PacificGoldenPlover's Practice
Keep the Heat Test

(Note: for all temperature related problems, C = celsius, F = farenheit, and K = kelvin. STP means 1 atmosphere and 25 C)

1.   How many joules are in a calorie?
      a.   3.26
      b.   4.18
      c.   101.365
      d.   760

2.   What reaction is classified as the thermite reaction?
      a. $N_2 + 3H_2 \rightarrow 2NH_3$
      b. $2H_2 + O_2 \rightarrow 2H_2O$
      c. $2Fe + 3O_2 \rightarrow Fe_2O_3$
      d. $Al_2O_3 + 2Fe \rightarrow 2Al + Fe_2O_3$

3.   Consider the following reactions, with their standard enthalpy and entropy:
            i. $2H_2O_2 \rightarrow 2H_2O + O_2$ enthalpy = -98.2 kJ/mol entropy =70.5
                  J/molK
            ii. $2H_2O \rightarrow 2H_2 + O_2$ enthalpy = 483.6 kJ/mol entropy = 48.7
                                    J/molK
      Will the following reaction be spontaneous at STP?
      $H_2O_2 \rightarrow H_2 + O_2$?
      a.   Yes
      b.   No
      c.   Cannot be determined

4.   Which of the following is an intensive property (mark all that apply).
      a.   Specific heat
      b.   Heat Capacity
      c.   Pressure
      d.   Mass

5.   A 15 gram object has a heat capacity of 20 J/C. What is the specific heat of that object,
        in J/gC?
      a.   15
      b.   20
      c.   1.33
      d.   .75

6.   What tool is used to measure thermodynamic values?
      a.   Heatometer
      b.   Calorimeter
      c.   Colorimeter
      d.   Entropimeter

7. You cannot live without withdrawing energy from food because of which law of thermodynamics?
    a. 1st
    b. 2nd
    c. 3rd
    d. Really, I thought you could!

8. Work is put into a system, yielding a _____ enthalpy
    a. Positive
    b. Negative
    c. 0
    d. Not enough information

9. What is the unit of power?
    a. Volt
    b. Watt
    c. Newton
    d. Joule

10. Combustion:
    a. Is exothermic
    b. Is also known as carbon compound formation
    c. Has a positive enthalpy
    d. Has a negative entropy

11. Which unit of energy is equivalent to the amount of energy needed to raise the temperature of 1 kg of water by 1 degree C
    a. calorie
    b. Joule
    c. Kilocalorie
    d. Kilojoule

12. What is the heat released by cooling 3 grams of iron by 20 degrees celsius? (Specific heat of iron is .449 J/gC
    a. 26.94 Joules
    b. 3.00 Joules
    c. 4.08 Kilojoules
    d. 133.6 Joules

13. Convert 20 degrees farenheit to kelvin
    a. 68 K

b.   341 K
c.   7 K
d.   266 K

14.   If a gas has 20 kJ of work done on it, and releases 50 kJ of heat, delta E is
a.   30 kJ
b.   -30 kJ
c.   70 kJ
d.   -70 kJ

15.   Which gaseous element or compound requires the lowest temperature to liquify?
a.   Hydrogen
b.   Helium
c.   Nitrogen
d.   Carbon Dioxide

16.   Under what conditions is a reaction spontaneous?
a.   Endothermic and high entropy
b.   Endothermic and low entropy
c.   Exothermic and high entropy
d.   Exothermic and low entropy

17.   Why was thermodynamics first explored by early physicists?
a.   To expand Newton's ideas to energy
b.   To develop new theories after the discovery of the quantum
c.   To explain Lavoisier's experiments regarding conservation of mass.
d.   To find ways to maximize output from steam engines

18.   It takes 420 joules of energy to raise the temperature of a substance by 14 degree C. If the
       mass of this substance is 10 grams, What is the heat capacity of the substance?, in J/gC
a.   .333
b.   3
c.   1400
d.   None of the above

19.   The founder of modern thermodynamics was:
a.   Maxwell
b.   Carnot
c.   Einstein
d.   Clausius

20.   In what year was the Newcomen's steam engine created?
a.   1709
b.   1710
c.   1711

d.   1712

21.   When 200 mL of water is cooled by 30 C in a calorimeter, the temperature of the 500 mL of water in the calorimeter increases from 10 C to 17 C. What is the heat capacity of the calorimeter in J/C? (Specific heat of water is 4.184 J/gC).
    a.   1.5 J
    b.   1.5 kJ
    c.   2.5 J
    d.   2.5 kJ

22.   In an exothermic system, energy flows
    a.   Into the system
    b.   Out of the system
    c.   No change
    d.   None of the above

23.   At which temperature does the Celsius reading equal the Farenheit reading?
    a.   -50 C
    b.   -40 C
    c.   -30 C
    d.   -20 C
    e.   -10 C

24.   A calorimeter has a fixed volume and variable pressure. What is the name for it?
    a.   Isobaric
    b.   Isotonic
    c.   Isothermic
    d.   None of the above

25.   In a Carnot process, the initial heat of a system is 50 J, and 300 K. The object then performs 15 J of work on the surroundings. What is the entropy of this system?

26.   A 1 meter bar of iron is heated from 20 C to 30 C. A 1.5 meter bar of titanium is raised from 10 C to 11 C. Which bar will be longer at the end, and what will be the difference of their lengths? (Thermal expansion coefficients are 11.8E-6 and 8.6E-6 Celsius for iron and titanium, respectively).