This print-out should have 5 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

Temperature of Brakes 001 10.0 points

A 752 kg car moving at 26 m/s brakes to a stop. The brakes contain about 14 kg of iron that absorb the energy.

What is increase in temperature of the brakes? Assume the specific heat of iron is $450 \text{ J/kg} \cdot^{\circ} \text{C}$.

Answer in units of $^\circ\mathrm{C}$

Cooling a Hot Ingot 002 10.0 points

A 0.0602 kg ingot of metal is heated to 205° C and then is dropped into a beaker containing 0.411 kg of water initially at 18° C.

If the final equilibrium state of the mixed system is 20.4 °C, find the specific heat of the metal. The specific heat of water is $4186 \text{ J/kg} \cdot ^{\circ} \text{C}$.

Answer in units of $J/kg \cdot^{\circ} C$

Steam to Water 003 10.0 points

You have 54 g of steam at 100° C.

How much heat must be removed to change it to 54 g of water at 22°C? The specific heat of water is 4180 J/kg \cdot° C and its latent heat of vaporization is 2.26 \times 10⁶ J/kg .

Answer in units of J

Serway CP 11 27 004 10.0 points

A 28 g block of ice is cooled to -89° C. It is added to 536 g of water in an 98 g copper calorimeter at a temperature of 27° C.

Find the final temperature. The specific heat of copper is 387 J/kg·°C and of ice is 2090 J/kg·°C. The latent heat of fusion of water is 3.33×10^5 J/kg and its specific heat is 4186 J/kg·°C.

Answer in units of $^\circ\mathrm{C}$

Solar Heating 005 10.0 points A hot water heater is operated by using solar power.

If the solar collector has an area of 7 m², and the power delivered by sunlight is 977 W/m², how long will it take to increase the temperature of 1 m³ of water from 20°C to 51°C? The specific heat of water is 4186 J/kg \cdot ° C and the density of water is 1000 kg/m³.

Answer in units of h