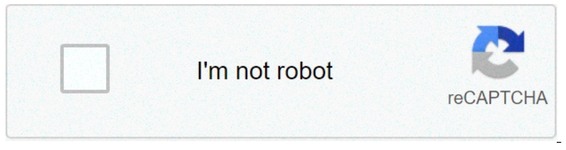

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Formula for hmax in projectile motion

In the diagram, a particle is generated with UUU speed at a corner of the thetaÃžÂ¸ with the horizontal. The bike analysis of the bullet starts breaking the components of the initial speed and acceleration in horizontal components (XXX along axes) and vertical (along Yyy Axis). Breaking speed and acceleration in independent components helps to study a 2-D movement projectile as two independent 1-D motions. The horizontal component of the UX speed = uCosÃ ¢ Â¡Ãœ. {} U_x = u so.uxÃ ¢ = ucosÃžÂ¸. The vertical component of the uy speed = usine Â¡Ãœ. {} U_Y = u. Uya = usini. The horizontal component of the acceleration AX = 0. {} = 0. A_X AXA = 0. The vertical component of the acceleration AY = Ã ¢ g. {} A_Y = - g. Aya = Ã ¢ g. (Show negative sign that acceleration is in a downward direction.) Flight time The total time spent in the air is t = 2usinÃ ¢ â¡igt = frac {{2u sinal}} {g } T = g2usinÃžÂ¸Ã ¢. We have sy = uyt + 12ayt2. {S_Y} = {} u_y t + frac {1} {2} {} {a_y t ^ 2} .syÃ ¢ = uya t + 21ã, AYA T2. The bulleted lands back to the same height, then the movement in the vertical direction is zero: 0 = use Â¡ita 12GT2Ã ¢ t = 2usinÃ ¢ â¡ÃžÂ¸g.ã, Ã ¢ â¡ ânzo {} aligned 0 & = u sin theta t - dfrac {1} {2} {g t ^ 2} \ {g t & = dfrac {{2u sinal}} {g} _ quadrate end {} aligned 0Ã, ta = 21ã, usinÃžÂ¸tÃ ¢ gt2 = g2usinÃžÂ¸Ã ¢ .ã, Ã, Ã, Ã, âåto important: flight time is independent of the horizontal component of the speed . The fastest of a bullet is vomited, the more it will remain in the air. Maximum height The maximum height a bullet reaches above its release point Ã¨ hmaxÃ ¢ â¡Â¡ = u2sinÃ ¢ 2ÃžÂ¸2g {h _ {max}} = frac {{{^ 2} { {sin} ^ 2} theta}} {{}} 2G hmaxÃ ¢ = 2GU2SIN2ÃŽÂ¸Ã ¢. (Avoid this trap: the speed at the highest point of the bullet is not zero, even if the vertical component of the speed is 0.) for movement in vertical direction, vy2 = uy2 + 2AYsy.v_y ^ 2 = u_y ^ 2 + 2 {A_Y} {} S_Y .VY2Ã ¢ = UY2Ã ¢ + 2AYÃ ¢ SYA. At the highest point, the vertical velocity component is zero: 0 = (usine â¡Ã) 2 bis 2ghmaxÃ ¢ â¡Ã ¢ hmaxÃ ¢ â¡ = Â¡u2sinÃ ¢ 2ÃžÂ¸2g.ã, Ã ¢ Â ¡Begin {aligned} 0 & = {(u left) ^ 2} - 2g {h _ {max}}} {{h _ {max}} & = frac {{{u ^ 2} {{sin} ^ 2} theta}} {{}} 2G. quadrate {} aligned 0Ã, hmaxÃ ¢ a = (usini) 2 bis 2ghmaxÃ ¢ = 2gu2sin2ÃžÂ¸Ã ¢. Ã, Â¡Ã, ã, the maximum height is independent of the horizontal component of the speed. Fastly a bullet is launched upward, higher will go upward, ie greater will resist the push down of gravity. Both the flight time and a maximum height depends on the vertical component of the speed, so the relationship between them can be expressed as HmaxÃ ¢ Â¡t2 = G8. Frac {{{h _ {max}}}} {{{t ^ 2}}} = frac {g} {8} .t2hmaxÃ ¢ Ã ¢ = 8gÃ ¢. Horizontal Range The net displacement in the horizontal direction for an object without vertical displacement is r = u2sinÃ ¢ â¡2ÃžÂ¸gr = frac {{u ^ 2} sin 2 theta}} {g} = .r GU2SIN2ÃŽÂ¸ Ã,. For horizontal movement, SX = UXT + 12AXT2. {S_x} = {} u_x t + frac {1} {2} {a_x} {t ^ 2} .sxÃ ¢ = uxa t + 21ã, AXA T2. Acceleration in the horizontal direction is zero: r = (ucosÃ ¢ â¡i) t = (ucosÃ ¢ â¡i) 2usinÃ ¢ â¡ig = 2u2sinÃ ¢ â¡â¡Â¡icosa ig = u2sinÃ ¢ Â¡2ig .ã, Ã ¸ Ã¡ beegin {} aligned R & = (u so) t & = (u cos) frac {{2u sin theta}} {g} & = frac {{2 {U ^ 2} sin theta cos}} {g} & = frac {{u ^ 2} sin 2 theta}} {g}. _ piazza end {} aligned ra = (ucosÃžÂ¸) t = (ucosÃžÂ¸) g2usinÃžÂ¸Ã ¢ = g2u2sinÃžÂ¸cosÃžÂ¸Ã ¢ = gu2sin2ÃžÂ¸Ã ¢. Ã, Ã, Â¡Ã, Ã, the horizontal distance depends both on the horizontal and vertical components of speed. For a specific projection speed, the range will be out Max in a projection angle of 45Ã, 45 ^ CIRC45Ã ¢. For bullets move to the same speed, the range will be the same when both They have a complementary projection angles. The relationship between the range, maximum height, and the flight time is RtanÃ ¢ Â¡A = 12GT2 = 4HR TANTA = FRAC {1} {2} {G T ^ 2} = 4HRTANÃŽÂ¸ = 21ã, GT2 = 4h. Trajectory equation The path equation followed by a bullet is y = xtanÃ ¢ â¡ãœ (1a gxu2sinÃ ¢ Â¡2i) .y = x tan Left ({1 - - 2 Theta}} Right) .y = xtanÃžÂ¸ (1a u2sin2ÃžÂ¸gxÃ ¢). The equation of a curve in two-dimensional space is a relationship between xxx- and yyy coordinates. Using motorcycle equations in horizontal and vertical directions, we can find relationships between XXX and YYY TTT and between and t.t.t. Then eliminating T, T, T, we can find the relationship between XXX and Y.Y.Y. For movement in the XXX-direction, SX = UXT + 12AXT2X = UCOSÃ ¢ â¡a TÃ ¢ t = xucosÃ ¢ â¡Ãœ. Begin {aligned} {s_x} & = {} u_x t + frac {1} {2} {} {a_x t ^ 2} x & = u cos theta t & = frac {x} {{u cos theta}}. End {} aligned sxa xÃ ¢ tÃ ¢ = uxa t + 21ã, axa t2 = ucosÃžÂ¸Ã ¢ t = ucosÃžÂ¸xÃ ¢ .ã, for movement in the direction yyy, sy = uyt + 12ayt2y = usine Â¡Aia TÃ ¢ 12GT2. begin {aligned} {} s_Y & = {} u_y t + frac {1} {2} {} {a_y t ^ 2} y & = u sin theta, t - frac {1} {2} {GT ^ 2}. End {} aligned sya yÃ ¢ = uya t + 21ã, Â¡sa t2 = usinÃžÂ¸tÃ ¢ 21ã, gt2.Ã ¢ Eliminating ttt from equations, y = â¡ÃžÂ¸â¸xucosÃ ¢ Â¡ia 12g (xucosÃ ¢ â¡i) 2 = xtanÃ ¢ â¡ãœ (1a gxu2sinÃ ¢ Â¡2i) .Ã, Ã, â] begin {} aligned y & = u sin theta frac {x} { {u cos}} - frac {1} {2} g {{{frac {x} {{u so}}} right) ^ 2} & = x TANTA Left. ({1 - frac {{gx}} {{{^ 2} sin 2 theta}}} }__ square {aligned} yÃ ¢ = usinÃžÂ¸ucosÃžÂ¸xÃ ¢ 21a g (ucosÃžÂ¸xÃ ¢) 2 = xtanÃžÂ¸ (1a u2sin2ÃžÂ¸gxÃ ¢) .Ã, Ã, â¡Ã, Observe that the equation is in the form of a parable y = AX2 + BX, Y = AX ^ 2 + BX, Y = AX2 + BX, where A = Utana Â¡i, B = G2U2CosÃ ¢ Â¡2i. a = u tanning theta, quad b = dfrac {g} {2u ^ 2 cos ^ 2 theta} .a = utanÃžÂ¸, b = 2u2cos2ÃžÂ¸gÃ ¢. The trajectory equation can also be written as y = xtanÃ ¢ Â¡Ãœ (1a xr), y = x tan left ({1 - frac {x} {r}} right), y = XtanÃžÂ¸ (1a RXA), where RRR is the horizontal distance. What is the shape of the curve? As Yyy depends on the X, X, X square, the curve must be a parabola. Therefore, when an object is generated in gravities (((in some different angles 90ã, 90 ^ CIRC90Ã ¢ to the horizontal plane),),), it follows a parabolic trajectory. This implies that when an object moves with constant acceleration with its initial speed, not in the acceleration direction, the particle follows a parabolic trajectory. A particle is generated from the ground with speed 20ã, M / S20 Text {m / s} 20Ã, m / s with a 30A 30 ^ CIRC30Ã ¢ angle with the horizontal. Find the horizontal interval, maximum height, and the projectile flight time. We r = u2sinÃ ¢ Â¡2ig = (20) 2sinÃ ¢ Â¡60010 = 203a m, h = u2sinÃ ¢ â¡2ÃžÂ¸2g = (20) 2sinÃ ¢ Â¡2 (30) 2a 10 = 5ã, m , T = 2usinÃ ¢ â¡ig = 2a 20sinÃ ¢ Â¡30010 = 2ã, s.Ã Ã Â¡ beegin {} aligned r & = dfrac {{{^ 2} sin 2 theta}} {g } & = dfrac {{{{(20)} ^ 2} sin {{60} ^ 0}}} {{10}} {{10}} & = 20 sqrt {3} text {} m, H & = dfrac {{{^ 2} {{sin} ^ 2} theta}} {{}} 2g & = dfrac {{{{(20)} ^ 2} {{sin} ^ 2} (30)}} {{2 per times 10}} & = 5 text {} m, T & = DFRAC {{2U sin then}} {g} & = dPrac {{220 times 20 sin {{30} ^ 0}}} {{10}} {{10}} & = 2 text {s}. quadrate {} aligned rhtÃ ¢ = g2sin2ÃžÂ¸Ã ¢ = 10 (20) 2sin600Ã ¢ = 203a Ã, m, = 2gu2sin2ÃžÂ¸Ã ¢ = 2a 10 (20) 2sin2 (30) a = 5Ã, m, = g2usinÃžÂ¸Ã ¢ = 102a 20sin300Ã ¢ = 2ã, S. Ã Ã ¢ â¡aaa The trajectory equation of a bullet is y = 16xÃ ¢ 5x24y = 16x - frac {{{{ 5 x ^ 2}}} {4} y = 16xÃ ¢ 45x2Ã ¢. Find the horizontal interval. The bike equation of the bullet Ã¨ y = xtanÃ ¢ â¡ãœ [1a XR] .y = x TANTA LEFT [{1 - frac {x} {r}} right] .y = XTANÃŽ Â¸ [1A RXA]. The equation proposal can be rewritten as y = 16x [1a x645] .y = 16x left [{1 - frac {hspace {3 mm} x {3mm}} {frac {64} 5}} Right] .y = 16x [1st 564a xÃ ¢]. Comparing the aforementioned 2 equations, we R = 645 = 12.8Ã, M.Ã, a Â¡r = frac {{64}} {5} = 12.8 text {m}. SQUARDRATED = 564A = 12.8Ã, M.Ã, a Â _ Square = 564a = M.A, an ¢ ¢ ¢

what is the formula for projectile motion. how do you calculate projectile motion. how to find velocity in projectile motion