

UNIT 14 HOME WORK AFTER SESSION ONE

➡ **SmartPhysics:** View the Prelecture 22 “Simple and Physical Pendula” before the class of next session and answer the checkpoint questions. (The online Homework is due the next day.)

- Finish the activities in Session 1.

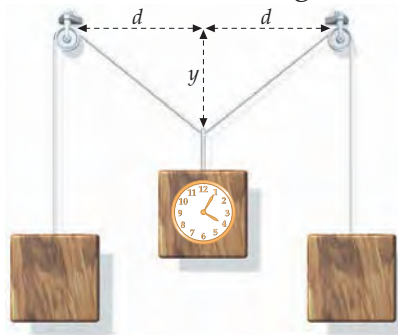
UNIT 14 HOME WORK AFTER SESSION TWO

➡ **SmartPhysics:** View the Prelecture 23 “Harmonic Waves and the Wave Equation” before the class of next session and answer the checkpoint questions. (The online Homework is due the next day.)

WORK THE FOLLOWING PROBLEM FROM TIPLER:

This is similar to your Midterm 2 problem but more general: the masses of the clock and weights are different.

You have designed a novelty desk clock, as shown in the figure. You are worried that it is not ready for market because the clock itself might be in an unstable equilibrium configuration. You decide to apply your knowledge of potential energies and equilibrium conditions and analyze the situation. The clock (mass m) is supported by two light cables running over the two frictionless pulleys of negligible diameter, which are attached to counterweights that each have mass M .



- (a) Find the potential energy of the system as a function of the distance y . (b) Find the value of y for which the potential energy of the system is a minimum. (c) If the potential energy is a minimum, then the system is in equilibrium. Apply Newton's second law to the clock and show that it is in equilibrium (the forces on it sum to zero) for the value of y obtained for Part (b). (d) Finally, verify that this is a point of stable equilibrium. (e) Find the frequency of oscillation about the equilibrium for small amplitude oscillations. (Hint, the second derivative of the potential gives the equivalent “spring constant”).

UNIT 14 HOME WORK AFTER SESSION THREE

➡ **SmartPhysics:** You're Done for this Semester!

- **Before the final examination:** *Study for the final examination*

About the Final: The final examination will cover Units 1-14 with special attention to Units 12 to 14. You should remember and be able to apply fundamental equations from which others can be derived.

Immediately after the final examination:

- *Hand in the Unit 14 Activity Guide Entries*