PROJECTILES

Unit 9 Dr. John P. Cise, Professor of Physics, Austin Com. College, Austin, Texas, USA, jpcise@austincc.edu & New York Times, May 26, 2018 by David Waldstein. Dedicated to Brain Basovich, my HS Coach

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M.L.B. Hired Scientists to Explain Why Home Runs Have Surged. They Couldn't.

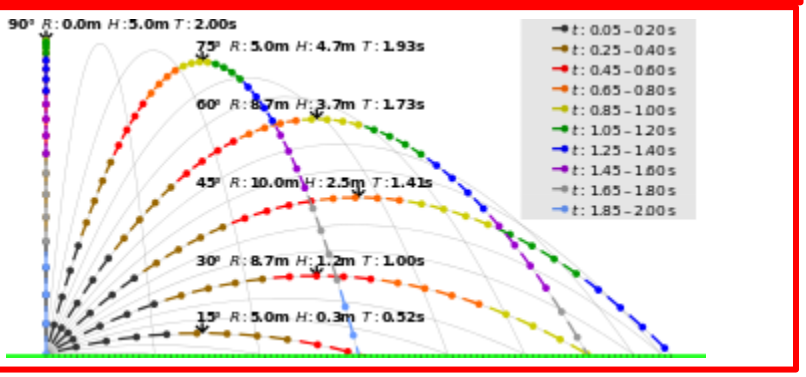
Aaron Judge led American League with 52 home runs

HINTS: To solve for two unknowns, two equations need to be set up. To set up one equation make use of the ideas that Horizontal velocity is a constant. Thus , **$X = V_{HORIZONTAL}\, t$.**
To set up the vertical equation make use of the idea that gravity acceleration vertical is a constant a= g = - 32 ft./s.^{2} . Thus,
$Y = V_{oV}\, t + \frac{1}{2} a t^2$, $v_{ov} = v \sin\Theta$, $V_{HORIZONTAL} = V \cos\Theta$
Assumption: No horizontal frictional forces, thus the horizontal component of velocity is not changed and thus $V_{HORIZONTAL}$ = CONSTANT.

ANSWERS: (a) X = 272 ft., t = ~ 3.125 s.
(b) X = ~ 312 ft., t = ~4.418 s., (c) X = ~300 ft., t = ~ 5 s.

INTRODUCTION: Object of this application is to compute the distance baseballs will travel depending on angle hit (at 100 ft./s.) with regards to horizontal: 30°,45°, 53°.

QUESTIONS: (a) Find displacement X and time of flight(t =?) of a baseball hit at 100 ft./s. at 30^0 above horizontal? (b) Same question(find X & t) as (a) except hit at a 45° angle?,(c) Same question as (a) [find X & t] except ball is hit at 53° angle?



The pitchers were right, sort of. Something in the aerodynamic properties of baseballs is making them fly through the air and over walls with greater ease, but a team of scientists hired by Major League Baseball could not determine exactly what it is. The ball itself is not juiced, as many pitchers have claimed. The red seams are not lower, as some also insisted. And the **launch angle of the balls off bats**, another posited theory, does not account for the staggering number of home runs hit between 2015 and 2017. **It turns out it is all about drag coefficient.** According to the study commissioned by Major League Baseball and released on Thursday, **baseballs were flying greater distances through the air** because of a decrease in wind resistance. But the scientists who wrote the report said they were unable to identify the reason for it. "We cannot find a single property that we can measure that would account for decreased drag," said Alan Nathan, a professor emeritus of physics at the University of Illinois and the chairman of the study. The group of 10 scientists — nine men and one woman — was commissioned by Major League Baseball last August to **determine why home run rates had surged between the second half of the 2015 season and last year.In 2014 there were an average of 0.86 home runs per game across M.L.B. That figure rose to 1.01 in 2015, 1.16 in 2016 and 1.26 last year, not including the 25 home runs hit in the seven-game World Series that seemed to heighten the anxiety of pitchers and fans over the physical properties of the balls**. Last season saw a record 6,105 home runs. (The study did not examine the early weeks of this season, but home runs hit per game have fallen slightly, to 1.13 per game through Wednesday). Last August, after **repeated claims by pitchers that the ball was bouncier than it once was,** and rampant speculation about possible causes for the surge in home runs, baseball's commissioner, Rob Manfred, convened the study group.