

ELECTRICAL 103 ● LIVE

**PARTICIPANTS
WORKBOOK**

TRANSFORMERS

KNOWING WHEN THE JOB IS TOO MUCH...

It's EQUALLY important to know when to call for help as it is to know how to do the job.

Transformers are a perfect example - DON'T Touch Them!
Call your Utility Company and let them handle it.



HOUSE METERS

An electricity meter, electric meter, electrical meter, or energy meter is a device that measures the amount of electric energy consumed by a residence, a business, or an electrically powered device.



HOUSE METERS

A white sheet of paper with ten horizontal lines, held in place by two orange paper clips against a background of a utility meter cabinet. The paper is positioned in the center of the image, and the lines are evenly spaced and extend across most of the width of the paper.

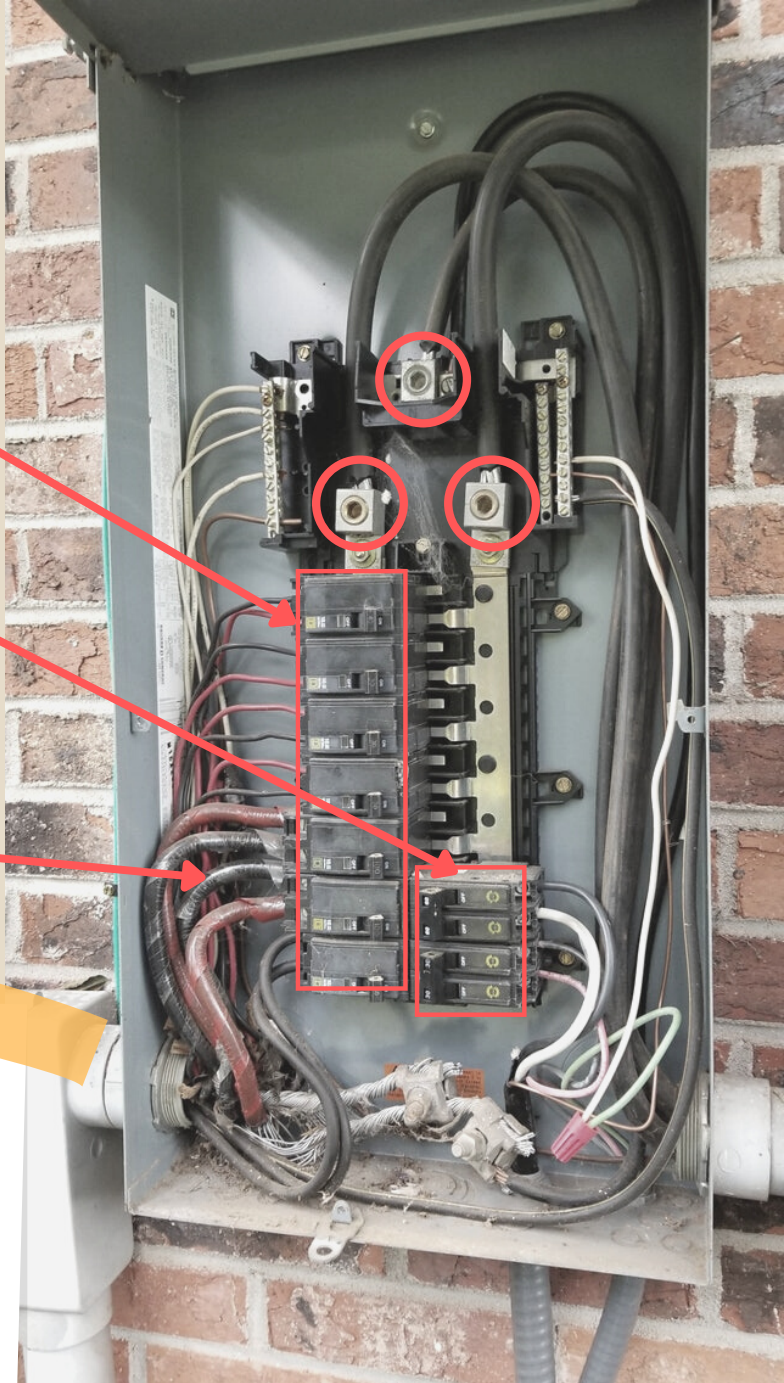
Electrical Service Panel

○ LUGS ARE CIRCLED

DOUBLE POLE
BREAKER

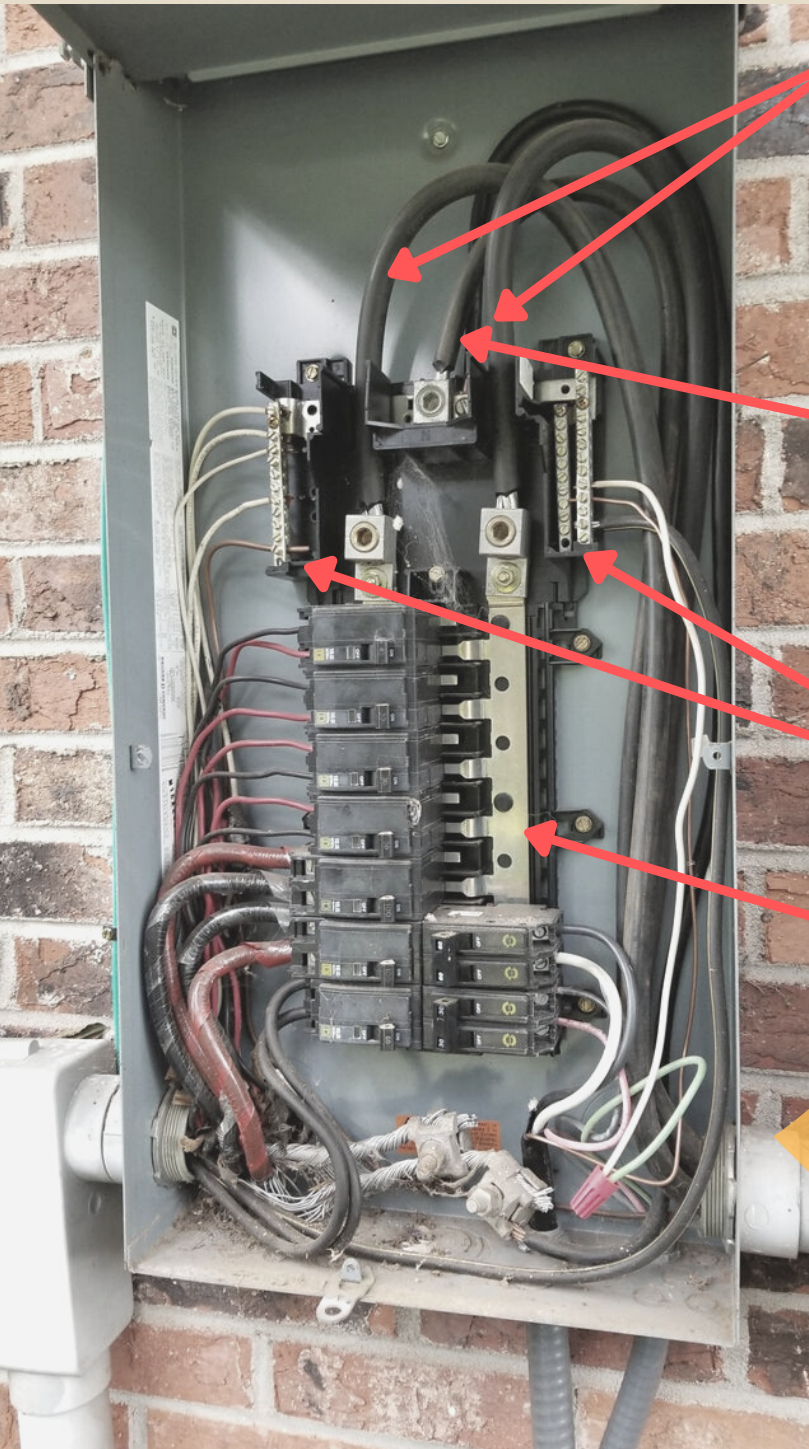
SINGLE POLE
BREAKER

LOAD WIRES TO
BRANCH CIRCUITS



Blank lined area for notes, resembling a sticky note with orange corners.

Electrical Service Panel



**TWO INSULATED 120V
HOT WIRES FROM THE
HOUSE METER**

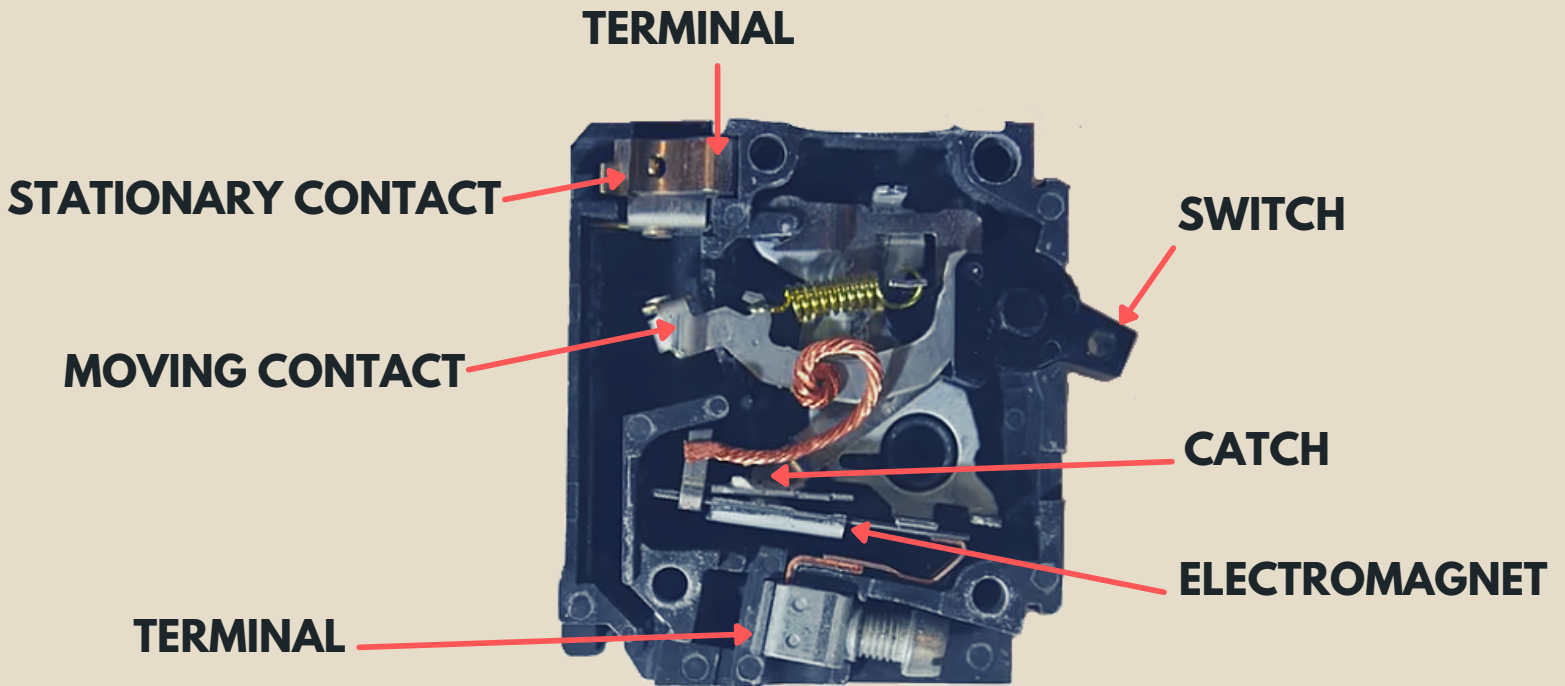
**INSULATED
GROUND WIRE
RETURNING TO
METER**

**NEUTRAL BUS
BARS**

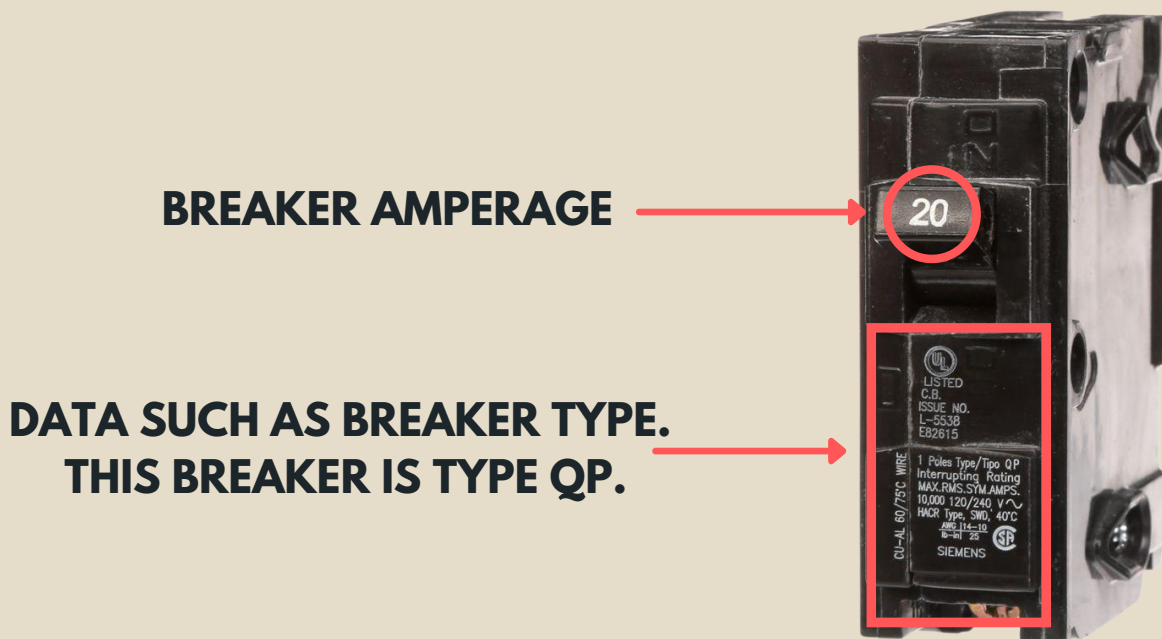
HOT BUS

Blank lined area for notes or additional information.

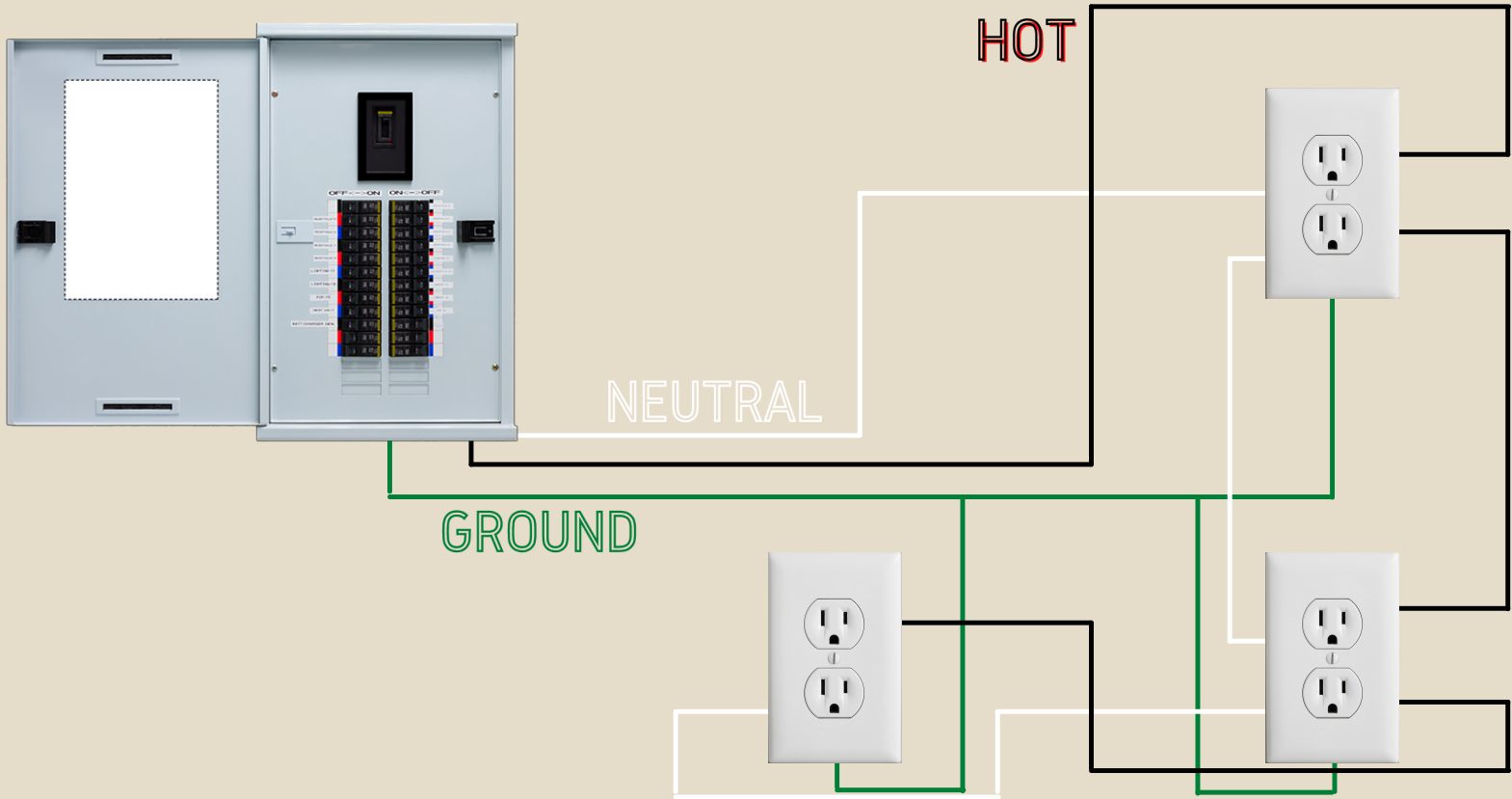
INTERNAL COMPONENTS OF AN AVERAGE BREAKER



EXTERNAL COMPONENTS OF AN AVERAGE BREAKER



BRANCH CIRCUIT

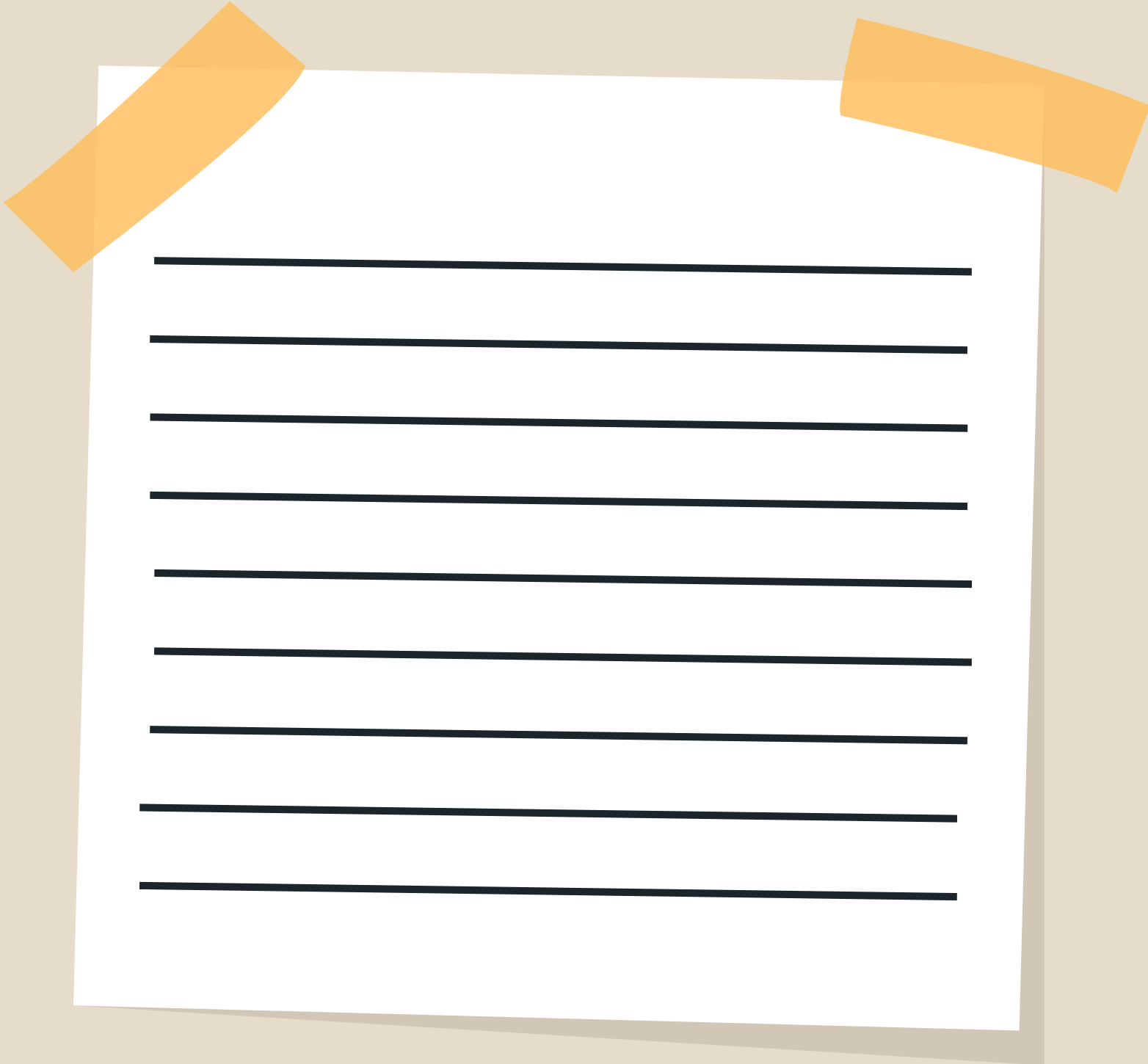


Two orange adhesive tape pieces are positioned at the top corners of a white sheet of paper. The paper contains ten horizontal black lines, providing a space for notes or a description of the circuit diagram.

Notes...

Notes...

Notes...



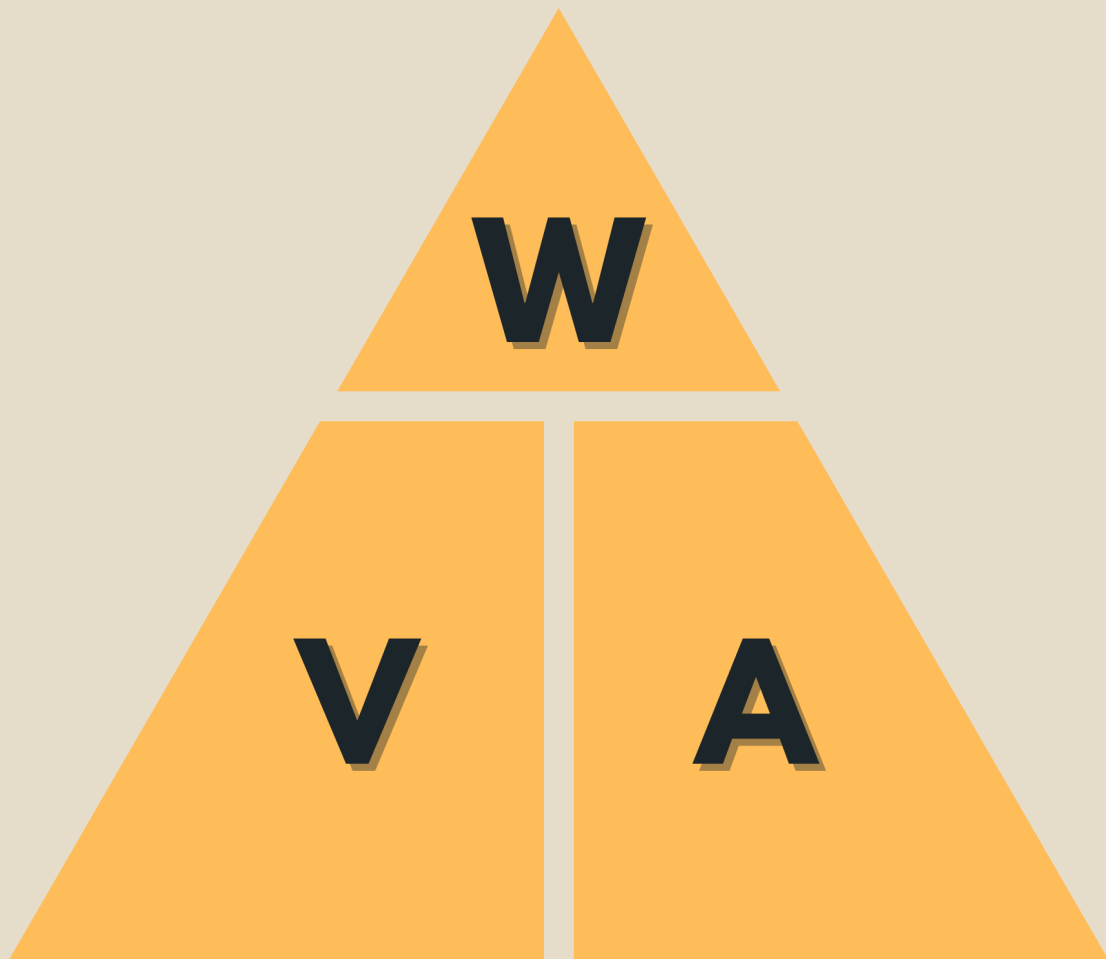
WATTS LAW

CALCULATIONS

$$\text{Volts} \times \text{Amps} = \text{Watts}$$

$$\frac{\text{Watts}}{\text{Volts}} = \text{Amps}$$

$$\frac{\text{Watts}}{\text{Amps}} = \text{Volts}$$



ELECTRICAL 103 WORKSHEET

WATTS = Volts x Amps
AMPS = Watts ÷ Volts

Scenario #1

1



...my vacuum trips the living room breaker every time I use it....

2



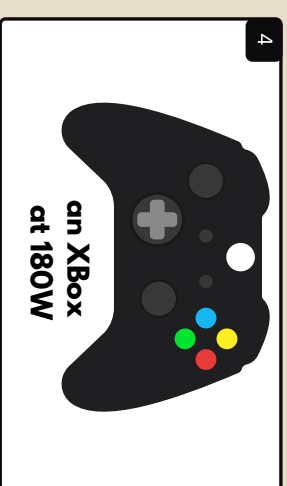
The vacuum uses
1400W

3



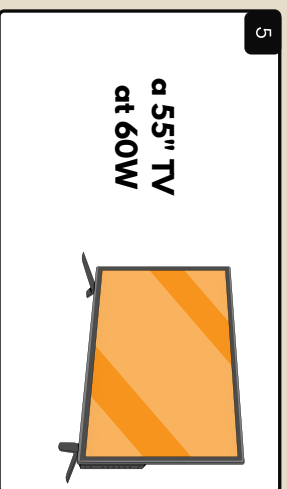
The resident is also
running...

4



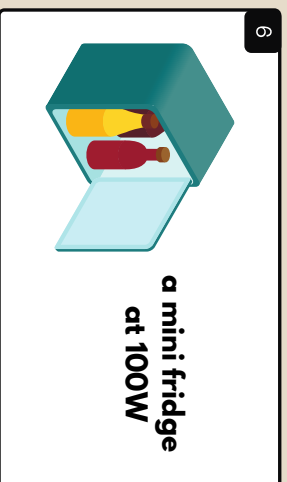
an Xbox
at 180W

5



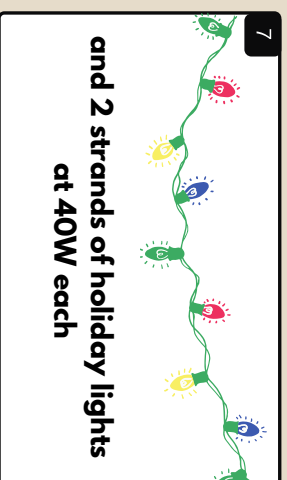
a 55" TV
at 60W

6



a mini fridge
at 100W

7



and 2 strands of holiday lights
at 40W each

8

WHAT IS THE
TOTAL
WATTAGE
BEING USED



ELECTRICAL 103 WORKSHEET

WATTS = Volts x Amps
AMPS = Watts ÷ Volts

Scenario #1

9

<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>
watts		watts		watts
<input type="text"/>	+	<input type="text"/>	=	<input type="text"/>
watts		watts		watts

10

let's find the AMPS

<input type="text"/>	÷	<input type="text"/>	=	<input type="text"/>
				amps


11

What is the MAX Safe Load of a 15 AMP Breaker?

REMINDER The safe load is 80%

12

<input type="text"/>	➔	<input type="text"/>
Total Watts used		AMP Safe Load



13

The Circuit Breaker is...


- a. broken
- b. overloaded
- c. totally fine

14

Can We Install a Larger Circuit Breaker to Fix the Problem?


YES or **NO**

15

WHY 

16

How can we help this resident? What suggestions can we make?



ELECTRICAL 103 WORKSHEET

WATTS = Volts x Amps
AMPS = Watts ÷ Volts

Scenario #2

1

..the breakers in this new unit trip **CONSTANTLY!**
There is something wrong with this panel!



2


Step 1: Determine which breaker is tripping.

Determine what else is on tripping....

Step 2: the breaker that is tripping....

3

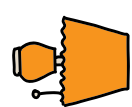
The Modem + Router



Google search suggests each of them uses on average about 3 watts of power

4


3 Lamps



each with LED bulbs installed

5

a TV



you can't read the wattage rating, but it still has an EnergyStar sticker on the front—Google search shows this model uses about 57 watts for every 5 hours of use.

6


Hall Light



property uses LED bulbs

7

4 Bathroom Lights + Fan



LED bulbs and a whisper green fan

8

a Portable A/C Unit



no wattage rating listed—Google search returns results for this brand and model of 1100 watts.



ELECTRICAL 103 WORKSHEET

WATTS = Volts x Amps
AMPS = Watts ÷ Volts

Scenario #2

9 none of these seem to be the issue...

HOW DID WE DETERMINE THAT?



13

amps + amps + amps

= Total Amperage

Light Bulbs

10

bulbs × **8** watts = watts

watts ÷ volts = amps

14

Step 3: TALK TO THE RESIDENT!



The Modem + Router + TV

11

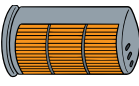
watts + **11.4** watts = watts

watts ÷ volts = amps

15

there was a **1500W** space heater hiding in the bathroom cabinets!

1500 watts ÷ volts = amps



a Portable A/C Unit

12

1100 watts ÷ volts = amps

14

Step 4: TALK TO THE RESIDENT SOME MORE!

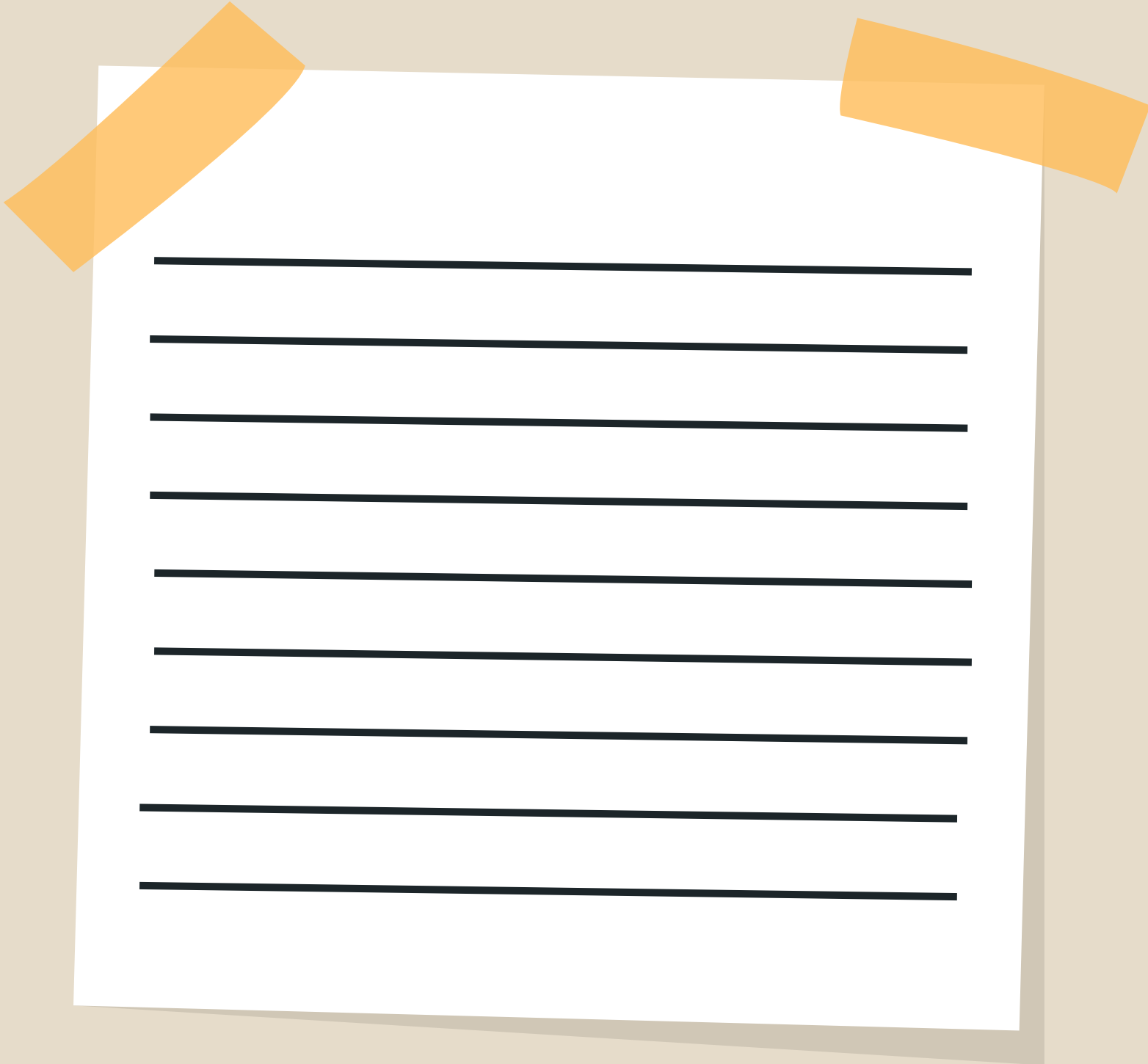
here's what will help...



Notes...

Notes...

Notes...



**Thank you for
your
participation
today!**