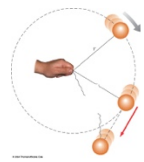
Mock Exam (Ch6 -to- Ch9.2) **Take $g = 9.8\ ms^{-2}$ where ever needed**

1 A ball of mass 0.5 kg is attached to the end of a cord whose length is 2 m. The ball is whirled in a horizontal circle. If the cord can withstand a maximum tension of 50 N, the maximum speed the ball can have before the cord breaks is:



a) 14.1 m/s **b)** 12.2 m/s **c)** 23.4 m/s **d)** 28.5 m/s **e)** 18.3 m/s

2 A curve in a road forms part of a horizontal circle. As a car goes around it at constant speed 12 m/s, the total force on the driver has magnitude 130 N. The vector total force on the driver if the speed is 17 m/s instead is:

a) 142 N **b)** 83 N **c)** 261 N **d)** 215 N **e)** 311 N

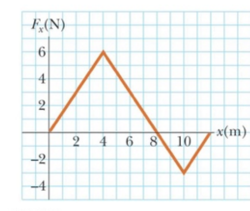
3 A 4 kg block of mass initially at rest is pulled to the right along a horizontal, frictionless surface by a constant horizontal force of 12 N, the speed of the block after it has moved 3 m is:

a) 1.3 m/s **b)** 2.4 m/s **c)** 5.3 m/s **d)** 4.2 m/s **e)** 3.5 m/s

4 If it takes 4 J of work to stretch a Hooke's-law spring 10 cm from its unstressed length, the extra work required to stretch it an additional 15 cm is:

a) 10 J **b)** 21 J **c)** 12 J **d)** 24 J **e)** 16 J

5 The force acting on a particle varies as shown in the Figure. The work done by the force on the particle as it moves from $x = 0$ to $x = 10$ m is:



a) 21 J **b)** 3 J **c)** 24 J **d)** 27 J **d)** 34 J

6 Ali jumps vertically upward with a vertical velocity component 4 m/s. How far does his center of mass move up as he makes the jump?

a) 2.14 m **b)** 0.92 m **c)** 1.11 m **d)** 0.82 m **e)** 1.84 m

7 The apparent weight of a fish in an elevator is the same as the real weight when the elevator.

a) moves downward at constant velocity **b)** accelerates downward **c)** accelerates upward **d)** None of those

8 Choose of the correct answer. The gravitational potential energy of a system

a) is always positive **b)** can be positive or negative or zero **c)** is always zero **d)** is always negative **e)** None of those

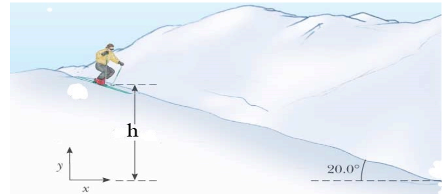
9 If a person lifts a 20 kg bucket from a well and does a 6 kJ of work, the depth of the well is: (assume the speed of the bucket is constant)

a) 7.8 m **b)** 30.6 m **c)** 15.5 m **d)** 42.2 m **e)** 22.3 m

10 If you push a 40 kg box at a constant speed of 1.4 m/s across a horizontal floor of $\mu_k = 0.25$, the rate of energy dissipation by the frictional force is:

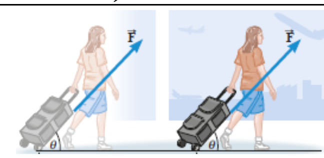
a) 210 W **b)** 98 W **c)** 173 W **d)** 137 W **e)** 34 W

11 A skier starts from rest at the top of a frictionless incline (θ = 20°) of height h = 30 m (as in the figure). The speed of the skier at the bottom of the incline is:



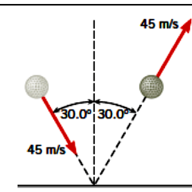
a) 32.3 m/s **b)** 7.6 m/s **c)** 24.2 m/s **d)** 17.1 m/s **e)** 19.8 m/s

12 In the figure, find the work done by a force F = 45 N to pull the suitcase at an angle θ = 50° for a distance s = 75 m



a) 0.92 kJ **b)** 2.17 kJ **c)** 3.52 kJ **d)** 4.11 kJ **e)** 1.71 kJ

13 A golf ball strikes a hard, smooth floor at an angle of 30° and rebounds at the same angle (as in the figure). The mass of the ball is 0.047 kg, and its speed is 45 m/s just before and after striking the floor. The magnitude of the impulse applied to the golf ball by the floor is:



b) 4.5 N.s **b)** 2.8 N.s **c)** 1.2 N.s
e) 3.7 N.s **e)** 5.6 N.s

14 If we know the potential energy function *U(x)* for a conservative system in which a one-dimensional force *F(x)* acts on a particle, we can find the force as:

a) $F(x) = -\frac{du(x)}{dx} + u(x)$ **b)** $F(x) = -du(x)$ **c)** $F(x) = \frac{du(x)}{dx}$ **d)** None of those **e)** $F(x) = -\frac{du(x)}{dx}$

15 If a particle of mass m moves with momentum P, the kinetic energy of the particle (k) is:

a) P/2m **b)** P^2/2m **c)** P^2/m **d)** m^2/2p **e)** $2m^2$/p