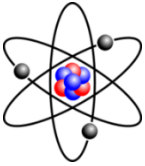


Name: _____



Circuit Math Page

Instructions: Write the formula first for each problem. Show all your work. Circle your final answer.

I pledge that I have neither given nor received any information beyond that permitted by the instructor, signed:

V=IR
P=VI
E=PΔT

V: Volts - 1A past 1Ω
 I: Amps C/s of e-
 R: Ohms kgm²s⁻³A⁻²
 P: Watts kgm²s⁻³
 E: Energy kgm²s⁻²

1. Alaina's new electric car has a front motor that uses **180 kW**. The lithium battery pack in her new car produces **320v**. How many amps does the motor pull?



2. Adrian's car will not start. His battery terminal is corroded and is adding resistance to the line that sends electricity to his starter motor. If Adrian's Ammeter shows that only **30A** are passing through the wire and the battery is supplying **12V**, what is the resistance of the bad connection?

3. Wilson is connecting an LED to the main power in his circuit board to show when it is powered up. The circuit is powered by a **5v** power supply. The LED can take a maximum of **20 mA** of current. What resistor should he choose from the ones in our lab (see the box)?

ResistorsWe Stock:

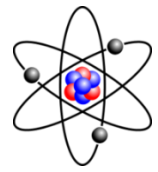
10Ω, 100Ω, 220Ω, 330Ω,
 470Ω, 1KΩ, 10KΩ, 100KΩ,
 220KΩ, 1MΩ, 2.49MΩ



4. Indira's stepper motor has a coil resistance of **70Ω**. She powered it with **12V**. Can she control it using a driver chip that will burn out if more than **500 mA** passes through it? She needs to be sure; show how much current it uses.



Name: _____



5. Michelle is building a windmill to generate electricity by reversing a **12v** electric motor. If the motor produces **3A** in a **10MPH** wind, how many watts should her device be rated at?

6. Every season Elizabeth watches a show named One Punch Man. The show runs for **45 minutes**, and has **30** episodes. Her large screen TV uses **150 watts**. Elizabeth's mother wants to charge her for the electricity, so she will stop watching that "dumb" show and do her homework. If FPL charges **10.8 cents** per Kilowatt-hour, how much did this TV binge cost? Should she stop or pay?



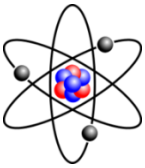
7. Hansel's new electric razor uses **500mA** of electricity. He has this powerful tool of grooming plugged into the wall socket that supplies **120v AC**. How much power is he using?

8. Laylani hooked a **5A** amplifier to her electric guitar. The amplifier is plugged in to a socket that provides **120v**. If she does not want to blow out her system, what wattage speakers should she use?

9. To keep the boys at bay, Hannah built a home-made taser from a high voltage generator connected to a 9v battery. Assuming the voltage generator produces **40,000v**, and the resistance of the air is **2.2 MΩ/m**, if the gap in the taser is **3cm**, how many amps run through the gap?



Name:



10. Second, how many watts should her taser be rated?

11. Third, if each taser pulse lasts 120μs, and there are 19 per second for 30 seconds, how much power does the device pull from her 9v battery (that has a capacity of 550 mAh)?

PARALLEL RESISTANCE

$$\frac{1}{R_{Tot}} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$$

SERIES RESISTANCE

$$R_{Tot} = R_1 + R_2 + \dots$$

V=IR
P=VI
E=PΔT

V: Volts $\text{kgm}^2\text{s}^{-3}\text{A}^{-1}$ or 1A thru 1Ω
 I: Amps C/s of e-
 R: Ohms $\text{kgm}^2\text{s}^{-3}\text{A}^{-2}$
 P: Watts $\text{kgm}^2\text{s}^{-3}$ or J/s or v•A
 E: Energy J or $\text{kgm}^2\text{s}^{-2}$

Fill out the following table using the circuits below.

Circuit	Total Reisistance	Total Cuent	Total Power
1	12.	13.	14.
2	15.	16.	17.
3	18.	19.	20.

