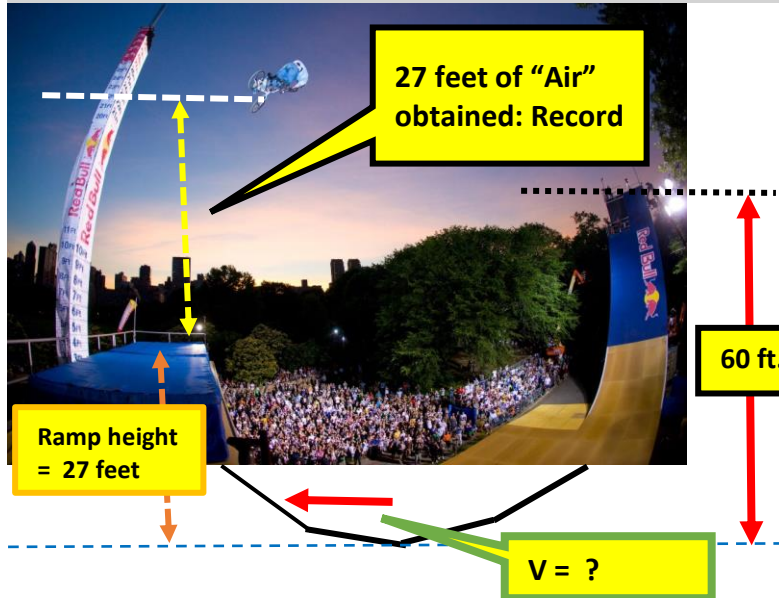


ENERGY: LINEAR

Units 10 & 11 Dr. John P. Cise, Professor of Physics, Austin Com.

College, Austin, Tx. jpcise@austincc.edu & New York Times, December 15, 2007 by Daniel E. Slotnik

Kevin Robinson, Soaring BMX Star, Dies at 45



INTRODUCTION: Great example here of converting gravitational potential energy to kinetic energy and then back to gravitational potential energy.

QUESTIONS: (a) Find speed in ft/s. & mph after Rolling down 60 ft. ramp?, (b) Neglecting rolling & wind friction find speed of Kevin & bike as he leaves the 27 ft. high half-pipe ramp heading up vertically into air?, (c) Since energy “should” be conserved, why is total vertical height attained just [27 ft.(ramp height) + 27 ft. of air] = 54 ft. ? (d) If Kevin & bike weigh 160 lb. , find work due to friction preventing him to reach max. 33 ft.?

HINTS: $KE = \frac{1}{2} m v^2$, $U = m g h$, $g = 32 \text{ ft./s.}^2$
 $88 \text{ ft./s.} = 60 \text{ mph}$. $W = \Delta K + \Delta U$

Kevin Robinson, who said his approach to BMX riding was “a matter of repetition,” set a record when he soared 27 feet above a ramp in Central Park in 2008. [Kevin Robinson](#), a BMX freestyle star who in 2006 became the first known rider to land a double flair — a double back flip with a half twist that many other BMX riders considered impossible — and who **set world records by soaring 27 feet above a ramp**



ANSWERS: (a) $V = 61.96 \text{ ft./s.} = 42.25 \text{ mph}$. NOTE: Speed at hill bottom close to article stated speed of 45 mph , (b) V (leaving ramp going vertical) = $\sim 45.94 \text{ ft./s.} = 31.32 \text{ mph}$, (c) Rolling and wind friction absorbs some of the energy of Kevin(+bike) by doing negative work., (d) -960 ft. lb.

COMMENT: It is evident here how reduction of rolling and air friction would help Kevin attain more height. He got a record 27 feet of height above the end of launch ramp, but with NO friction he could add another maximum of 5 ft. to the 27 ft.= 33 ft possible. Note the ideal Maximum Air height of 33 ft. + ramp height of 27 ft. = 60 ft. Which would equal the 60 ft. of Gravitational potential energy lost when rolling down the first ramp.

. In Central Park in 2008 he broke [the record for highest air](#), which had been set at 26½ feet by the BMX superstar [Mat Hoffman](#). After several unsuccessful attempts, some of which ended in crashes, **he rolled down a 60-foot-tall ramp, reaching speeds up to 45 miles per hour, and launched 27 feet out of a vertiginous quarterpipe ramp.** In 2016 Robinson came out of retirement to break another record, [the Guinness World Record for longest power-assisted bicycle flip](#), in Providence, R.I., his hometown. The record was 64 feet; Robinson had to be towed by an all-terrain vehicle to achieve the speed needed to make the jump. On the first try he flung a back flip over the 84-foot gap, but bounced [on the flat top of the landing ramp and slammed into the ground](#), drawing gasps from the audience. He soon tried again and landed the jump flawlessly. During his TEDx talk, **Robinson noted the toll that BMX had taken on his body, including 45 orthopedic operations, 22 broken bones and a hip replacement. But, he said, moments like landing the double flair were worth the injuries.**