This print-out should have 9 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering. The due time is Central time.

Please notice that for your homework to be considered towards your grade, it needs to be submitted one hour before the corresponding recitation starts.

PLEASE REMEMBER THAT YOU MUST CARRY OUT YOUR CALCULATIONS TO AT LEAST THREE SIGNIFICANT FIGURES. YOUR ANSWER MUST BE WITHIN ONE PERCENT OF THE CORRECT RESULT TO BE MARKED AS CORRECT BY THE SERVER.

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001 (part 1 of 2) 4 points

At 32°C, an aluminum ring has an inner diameter of 5 cm and a brass rod has a diameter of 5.05 cm.

If the temperature coefficient of expansion for brass is $\alpha_b = 1.9 \times 10^{-5}\ (^\circ\mathrm{C})^{-1}$ and the temperature coefficient of expansion for aluminum is $\alpha_a = 2.4 \times 10^{-5}\ (^\circ\mathrm{C})^{-1}$, to what temperature must the ring be heated so that it will just slip over the rod? Answer in units of °C.

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002 (part 2 of 2) 4 points

To what temperature must both be heated so that the ring just slips over the rod? Answer in units of °C.

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003 (part 1 of 1) 6 points

The density of gasoline is 730 kg/m^3 at 0°C. One gallon of gasoline occupies 0.0038 m^3. Gasoline's volume expansion coefficient is $0.00096^\circ\mathrm{C}^{-1}$.

How many extra kilograms of gasoline are obtained when fifteen gallons of gasoline are bought at 0°C rather than at 18°C (temperature at the filling station)? Answer in units of kg.

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004 (part 1 of 1) 6 points

A cowboy fires a silver bullet of mass 6 g with a muzzle speed of 228 m/s into the pine wall of a saloon.

What is the temperature change of the bullet? Assume that all the internal energy generated by the impact remains with the bullet. The specific heat of silver is 234 J/kg $\cdot^\circ$ C. Answer in units of °C.

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005 (part 1 of 1) 6 points

A 0.0489 kg ingot of metal is heated to 171°C and then is dropped into a beaker containing 0.42 kg of water initially at 23°C.

If the final equilibrium state of the mixed system is 25.4 °C, find the specific heat of the metal. The specific heat of water is 4186 J/kg $\cdot$ °C. Answer in units of J/kg $\cdot$ °C.

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006 (part 1 of 1) 6 points

In an insulated vessel, 395 g of ice at 0℃ is added to 660 g of water at 13℃.

How much ice remains when the system reaches equilibrium? Assume the heat of fusion of ice is 79.7 cal/g and its specific heat is 0.5 cal/g $\cdot^\circ$C. The heat of vaporization of water is 540 cal/g and its specific heat is 1 cal/g $\cdot^\circ$C. Answer in units of g.

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007 (part 1 of 1) 6 points

Given: specific heat of water = 1 cal/(g $\cdot^\circ$ C) .

How much heat is required to vaporize a(n) 1 g ice cube initially at 0°C? The latent heat of fusion of ice is 80 cal/g and the latent heat of vaporization of water is 540 cal/g. Answer in units of cal.

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008 (part 1 of 1) 6 points

A calorimeter contains 421 mL of water at 33°C and 24 g of ice at 0°C.

Find the final temperature of the system. The specific heat of water is 1 cal/g $\cdot^\circ$ C and the latent heat of fusion of water is 333000 J/kg . Answer in units of °C.

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009 (part 1 of 1) 6 points

A 76 g ice cube at −23°C is dropped into a container of water at 0°C .

How much water freezes onto the ice? The specific heat of ice is 0.5 cal/g $\cdot^\circ$ C and the heat of fusion of is 80 cal/g. Answer in units of g.