WORK-ENERGY

Units 10 & 11, Dr. John P. Cise, Professor of Physics, Austin Com. College, Austin Tx., jpcise@austincc.edu , & New York Times , June 30, 2017 by Matt Stevens

----

A Stunt Turns Deadly for a Couple Seeking YouTube Fame

INTRODUCTION: The 1.5 inch thick book one foot away from Pedro's chest did not stop the the big game hunting 50 caliber (1/2 inch in diameter) 19 gram bullet seen at left. The muzzle velocity was 1500 ft./s. (Wikipedia)
QUESTIONS: see below

Monalisa Perez, 19, and Pedro Ruiz III, 22. The authorities said that **Ms. Perez shot Mr. Ruiz at close range as he held a book** Over the past several weeks, Monalisa Perez of Halstad, Minn., and her boyfriend, Pedro Ruiz III, began their quest for YouTube fame by creating and posting videos of mostly harmless pranks: Mr. Ruiz climbing onto a tenuous tree branch and falling a short distance, or Ms. Perez feeding him a doughnut covered in baby powder rather than powdered sugar. On Monday evening, the couple suddenly upped the ante when, the authorities say, **Ms. Perez, 19, shot at a thick book that Mr. Ruiz, 22, was holding, apparently believing that the bullet would not make it through the volume. But the high-risk stunt went horribly wrong: The bullet entered Mr. Ruiz's chest and he died at the scene.** Instead, just hours after she posted that video, Ms. Perez was arrested and booked into Northwest Regional Corrections Center on suspicion of reckless discharge of a firearm, the sheriff said. Then, on Wednesday morning, prosecutors charged her with second-degree manslaughter. The charge carries a maximum sentence of 10 years in prison, a fine of up to $20,000, or both. Ms. Perez, who is pregnant with her second child, appeared in court on Wednesday afternoon for a hearing and was released in the evening after $7,000 bail was posted. The department has video recordings of the shooting, the sheriff said, adding that he would not release them. Ms. Perez told investigators that **she had shot Mr. Ruiz from about a foot away while he held a 1.5-inch thick book to his chest,** the authorities said. She described using a firearm that matched the pistol that was found at the scene. Mr. Ruiz had been "trying to get her" to fire the gun "for a while," Ms. Perez told investigators, according to court documents. They state that he had set up one camera on the back of a vehicle and another on a ladder to capture the stunt. To help persuade her to pull the trigger, Mr. Ruiz had even shown Ms. Perez a book that he had previously shot himself, she told investigators. In that case, she said, the bullet had not gone all the way through the text. The gun, a **gold Desert Eagle .50-caliber pistol, was a "very strong weapon,"** the sheriff said, adding that "as far as I know," it was legal for Mr. Ruiz to own it. Claudia Ruiz, another aunt of Mr. Ruiz, told WDAY-TV in Fargo that before the fatal shooting, her nephew rationalized the stunt as a way to get more viewers and "get famous."

QUESTIONS: (a) Convert 19 gram bullet mass to slugs ?, **(b)** Find kinetic energy of bullet at muzzle velocity ? **(c)** The bullet was not stopped by 1.5 inch (0.125 ft.) thick book in front of Pedro's chest. The bullet came out of the book at 1000 ft./s. hitting Pedro in the chest and killing him. Find work done by the book in slowing the bullet down to 1000 ft./s.?, **(d)** Find force of friction on bullet by the 1.5 inch book? **(e)** What fraction of the original muzzle kinetic energy was lost by doing work in the book?

HINTS: 6.8522×10^{-5} slugs/ gram , kinetic energy = $K = \frac{1}{2} m v^2$, Work = F x , W = ΔK + ΔU

ANSWERS: (a) m = 1.3019×10^{-3} slugs , **(b)** K = 1450 ft. lb. , **(c)** W = 808.5 ft. lb. , **(d)** f = ~ 6468 lb. , **(e)** ~ 55.4 % lost