PART A: MULTIPLE CHOICE (10 MARKS)

Choose the best response in each case and place your answer in the appropriate space on your answer sheet.

1. Like work, energy is a _____ quantity.
   (a) scalar
   (b) vector
   (c) fundamental

2. Work is always done when:
   (a) an object moves.
   (b) a force moves an object.
   (c) a force is exerted on an object.
   (d) an object has potential energy.

3. In which case below is work <u>not</u> being done?
   (a) Pushing a car a distance of 0.5 m.
   (b) Walking down a flight of stairs.
   (c) Playing a violin in an orchestra.
   (d) Pushing against an immovable wall.

4. Which object below has the <u>most</u> gravitational potential energy relative to the base level indicated?
   (a) A 200 kg object 0.5 m above base level.
   (b) A 5 kg object 15 m above base level.
   (c) A 50 kg object 3 m above base level.
   (d) A 8 kg object 12 m above base level.

5. Which object below has the <u>least</u> kinetic energy?
   (a) A 10 kg object moving at 20 m/s.
   (b) A 2 kg object moving at 30 m/s.
   (c) A 100 kg object moving at 3 m/s.
   (d) A 500 kg object moving at 1 m/s.

6. If the mass of an object is quadrupled and the speed decreased by a factor of three, by what factor does the kinetic energy change?
   (a) 4/3 (b) 16/3
   (c) 4/9 (d) 16/9

7. In which of the following is gravitational potential energy being transformed into kinetic energy?
   (a) A car accelerating on a level road.
   (b) A raindrop falling freely through the air.
   (c) Water turning an electric turbine.
   (d) A stone thrown up into the air.

8. Consider an object falling from a height of 300 m. If we ignore air resistance, its total energy:
   (a) increases during the fall.
   (b) decreases during the fall.
   (c) remains constant during the fall.
   (d) is zero at the start of the fall.

9. A 6.0 kg object (at rest) is released from a height of 80 m. If air resistance is negligible and g = 9.8 N/kg, the kinetic energy of the mass when it is 20 m above the ground is:
   (a) 4.7×10^3 J (b) 3.5×10^3 J
   (c) 2.4×10^3 J (d) 1.2×10^3 J

10. A pulley system operated with an electric motor consumes 5.0 kJ of energy as it does 3.2 kJ of work in raising an object. The efficiency of this technology is:
    (a) 64% (b) 84%
    (c) 119% (d) 156%

PART B: MATCH (5 MARKS)

Match the definition from the 1st column to the best term in the 2nd column and place the matching letter in the appropriate space on your answer sheet.

1. Energy transferred to an object by an applied force over a distance.
2. Energy possessed by an object because of its motion.
3. Ratio of the useful energy provided by a device to the energy required to operate the device.
4. Type of work that tends to decrease the speed of an object.
5. States that when energy changes from one form to another no energy is lost.

A) efficiency
B) energy
C) gravitational potential energy
D) heat
E) kinetic energy
F) law of conservation of energy
G) mechanical energy
H) negative work
I) positive work
J) work

SPH3U-3 ENERGY & SOCIETY: WORK & ENERGY QUIZ#1

PART A: MULTIPLE CHOICE (10 MARKS)

1	2	3	4	5	6	7	8	9	10

PART B: MATCH (5 MARKS)

1	2	3	4	5

PART C: SHORT ANSWER (10 MARKS)

Answer the following questions in the space provided.

{4} 1. State the <u>form</u> of energy described by each of the following:

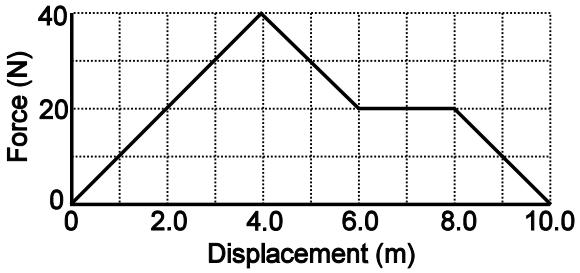
(a) This form of energy is possessed by charged particles. (a) _____

(b) A raised object has stored energy due to its position above some reference level. (b) _____

(c) This form of energy travels by means of waves without requiring particles of matter. (c) _____

(d) This form of energy is stored in objects that are stretched or compressed. (d) _____

{6} 2. Use the graph below to determine how much work is done between: (a) 0 & 4.0 m (b) 4.0 & 6.0 m (c) 6.0 & 8.0 m



PART D: PROBLEMS (35 MARKS)

Answer the following questions on a separate sheet of paper. You may use the back of this sheet if you wish.

Use g = 9.8 N/kg[down] where necessary.

{4} 1. A clerk moved a 4.4 kg box of soap without acceleration along a shelf by pushing it with a force of 8.1 N. If the employee did 5.9 J of work on the box, how far did the box move, in centimetres?

2. A toboggan carrying two children (total mass = 85 kg) reaches its maximum speed at the bottom of a hill, and then glides to a stop in 21 m along a horizontal surface. The coefficient of kinetic friction between the toboggan and the snowy surface is 0.11.

{6} (a) Draw a FBD of the toboggan as it slows down, and calculate the magnitude of <u>ALL</u> the forces in the diagram.

{4} (b) Calculate the acceleration of the toboggan.

{6} (c) Calculate the work done on the toboggan by the friction on the snowy surface. Should the work be positive or negative? Explain.

3. A child throws a 0.50 kg snowball at his friend at 12.0 m/s but the snowball lands on the ground in front of his friend. The snowball is 1.3 m above the ground when it leaves the child's hand.

{6} (a) What is the (i) kinetic energy & (ii) potential energy of the snowball at the time of release?

{4} (b) What is the total energy of the snowball (i) at the time of release & (ii) <u>just before</u> it hits the ground?

{2} (c) What is the snowball's kinetic energy <u>just before</u> it hits the ground in front of his friend?

{3} (d) How fast is the snowball moving <u>just before</u> it hits the ground in front of his friend?