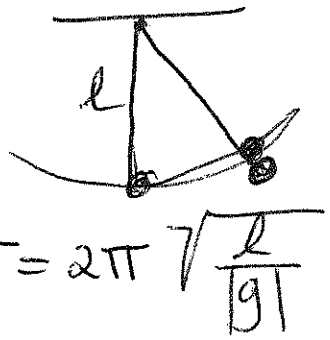
Name: _____ Period_____ Date: _____

Conceptual Physics Review for KE PE Momentum Pendulums Work Power

Write the complete, original <u>equation</u> in each problem (as found on the cheat sheet).
Show units everywhere, show all work, be careful.

Multiple Choice (Capital letters, please)
Identify the choice that best completes the statement or answers the question.



$T = 2\pi\sqrt{\frac{l}{g}}$

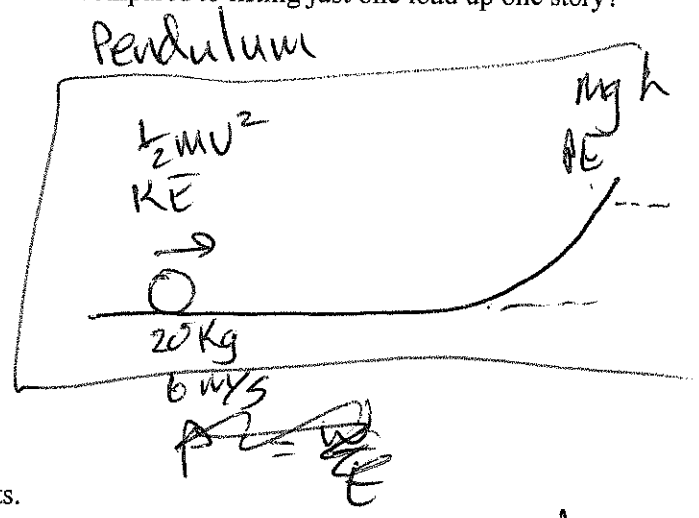
E 1. In physics, work is defined as
   a. force times time.
   b. force divided by distance.
   c. distance divided by time.
   d. force divided by time.
   e. force times distance.

$W = F \times d$

D 2. If you lift two loads up one story, how much work do you do compared to lifting just one load up one story?
   a. One quarter as much
   b. One half as much
   c. The same amount
   d. Twice as much
   e. Four times as much

C 3. The unit of work is the
   a. watt.
   b. meter.
   c. joule.
   d. newton.
   e. second.

Nm or J



$P = \frac{W}{t}$

C 4. Power is defined as the
   a. force on an object divided by the time the force acts.
   b. work done times the time taken to do that work.
   c. work done on an object divided by the time taken to do the work.
   d. distance divided by the time taken to move that distance.
   e. force on an object times the distance the object moves.

$\frac{1}{2}mv^2 = mgh$

$\frac{1}{2}\ 20Kg\left(\frac{6M}{S}\right)^2 =$

$\frac{360\ Nm}{20(9.8)} = \frac{20Kg(9.8)h}{20\ 9.8}$

$h = 1.8m$

E 5. The unit of power is the
   a. newton.
   b. meter.
   c. joule.
   d. second.
   e. watt.

$\frac{J}{S} = Watt$

D 6. The amount of potential energy possessed by an elevated object is equal to
   a. the power used to lift it.
   b. the distance it is lifted.
   c. the force needed to lift it.
   d. the work done in lifting it.
   e. the value of the acceleration due to gravity.

$PE = mgh$

B 7. Kinetic energy of an object is equal to $KE = \frac{1}{2}mv^2$
a. its mass multiplied by its acceleration squared.
b. one half the product of its mass times its speed squared.
c. its mass multiplied by its speed.
d. one half the product of its mass times its speed.
e. its mass multiplied by its acceleration.

C 8. Energy is changed from one form to another with no net loss or gain.
a. Sometimes true
b. Always false
c. Always true

B, C 9. 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. energy.
b. power.
c. both A and B
d. none of the above

C 10. An object that has kinetic energy must be
a. at rest.
b. falling.
c. moving.
d. elevated.

C 11. How much power is required to do 40 J of work on an object in 5 seconds?
a. 0 W
b. 5 W
c. 8 W
d. 40 W
e. 200 W

$P = \frac{W}{t} = \frac{40\,J}{5\,s} = 8\,W$

A 12. How much work is done on a 60-N box of books that you carry horizontally across a 6-m room?
a. 0 J
b. 6 J
c. 10 J
d. 60 J
e. 360 J

60 N

E 13. How much work is done on a 20-N crate that you lift 2 m?
a. 0 J
b. 1 J
c. 2 J
d. 20 J
e. 40 J

20 N weight

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E 14. How much power is expended if you lift a 60 N crate 10 meters in 1 second?
a. 0 W
b. 6 W
c. 10 W
d. 60 W
e. 600 W

$P = \frac{W}{t} = \frac{600\,J}{1\,s}$ $W = 60 \cdot 10 = 600$

600 W

A 15. The momentum of an object is defined as the object's
a. mass times its velocity.
b. force times the time interval.
c. force times its acceleration.
d. mass times it acceleration.
e. velocity times the time interval.

$P = mv$

C 16. Which has more momentum, a large truck moving at 30 miles per hour or a small truck moving at 30 miles per hour?
a. Both have the same momentum.
b. The small truck
c. The large truck

Problem

17. What is the work done in lifting 60 kg of blocks to a height of 20 m?

$W = Fd$

$W = 60(9.8) = 588\ N$

$= 588\ N \times 20\ M$

$= 11{,}760\ NM$

18. What is the work done in raising a 20-kg block 5 m vertically?

$W = (20)(9.8)(5)$

$W = 980\ Nm$

19. A 30-kg girl runs up the staircase to a floor 5 m higher in 8 seconds. What is her power output?

$P = \frac{W}{t}$ $W = F \times d = 30kg(9.8)(5m)$

$= 1470$

$P = \frac{1470\ Nm}{8\ sec} = 183.75\ W$

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Review for Test on KE, PE, Momentum, Work, and Pendulums

1. How much work is required to lift a 2.4 kg book from a shelf that is 1.2 m high to a shelf that is 1.9m high?

$2.4(9.8) = 23.52\ N$

$W = F \times d = 23.52\ N\ (0.7\ m) = 16.46\ NM$

2. What is the Potential Energy of a cannonball with mass of 6 kg at a height of 3 m?

$PE = mgh = 6Kg(9.8)(3M) = 176.4\ NM$

3. A 1600 kg car travels at a speed of 15 m/s. What is its kinetic energy?

$KE = \frac{1}{2}mV^2$

$= \frac{1}{2}(1600Kg)\left(\frac{15M}{S}\right)^2 = \frac{1}{2}(1600)\left(225\frac{M^2}{S^2}\right) = 180{,}000\ NM$

4. Bob and his bike have a total mass of 45 kg. Bob rides his bike 1.8 km in 9 min with constant velocity. What is Bob's kinetic energy?

$m = 45Kg$

$KE = \frac{1}{2}MV^2$

$\frac{1}{2}(45Kg)\left(3.3\frac{M}{S}\right)^2 = 250\ NM$

$V = \frac{d}{t} = \frac{1.8Km}{9\ min}\left(\frac{1000M}{1\ Km}\right)\left(\frac{1\ MIN}{60\ S}\right) =$ 3.3 KM

5. A 55 kg rock is at the edge of a 100 m cliff. What is the rock's PE?

$PE = mgh$

$= 55Kg\left(9.8\frac{m}{S^2}\right)100m = 53{,}900\ NM$

6. If the rock from the previous question falls, what is KE just before it hits the ground?

53,900 NM

7. Billy is ice skating and has a mass of 60 kg. He is moving at 2 m/s and leans over and scoops up his pet pig, Porky, from the ice. If they move off together with a velocity of 1.4 m/s, what is Porky's mass?

$M_1V_1 + M_2V_2 = (M_1 + M_2)V_2$

$60Kg\left(\frac{2m}{s}\right) = (60 + M_2)\ 1.4\frac{m}{s}$

$\frac{120}{1.4} = 60 + M_2$

$85.71 = 60 + M_2$

$-60 \quad -60$

$M_2 = 25.71\ Kg$