Simulated Circuit Elements

Getting Started

- 1. Go to http://falstad.com/circuit/
- 2. Select Circuits Basics Ohm's Law.
- 3. The yellow dots represent current flow. Notice it flows faster through the 100 Ω than the 1000 Ω resistor as we would expect.
- 4. You can hover your cursor over each resistor to see the current through each resistor (as well as other properties) in the bottom right corner.

<u>Diodes</u>

- 1. Select *Circuits Diodes Diode*.
- 2. Manipulate the voltage using the slider on the right.
 - a. What do you notice when the voltage is negative?
 - b. Check a range of positive voltages. What do you notice?
 - c. At what voltage is the current through the diode appreciable (~1 mA)
 - d. Sketch the I vs V graph through the diode based on your observations.
 - e. Now select *Circuits Diodes Diode Diode I/V Curve*. How does the I vs V graph compare to your sketch?
 - f. Describe the behavior of the diode in your own words

Rectifiers

- 1. Select Circuits Diodes Half Wave Rectifiers
- 2. What do you notice about the voltage across the resistor in comparison to the voltage of the power supply?
- 3. What do you notice about the flow of the current through the resistor?
- 4. Based on your observations, why do you think this is called a half wave rectifier?
- 5. Now select Circuits Diodes Full Wave Rectifiers
- 6. What do you notice about the voltage across the resistor in comparison to the voltage of the power supply?
- 7. What do you notice about the flow of the current through the resistor?
- 8. Based on your observations, why do you think this is called a full wave rectifier?
- 9. What practical applications do you think half and full wave rectifiers have?
- 10. Describe a rectifier in your own words

Transformers

- 1. Select Circuits Other Passive Circuits Transformers Transformer
- 2. What do you notice about the current on either side of the transformer?
- 3. Based on your observations, sketch what you think the physical setup of the transformer is.
- 4. Go to <u>http://hyperphysics.phy-astr.gsu.edu/hbase/magnetic/tracir.html</u> and compare this diagram to your sketch.
- 5. Now hover over the transformer. What do you think the ratio stat tells you?
- 6. Select Circuits Other Passive Circuits Transformers Step-Up Transformer
- 7. What do you notice about the current on either side of the transformer?
- 8. Now hover over the transformer. How do you think this ratio affects the circuit's behavior?
- 9. Select *Circuits Other Passive Circuits Transformers Step-Down Transformer* 10. What do you notice about the current on either side of the transformer?
- 11. Now hover over the transformer. How do you think this ratio affects the circuit's behavior?

Circuit of your Choice

- 1. Select one other circuit that we have not seen in this course so far and write which circuit you chose here.
- 2. Write at least three focused questions you would want answered in order to understand the circuit and try to answer them.