## **Wrap-Up Challenge: Rescue Base Blueprint**

You’re now ready to design a **complete jungle rescue system** using everything you’ve learned.

### **Materials Needed:**

* Use at least **2 types of energy transfer**:
  + 💡 Light (LED)
  + 🔊 Sound (buzzer)
  + 🔄 Motion (motor/spinner)

### **Sketch Your Rescue Base:**

Draw your system and **label where energy starts and what it turns into**.  
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**🧭 Wrap-Up Challenge: Rescue Base Blueprint**

**Goal**: Design a jungle rescue system using at least **two types of energy transfer**:  
💡 *Light*, 🔊 *Sound*, 🔄 *Motion*

**✅ ITEEA STEL Standards – Middle School**

**STEL 1D** – *Technological systems use inputs, processes, outputs, and feedback.*  
→ Students design a **working system** where electrical energy is **converted into light, sound, or motion**.

**STEL 2D** – *Systems thinking helps students understand how parts interact.*  
→ The rescue base design shows how **LEDs, buzzers, and motors function together** as an energy-based system.

**STEL 3D** – *Troubleshooting helps identify and fix problems in design.*  
→ Students draw and test a model that can be **refined through observation and iteration**.

**STEL 4D** – *Creativity and innovation help develop new ideas and solutions.*  
→ Each student’s **unique rescue blueprint** encourages imaginative thinking with real constraints.

**STEL 5D** – *Engineering design is a process involving testing and redesign.*  
→ Students demonstrate the **final phase of the engineering design cycle**, integrating components and testing.

**STEL 6D** – *Modeling and prototyping are key to exploring solutions.*  
→ The blueprint sketch represents a **system prototype**, showing energy flow and system layout.

**STEL 7D** – *Constraints shape design decisions.*  
→ Choosing which components to include (due to space, power, or simplicity) introduces **realistic design limits**.

**✅ Common Core Math Standards – Middle School**

**CCSS.MATH.CONTENT.6.EE.C.9** – *Use variables and write equations to model real-world systems.*  
→ Students **label energy sources and conversions** using symbols or expressions (e.g., “Battery → LED = Light”).

**CCSS.MATH.CONTENT.7.RP.A.2** – *Recognize and represent proportional relationships.*  
→ If students estimate how **brightness or sound scales with voltage or battery count**, they explore **ratios in circuits**.

**CCSS.MATH.PRACTICE.MP2** – *Reason abstractly and quantitatively.*  
→ Students understand how **energy flows through components**, and what quantities affect performance.

**CCSS.MATH.PRACTICE.MP4** – *Model with mathematics.*  
→ The blueprint is a **visual model** of a system, linking science and math through design.

**CCSS.MATH.PRACTICE.MP5** – *Use appropriate tools strategically.*  
→ Students may incorporate circuit symbols, measurement units, or arrows to **communicate energy flow effectively**.

**✅ Summary**

This final project is a **culminating STEM task** that demonstrates mastery of:

* **NGSS physical science concepts** (energy transfer),
* **ITEEA engineering systems thinking**, and
* **Common Core math modeling and problem-solving**.

It prepares students to think like **engineers and inventors**, with real-world applications in rescue tech, robotics, and energy systems.