8. –/5 points 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?

_____ m/s

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

_____ s

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

$v_{y,f}$ = _____ m/s

$v_{x,f}$ = _____ m/s

v_f = _____ m/s

$$\vec{d} = \vec{d}_o + \vec{v}_i \Delta t + \frac{1}{2}\vec{a}\Delta t^2$$

X

$135\,m = 0\,m + V\cos 35\,(t)$

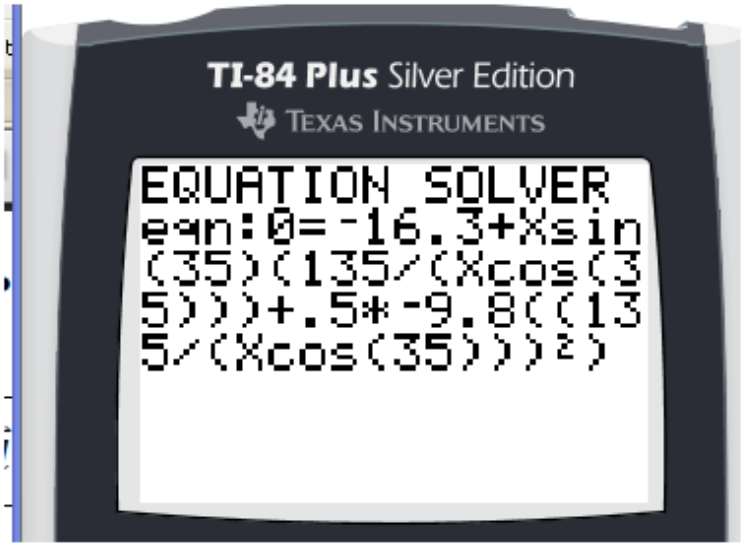
$$t = \frac{135\,m}{V\cos 35}$$

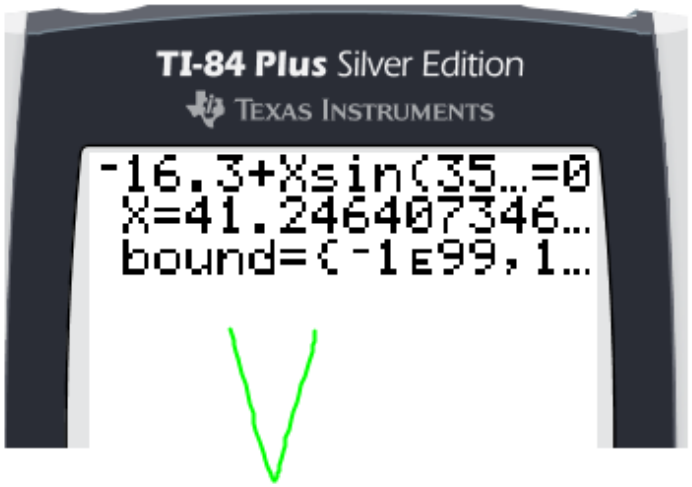
y

$17.3\,m = 1.0\,m + (V\sin 35)t + \frac{1}{2}(-9.8\,m/s^2)t^2$

$16.3\,m = (V\sin 35)\left(\frac{135\,m}{V\cos 35}\right) + \frac{1}{2}(-9.8\,m/s^2)\left(\frac{135\,m}{V\cos 35}\right)^2$

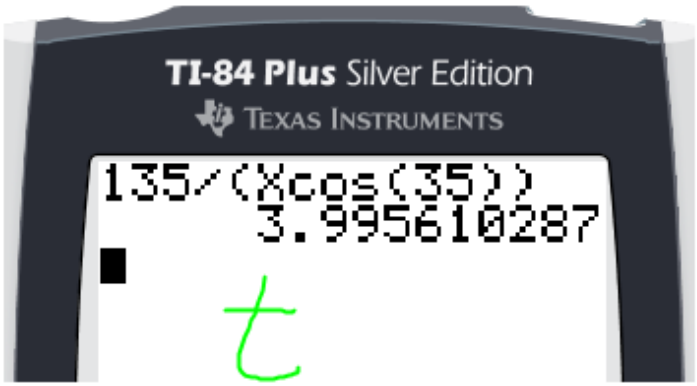
put into form





V

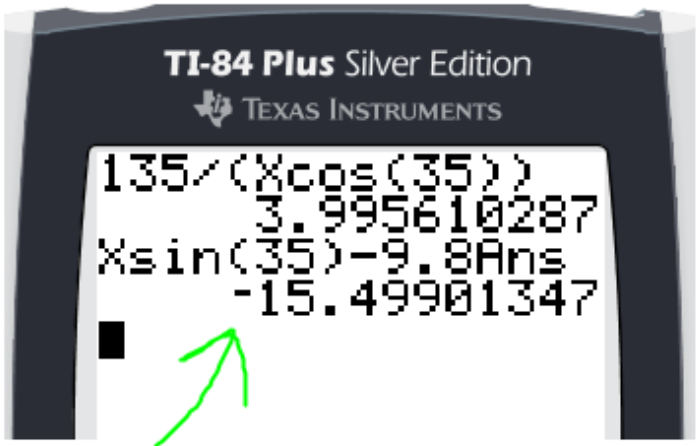
$$t = \frac{135\,m}{\sqrt{\cos 35}}$$

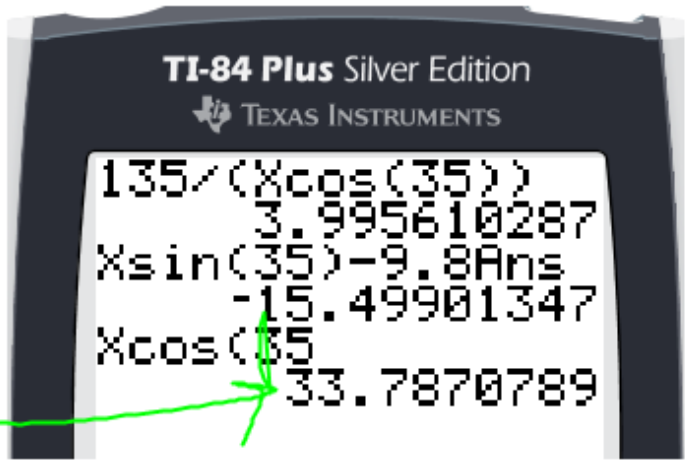


t

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

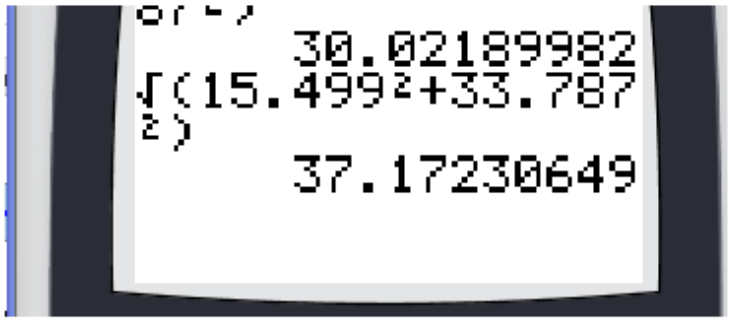
$$V_{fy} = V\sin 35 + (-9.8\,m/s^2)(3.995\,s)$$





$$V_f^2 = V_{fy}^2 + (V\cos 35)^2$$

$$V_f^2 = (-15.499\,m/s)^2 + (33.787\,m/s)^2$$


30.02189982
√(15.499²+33.787²)
37.17230649

18. –/3 points Notes Question: HoltPhys06 3.P.062.

A rocket is launched at an angle of θ = 48° above the horizontal with an initial speed v_i = 55 m/s, as shown below. It moves for 25 s along its initial line of motion wth an acceleration of 25.0 m/s^2. At this time, its engines fail and the rocket proceeds to move as a free body.

(a) What is the rocket's maximum altitude?

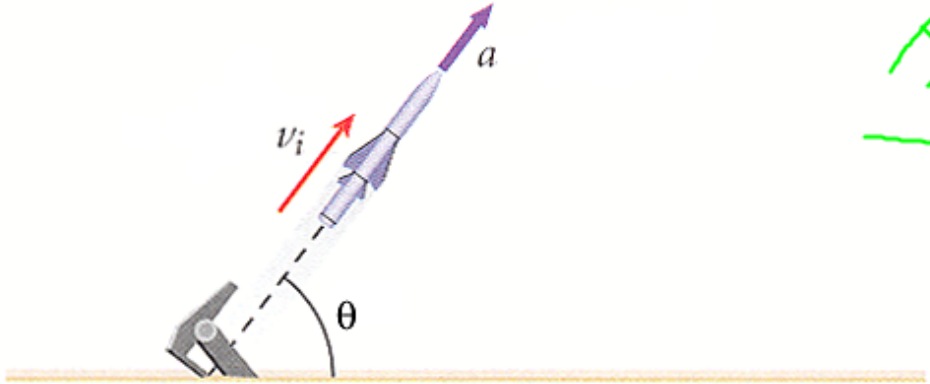
m

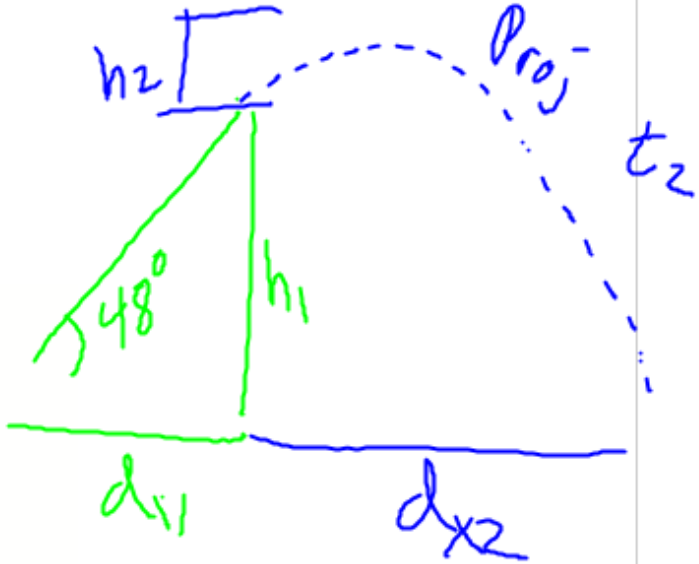
(b) What is the rocket's total time of flight?

s

(c) What is the rocket's horizontal range?

m





not Proj

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

$$V_f = (55\ m/s) + (25\ m/s^2)(25\ s)$$

$$V_f = 680\ m/s$$

Finding h_1

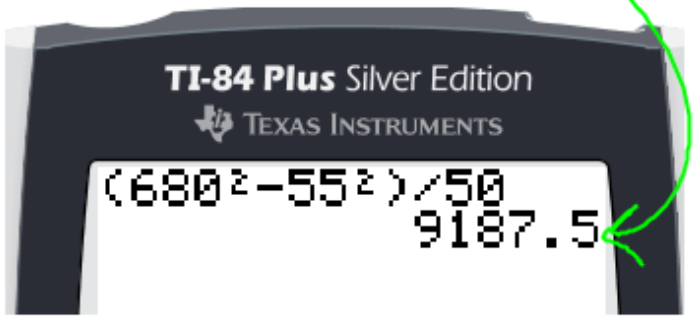
$h_1 = d \sin 48$

$d_{x1} = d \cos 48$

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

$$(680\,m/s)^2 = (55\,m/s)^2 + 2(25\,m/s^2)d$$

$d =$

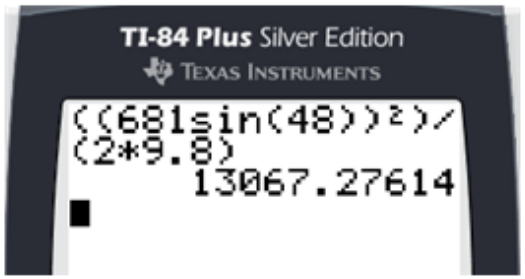


Finding h_2

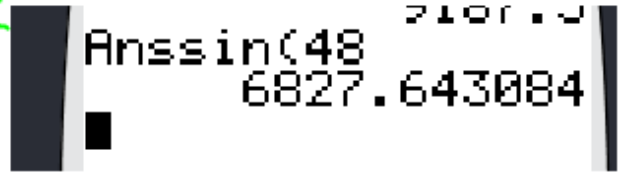
$$\vec{v}_f^2 = \vec{v}_i^2 + 2\vec{a}\Delta\vec{d}$$

$$(0\,m/s)^2 = (680\,m/s \sin 48)^2 + 2(-9.8\,m/s^2)h_2$$

$h_2 =$

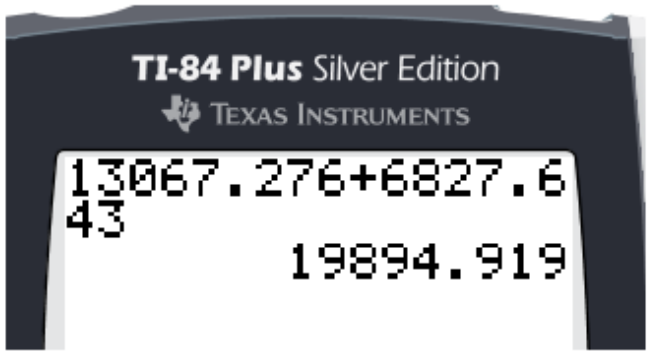


$h_1 =$



$$h_1 + h_2 = h_T$$

$$h_T =$$



$$t_T = t_1 + t_2$$

find $t_1 = 25\,s$

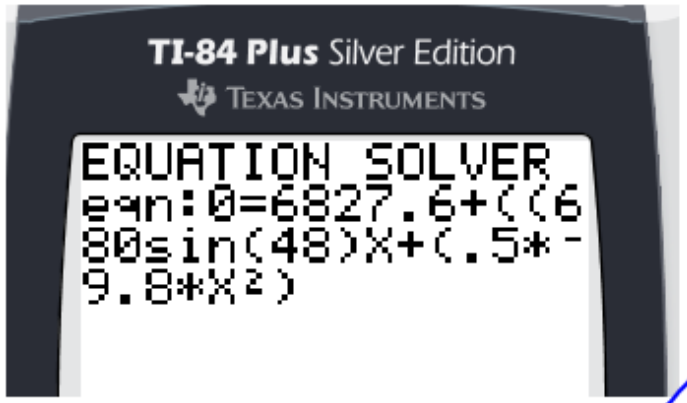
$$\vec{v}_f = \vec{v}_i + \vec{a}\Delta t$$

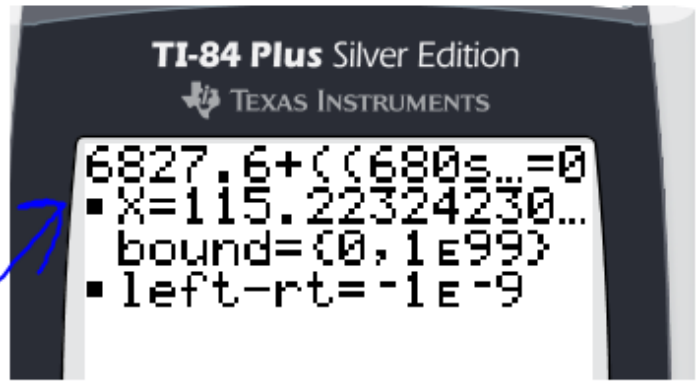
finding t_2

$$\vec{d} = \vec{d}_o + \vec{v}_i \Delta t + \frac{1}{2}\vec{a}\Delta t^2$$

0 h_1

$$(0m) = (6827.6m) + (680\sin 48)t + \frac{1}{2}\left(-9.8\,m/s^2\right)t^2$$





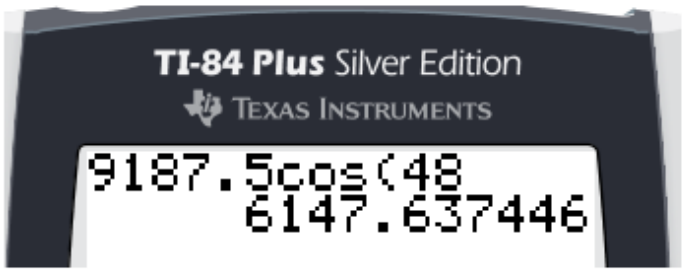
t_2

$t_t = 25 + 115.22 = 140\,s$

finding d_{x1}

$d_{x1} = d\cos 48$

$d_{x1} = (9187.5 \cos 48) =$



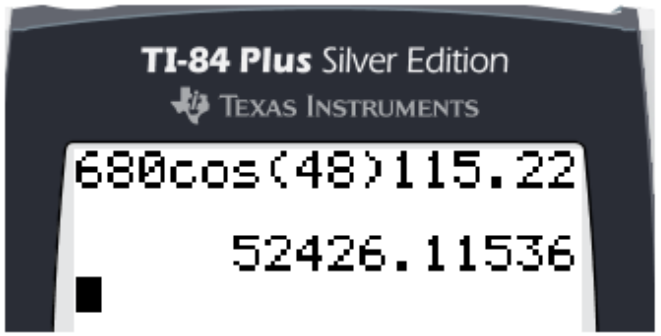
finding d_{x2}

$0 \quad v_x \quad t_2 \qquad 0$

$$\vec{d} = \vec{d}_o + \vec{v}_i \Delta t + \frac{1}{2}\vec{a}\Delta t^2$$

$d_{x2} = (680\ m/s \cos 48^\circ)(115.22)$

$d_{x2} =$



$d_{x1} + d_{x2} = d_x$

58600 m