NEWTON'S 2ND. LAW

Units 6 & & Dr. John P. Cise, Professor of Physics, Austin Com. College, 1212 Rio Grande St., Austin Tx., 78701 jpcise@austincc.edu & NYTimes January 4, 2017 by Matt Giles

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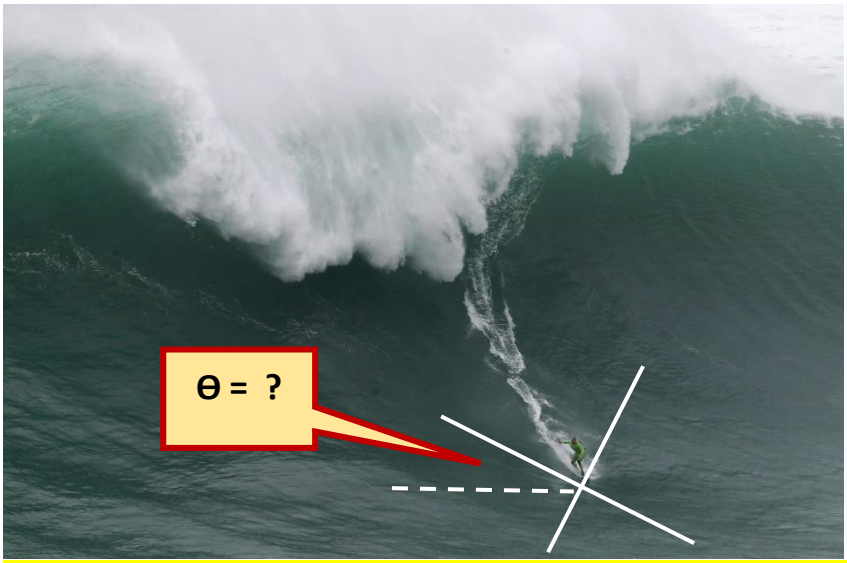
A Big-Wave Great Ponders the Surf After the Wipeout of a Lifetime



INTRODUCTION: Goal for this application is to make a free body diagram of forces ON surfer and find angle Θ of surfer's surfboard as surfer goes down wave.

QUESTIONS: (a) Sketch the normal force F_N ON surfboard from the water surface? Sketch on graphic at left.(b)Sketch the component [m g sin. Θ] of weight down Face of wave ?,(c)Sketch component of weight [mg cos.Θ] parallel to Y axis? (d) Sketch frictional force vector f on surfboard ?,(e) With no acceleration in Y or X direction(v = constant), set up Newton's 2nd. Law application equation's in X & Y direction ?, (f) With two equations just set up, find hill angle Θ?

Garrett McNamara riding a big wave during a tow-in surfing session in Nazaré, Portugal, in 2015. McNamara set a world record for the largest wave surfed on a 78-foot swell in Portugal. McNamara began to question why he was still chasing the walls of water.

But especially as 2016 approached, the adrenaline surge that McNamara, then 48, felt as he sped down the wave's face had waned. It seemed an inconceivable notion for someone like McNamara, one of surfing's big-wave godfathers. The slightly stocky Hawaii resident was in the lineup the day Laird Hamilton, the sport's most influential ambassador, was first towed into a wave by a jet ski. **McNamara even holds several big-wave records, including having surfed a 78-foot swell — the largest ever officially measured — off the coast of Nazaré, Portugal.**

HINTS: $F_{NET} = m\,a$, friction = $f = \mu F_N$, tan. Θ = sin. Θ/cos. Θ , μ = usual coefficient of friction between water and surfboard from surfboard websites = ~ 0.25

ANSWERS: (a) Show(sketch) F_N ON graphic above.,(b)Show(sketch) mg sin. Θ ON graphic above.,(c) Show(sketch) mg cos. Θ ON graphic above?.(d) Show(sketch) friction force f ON surfboard ON graphic above? ,(e) X direction: mg sin. Θ – f = 0 or mg sin. Θ – μ mg cos. Θ = 0 , Y direction: F_N – mg cos. Θ = 0 , (f) $\Theta = 14^0$

COMMENT: The result of 14^0 seems plausible considering the actual stance of surfer on surfboard.