8. 5/5 points All Submissions Notes Question: HoltPhys06 3.P.047.

A ball player hits a home run, and the baseball just clears a wall 17.3 m high located 135.0 m from home plate. The ball is hit an an angle of 35° to the horizontal, and air resistance is negligible. Assume the ball is hit at a height of 1.0 m above the ground.

(a) What is the initial speed?

41.2 ✔ m/s

(b) How much time does it take for the ball to reach the wall?

4.00 ✔ s

(c) Find the components of the velocity and the speed of the ball when it reaches the wall

$v_{y,f}$ = -15.5 ✔ m/s

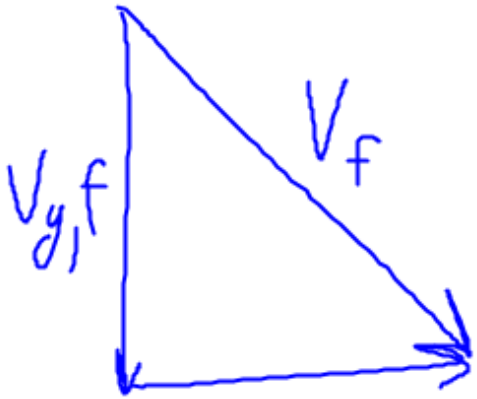
$v_{x,f}$ = 33.8 ✔ m/s

v_f = 37.2 ✔ m/s

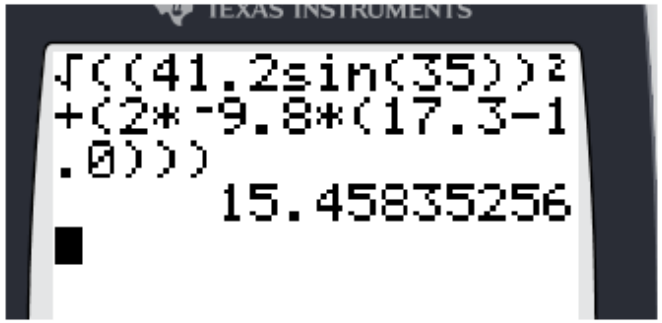
$V_{yi} = 41.2 m/s \sin 35^\circ$

$$\vec{v}_f^2 = \vec{v}_i^2 + 2\vec{a}\Delta\vec{d}$$

$(V_{yf})^2 = V_{yi}^2 + 2(-9.8 m/s^2)(17.3 m - 1.0 m)$



$V_{x,f} = 41.2 \cos 35^\circ$



14. –/2 points Notes Question: HoltPhys06 3.P.059.

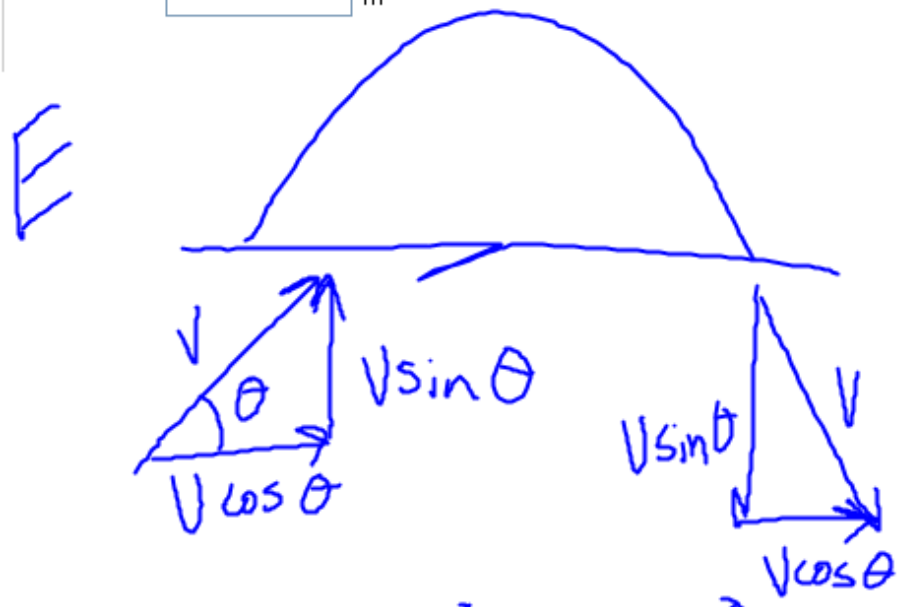
A person can jump a horizontal distance of 3.38 m on Earth, where the free-fall acceleration, g = 9.81 m/s^2.

(a) How far could the person jump on the moon, where the free-fall acceleration is $g/6$

m

(b) How far could the person jump on Mars where the acceleration due to gravity is $0.38g$?

m



$$\vec{v}_f = \vec{v}_i + \vec{a}\Delta t$$

$$-V\sin\theta = V\sin\theta + gt$$

$$t = \frac{-2V\sin\theta}{g}$$

$$\vec{d} = \cancel{\vec{d}_o}^{\,0} + \vec{v}_i\Delta t + \cancel{\tfrac{1}{2}\vec{a}\Delta t^2}^{\,0}$$

$$d = V\cos\theta\left[\frac{-2V\sin\theta}{g}\right]$$

$$d = V\cos\theta\, t$$

$$d = \frac{-2V^2\cos\theta\sin\theta}{g}$$

$$d = \frac{k}{g}$$

$$d_g = k$$

$$(3.38)\, g = d_m \left(\frac{g}{6}\right)$$

$$d_m = 3.38(6)$$

12. –/2 points Notes Question: HoltPhys06 3.P.056.

A golf ball with an initial angle of 34° lands exactly 225 m down the range on a level course.

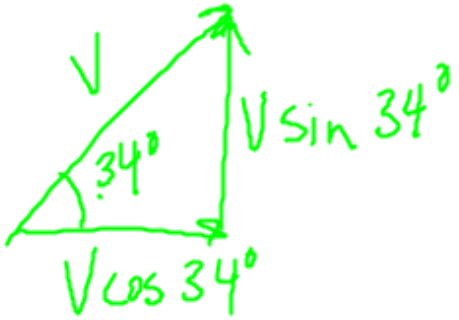
(a) Neglecting air friction, what initial speed would achieve this result?

m/s

(b) Using the speed determined in item (a), find the maximum height reached by the ball.

m

$$\vec{v}_f = \vec{v}_i + \vec{a}\Delta t$$



$$-V\sin 34 = V\sin 34 + (-9.8\,m/s^2)t$$

$$-2V\sin 34 = (-9.8\,m/s^2)\,t$$

$$\vec{d} = \cancel{\vec{d}_o}^{\,0} + \vec{v}_i\Delta t + \cancel{\tfrac{1}{2}}^{\,0}\vec{a}\Delta t^2$$

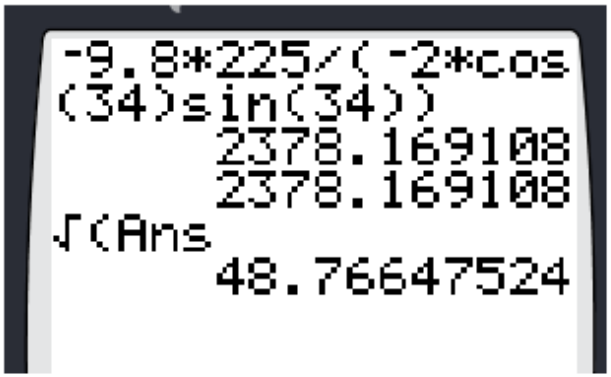
$$-2V\sin 34 = \frac{(-9.8\,m/s^2)(225\,m)}{V\cos 34}$$

$$225\,m = V\cos 34\, t$$

$$V^2 = \frac{(-9.8\,m/s^2)(225\,m)}{-2\cos 34 \sin 34}$$

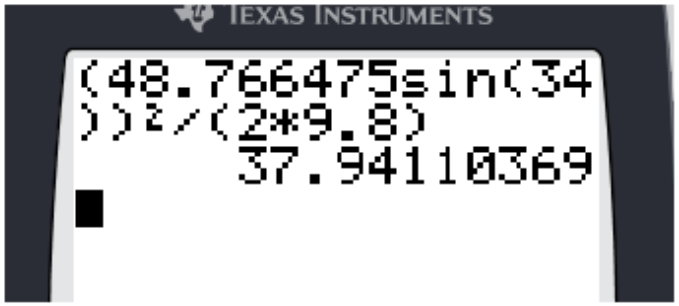
$$t = \frac{225\,m}{V\cos 34}$$

$$V = 48.8\,m/s$$



$$\vec{v}_f^2 = \vec{v}_i^2 + 2\vec{a}\Delta\vec{d}$$

$$0^2 = (V\sin 34)^2 + 2(-9.8\,m/s^2)h$$



$$h = \frac{-(48.7665\,m/s\sin 34)^2}{2(-9.8\,m/s^2)}$$

$$h = 37.9\,m$$