

Vasquez High School -- Physics -- Quest #5 -- Chapters 5 and 6 -- 100 points

Write TRUE if the statement is true OR write the word(s) that substitutes for the underlined word(s) that would make it true. Writing false only earns partial credit. Three points each.

- _____ 1) Power is the ability to do work.
- _____ 2) Kinetic energy depends on an object's motion. If you were to double the speed of an object, then the kinetic energy of the object goes up by a factor of two.
- _____ 3) During an elastic collision, kinetic energy is conserved.
- _____ 4) The work resulting from a force applied perpendicular to the direction of motion is $Fd \sin \theta$.
- _____ 5) A kilowatt-hour is a unit of electrical power.
- 5) Define impulse. Define momentum. Show how we arrived at the equivalence between impulse and change in momentum. Easy five points.
- 6) In the absence of _____, mechanical energy is _____, so the sum of kinetic and potential energies remains a constant.

Multiple Choice. Write the letter that best answers each example. Three points apiece. Be careful.

- _____ 7) If a roadie pushes an object with twice the force for twice the distance, he does
- a) the same work. b) twice the work. c) four times the work. d) eight times the work.
- _____ 8) How much power is required to do 200 joules of work in 5 seconds?
- a) 1000 W b) 200 W c) 100 W d) 40 W e) 0 W
- _____ 9) The amount of potential energy possessed by an elevated object is equal to
- a) the force needed to lift it. b) the distance it is lifted.
c) the acceleration due to gravity. d) the work done in lifting it.
e) the power used to lift it.
- _____ 10) Energy is changed from one form into another with no net loss or gain.
- a) Always true b) Sometimes true c) Always false
- _____ 11) Bullets are fired from the machine gun of a combat jet in the forward direction of motion. The speed of the jet will
- a) increase b) remain constant c) decrease

- _____ 22) A job is done slowly, and an identical job is done quickly. Both jobs require the same amount of work but different amounts of
- a) power b) energy c) both a and b d) none of the above
- _____ 23) It takes 80 J to push a large box 4 m across a floor. Assuming the push is in the same direction as the move, what is the magnitude of the force on the box?
- a) 320 N b) 76 N c) 40 N d) 20N e) 0 N
- _____ 24) Which has the greater kinetic energy, a car traveling at 30 km/hr or a half-as-massive car traveling at 60 km/hr?
- a) The 30 km/hr car b) The 60 km/hr car c) Both have the same kinetic energy
- _____ 25) A 10 kg object and a 5 kg object are released from rest at the same height and time in a vacuum chamber on Earth. As they fall, they have equal
- a) energies. b) momenta. c) weights. d) all of these e) none of these
- _____ 26) A man lifts a 20 kg briefcase vertically a distance of one meter in two seconds. Then he holds it motionless for a period of two seconds. Then he lowers the briefcase back down to its starting point in two seconds. During which of the periods did he do the most work?
- a) lifting it c) lowering it
b) holding it d) lifting and holding it were the same

Problem Section. Be clear and neat and organized in your presentations. Be sure they can be followed. Ten points apiece.

- 27) Mickey Mantle was known to have hit the hardest baseball ever in a major league game. It is believed the ball traveled at 216 km/h. Suppose that such a baseball moving to the right with this speed hits a moveable target of unknown mass. After a one-dimensional, perfectly elastic collision, the baseball bounces to the left with a speed of 48.0 km/h. If the baseball's mass is 142 g, what is the target's mass?

- 28) The world's largest mandolin was built by a band of rabid gypsies in Outer Slobovia. Suppose this mandolin was placed on a light cart. The cart and mandolin are then pushed with a velocity of 5.25 m/s to the right. One of the gypsies, who had been drinking far too much, tries to slow the cart down by stepping on it as it passed by him. The new velocity of the cart, mandolin and drunken gypsy is 3.90 m/s to the right. If the gypsy's mass is 78 kg, what is the mass of the mandolin? Assume the mass of the cart and frictional forces to be negligible.
- 29) Our sun is of spectral class G2. If the sun's mass is 1.99×10^{30} kg and has a kinetic energy of 5.82×10^{41} joules, what is its speed hurtling through space, in km/s?
- 30) In order to top the human cannonball, a man invented the human howitzer. Despite being highly dangerous and downright stupid to attempt, the 67.5 kg man wanted very badly to entertain and show off his death wish. When the howitzer exerted a force of 6.72×10^4 N on him over a period of 0.750 s, what was the speed he was shot out at?
- 31) Easy five points. What does "Oh, be a fine girl, kiss me softly" mean?