

### Visible Elements in Photo



- A green terminal block (numbered 1–8) with multiple wire connections in various colors (green, blue, yellow, red, black)
- A blue terminal block labeled "C P/MV" mounted above the green block
- A yellow terminal block labeled "R1 R2 C" mounted to the right
- Colored wires (copper or insulated) connected between blocks and extending downward
- A white rectangular component (likely a fuse holder or breaker) mounted at the top of the wall
- A small metallic cylindrical object (possibly a component or connector) visible on one...

### Reasonable Inferences

- From the numbered terminal blocks and color-coded wires: This is a functional electrical circuit or control system where different wires must connect to specific terminals in the correct sequence to deliver power safely (inference: the numbering and color-coding serve as guides to prevent miswiring).
- From the multiple terminal blocks and visible connections: The system distributes or controls electrical current to multiple destinations, suggesting a need for organization and clear labeling to avoid dangerous mistakes (inference: safety and reliability depend on correct connections).
- From the exposed wires and connectors: The setup is designed to be modular and testable, allowing changes without permanent modification (inference: this is an educational or diagnostic system where troubleshooting and reconfiguration are expected).

### Engineering Task

#### K-2 Challenge:

Make a "wire pathway" that helps electricity find the right path from start to finish. Use string or yarn to create a trail that connects your starting point (a colored block) to all your stopping points (other colored blocks), following the same color order. Your pathway should be easy to follow and not tangle up.

#### 3-5 Challenge:

Design a color-coded wiring guide system for a multi-terminal electrical panel. Your challenge: create a clear, reusable labeling and routing scheme that allows someone unfamiliar with the circuit to correctly connect 6 colored wires to 8 numbered terminal positions without error. Your design must include: (1) color-to-number mapping labels, (2) a physical routing method (clips, channels, or guides) that keeps wires organized and separated to prevent accidental contact, and (3) a testing checklist that verifies each connection before power is applied. Success = zero miswired connections on a first attempt by a peer using only your guide.

### EDP Phase Targeted

**Create / Test** — This phase fits best because the photo shows an existing functional system with visible components and wire connections. Students can immediately prototype solutions by building their own scaled version, testing how well their labeling and routing scheme prevents errors, and iterating based on whether peers can follow their instructions correctly. The tangible, hands-on nature of the task aligns with building and testing rather than abstract planning.

## Suggested Materials

- Colored yarn, string, or electrical tape (to represent or organize wires)
- Index cards or sticky labels (for creating color-to-number mapping guides)
- Foam board, cardboard, or pegboard (to build a practice terminal block panel)
- Plastic clips, velcro strips, or paper fasteners (to hold wires in organized routes)
- Marker or pen (to label terminals and create connection diagrams)

## Estimated Time

K-2: 20–30 minutes (one session)

3-5: 45–60 minutes (one extended session, or two 30-minute sessions if testing with peers is included)

## Why This Works for Teachers

This task directly addresses NGSS ETS1.B (Developing Possible Solutions) by requiring students to design, test, and refine a clear communication and safety system for managing multiple connections—a real-world constraint in electrical and technical fields.