Name: KEY

Period: 1 2 3 4 5 6

Chapter 7 Review

Part A: Terms

1. work: _____
2. energy: _____
3. joule: _____
4. potential energy: _____
5. kinetic energy: _____
6. work input: _____
7. work output: _____
8. efficiency: _____
9. power: _____
10. watt: _____

Part B: Work

Answer the following questions relating to work.

11. Determine whether work is being done.
    a. A person carries a 5 N bag 22 meters. NO WK
    b. An ice skater carries their partner around the rink 5 times. NO WK
    c. A weight lifter lifts 20 N dumbbells. WK.
    d. A student carries books from class to class for a total of 25 meters. NO WK
    e. A mover push a 250 Newton refrigerator 15 feet. WK.

Part C: Potential Energy

12. What is the equation for potential energy?

$E_p = mgh$ (height)
(mass) (gravity)

13. John has an object suspended in the air. It has a mass of 50 kilograms and is 50 meters above the ground. Calculate the objects potential energy.

$E_p = ?$ $h = 50\ m$ $E_p = mgh$
$m = 50\ kg$ $E_p = (50)(9.8)(50) =$ **24,500 J**
$g = 9.8\ m/s^2$

14. Mrs. Jacobs dropped an object from 10 meters. She knows it did 50 joules of work. How much did it weigh?

E_p / W - 50 J
h - 10 m
g - 9.8 m/s²
m - ?

$E_p = mgh$
$50 = m(9.8)(10)$
$50 = m(98)$ mass?
$\frac{50}{98} = m =$ **.510 kg**

$W = Fd$
$50 = F(10)$
$\frac{50}{10} = F$
5N = weight

15. Maria is holding a ball from a height of 2 m that has the potential energy of 10 J, calculate the mass of the ball.

$E_p = 10\,J \quad h = 2m$

$m = ?$

$g = 9.8\,m/s^2$

$E_p = mgh$

$10 = m(9.8)(2)$

$10 = (m)(19.6)$

$\frac{10}{19.6} = m$

$.51\,kg = m$

Part D: Kinetic Energy

16. What is the equation for kinetic energy?

$E_K = 1/2\,m\,v^2$

17. You serve a volleyball with a mass of 2.1 kg. The ball leaves your hand with a speed of 30 m/s. What is its kinetic energy?

$E_K = ?$

$m = 2.1\,kg$

$V = 30\,m/s$

$E_K = 1/2\,m\,v^2$

$E_K = 1/2\,(2.1)\,(30^2)$

$E_K = 1/2\,(2.1)\,(900)$

$E_K = 945\,J$

18. A golf pro has 2400 J of kinetic energy and swings his driver which weighs .75 kg. What is the speed of his swing?

$E_K = 2400\,J$

$m = .75\,kg$

$V = ?$

$E_K = 1/2\,m\,v^2$

$2400 = 1/2\,(.75)\,v^2$

$2400 = (.375)\,v^2$

$\frac{2400}{.375} = v^2$

$\sqrt{6400} = \sqrt{v^2}$

$= V = 80\,m/s$

18. A running back has 4500 J of kinetic energy and is running at a speed of 8 m/s. Calculate his mass.

$E_K = 4500\,J$

$V = 8\,m/s$

$m = ?$

$E_K = 1/2\,m\,v^2$

$4500 = 1/2\,m\,(8^2)$

$4500 = 32\,m$

$m = 141\,kg$

Part E: Conservation of Energy

19. You throw a 0.200 kg baseball into the air with an initial speed of 5.0 m/s. How high does the baseball travel?

$m = .200\,kg$

$V = 5.0\,m/s$

$h = ?$

$E_K = 1/2\,m\,v^2$

$E_K = 1/2\,(.200)\,(5^2)$

$E_K = 1/2\,(.200)\,(25)$

$E_K = 2.5\,J$

$2.5\,J = E_K + E_p$

$E_p = mgh$

$2.5 = (.2)(9.8)(h)$

$2.5 = 1.96\,h$

$1.28\,m = h$

20. A ball with the mass of 5.50 kg is dropped from a height of 32 meters. Calculate the velocity of the ball.

$m = 5.50\,kg$

$h = 32\,m$

$V = ?$

$E_p = mgh$

$E_p = (5.5)(9.8)(32)$

$E_p = 1724.8\,J$

$E_p = E_K = 1724.8\,J$

$E_K = 1/2\,m\,v^2$

$1724.8\,J = 1/2\,(5.5)\,v^2$

$1724.8 = (2.75)\,v^2$

$627.2 = v^2$

$25.04 = V$

m/s

Part F: Power and Efficiency

21. A 100-newton object is lifted 100 meters in 100 seconds. What is the power generated in this situation?

$W = F \times d$

$W = 100 \times 100$

$W = 10{,}000\,J$

$P = W/t$

$t = 100\,s$

$P = \frac{10{,}000\,J}{100} = 100$ watts

22. A half cup of ice cream contains about 836,899 J of energy. How much power can be produced if the energy in a cup of ice cream is expended over a period of 10 minutes (600 seconds)?

$P = ?$

$W = 836{,}899\,J$

$t = 600\,s$

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

$P = \frac{836{,}899}{600} = 1{,}394$ watts

23. A simple machine produces 25 joules of output work for every 50 joules of input work. What is the efficiency of this machine?

$W_O = 25\,J$

$W_I = 50\,J$

$Eff = \frac{W_O}{W_I} \times 100$

$Eff = \frac{25}{50} \times 100 = 50\%$ efficient

24. A car's efficiency is only 13 percent. If the input work for the a car is 200 joules, what is the output work?

$Eff = 13\%$

$W_I = 200\,J$

$W_O = ?$

$Eff = \frac{W_O}{W_I}$

$13\% = \frac{W_O}{200\,J}$

$(200\,J)(13) = W_O \times 100$

100

$26\,J = W_O$