

Heat Assignment

Due date: September 30, 2019

Reminder: there is a grace period until October 3rd; however, if an assignment is handed in late (after September 30th) it will be marked but you will not receive feedback/corrections that help when studying for tests and exams. After October 3rd, the assignment will receive a mark of 0. Please refer to the course outline for full details.

To receive full marks, list all variables, equations used and show all your work. State your answer using the correct units and significant figures.

1. If your doctor tells you that your temperature is 310 K, should you worry? Explain your answer. (2 marks)
2. Convert 32 degrees Fahrenheit to degrees Kelvin. (3 marks)
3. For a 225 g sample of ethanol, 8.30 kJ of heat was removed to lower the temperature from 25.0°C to 10.0°C. What is the specific heat capacity of ethanol? (5 marks)
4. A person has a cup of very hot tea and adds a small amount of cold water to cool it. If the tea has a mass of 219 g and an initial temperature of 87°C, and the water has a temperature of 12°C and a mass of 27 g, what is the final temperature of the tea and water? Assume that the specific heat of tea is the same as that of water (6 marks).
5. How much energy does it take to melt 1.0 kg of solid gold? ($H_f = 6.7 \times 10^4$ J/kg) (3 marks)
6. How much total heat is required to raise the temperature of 1.5 kg of water from 19°C to 100°C and then to turn it into steam? (6 marks)
7. Thermal Expansion of a Hole: Is the object with a hole is heated, does the hole become larger or smaller? Many people believe that the it would become smaller, but in fact it becomes larger. As the temperature increases, the spacing between atoms lining the edge of the hole increases and therefore the hole's circumference increases.

Now consider this: a circular aluminum washer with a hole 9.500 mm in diameter at 20.0°C is to be heated until it will fit around a circular bolt 9.550 mm in diameter. To what temperature must the washer be heated? (5 marks)

