

Problem 3.1

A block with mass of 5 kg is attached to a horizontal spring with spring constant $k=400$ N/m. The surface the block rests upon is frictionless. If the block is pulled out to $x=0.05$ m and released, (a) find the speed of the block at the equilibrium point, (b) find the speed when $x = 0.0250$ m.

Problem 3.2

Calculate period of oscillations for 1 m long rod, which is suspended by the end. Calculate also maximal potential energy of the rod if maximum deviation from equilibrium position is 30° and mass of the rod equals 6 kg.

Homework #3/1

Problem#1

A 2kg metal ball is suspended from a rope. If it is released from height 3 m and swings down to the height 1 m what is its velocity?

Problem#2

If the object–spring system is described by $x = (0.330 \text{ m}) \cos (1.50t)$, find the amplitude, the angular frequency, the frequency, and the period, and the position when $t = 0.25 \text{ s}$.

Homework #3/2

Problem#1

If you push a box 20m forward by applying a force of 15N in the forward direction, what is the work you have done on the box?

Problem#2

A 50.0-kg acrobat drops from a height of 2 meters straight down onto a springboard with a force constant of 800 N/m. By what maximum distance does she compress the spring?

Homework #3/3

Problem#1

Calculate the work done on 4 kg rock, if it is lifted up from the ground to 3m height.

Problem#2

What power must be supplied to push a 1-kg block up to 10 m height in 5 s?

Homework #3/4

Problem#1

How much potential energy does a brick with a mass of 1kg gain if it is lifted 4m.

Problem#2

If the object–spring system is described by $x = (0.2 \text{ m}) \cos (3.14t)$, find the amplitude, the frequency, and the period, and the position when $t = 0.5 \text{ s}$.

Homework #3/5

Problem#1

If a rock has a mass of 1kg and is thrown at 5m/s, what is its kinetic energy?

Problem#2

The free-fall acceleration is 9.8 m/s^2 . What period has pendulum of 0.5m length?

Homework #3/6

Problem#1

If a car has a mass of 900kg and is driving at 60km/hr, what is its kinetic energy?

Problem#2

The free-fall acceleration on Mars is 3.7 m/s^2 . What length of pendulum has a period of 1 s?

Homework #3/7

Problem#1

What is the work done by you on a car, if you try to push the car up a hill by applying a force of 40N directed up the slope, but it slides downhill 30cm?

Problem#2

A simple 2-m-long pendulum oscillates at a location where $g = 9.80 \text{ m/s}^2$. How many complete oscillations does it make in 5 min?

Homework #3/8

Problem#1

Calculate the work done on a box, if it is pulled 5m along the ground by applying a force of $F = 10\text{N}$ at an angle of 60° to the horizontal.

Problem#2

A 0.4-kg object connected to a light spring with a force constant of 19.6 N/m oscillates on a frictionless horizontal surface. If the spring is compressed 4 cm and released from rest, determine (a) the maximum speed of the object, (b) the speed of the object when the spring is compressed 1.5 cm,