



# POWER HOUSE

## STUDY GUIDE FOR APTITUDE TEST

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# POWER YOUR POTENTIAL

**Safety & Workplace Policies****1. Testing a Circuit Before Touching**

- o Always test a circuit yourself before touching it. Never rely on someone else's word.
- o Use a voltage tester or multimeter to verify the circuit is de-energized.

**2. Alcohol and Drug Policy**

- o No alcohol or drugs are permitted on a worksite at any time.
- o These substances impair judgment and pose safety risks.

**3. Lockout/Tagout Procedures**

- o Designed to prevent accidental energization of equipment.
- o Lockout involves physically locking power sources in an "off" position.
- o Tagout involves labeling the locked-out device to warn others.

**4. Ladder Safety**

- o Never use the top step of a ladder, as per manufacturer recommendations.
- o Maintain three points of contact when climbing.

**5. Lab Safety at PowerHouse**

- o Safety goggles are always required in the lab.
- o Additional PPE (personal protective equipment) may be necessary depending on the task.

**Electrical Concepts & Definitions**

6. **Resistance** – The opposition to current flow in an AC or DC circuit.
7. **Alternating Current (AC)** – Current that periodically reverses direction.
8. **Current** – The rate of flow of electrons.

9. **Voltage** – Electromotive force or potential difference.

10. **Direct Current (DC)** – Current that does not reverse its direction of flow.

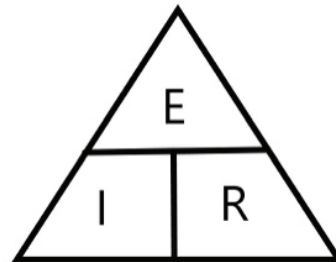
### Ohm's Law & Electrical Calculations

Ohm's Law is a fundamental principle in electrical engineering that defines the relationship between voltage (V), current (I), and resistance (R) in an electrical circuit. It states that the voltage across a conductor is directly proportional to the current flowing through it, provided the resistance remains constant. The formula for Ohm's Law is:

$$V=I \times R \quad R = \frac{V}{I} \quad I = \frac{V}{R}$$

Where:

- V = Voltage (volts)
- I = Current (amperes)
- R = Resistance (ohms)



To execute the formula:

1. To find voltage (V): Multiply current (I) by resistance (R).

o Example: If a circuit has 2A of current and 10Ω of resistance, the voltage is:

$$V=2A \times 10\Omega = 20V \quad V = 2A \times 10\Omega = 20V$$

2. To find current (I): Divide voltage (V) by resistance (R).

o Example: If a circuit has 24V and 8Ω of resistance, the current is:

$$I = \frac{24V}{8\Omega} = 3A \quad I = \frac{24V}{8\Omega} = 3A$$

3. To find resistance (R): Divide voltage (V) by current (I).

o Example: If a circuit has 120V and 6A of current, the resistance is:

$$R = \frac{120V}{6A} = 20\Omega \quad R = \frac{120V}{6A} = 20\Omega$$

Ohm's Law is essential for designing and troubleshooting electrical circuits, ensuring proper voltage, current, and resistance levels for safe and efficient operation.

11. **E in Ohm's Law** – Stands for Electromotive Force (Voltage/EMF).

12. **I in Ohm's Law** – Represents Intensity, meaning Current.

13. **R in Ohm's Law** – Stands for Resistance, measured in ohms (Ω).

**14. Voltage Calculation ( $V = I \times R$ )**

- o Example: A circuit has a resistance of  $15\Omega$  and a current of 3A.
- o Voltage =  $3A \times 15\Omega = 45V$

**15. Current Calculation ( $I = V \div R$ )**

- o Example: A 36V power supply is connected to a  $12\Omega$  resistor.
- o Current =  $36V \div 12\Omega = 3A$

**16. Resistance Calculation ( $R = V \div I$ )**

- o Example: A heating element operates at 240V with a current of 8A.
- o Resistance =  $240V \div 8A = 30\Omega$

**Apprenticeship Requirements****17. On-the-Job Experience**

- o Apprentice electricians need **8,000 hours** of on-the-job training to test for the journeyman license in ND and MN.

**18. Education/Related Training**

- o Apprentices must complete **576 hours** of classroom education to be eligible for the journeyman's exam.

**Math Skills Review**

To add fractions, follow these steps:

**1. Same Denominators**

If the fractions have the same denominator, **add the numerators** and keep the denominator the same.

**Example:**

$$\frac{3}{8} + \frac{2}{8} = \frac{5}{8}$$

## 2. Different Denominators

If the denominators are different, follow these steps:

Example:

$$\frac{1}{4} + \frac{2}{6}$$

**Step 1: Find the Least Common Denominator (LCD)**

The LCD of 4 and 6 is 12.

**Step 2: Convert each fraction to the LCD**

$$\frac{3}{12} = \frac{2}{6} \quad (\text{multiply top and bottom by 3})$$

$$\frac{3}{12} = \frac{4}{12} \quad (\text{multiply top and bottom by 2})$$

**Step 3: Add the numerators**

$$\frac{3}{12} + \frac{4}{12} = \frac{7}{12}$$

## 19. Adding Fractions

o  $(2/5) + (3/7) = 29/35$

o  $(5/9) + (2/3) = 11/9$

o  $(7/8) + (1/4) = 9/8$

## 20. Area Calculation

o A workshop measures 14 ft by 9 ft. What is the total square footage?

o  $14 \times 9 = 126 \text{ sqft}$

### Tips for Success

- o **Understand concepts, not just answers.** Knowing why an answer is correct helps retain knowledge.
- o **Familiarize yourself with electrical terminology** to build confidence for the test.
- o **Brush up on math skills**, especially working with fractions and basic algebra.
- o **Familiarize yourself with reading a tape measure**, including identifying the main markings, understanding the fractional increments, and reading the measure within the nearest whole inch and fraction within a 16th of an inch.

**Good luck on your exam!**