**Scenario: Setting Up a Simple Office Network**

**Objective**: Create a small office network to allow devices (computers, printers, and mobile devices) to communicate, share files, and access the internet.

**Step 1: Gather Equipment**

1. **Router**: Acts as the gateway to the internet.
2. **Switch**: Connects multiple devices within the local network (if you have more devices than router ports).
3. **Ethernet Cables**: For wired connections.
4. **Computers/Devices**: At least two for testing.
5. **Printer/Scanner**: Optional, for testing shared resources.

**Step 2: Set Up the Physical Network**

1. **Connect the Router**:
   * Plug the router into a power source.
   * Connect the router’s WAN/Internet port to the internet source (modem or ISP line).
2. **Connect the Switch (if needed)**:
   * Connect one of the router's LAN ports to the switch using an Ethernet cable.
3. **Connect Devices**:
   * Plug computers into the router or switch using Ethernet cables.
   * For wireless devices, connect to the router’s Wi-Fi network.

**Step 3: Assign IP Addresses**

1. **Understand IP Addressing**:
   * **Router IP**: Usually 192.168.1.1 or 192.168.0.1.
   * **Subnet Mask**: Typically 255.255.255.0.
   * **Device IP Range**: E.g., 192.168.1.2 to 192.168.1.254.
2. **Enable DHCP (Dynamic Host Configuration Protocol)**:
   * Log into the router’s web interface (usually accessible via http://192.168.1.1 in a browser).
   * Ensure DHCP is enabled so devices get IP addresses automatically.
3. **Static IP Option (Manual Assignment)**:
   * On a computer, go to **Network Settings > IPv4 Settings** and assign:
     + IP: 192.168.1.x (where x is unique for each device).
     + Subnet Mask: 255.255.255.0.
     + Gateway: 192.168.1.1.
     + DNS: Use the router IP or public DNS like 8.8.8.8.

**Step 4: Test Network Connectivity**

1. **Ping Test**:
   * Open Command Prompt (Windows) or Terminal (Mac/Linux).
   * Run ping 192.168.1.1 to test connectivity to the router.
   * Ping another device (e.g., ping 192.168.1.2) to verify internal communication.
2. **Check Internet Access**:
   * Open a web browser and access a website.

**Step 5: Set Up Shared Resources**

1. **File Sharing**:
   * On Windows:
     + Create a folder, right-click it > **Properties > Sharing > Share**.
     + Set permissions (e.g., read-only or full access).
   * On Mac:
     + Go to **System Preferences > Sharing > File Sharing**.
     + Add a folder and set user permissions.
   * Verify that the shared folder is accessible from another device.
2. **Printer Sharing**:
   * Connect the printer to one computer or directly to the network (Wi-Fi/Ethernet).
   * Share the printer:
     + On Windows: **Control Panel > Devices and Printers > Share Printer**.
     + On Mac: **System Preferences > Sharing > Printer Sharing**.

**Step 6: Configure Security**

1. **Change Router Default Settings**:
   * Set a strong admin password for the router.
   * Change the default Wi-Fi SSID (network name) and password.
2. **Enable Network Encryption**:
   * Use **WPA3** or **WPA2** for Wi-Fi security.
   * Disable WPS (Wi-Fi Protected Setup) for better security.
3. **Firewall and Antivirus**:
   * Ensure devices have a firewall enabled and updated antivirus software.

**Step 7: Advanced Networking (Optional)**

1. **Create VLANs**:
   * Separate devices (e.g., guests vs. staff) for better security.
   * Configure VLANs on a managed switch or router.
2. **Access Control**:
   * Set up MAC address filtering to control which devices can join the network.
3. **Remote Access**:
   * Configure VPN (Virtual Private Network) on the router for secure remote access.

**Step 8: Troubleshooting**

* **No Internet?**:
  + Check if the router is connected to the ISP.
  + Verify that devices have correct IP configurations.
* **Can’t Ping?**:
  + Ensure devices are on the same subnet.
  + Disable any firewalls temporarily for testing.
* **Wi-Fi Issues?**:
  + Reduce interference by changing the Wi-Fi channel in the router settings.
  + Position the router centrally for better signal coverage.