$(PE_E = \frac{1}{2} kx^2)$

When a 13.2-kg mass is placed on top of a vertical spring, the spring compresses 5.93 cm. Find the spring constant of the

$F_s = -kx$ 2200 N/m

. If a spring has a spring constant of 400 N/m, how much work is required to compress the spring 25.0 cm from its undist

$PE = W = \frac{1}{2}(400\ N/m)(0.25\ m)^2$

$= 12.5\ J$

3. A compressed spring that obeys Hooke's law has a potential energy of 18 J. If the spring constant of the spring i distance by which the spring is compressed.

0.09m 0.3 m = 30cm

4. An object is attached to the lower end of a 100-coil spring that is hanging from the ceiling. The string stretches by 0 then cut into two identical springs of 50 coils each. Each spring is attached between the ceiling and the object. By of the springs stretch? 0.04m = 4cm

½ # coils = double k

= double F_s

($F_s = -kx$)

F_s doubled again : like our tension problems.

we didn't talk about # of coils so it's not in this one

Power ($P = W/t = KE/t = PE/t$)

is done on your car by applying 200 N of force a distance of 12 m in 2 minutes?

Kinetic Energy ($KE = \frac{1}{2} mv^2$), $W = \Delta KE$

1. A car with occupants has a mass of 1000-kg. If it is going 30m/s, what is its kinetic energy?

450,000J

$(4.5 \times 10^5 J)$

3. A car with occupants has a mass of 1000-kg. If it accelerates from 70 to 100 m/s, how much kinetic energy is added to the car?

2,550,000J

work

$(2.5 \times 10^6 J)$

4. How much kinetic energy must be removed from the 1000-kg car that is going 20 m/s in order to make it stop? How much for the same car gong 40 m/s or 60 m/s?

a) 200,000J $(2 \times 10^5 J)$

b) 800,000J $(8 \times 10^5 J)$

c) 1,800,000J $(1.8 \times 10^6 J)$

5. A 70-kg man is falling at 70 m/s. How much kinetic energy is that?

$1.7 \times 10^5 J$

6. How much work is required to accelerate a 1000 kg car from 20 m/s to 30 m/s?

$2.5 \times 10^5 J$

Potential Energy (PE = mgh)

1. An apple has a mass of 0.40 kg and is hanging 3 meters above the ground. What is its potential energy?

12J

2. A 100 kg object is pulled vertically upward 5.0 m by a rope. Find the work done by the tension force in the rope.

5000J

3. How much work is done by a crane lifting a 200.0 kg crate from the ground to a floor 21.0 m above the ground? What is the change in gravitational potential energy of the crate?

42,000J

4. A 25.6 kg child pulls a 4.81kg toboggan up a hill inclined at 25.7° to the horizontal. The vertical height of the hill is 27.3 m. Friction is negligible. Determine the change in potential energy of the toboggan.

1300J

5. A 1000-kg cart of a rollercoaster is pushed with up a 50-m incline. There is a change of 30-m in height. How much potential energy was added to the cart?

294,000J