1.  Raphael the hero ninja kicks the villain Shredder. While Raphael's foot is in contact with The Shredder, an average net horizontal force (Raphael + friction) of 400 N acts over a distance of 2m.  If The Shredder was initially at rest and has a mass of 90kg:

    a.  How much net work, in the horizontal direction, was done on The Shredder?  (1)
    b.  What is the Shredders' velocity after the 400 N net force stops acting?  (1)
    c.  How much energy does the Shredder have right after the 400 N net force stops acting? (1)
    d.  After traveling the 2m (the 400 N net force is no longer being applied), the Shredder slides for an additional 1.5 s before coming to rest.  What is the coefficient of friction between the Shredder and the sewer floor?  (2)


2.  The velocity of a 10 kg block is changed at a constant rate from rest to 6 m/s in 8 s?

    a.  What average force was exerted on the block?  (1)
    b.  What distance did the block travel?  (1)
    c.   How much work was done on the block?  (1)


3.  A 6 kg bowling ball is moving with a velocity of 3 m/s.

    a.  How much kinetic energy does the bowling ball possess?   (1)
    b.  How much work must act on the bowling ball to bring it to a stop?   (1)


4.  Consider the following 2 scenarios. (A) A pitcher throws a ball at -55 m/s and the batter swings at 25 m/s.  (B) A pitcher throws a ball at -25 m/s and the batter swings at 55 m/s.  The ball has a mass of .15 kg, and the bat has a mass of 1 kg.  Assume that the impact between the ball and bat lasted for 0.3 s, the coefficient of restitution was 0.5 and that the force of impact maintained a constant value throughout impact.

    a.  For both scenarios: what impulse was exerted on the ball by the bat?   (2)
    b.  For both scenarios: how much work was done on the ball by the bat?   (2)


5.  Assume that a sling shot behaves like a linear spring with stiffness, k=2, according to Hooke's Law,   how much must the sling shot be deformed to store 120 J of energy? (1)



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This assignment is due in class on Monday October 29th, 2018.  Please show all your work and | BOX | your answers.  Be sure to include units.

Late assignments will be deducted by 25% per day and will not be accepted once solutions are posted.