

Assignment Preview

[Close this window](#)**Homework 9****About this assignment**

This homework is due 11:59 pm on 6/24 Thursday. Note that the final exam is also on 6/24 Thursday, from 8:10 am to 10 am. If you would like to have more time to work on this problem, please let me know as soon as possible.

1. CJ6 10.P.006. [294541] A **0.63** kg block is hung from and stretches a spring that is attached to the ceiling. A second block is attached to the first one, and the amount that the spring stretches from its unstrained length **quadruples**. What is the mass of the second block?

[1.89] kg

2. CJ6 10.P.016. [239395] Refer to Conceptual Example 2 as an aid in solving this problem. A **140** coil spring has a spring constant of **448** N/m. It is cut into **2** shorter springs, each of which has **70** coils. One end of a **70** coil spring is attached to a wall. An object of mass **58** kg is attached to the other end of the spring, and the system is set into horizontal oscillation. What is the angular frequency of the motion?

[3.93] rad/s

3. CJ6 10.P.018. [239397] A computer to be used in a satellite must be able to withstand accelerations of up to **28** times the acceleration due to gravity. In a test to see if it meets this specification, the computer is bolted to a frame that is vibrated back and forth in simple harmonic motion at a frequency of **8.7** Hz. What is the minimum amplitude of vibration that must be used in this test?

[0.0918] m

4. CJ6 10.P.024. [239400] An archer pulls the bowstring back for a distance of **0.450** m before releasing the arrow. The bow and string act like a spring whose spring constant is **450** N/m.

(a) What is the elastic potential energy of the drawn bow?

[45.6] J

(b) The arrow has a mass of 0.0300 kg. How fast is it traveling when it leaves the bow?

[55.1] m/s

5. CJ6 10.P.030. [294482] A 3.2 kg block is hanging stationary from the end of a vertical spring that is attached to the ceiling. The elastic potential energy of this spring/mass system is **2.1** J. What is the elastic potential energy of the system when the 3.2 kg block is replaced by a **5.5** kg block?

[6.2] J

6. CJ6 10.P.040. [294481] A simple pendulum is made from a **0.80** m long string and a small ball attached to its free end. The ball is pulled to one side through a small angle and then released from rest. After the ball is released, how much time elapses before it attains its greatest speed?

[0.449] s

7. CJ6 10.P.042. [294451] A pendulum clock can be approximated as a simple pendulum of length **1.20** m and keeps accurate time at a location where $g = 9.83 \text{ m/s}^2$. In a location where $g = 9.79 \text{ m/s}^2$, what must be the new length of the

pendulum, such that the clock continues to keep accurate time (that is, its period remains the same)?

[1.2] m

8. CJ6 11.P.002. [294510] The "karat" is a dimensionless unit that is used to indicate the proportion of gold in a gold-containing alloy. An alloy that is one karat gold contains a weight of pure gold that is one part in twenty-four. What is the volume of gold in a 12.0 karat gold necklace whose weight is 1.10 N? (See Table 11.1 for appropriate constants)

[2.91e-06] m³

9. CJ6 11.P.016. [296152] A cylinder is fitted with a piston, beneath which is a spring, as in the drawing. The cylinder is open at the top. Friction is absent. The spring constant of the spring is 4300 N/m. The piston has a negligible mass and a radius of 0.021 m.



(a) When air beneath the piston is completely pumped out, how much does the atmospheric pressure cause the spring to compress?

[0.0326] m

(b) How much work does the atmospheric pressure do in compressing the spring?

[2.29] J

10. CJ6 11.P.020. [294551] At a given instant, the blood pressure in the heart is 1.9×10^4 Pa. If an artery in the brain is 0.37 m above the heart, what is the pressure in the artery? Ignore any pressure changes due to blood flow. (See Table 11.1 for appropriate constants.)

[15200] Pa

11. CJ6 11.P.024. [294550] The human lungs can function satisfactorily up to a limit where the pressure difference between the outside and inside of the lungs is one-twentieth of an atmosphere. If a diver uses a snorkel for breathing, how far below the water can she swim? Assume the diver is in salt water whose density is 1049 kg/m³.

[0.493] m

12. CJ6 11.P.032. [239664] In the hydraulic press used in a trash compactor, the radii of the input piston and the output plunger are 5.6×10^{-3} m and 4.7×10^{-2} m, respectively. If the height difference between the input piston and the output plunger can be neglected, what force is applied to the trash when the input force is 357 N.

[25100] N

13. CJ6 11.P.038. [294538] A duck is floating on a lake with 28% of its volume beneath the water. What is the average density of the duck?

[280] kg/m³

14. CJ6 11.P.040. [294438] Only a small part of an iceberg protrudes above the water, while the bulk lies below the surface. The density of ice is 899 kg/m^3 and that of seawater is 1016 kg/m^3 . Find the percentage of the iceberg's volume that lies below the surface.

[88.5]%

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