



HVAC

Flexible Instruction Day

Assignment #3

Learning Standard	Standard 2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
Task # 615	Size, apply, and ground electrical circuits and raceways.

CONTACT INFORMATION/ASSISTANCE

Instructor Name: Mr. Collins/ Mr. Barnes

Instructor E-Mail:

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We will be available by email from 7:40-12, and 12:30-3:10 to answer your questions. Please reach out if you are having difficulty completing your assignments.

INSTRUCTIONS

✓ All work is due on the day we return to school. This is counted towards your attendance **and** as a classroom assignment.

Please use Unit 12 Basic Electricity and Magnetism Part 1 Notes to complete the form. Wattage is on page 6-7. The first page of the worksheet is to help you with the second page. Walk around your house and fill out the second page. Then find the watts on the first page for that appliance. There is a difference between running watts and starting watts so fill out both columns. Make sure you read the questions and answers at the bottom of the page.

Name: _____

Session: _____

_____/____ points

Inclement Weather: Assignment 3

Wattage

Name: _____ Session: _____ Date: _____

Please use Unit 12 Basic Electricity and Magnetism Part 1 Notes to complete the form.

Wattage is on page 6-7. The first page of the worksheet is to help you with the second page.

Walk around your house and fill out the second page. Then find the watts on the first page for that appliance. There is a difference between running watts and starting watts so fill out both columns. Make sure you read the questions and answers at the bottom of the page.

Please note that this assignment will be part of your participation grade for the day. This needs to be returned completed the day of return. If this is not returned you will NOT receive your participation grade for the day. You will also be marked absent for the day if not completed.

_____ INCOMPLETE

_____ COMPLETE

Wattage Worksheet

TOOL OR APPLIANCE

ESTIMATED
RUNNING
WATTS

ADDITIONAL
STARTING
WATTS

TOOL OR APPLIANCE

ESTIMATED
RUNNING
WATTS

ADDITIONAL
STARTING
WATTS

Recreational Use



Tailgating/Camping:

Electric Grill	1650	0
AM/FM Radio	100	0
Box Fan – 20"	200	0

Outdoor Light String	250	0
Cell Phone Battery Charger	25	0
Inflator Pump	50	150

Storm / Emergency Use



Essentials:

Light Bulb – 60 Watt	60	0
Light Bulb – 75 Watt	75	0
Refrigerator/ Freezer	700	2200
Sump Pump – 1/3 HP	800	1300
Sump Pump – 1/2 HP	1050	2200
Water Well Pump – 1/3 HP	1000	2200
Electric Water Heater	4000	0

Heating/Cooling:

Space Heater	1800	0
Humidifier – 13 Gal	175	0
Furnace Fan Blower – 1/2 HP	800	2350
Furnace Fan Blower – 1/3 HP	700	1400
Window AC – 10,000 BTU	1200	1800
Window AC – 12,000 BTU	3250	3950
Central AC – 10,000 BTU	1500	3000
Central AC – 24,000 BTU	3800	4950
Central AC – 40,000 BTU	6000	6700
Heat Pump	4700	4500

Laundry Room:

Iron	1200	0
Washing Machine	1150	2250
Clothes Dryer – Electric	5400	1350
Clothes Dryer – Gas	700	1800

Kitchen:

Microwave Oven – 625 Watts	625	0
Microwave Oven – 1000 Watts	1000	0
Coffee Maker	1000	0
Electric Stove – 8" Element	2100	0
Dishwasher – Hot Dry	1500	1500
Food Processor	400	0
Toaster Oven	1200	0
Toaster	850	0
Electric Can Opener	168	0

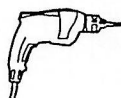
Family Room:

VCR	100	0
Stereo Receiver	450	0

Other:

Security System	500	0
Garage Door Opener – 1/2 HP	875	2350
Curling Iron	1500	0
Hair Dryer – 1250 Watt	1250	0

Jobsite



DIY/Jobsite:

Quartz Halogen Work Light, 300	300	0
Quartz Halogen Work Light, 500	500	0
Quartz Halogen Work Light, 1,000	1000	0
Airless Sprayer – 1/3 HP	600	1200
Reciprocating Saw	960	960
Electric Drill – 3/8", 4 Amps	440	600
Electric Drill – 1/2", 5.4 Amps	600	900

Hammer Drill	1000	3000
Circular Saw – 7-1/4"	1400	2300
Miter Saw – 10"	1800	1800
Planer/Jointer – 6"	1800	1800
Table Saw/Radial Arm Saw – 10"	2000	2000
Belt Sander	1200	2400
Air Compressor – 1/4 HP	970	1600
Air Compressor – 1 HP	1600	4500

The above are estimates only. Check your tool or appliance for exact wattage requirements. The wattages listed in our reference guide are based on estimated wattage requirements. For exact wattages, check the data plate or owner's manual on the item you wish to power.

CAUTION:

Operating voltage and frequency requirement of all electronic equipment should be checked prior to plugging them into this generator. Damage may result if the equipment is not designed to operate within a +/- 10% voltage variation, and +/- 3 hz frequency variation from the generator name plate ratings.

Wattage Worksheet

When selecting a generator there are a few important features to consider:

Wattage ■ Engine ■ Run Time ■ Starting ■ Mobility

This worksheet will focus on determining your running and starting watt needs. The size of the generator you need depends on your power requirements. Generally, a higher-wattage generator lets you power more items at once.

- 1 Select the items you wish to power at the same time. Using the chart on the opposite page, fill in the running watts and starting watt requirements on the "Your Power Needs" worksheet.
- 2 Add the Running Watts of the items you wish to power. Enter this number in the Total Running Watts column.
- 3 Select the one individual item with the highest number of starting watts. Take this one number, add it to your Total Running Watts, and enter it in the Total Starting Watts box.

EXAMPLE

TOOL OR APPLIANCE	RUNNING WATTS	ADDITIONAL STARTING WATTS
1. Refrigerator/Freezer	700	2200
2. 1/2 HP Furnace Fan	800	2350
3. Television	500	0
4. Window AC	1200	1800
5. Sump Pump - 1/2 HP	1050	2200
6.		
7.		

HIGHEST
STARTING
WATTS

4250

4250

TOTAL
RUNNING
WATTS

+

2350

HIGHEST
STARTING WATTS

=

6600

TOTAL STARTING
WATTS NEEDED

With this example you need a generator that produces at least 4250 total running watts and 6600 total starting watts.

YOUR POWER NEEDS

TOOL OR APPLIANCE	RUNNING WATTS	ADDITIONAL STARTING WATTS
1.		
2.		
3.		
4.		
5.		
6.		
7.		

TOTAL RUNNING
WATTS

+

HIGHEST
STARTING WATTS

=

TOTAL STARTING
WATTS NEEDED

I need a generator that produces at least _____ total running watts and _____ total starting watts.

FREQUENTLY ASKED QUESTIONS

How many watts does it take to power basic items in an average size house?

In a typical home, essential items will average 5000 - 7500 watts of power to run.

What is the difference between running watts and starting watts?

Running, or rated watts are the continuous watts needed to keep items running. Starting watts are extra watts needed for two to three seconds to start motor-driven products like a refrigerator or circular saw, this is the maximum wattage the generator can produce.

Why is only one starting watt item used to calculate your total starting watt requirement?

Unlike running watts, starting watts are only needed during the first few seconds of operation. In most cases, only one item will start or cycle at the same time, therefore this is the most accurate estimate.

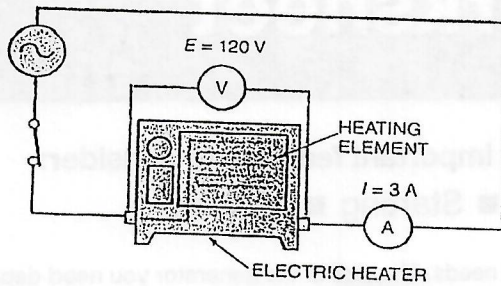
What if I can't determine the running or the starting watt requirement for a tool or appliance?

If the running watts are not on the tool or appliance, you may estimate using the following equation: **WATTS=VOLTS x AMPS**. Only motor-driven items will require starting watts. The starting watts required may be estimated at 1-2x the running/rated watts.

⚠ DANGER		⚠ PELIGRO	
Using a generator indoors CAN KILL YOU IN MINUTES. Generator exhaust contains carbon monoxide. This is a poison you cannot see or smell.		Usar un generador en el interior PUEDE MATARLO EN POCOS MINUTOS. Los gases de escape del generador contienen monóxido de carbono. Es un veneno que no puede verse ni olerse.	
NEVER use inside a home or garage, EVEN IF doors and windows are open.	Only use OUTSIDE and far away from windows, doors, and vents.	NUNCA lo use dentro de su hogar o del garaje, INCLUSO con las puertas y las ventanas abiertas.	SÓLO utilícelo AL AIRE LIBRE y lejos de ventanas, puertas y respiraderos.
Avoid other generator hazards. READ MANUAL BEFORE USE.		Evite otros peligros provocados por el generador. LEA EL MANUAL ANTES DE USARLO.	

Problem 1

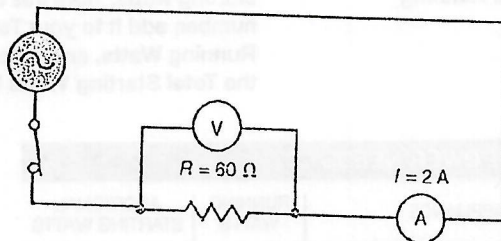
Math:



Calculate the heaters resistance.

Problem 2

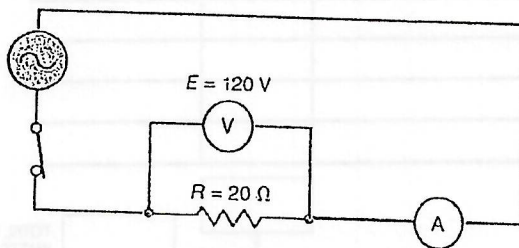
Math:



Calculate the circuit voltage.

Problem 3

Math:



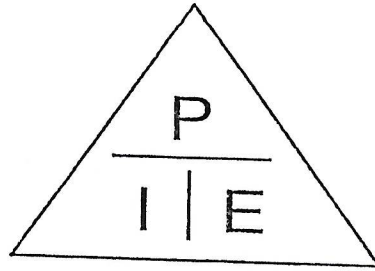
Calculate the circuit amperage.

Electrical Power Calculations

-Most load devices are rated by the power they consume.

Watts= Power consumed

Watts= Volts x Amps



P=Watts (Power)

I=Amps (Current, Intensity)

E=Volts (Potential, Electromotive Force)

Example

$$P = E \times I$$

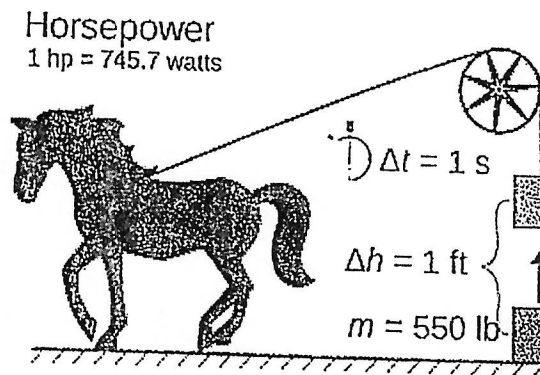
$$P = 120 \text{ V} \times 22 \text{ A} = 2640 \text{ W}$$

$$\text{kW} = P \div 1000$$

$$\text{kW} = 2640 \text{ W} \div 1000 = 2.64 \text{ kW}$$

-Horsepower= 33,000 lbs. to a height of one foot in one minute.

1HP=746 watts



550lbs at a height of 1ft in one second x 60 = 33,000lb for one minute

