Part 1: 11 Multiple Choice Questions (1 mark each)

1) How much power is required to raise a 30 kg crate a vertical distance of 6 m in a time of 4 seconds?

a) 120 watt b) 52.5 watt c) 450 watt d) 385 watt e) 525 watt

2) How much power is required to increase the kinetic energy of an object from 360 J to 1800 J in 3 minutes?

a) 0.25 watt b) 7.67 watt c) 4 watt d) 8 watt e) 240 watt

3) Which of the following is a vector quantity?

a) Energy. b) Power. c) Impulse. d) Work. e) Mass.

4) What is the momentum of ball that is moving at 6 m/s and having 96 J of kinetic energy?

a) 900 kg.m/s. b) 4 kg.m/s c) 8 kg.m/s d) 32 kg.m/s e) 2 kg.m/s

5) Consider an 80 kg man and 320 kg horse both running along a road with the same kinetic energy. The man must run

a) with the same speed as the horse.

b) 4 times as fast as the horse.

c) twice as fast as the horse.

d) 16 times as fast as the horse.

e) None of the above.

6) No work is done by gravity on a bowling ball that rolls along a bowling alley because

a) no force acts on the ball.

b) no distance is covered by the ball.

c) no potential energy is being converted to kinetic energy.

d) the force on the ball is at right angles to the ball's motion .

e) its kinetic energy may vary.

7) The property of a system that enables it to do work is
a) Energy
b) Inertia
c) Momentum
d) Impulse
e) Efficiency

8) When you jump from an elevated position you usually bend your knees upon reaching the ground. Doing this reduces the force of impact on you because the

a) force of impact is reduced.
b) time of impact is increased.
c) time of impact is decreased.
d) relative velocity is less.
e) none of these.

9) A 8 kg ball of clay moving at 3 m/s slams into a 2 kg ball of clay at rest. If the two balls stuck together after collision, what is the speed of the combined ball?
a) 1.5 m/s.
b) 2.4 m/s.
c) 1.1 m/s.
d) 2.1 m/s.
e) 3.5 m/s.

10) Which of the following shows an example of Newton's third law of motion?

a) Objects in free fall have equal acceleration.

b) A woman presses on both sides of a box with equal forces.

c) A girl hits a volleyball. Her hand exerts a force on the ball, and the ball exerts a force on her hand.

d) A moving cart becomes more difficult to stop as more mass is added to it.

e) Decreasing momentum over a short time means more force.

11) Forces always occur

a) by themselves. b) as single quantities. c) in triplets. d) in groups e) in pairs.

Part 2: Solve the following two problems in the space provided in between showing all your steps (3 marks each)

Problem 1: A 180 g baseball is thrown at a speed of 30 m/s towards the bat. If the bat acts on the ball with a force of 90 N and remains in contact with the ball for 0.2 s, calculate:

a) The Impulse delivered to the ball

b) The speed of the ball just after it bounces back

Problem 2: Consider a freely falling ball that has a speed of 6 m/s at a certain height. Use conservation of mechanical energy to calculate the speed of the ball after falling additional 14.4 m?