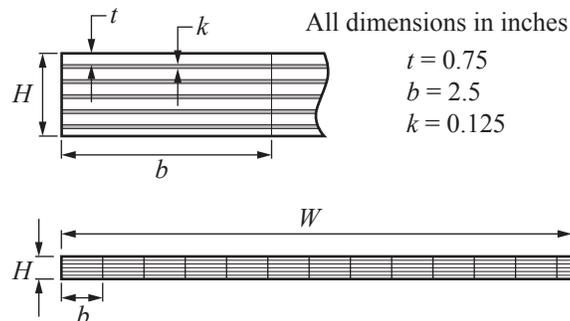


**NOTE:** Use engineering format for problems 2 through 6. Since the answers are given, you should put effort into developing a concise, organized and accurate analysis leading up to the final value. This is an individual assignment. You must *complete* the assignment on your own. You may discuss the problems and solution techniques with other class members. You may not copy the work of other students, exchange of PowerPoint slides, or share the finished work of others.

- Send the instructor an email message using your PSU email address. Include a selfie with a caption that tells a little about yourself. In the body of the email message, list the tools and materials from the equipment list that you have purchased or assembled so far. The equipment list is on the dokuwiki site for the class, <http://me120.mme.pdx.edu/doku.php?id=equipment>.
- Narrow pieces of wood 2.5 inches long and 0.75 inches wide are needed to assemble a mobile robot for ME 120. As indicated in the schematic below, the strips are cut from a 1 x 4 x 8-foot board from a lumber yard. Including a 1/8 inch allowance for the kerf, how many pieces can be cut from a 1 x 4 x 8-foot board? Set up the problem with symbols and show your work. No credit will be given if you just provide a numerical answer.  
Hints: (1) A 1 x 4 board from a lumber yard is *not* 4 inches wide and 1 inch thick. (2) *Kerf* is the thickness of material removed during cutting.



- Jane wants to build a heater to keep her tea warm. She found a thin heating element on Amazon (<https://www.amazon.com/gp/product/B06XR9YZDH>) that is claimed to produce 7W at 12V. What is the resistance of this heater?
- A lamp is plugged into 10 volt DC power source. An ammeter attached to the circuit indicates a current of 2 amps. Using this information, how many ohms of resistance does the lamp provide? **Answer = 5Ω**
- Three separate circuits are created with incandescent light bulbs having electrical resistances of 1Ω, 3Ω and 330Ω, respectively. One alkaline AA battery supplies power for each circuit. For each light bulb:
  - How much current flows through the filament?
  - How much power is dissipated?

6. An ideal voltage source of 12 volts is attached to a set of four resistors with  $R_1=270\Omega$ ,  $R_2=470\Omega$ ,  $R_3=330\Omega$  and  $R_4=10k\Omega$  as shown below.

- (a) Find the equivalent resistance of the circuit diagram.  
(b) Draw the equivalent circuit diagram (using standard symbols for the voltage source and the resistor).  
(c) Compute the current leaving the power source. **Answer = 24mA**

