

This print-out should have 6 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

Block Jump Spring 01

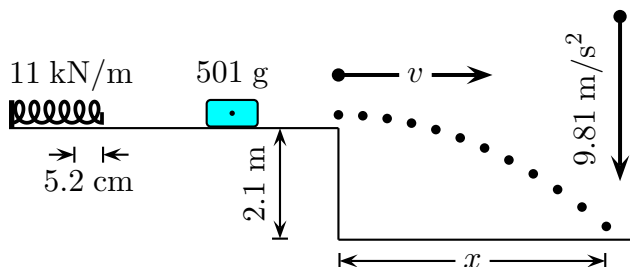
001 (part 1 of 3) 10.0 points

A block is pushed against the spring with spring constant 11 kN/m (located on the left-hand side of the track) and compresses the spring a distance 5.2 cm from its equilibrium position (as shown in the figure below).

The block starts at rest, is accelerated by the compressed spring, and slides across a frictionless track (as shown in the figure below).

It leaves the track horizontally, flies through the air, and subsequently strikes the ground.

The acceleration of gravity is 9.81 m/s^2 .



What is the speed v of the block when it leaves the track?

Correct answer: 7.70515 m/s.

002 (part 2 of 3) 10.0 points

What is the horizontal distance x the block travels in the air?

Correct answer: 5.04163 m.

003 (part 3 of 3) 10.0 points

What is the total speed of the block when it hits the ground?

Correct answer: 10.0285 m/s.

Serway CP 05 77

004 10.0 points

In the dangerous “sport” of bungee-jumping, a daring student jumps from a balloon with a specially designed elastic cord attached to his waist. The unstretched length of the cord is

22.2 m, the student weighs 1035 N, and the balloon is 31.6 m above the surface of a river below.

Calculate the required force constant of the cord if the student is to stop safely 2.16 m above the river.

Correct answer: 1162.6 N/m.

Serway CP 05 24

005 10.0 points

A softball pitcher rotates a 0.223 kg ball around a vertical circular path of radius 0.691 m before releasing it. The pitcher exerts a 25.5 N force directed parallel to the motion of the ball around the complete circular path. The speed of the ball at the top of the circle is 10.8 m/s.

The acceleration of gravity is 9.8 m/s^2 .

If the ball is released at the bottom of the circle, what is its speed upon release?

Correct answer: 25.3021 m/s.

Radial Force

006 10.0 points

The potential energy of a two-particle system separated by a distance r is $U(r) = \frac{A}{r}$, where $A = 259 \text{ J} \cdot \text{m}$ is a constant.

Find the radial force F_r if $r = 61.5 \text{ m}$.

Correct answer: 0.0684778 N.