

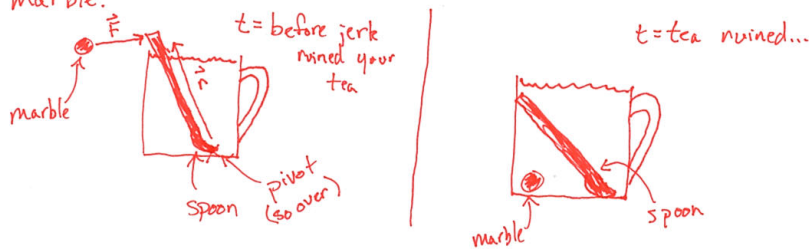
Simple Harmonic Motion

14.33 • A mass is oscillating with amplitude A at the end of a spring. How far (in terms of A) is this mass from the equilibrium position of the spring when the elastic potential energy equals the kinetic energy?

14.49 • After landing on an unfamiliar planet, a space explorer constructs a simple pendulum of length 50.0 cm. She finds that the pendulum makes 100 complete swings in 136 s. What is the value of g on this planet?

Thermal Equilibrating & Latent Heat

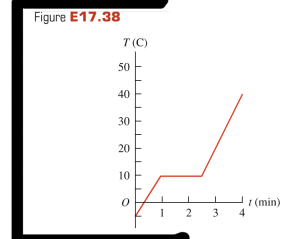
1) You are making tea & have almost boiling water at 95°C . Your friend doing a physics experiment launches a marble at your spoon, hoping to learn about torque. You laugh at their totally last week physics and find out they knocked your spoon, originally at room temperature 20°C , into your tea along with the marble.



Assuming the tea, marble & spoon thermally equilibrate before the objects lose heat to the air in the room, what is the system's final temperature?

Tea	$C_{\text{H}_2\text{O}} = 4190 \frac{\text{J}}{\text{kg}\cdot\text{K}}$	$T_{i,\text{H}_2\text{O}} = 95^\circ\text{C}$
Spoon	$C_{\text{Ag}} = 234 \frac{\text{J}}{\text{kg}\cdot\text{K}}$	$T_{i,\text{Ag}} = 20^\circ\text{C}$
marble	$C_{\text{CaCO}_3} = 879 \frac{\text{J}}{\text{kg}\cdot\text{K}}$	$T_{i,\text{CaCO}_3} = 25^\circ\text{C}$

In this scenario the marble was launched using explosives, maybe torque isn't so lame, & was ~~25~~ 25°C when it landed in your tea. You ~~can say~~ you had 1.5 cups of water, the marble was 100g & the spoon was 250g. (1 cup = 236.6 mL).



17.45 • A 6.00-kg piece of solid copper metal at an initial temperature T is placed with 2.00 kg of ice that is initially at -20.0°C . The ice is in an insulated container of negligible mass and no heat is exchanged with the surroundings. After thermal equilibrium is reached, there is 1.20 kg of ice and 0.80 kg of liquid water. What was the initial temperature of the piece of copper?

17.38 • As a physicist, you put heat into a 500.0-g solid sample at the rate of 10.0 kJ/min, while recording its temperature as a function of time. You plot your data and obtain the graph shown in Fig. E17.38. (a) What is the latent heat of fusion for this solid? (b) What are the specific heats of the liquid and solid states of the material?