

Practice problems for recitation – Exam II

1. A 50.0-kg box is being pulled along a horizontal surface by means of a rope that exerts a force of 250 N at an angle of 32.0° above the horizontal. The coefficient of kinetic friction between the box and the surface is 0.350. What is the acceleration of the box?

- A) 0.638 m/s^2
- B) 1.74 m/s^2
- C) 3.16 m/s^2
- D) 6.31 m/s^2
- E) 8.53 m/s^2

2. A mass of 3.0 kg rests on a smooth surface inclined 34° above the horizontal. It is kept from sliding down the plane by a spring attached to a wall. The spring is aligned with the plane and has a spring constant of 120 N/m. How much does the spring stretch?

- A) 360 cm
- B) 240 cm
- C) 14 cm
- D) 24 cm
- E) 36 cm

3. A 3.00-kg mass rests on the ground. It is attached to a string which goes vertically to and over an ideal pulley. A second mass is attached to the other end of the string and released. The 3.00-kg mass rises 50.0 cm in 1.00 s. How large was the other mass?

- A) 3.67 kg
- B) 4.29 kg
- C) 6.83 kg
- D) 7.15 kg
- E) 7.34 kg

4. A 600-kg car is going around a banked curve with a radius of 110 m at a speed of 24.5 m/s. What is the appropriate banking angle so that the car stays on its path without the assistance of friction?

- A) 29.1°
- B) 13.5°
- C) 33.8°
- D) 56.2°
- E) 60.9°

5. An object of mass m is at rest on a rough inclined plane with height h , length 8 m, and which makes an angle of 30° with the horizontal. The object is allowed to move and it stops on a rough horizontal surface, at a distance of 4 m from the bottom of the inclined plane, as shown in Figure 1. The coefficient of kinetic friction on the inclined plane is 0.4 and $g = 10 \text{ m/s}^2$. What is the coefficient of kinetic friction for the horizontal surface?

- A) 0.1
- B) 0.2
- C) 0.3
- D) 0.4
- E) 0.6

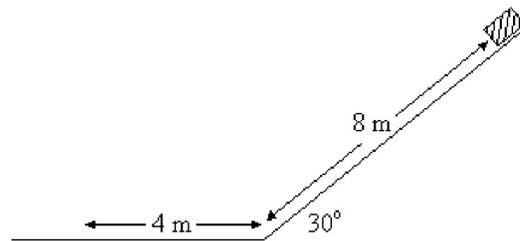


Fig. 1

6. A 2-kg mass is moving along the x axis. The potential energy curve as a function of position is shown in Figure 2. The system is conservative. There is no friction. If the kinetic energy of the object at the origin is 12 J, what will be the speed of the object at 6.0 m along the $+x$ -axis?

- A) 2.0 m/s
- B) 2.2 m/s
- C) 2.5 m/s
- D) 2.7 m/s
- E) 3.0 m/s

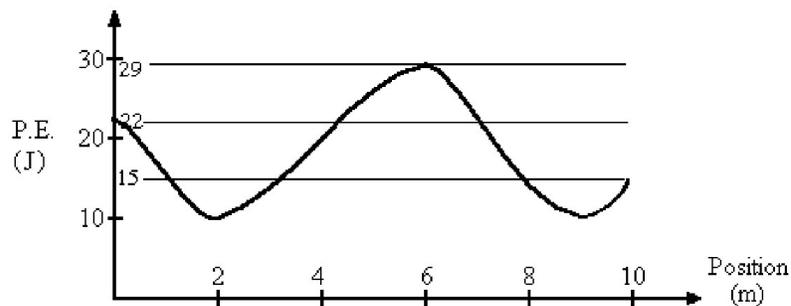


Fig. 2

7. You and your friend want to go to the top of the Eiffel Tower. Your friend takes the elevator straight up. You decide to walk up the spiral stairway, taking longer to do so. Compare the gravitational potential energy (U) of you and your friend, after you both reach the top.

- A) It is impossible to tell, since the times are unknown.
- B) It is impossible to tell, since the distances are unknown.
- C) Your friend's U is greater than your U , because she got to the top faster.
- D) Both of you have the same amount of potential energy.
- E) Your U is greater than your friend's U , because you traveled a greater distance in getting to the top.

8. A golf club exerts an average force of 1000 N on a 0.045-kg golf ball which is initially at rest. The club is in contact with the ball for 1.8 ms. What is the speed of the golf ball as it leaves the tee?

- A) 30 m/s
- B) 35 m/s
- C) 40 m/s
- D) 45 m/s
- E) 50 m/s

9. A 900-kg car traveling east at 15.0 m/s collides with a 750-kg car traveling north at 20.0 m/s. The cars stick together. What is the speed of the wreckage just after the collision?

- A) 6.10 m/s
- B) 12.2 m/s
- C) 25.0 m/s
- D) 35.0 m/s
- E) 17.3 m/s

10. An assault rifle fires an eight-shot burst in 0.40 s. Each bullet has a mass of 7.5 g and a speed of 300 m/s as it leaves the gun. What is the average recoil force on the gun during that burst?

- A) 45 N
- B) 5.6 N
- C) 16 N
- D) 2.0 N
- E) 23 N

Answers: 1.B; 2.C; 3.A; 4.A; 5.C; 6.B; 7.D; 8.C; 9.B; 10.A.