**Energy & Power Systems**

NAME \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

DATE \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Solder Practice & Police Siren Kit I**

**INVENTORY**

1. PAGE 2 Check the inventory of your parts kits from Table 1 and Table 2. Circle the QTY number as you check off each item. Be careful not to lose any parts.

**IDENTIFYING COMPONENTS**

1. What is the most used electronic component? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What is the function of a resistor? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Describe in words what a resistor looks like. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#5

#4

1. Draw a sketch of what a resistor looks like.
2. Draw the electronic component symbol for resistor.
3. The physical size of a resistor depends on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ it was designed to handle.
4. All of the resistors in this module are design to handle a \_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ of power.
5. T / F All of the resistors in this kit are physically the same size.
6. Even though resistors are physically the same size, they can have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ electrical values.
7. What is the electrical unit of measure for a resistor? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. How can we tell the resistance value of a resistor? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**RESISTORS**

**DIRECTIONS:** Go to <http://www.kpsec.freeuk.com/components/resist.htm> or find the link on my webpage and answer the questions below. All answers are from the webpage.

1. What is the function of a resistor? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. T / F Heat can damage a resistor.
3. T / F A resistor can be soldered in a board in any direction. They are not directional.
4. Resistance is measured in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

#16

1. Write the word and draw the symbol that represents ohms.
2. Resistor values are can be determined by what markings? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. T / F 1 is quite small so resistor values are often given in k and M.
4. 1 k = \_\_\_\_\_\_\_\_    1 M = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. (be sure to use commas)



1. Enter the number values on the resistor chart on the right.
2. Most resistors have\_\_\_\_\_ bands

The first band give the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The second band gives the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The third band gives the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The fourth band used to shows the \_\_\_\_\_\_\_\_\_\_\_\_ (precision) of the resistor

1. Look at the resistor below and determine its resistance value. Do not use the

shorthand version. Use the symbol for ohm in your answer.



22. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Gold**

**Yellow**

**Violet**

**Red**

23. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**Orange**

**Blue**

**Silver**

**Green**

#### resistor

**Orange**

24. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Gold**

**Green**

**Brown**

24. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#### resistor

**Silver**

**Yellow**

**Orange**

**Orange**

####  Small value resistors (less than 10 ohm)

1. The standard color code cannot show values of less than \_\_\_\_\_\_. To show these small values two special colors

are used for the \_\_\_\_\_\_\_\_\_\_ band: \_\_\_\_\_\_\_\_\_\_ which means × \_\_\_\_\_\_and \_\_\_\_\_\_\_\_\_ which means × \_\_\_\_\_\_\_. The first and second bands represent the digits as normal.

1. SAMPLE PARACTICE – Use your calculator to check the answer
red, \_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_bands represent \_\_\_\_\_\_\_\_ × \_\_\_\_\_\_\_ = \_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_, blue, \_\_\_\_\_\_\_\_\_ bands represent \_\_\_\_\_\_\_\_ × \_\_\_\_\_\_\_ = \_\_\_\_\_\_\_

1. Orange, Orange, Gold bands represent \_\_\_\_\_\_\_\_ × \_\_\_\_\_\_\_ = \_\_\_\_\_\_\_
2. Yellow, Violet, Silver bands represent \_\_\_\_\_\_\_\_ × \_\_\_\_\_\_\_ = \_\_\_\_\_\_\_

**Tolerance of resistors (fourth band of color code)**

1. The tolerance of a resistor is shown by the \_\_\_\_\_\_\_\_\_ band of the color code. \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_is the precision of the resistor and it is given as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. For example a 390 resistor with a tolerance of \_\_\_\_10% will have a value within \_\_\_\_\_\_\_\_\_ of 390, between 390 - 39 = \_\_\_\_\_\_\_\_ and 390 + 39 = \_\_\_\_\_\_\_\_ (39 is 10% of 390).
2. A special color code is used for the \_\_\_\_\_\_\_\_\_\_ band tolerance:

\_\_\_\_\_\_\_\_\_\_\_ ±10%

\_\_\_\_\_\_\_\_\_\_\_ ±5%

\_\_\_\_\_\_\_\_\_\_\_ ±2%

\_\_\_\_\_\_\_\_\_\_\_ ±1%.

1. If no fourth band is shown the tolerance is \_\_\_\_\_\_\_\_\_\_%
2. Tolerance may be \_\_\_\_\_\_\_\_\_\_\_ for almost all circuits because precise resistor values are rarely required.

### Resistor Shorthand

1. Resistor values are often written on circuit \_\_\_\_\_\_\_\_\_\_\_ using a code \_\_\_\_\_\_\_\_\_\_\_\_ which avoids using a \_\_\_\_\_\_\_\_\_\_\_\_ point because it is easy to miss the small dot. Instead the letters \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ are used in place of the decimal point. To read the code: \_\_\_\_\_\_\_\_\_\_ the letter with a decimal point, then \_\_\_\_\_\_\_\_\_\_\_\_ the value by \_\_\_\_\_\_\_\_\_\_ if the letter was K, or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ if the letter was M. The letter R means multiply by \_\_\_\_\_. Mr. Kush recommends to always use commas when writing numbers 1,000 or greater. This will help you identify the place values more easily.

**EXAMPLES**

1. 560R means 560  or 560 x 1 = 560
2. 2K7  means 2.7 k = 2700  or 27 x \_\_\_\_\_\_\_\_\_\_ = 2,700
3. 39K  means 39 k or 39 x \_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. 1M0  means 1.0 M = 1000 k or \_\_\_\_\_\_\_\_\_\_\_\_\_ x \_\_\_\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**GO BACK TO PAGE 4 IN THE “SOLDER PRACTICE KIT GUIDE”**

**CAPACITORS**

1. What is the function of a capacitor? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#38

#39

#37

1. What is the electronic symbol for a capacitor?
2. Draw a sketch of a ceramic capacitor visually looks like.
3. Draw a sketch of a electrolytic capacitor visually looks like.
4. What two types of capacitors are used in this kit? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ capacitor is a \_\_\_\_\_\_\_\_\_\_ lead \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ device. Unidirectional means that the capacitor must be installed in the \_\_\_\_\_\_\_\_\_\_ direction. It will \_\_\_\_\_\_\_\_\_\_\_ work if it is soldered in the wrong direction.
6. The \_\_\_\_\_\_\_\_\_\_\_ lead (pronounced “leed”) of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ capacitor is marked with “\_\_\_\_” (negative). The other lead is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ which is normally \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
7. The \_\_\_\_\_\_\_\_\_\_\_\_\_ value of capacitor is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a unit called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The value of an electrolytic capacitor is normally printed on the capacitor in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
8. What is the symbol for microfarad printed on the side of an electrolytic capacitor? \_\_\_\_\_\_\_\_
9. What does the term “bidirectional device” mean? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**DIODES**

1. What is the function of a diode? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#48/49

#47

1. What is the electronic symbol for a diode?
2. Draw a sketch of a diode visually looks like.
3. Label the “cathode” and the “anode” in the diagram
4. A \_\_\_\_\_\_\_\_\_ is a unidirectional device. Explain what this means. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. A diode is normally in the shape of a \_\_\_\_\_\_\_\_\_\_\_\_ with leads coming out of \_\_\_\_\_\_\_ends.
2. A diode will have a \_\_\_\_\_\_\_\_\_\_\_ around the one end which is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The opposite end is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**L E D**

1. What does the acronym L.E.D stand for? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What is the function of a LED? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#56/57

#55

1. What is the electronic symbol for a LED?
2. Draw a sketch of a LED visually looks like.
3. Label the “cathode”, “anode”, and “flat” in the diagram
4. A \_\_\_\_\_\_\_\_\_ is a unidirectional device. Explain what this means. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Like a normal diode, a \_\_\_\_\_\_\_\_\_\_\_ has \_\_\_\_\_\_\_\_\_\_\_ leads. One lead is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the other lead is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lead is always nearest the \_\_\_\_\_\_\_\_\_\_ edge on the \_\_\_\_\_\_\_\_\_\_\_ of the LED. The other lead is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the anode.

**TRANSISTOR**

1. What is the function of a Transistor? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#63/64

#62

1. What is the electronic symbol for a transistor?
2. Draw a sketch of a transistor visually looks like.
3. Label the “emitter”, “base”, and “collector” in the diagram
4. What transistor is used in this module? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**I C**

1. What does the acronym I. C. stand for? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What is the function of a IC? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#63/64

#62

1. What is the electronic symbol for an IC?
2. Draw a sketch of an IC visually looks like.
3. Label each of the legs of the IC in the diagram
4. There are many types of IC packages. The most popular type of IC is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. What does the acronym D.I.P. stand for? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. The notch on the IC is very important. The notch tells us what direction to place the component into the socket.

**PRINTED CIRCUIT BOARD**

1. What does the acronym PCB stand for? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What is the function of a PCB? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. The PCB board is made from an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ type of material which is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. On one side of the board, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ runs provide electrical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between the components.

Draw a picture of what a PCB visually looks like.