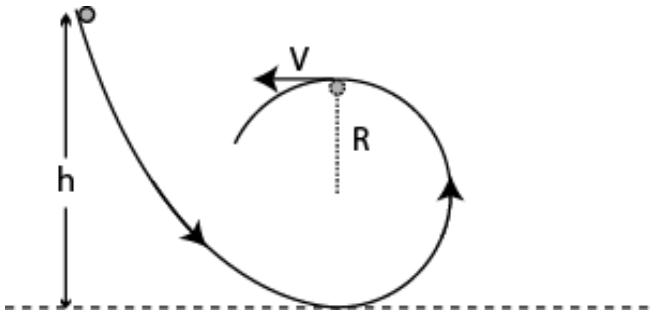
Old Exams Questions Ch. 8

T072

Q2.: A ball slides without friction around a loop-the-loop (see Fig 2). A ball is released, from rest, at a height *h* from the left side of the loop of radius *R*. What is the ratio (*h/R*) so that the ball has a speed v=$\sqrt{gR}$ at the highest point of the loop? (g = acceleration due to gravity) (5/2)



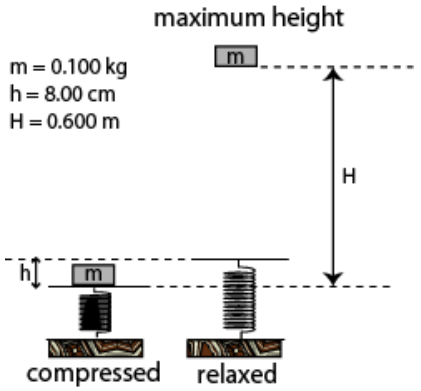
Q4. A worker does 500 J of work in moving a 20 kg box a distance *D* on a rough horizontal floor. The box starts from rest and its final velocity after moving the distance *D* is 4.0 m/s. Find the work done by the friction between the box and the floor in moving the distance *D*. (–340 J)

Q5. A 2.0 kg block is released from rest 60 m above the ground. Take the gravitational potential energy of the block to be zero at the ground. At what height above the ground is the kinetic energy of the block equal to half its gravitational potential energy? (Ignore air resistance).(40 m)

Q6. A 2.2 kg block starts from rest on a rough inclined plane that makes an angle of 30° above the horizontal. The coefficient of kinetic friction is 0.25. As the block moves 3.0 m down the plane, the change in the mechanical energy of the block is: (–14 J)

Q7. A 0.50 kg block attached to an ideal spring with a spring constant of 80 N/m oscillates on a horizontal frictionless surface. The speed of the block is 0.50 m/s, when the spring is stretched by 4.0 cm. The maximum speed the block can have is: (0.71 m/s)

Q8.A block (mass = 0.100 kg) is pushed against a vertical spring compressing the spring a distance of h = 8.00 cm (see Fig 3). The block is not attached to the spring. When released from rest, the block rises to a maximum height of H = 0.600 m. Calculate the spring constant.



T071

Q5. A 10.0 kg block is released from rest 100 m above the ground. When it has fallen 50 m, its kinetic energy is: (4900 J)

Q6. A 4.0 kg block is initially moving to the right on a horizontal frictionless surface at a speed of 5.0 m/s. It then compresses a horizontal spring of spring constant 200 N/m. At the instant when the kinetic energy of the block is equal to the potential energy of the spring, the mechanical energy of the block-spring system is: (50 J)

Q7. A 5.0 kg block starts up a 30° incline with 198 J of kinetic energy. The block slides up the incline and stops after traveling 4.0 m. The work done by the force of friction between the block and the incline is: (−100 J)

T062

Q4 A 200 kg box is pulled along a horizontal surface by an engine. The coefficient of friction between the box and the surface is 0.400. The power the engine delivers to move the box at constant speed of 5.00 m/s is: (3920 W)

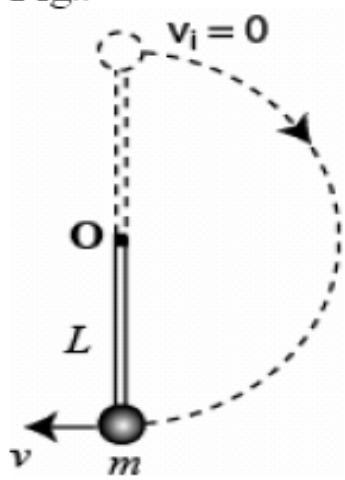
Q5. A 2.0 kg object is connected to one end of an unstretched spring which is attached to the ceiling by the other end and then the object is allowed to drop. The spring constant of the spring is 196 N/m. How far does it drop before coming to rest momentarily? (0.20 m)

Q6. A 2.0 kg block is thrown upward from the ground. At what height above the ground will the gravitational potential energy of the Earth-block system have increased by 490 J? (25 m)

Q7. An ideal spring (compressed by 7.00 cm and initially at rest,) fires a 15.0 g block horizontally across a frictionless table top. The spring has a spring constant of 20.0 N/m. The speed of the block as it leaves the spring is: (2.56 m/s)

Q8 A small object of mass m on the end of a massless rod of length L is held vertically, initially. The rod is pivoted at the other end **O**. The object is then released from rest and allowed to swing down in a circular path as shown in Fig. 2. What is the speed (v) of the object at the lowest point of its swing? (Assume no friction at the pivot) (4gL)

Fig#

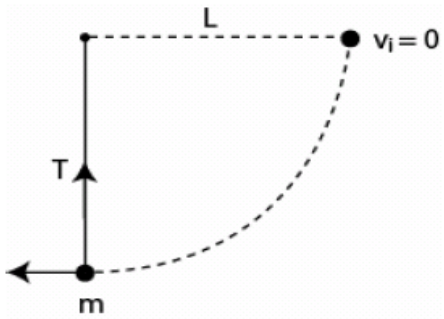


T061:

Q5. A 2.2 *kg* block starts from rest on a rough inclined plane that makes an angle of 25° with the horizontal. The coefficient of kinetic friction is 0.25. As the block slides 2.0 *m* down the plane, the mechanical energy of the Earth-block system changes by: (−9.8 *J)*

Q6. An ideal spring with a 20 *N/m* spring constant is compressed by a 10 *N* force. The potential energy stored in the spring is: (2.5 *J)*

Q7. An object of mass *m*, attached to a light cord of length *L*, is held horizontally from a fixed support as shown in Fig 1. The object is then released from rest. What is the tension force in the cord when the object is at the lowest point of its swing? (3 *mg)*



Q8. A block of mass 2.0 *kg* is initially moving to the right on a horizontal frictionless surface at a speed 5.0 *m/s*. It then compresses a spring of spring constant 100 *N/m*. At the instant when the kinetic energy of the block is equal to the potential energy of the spring, the spring is compressed a distance of: (0.50 *m)*

T052:

Q5: A 4.0 kg block starts up a 30° incline with 128 J of kinetic energy. How far will it slide up the incline if the coefficient of kinetic friction between the block and the incline is 0.50? (3.5 m)

Q7: A block is released from rest at a height h = 6.0 m along a frictionless loop-the-loop with a diameter of 3.0 m (see Fig 1). The speed at the top of the loop is: (7.7 m/s)

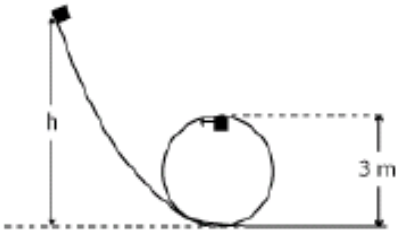


Figure 1

Q8: 2.0-kg block slides on a rough horizontal table top (see Fig 2). Just before it hits a horizontal ideal spring its speed is 5.0 m/s. It hits the spring and compresses it 10.0 cm before coming momentarily to rest. If the spring constant is 1200 N/m, the work done by friction is: (−19 J)

T051:

Q8. A 0.75-kg block slides on a rough horizontal table top. Just before it hits a horizontal ideal spring its speed is 3.5 m/s. It compresses the spring 5.7 cm before coming to rest. If the spring constant is 2600 N/m, the coefficient of kinetic friction between the block and the table is: (0.88)

T042:

Q4 A 3.00 kg block is dropped from a height of 40 cm onto a spring of spring constant k (see Fig 2). If the maximum distance the spring is compressed = 0.130 m, find k. (1840 N/m)

Figure 2

Q5: A 6.0 kg box starts up a 30 degrees incline with 158 J of kinetic energy. How far will it slide up the incline if the coefficient of kinetic friction between box and incline is 0.40? (3.2 m)

Q6 : Fig 1 shows a pendulum of length L = 1.0 m. Its ball has speed of vo=2.0 m/s when the cord makes an angle of 30 degrees with the vertical. What is the speed (V) of the ball when it passes the lowest position? (2.6 m/s)

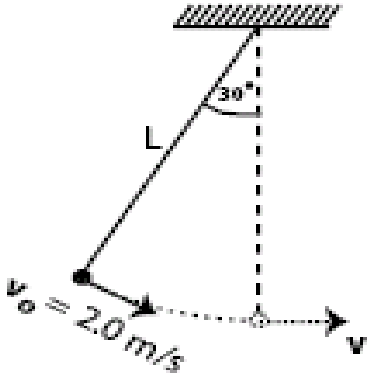


Figure 1

T041:

Q4 A 3.0 kg block is released from a compressed spring (k=120 N/m). It travels over a horizontal surface (μk =0.20) for a distance of 2.0 m before coming to rest, Fig 1. How far was the spring compressed before being released ? (0.44 m.)

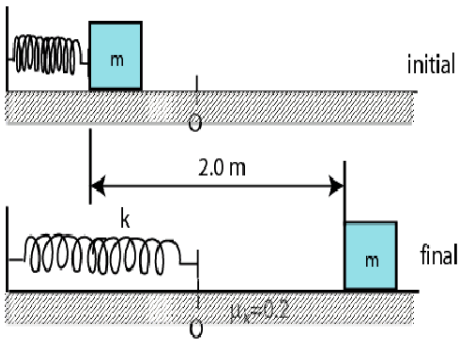


Figure 1

Q5 A projectile is fired from the top of a 40 m high building with a speed of 20 m/s. What will be its speed when it strikes the ground? (34 m/s.)

Q6 A 75 kg parachutist releases himself off a tower that is 85 m high. Assume that he starts from rest and reaches the ground with a speed of 5.0 m/s. How much work was done by the nonconservative forces on him? (-6.2×10^4 J)