As you complete this scientific investigation, fill in ay needed information on this template. If you need more information about each section, please visit the Developmental Module.

**Title**

Faraday’s Electromagnetic Scientific Investigation

**Hypothesis**

Using the **Procedure and Data Collection** section of the scientific investigation, read through the procedural information for this scientific investigation. Based on your understanding of the procedure, develop your own hypothesis which describes your expected results. Below write your hypothesis regarding the characteristics of electromagnets and their effect on a magnetic field's strength and direction? Record your hypothesis below:

**Data Collection and Analysis**

Once you have completed the Procedure and Data portions of the scientific investigation, provide responses to the following questions:

**Bar Magnet Simulation**

1. Move the magnet and compass around to various positions. What impact did the movement have on the direction of the compass point?
2. Using the slider near the upper right of the screen, change the Bar magnet strength to 0%. What impact did this have on the magnetic field?

**Pickup Coil Simulation**

1. Move the magnet and the coil of wire around with respect to each other and describe what you see.
2. Now, place the bar magnet so that the red side (N) is just touching the coil. Quickly change the strength of the bar magnet between 0% and 100% and back again. Describe what you see, paying particular attention to the electrons.
3. What does a changing electric field do to electric charges?
4. Electric charges are actually directly influenced by electric fields, not magnetic ones, so what must a changing magnetic field produce?

**Electromagnet Lab**

1. Using the slider on the battery, vary the voltage of the battery from 10 Volts to 0 Volts to 10 Volts in the other direction. What happens to the motion of the charges?
2. What happens to the magnetic field when the charges are at rest?
3. What can you conclude about how magnetic fields can be produced?

**Conclusion**

Compose three to four sentences describing an overall conclusion about the relationship between the characteristics of electromagnets that are variable and the effects each variable has on the magnetic field's strength and direction. Were your hypotheses true or false, and how do you know? Use the data and notes that you collected from your simulation experience to form your conclusion. Make sure that you include information that you gained from data analysis to support your conclusion.

**Experimental Sources of Error**

On your Faraday’s Electromagnetic Scientific Investigation Report, provide responses to the following questions: **Are there any sources of error? If so, what are they and what could be done to minimize error?**