## Practice Problems

Solve the following problems. If doing by hand, use engineering paper, and no more than one problem per page. For each problem include organizational headers like: Given, Find, Plan, Solution, Check, and Reflection

1. The thermal conductivity equation is:

Where is the rate of heat transfer [Watt], A is the cross sectional area [m2], T is the temperature [K], and x is the distance [m]. Determine the units of κ (thermal conductivity)

1. Trinitrotoluene (TNT) has a molecular formula of C7H5(NO2)3. If you have 1.0 lbm­ of TNT, determine the number of lbmole you have.
2. A Honda EU2000i generator will be used to power a toaster.   
   The toaster information is:

Voltage: 110V  
Current: 8.0 A  
Time: 3 minutes and 9 seconds to make toast

The generator information is:

Energy conversion efficiency (from gasoline to electricity): 30%

Heating value (chemical energy) of gasoline: 44,400 kJ/kg

Density of fuel: 43.75 lbm/ft3

Determine how many teaspoons of gasoline are required to make toast?

## Preparatory Reading Questions

1. What are three fundamentally different types of thermodynamic systems? How do these differ based on mass and energy transfer in/out of the system?
2. For each of the following variables (see the list of symbols on page xxi), determine the following: (a table/grid layout may be the easiest way to present this)
   1. What is the physical interpretation of the following variables?
   2. Classify them as intensive or extensive
   3. What are the SI units for each?
   4. What are the fundamental dimensions of each in the MLt system?

**Variables:** *v, V, PE, F, p, ke, u, U, W, Q*

1. What is the difference between a thermodynamic process and a thermodynamic cycle?

## Answers to Practice Problems

1. Thermal conductivity should have units of W/(m\*K) in the SI unit system
2. 1.0 lbm­ of TNT will be roughly 4.4 \* 10-3 lbmol
3. Making toast with this method will require ~ 3.6 teaspoons of gasoline