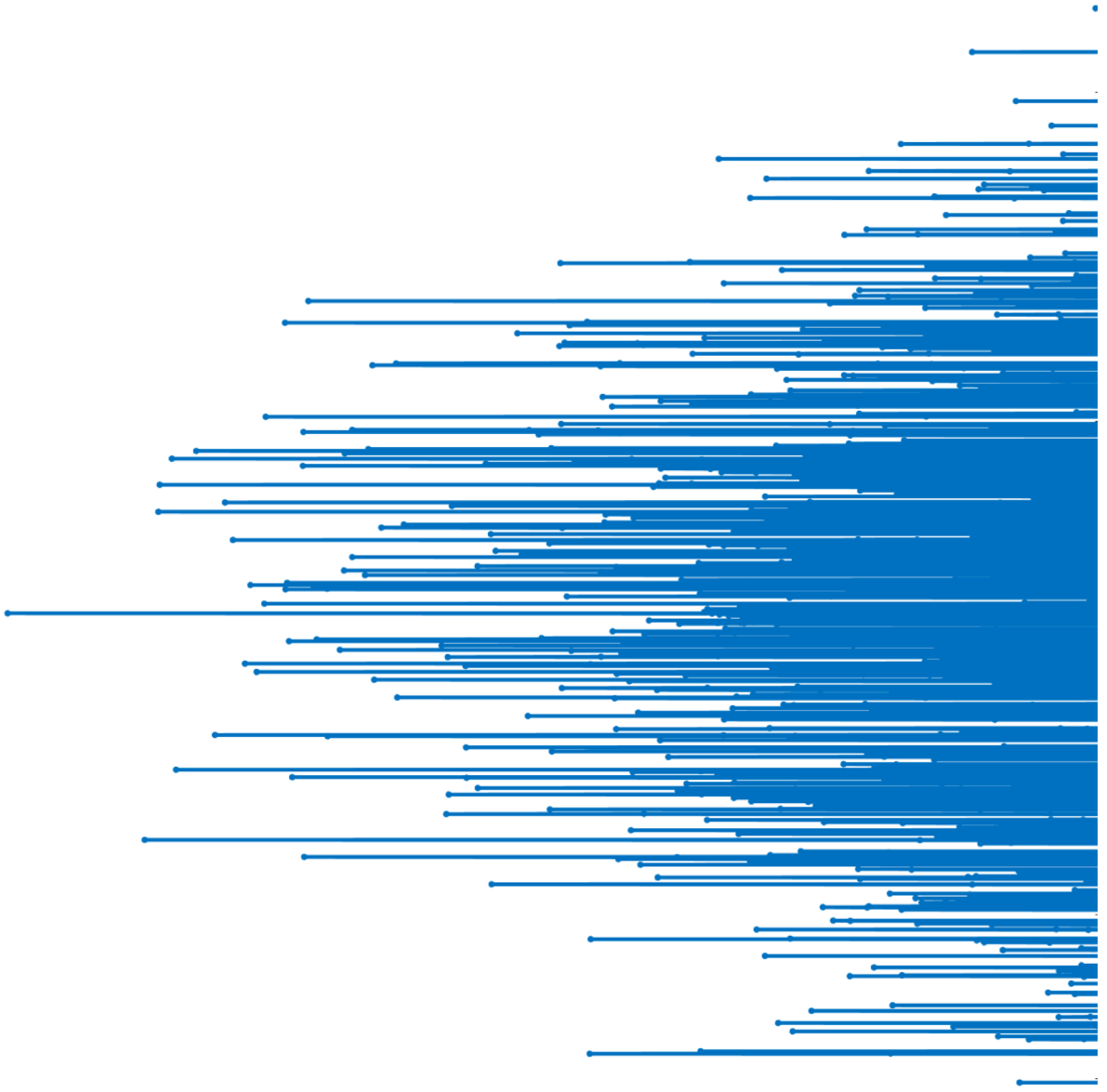
PHYS 2010 (W20)
Classical Mechanics



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Tutorial

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Ref. (re images):
Knudsen & Hjorth (2000), Kesten & Tauck (2012)

2. What are the properties of two vectors **a** and **b** such that

(*a*) $\mathbf{a} + \mathbf{b} = \mathbf{c}$ and $a + b = c$,

(*b*) $\mathbf{a} + \mathbf{b} = \mathbf{a} - \mathbf{b}$,

(*c*) $\mathbf{a} + \mathbf{b} = \mathbf{c}$ and $a^2 + b^2 = c^2$.

Resnick & Halliday (1968)

19. Show for any vector $\mathbf{a}$ that $\mathbf{a} \cdot \mathbf{a} = a^2$ and that $\mathbf{a} \times \mathbf{a} = 0$.

Resnick & Halliday (1968)

29. (*a*) Write an expression for the position vector **r** for a particle describing uniform circular motion, using rectangular coordinates and the unit vectors **i** and **j**. (*b*) From (*a*) derive vector expressions for the velocity **v** and the acceleration **a**. (*c*) Prove that the acceleration is directed toward the center of the circular motion.

Resnick & Halliday (1968)

18. Projectiles are hurled at a horizontal distance R from the edge of a cliff of height h in such a way as to land a horizontal distance x from the bottom of the cliff. If you want x to be as small as possible, how would you adjust θ_0 and v_0, assuming that v_0 can be varied from zero to some maximum finite value and that θ_0 can be varied continuously? Only one collision with the ground is allowed (see Fig. 4–14).

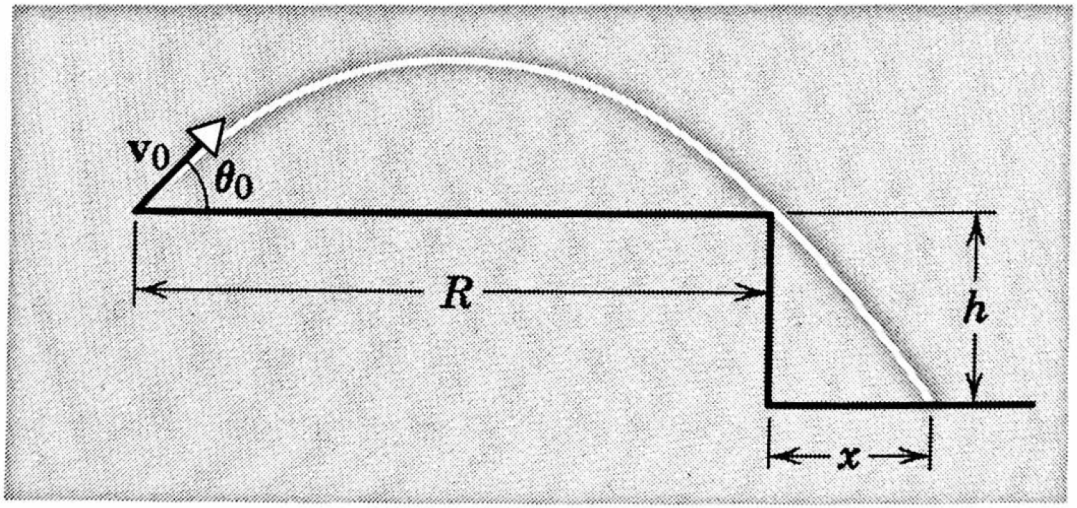

Fig. 4–14