

## Phys11 Work and Energy : W.S. - 20

- 1) Define Energy.
- 2) A box is pushed across the floor at a constant speed of 0.50 m/s over a distance of 3.5 m by a force of 140 N.
  - a) The force of friction is \_\_\_\_\_ .
  - b) The work done is \_\_\_\_\_ .
- 3) A box with a weight of 780 N is pushed 18.0 m along the floor at a constant speed. The work done is 240 J. The pushing force is \_\_\_\_\_ . The force of friction is \_\_\_\_\_ .
- 4) A 3.20 kg book is lifted onto a bookshelf 2.10 m high. Find the work done. (assume  $g = 9.81 \text{ m/s}^2$ ) \_\_\_\_\_ .
- 5) The acceleration due to gravity on the moon is  $1.6 \text{ m/s}^2$ . Find the work required to lift a 5.0 kg moon-rock to a height of 1.4 m. \_\_\_\_\_ .
- 6) A 12 kg box is carried horizontally for a distance of 23 m. Find the work done. \_\_\_\_\_ .
- 7) If 48 J of work is done in lifting an object, the increase in gravitational potential energy is \_\_\_\_\_ .
- 8) A 28 kg box is pushed horizontally a distance of 3.6 m with a force of 100. N. There is no friction. The work done is \_\_\_\_\_ . The increase in kinetic energy is \_\_\_\_\_ .
- 9)a) Find the kinetic energy of a 780 kg car moving with a velocity of 7.1 m/s. \_\_\_\_\_ .  
b) How much work must be done by the brakes in order to stop the car ? \_\_\_\_\_ .
- 10) State the law of conservation of energy.
- 11)a) A 0.65 kg ball is dropped from a height of 35 m. The potential energy at this height is \_\_\_\_\_ .

b) Find the velocity of the ball just before it hits the ground. \_\_\_\_\_ .

12) A 0.21 kg ball moving horizontally with a velocity of 7.2 m/s starts to move up a 30.° incline. Find the maximum vertical height it reaches. \_\_\_\_\_ .

13) A sled is pulled horizontally a distance of 35.0 m at constant speed by a boy with a rope at an angle of 60.0°. The tension in the rope is 84.0 N. Find the work done. (hint : only the horizontal component of the tension force is doing work). \_\_\_\_\_ .

14) A 65 kg crate is pushed 5.0 m up a 28.° incline at constant speed by a man applying a 520 N force.

a) The work done by the man is \_\_\_\_\_ .

b) How much work was done against gravity ? \_\_\_\_\_ .

c) How much work was done against the friction force ? \_\_\_\_\_

d) Find the force of friction. \_\_\_\_\_ .

15) A 0.43 kg ball is thrown straight up with a velocity of 17 m/s.

a) Find the initial kinetic energy. \_\_\_\_\_

b) Find the potential energy when it reaches its maximum height. \_\_\_\_\_

c) Find the maximum height ? \_\_\_\_\_

16) A 52 kg boy slides on ice for 8.0 m. He slows down to a stop because there is some friction. His initial velocity is 3.0 m/s.

a) The work done by friction is \_\_\_\_\_ .

b) The force of friction is \_\_\_\_\_ .

17) An 8.0 kg bowling ball is rolled at 4.5 m/s. The ball is held for a distance of 1.9 m. Find the force exerted. \_\_\_\_\_ .

18) A 2.71 kg ball is dropped from a height of 36.0 m. ( $g = 9.81 \text{ m/s}^2$ )

a) The total energy at a height of 36.0 m is \_\_\_\_\_ .

b) The potential energy at a height of 36.0 m is \_\_\_\_\_ .

c) The total energy at a height of 12.0 m is \_\_\_\_\_ .

- d) The potential energy at a height of 12.0 m is \_\_\_\_\_ .  
e) The kinetic energy at a height of 12.0 m is \_\_\_\_\_ .

Answers : 1) It is the ability to do work, 2)a) -140 N, b) 490 J, 3) 13 N, -13 N, 4) 65.9 J, 5) 11 J, 6) 0.0 J, 7) 48 J, 8) 360 J, 360 J, 9)  $2.0 \times 10^4$  J,  $2.0 \times 10^4$  J, 10) In any transformation of energy, the total energy of the system remains constant., 11)a) 220 J, b) 26 m/s, 12) 2.6 m, 13) 1470 J, 14)a) 2600 J, b) 1500 J, c) 1100 J, d) 220 N [down the incline], 15)a) 62 J, b) 62 J, c) 15 m, 16)a) 230 J, b) -29 N, 17) 43 N, 18)a) 957 J, b) 957 J, c) 957 J, d) 319 J, e) 638 J.