

For each item below, list the definition, equation needed to solve, and the SI unit.

	Definition	Equation	SI unit
Power (P)	work done in a certain amount of time	$P = W/t$ $W = \frac{\text{work}}{\text{time}}$ $P = \frac{\text{power}}{\text{time}}$	watt
Work (W)	done when a force is applied to an object and the object moves in the direction of that force	$W = F \times d$ $W = \frac{\text{work}}{\text{force}}$ $d = \frac{\text{distance}}{\text{force}}$	Joule
Gravitational Potential Energy (GPE)	PE based on object's height above the ground Depends on the <u>height</u> and <u>mass</u> of an object	$GPE = mgh$ $m = \frac{\text{mass}}{\text{gravity}}$ $h = \frac{\text{height}}{9.8 \text{ m/s}^2}$	Joule
Kinetic Energy (KE)	energy of motion	$K = \frac{1}{2}mv^2$ $m = \frac{\text{mass}}{\text{velocity}}$	Joule

- At the top of its arc, a thrown ball has _____ potential energy.
 - maximum
 - minimum
 - zero
 - average
- As a dropped penny falls toward the ground, _____ energy is converted to _____ energy.
 - thermal, potential
 - kinetic, vibrational
 - kinetic, heat
 - potential, kinetic
- Mechanical energy can change to nonmechanical energy as a result of
 - air resistance.
 - heat.
 - radiation.
 - None of the above
- A quantity that measures the effects of a force acting over a distance is called work.
- Which of the following is an example of mechanical energy?
 - nuclear energy
 - potential energy
 - chemical energy
 - light energy
- The primary source of the sun's energy is nuclear fusion.

7. Potential energy is sometimes called energy of position.
8. The two main types of energy are potential and kinetic.
9. **Identify and define** the other forms of energy from your notes.

Light

heat

electric

nuclear

sound

mechanical

chemical

10. State the law of conservation of energy and give an example of it. Do not use your rolling object lab as an example.

energy cannot be created or destroyed, it can only change forms

roller coaster, bike going up and down a hill

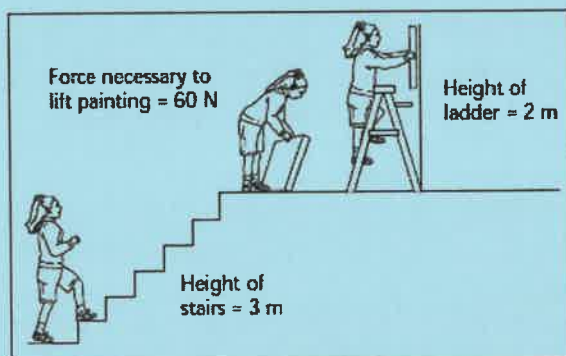
11. Only a portion of the work done by any machine is useful work. Explain what this means -

useful work is work a machine was designed to do

12. What is efficiency?

how well a machine does what it is designed to do

13. If the temperature increases, thermal energy will also increase.



14. A 50 N girl climbs the flight of stairs in 3 seconds. Calculate work and power.

$$W = 50 \times 3 \quad 150 \text{ J}$$

$$P = 150 / 3 \quad 50 \text{ watts}$$

15. The girl lifts a painting to a height of 0.5 m in 0.75 seconds. Calculate work and power.

$$W = 60 \times 0.5$$

$$P = 30 / 0.75$$

~~30 J~~
30 J
40 watts

16. The girl climbs the ladder with the painting in 5 seconds. Calculate work and power.

$$W = 110 \times 2 = 220 \text{ J}$$

$$P = 220 / 5 = 44 \text{ Watts}$$

17. A boy exerts an average force of 65 N when he lifts a box 1.2 meters. How much work does he do?

$$78 \text{ J}$$

18. Calculate the gravitational potential energy of an 82 kg student that Ms. Lopez lifts 2.0 m above the ground.

$$1607.2 \text{ J}$$

19. Imagine a bouncing ball that does not lose any energy as it bounces. Could it ever bounce to a greater height than it was dropped from? Explain your answer.

no, not unless additional energy is added to the system. Energy is lost as it transforms, so the ball cannot return to its original height

20. A dropped racquetball will not return to its original position because some of the ~~mechanical~~ nonmechanical energy is converted to mechanical nonmechanical energy.

Choose the sequence of energy forms that best fits each item.

21. b Hairdryer

22. c Electric saw

23. bore Toaster

24. b Shredder

25. b Coffee Pot

26. d Windmill

~~27. c iPod~~

~~28. c Speaker Vibrates~~

a. chemical energy → electrical energy → mechanical energy

b. electrical energy → thermal energy

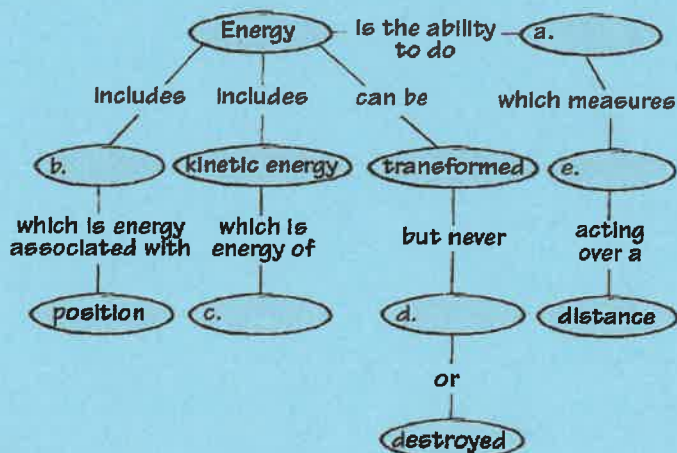
c. electrical energy → mechanical energy

d. mechanical energy → electrical energy

e. electrical → thermal & radiant energy

29. Complete the concept map by writing the correct word or phrase in the lettered box.

- a. work
- b. potential
- c. motion
- d. created
- e. force



30. An object has a mechanical energy of 1575 J and a potential energy of 1265 J.

a. What is the kinetic energy of the object?

$$1575 - 1265 = 310 \text{ J}$$

b. If the mass of the object is 12 kg, what is its speed?

$$7.2 \text{ m/s}$$

c. How high above ground is the object?

$$10.76 \text{ m}$$

31. A 59 kg man has a total mechanical energy of 150,023 J. If he is swinging downward and is currently 2.6 m above the ground, what is his speed?

$$PE = (59)(9.8)(2.6) = 1503.3 \text{ J}$$

$$KE = 148519.7$$

$$v = 71 \text{ m/s}$$

32. Calculate the kinetic energy of a 750 kg compact car moving at 50 m/s.

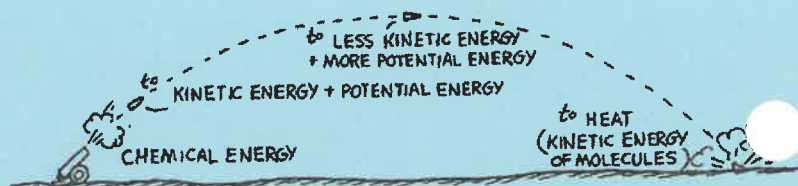
$$18750 \text{ J}$$

33. Determine the mechanical energy of a 450 kg roller coaster moving at 30 m/s at the bottom of the first dip which is 15 meters above the ground.

$$PE = 66150 \text{ J}$$

$$KE = 202500 \text{ J}$$

$$ME = 268650 \text{ J}$$



Energy Cannot Be Created or Destroyed
(It just changes forms)