

IPSH, MECHANICS UNIT PRACTICE PROBLEMS

- 1) An object is pulled northward with a force of 10N and southward with a force of 15N. Draw the freebody diagram. What is the magnitude of the net force on the object?
- 2) The average speed of a horse that gallops a distance of 10km in a time of 30 min is _____.
- 3) Ten seconds after starting from rest, a freely falling object will have an instantaneous speed of about _____.
- 4) A stone is dropped from the roof of a building. It takes 5.5 seconds for the stone to hit the ground. Neglecting air resistance, how tall is the building?
- 5) A tow truck exerts a force of 3000N on a car while accelerating at 2 m/s^2 . What is the mass of the car?
- 6) A bag of groceries has a mass of 8 kg. What is the weight of the groceries in pounds? What is the weight in Newtons?
- 7) A 300 kg bear grasping a vertical tree slides down at constant velocity. The friction force between the tree and the bear is _____.
- 8) A 5000 kg freight car runs into a 10,000 kg freight car at rest. They couple upon collision and move with a speed of 2 m/s. What was the initial speed of the 5000 kg car?
- 9) What is the average momentum of a 70 kg runner who covers 400 m in 50 sec?
- 10) Exert 100 J in 50 sec and your power output is _____.
- 11) A TV set is pushed a distance of 2 m with a force of 20 N that is in the same direction as the TV set moves. How much work is done on the set?
- 12) A 2 kg mass has 40 J of potential energy with respect to the ground. Approximately how far is it located above the ground?
- 13) A diver who weighs 50 kg steps off a diving board that is 10 m above the water. The diver hits the water with kinetic energy of _____.
- 14) A construction worker moves a crowbar through a distance of 0.50 m to lift a load 0.05 m off of the ground. What is the ideal mechanical advantage of the crowbar?

Answers: 1) 5N; 2) 20 km/h; 3) 98 m/s; 4) 148.5 m; 5) 1500 kg; 6) 17.6 lbs, 78.4N; 7) 2940N; 8) 6 m/s; 9) 560 kg•m/s; 10) 2 W; 11) 40 J; 12) 2 m; 13) 4900 J, 14) 10.