

Shedding Light on Electricity Episode 5: Electrical Safety Name: _____

Part A

1. How much electric current passing across a person's chest is enough to kill the person?
Approximately _____ A (_____ mA).
2. If a small light globe connected to a 6 V battery draws 0.29 Amps, why is it still safe to touch the terminals of the 6 V battery? _____

3. What is the resistance of the light globe in Q2? ($V = IR$) (This is a revision question from EP4.)
4. What effect does too much current have on muscles? _____

Part B

5. The resistance of a wire is determined by four main factors:
 - (a) Length: a longer wire has a _____ resistance than a shorter wire.
 - (b) Thickness: a thicker wire has a _____ resistance than a thinner wire and will draw _____ current than a thinner wire when it is connected to a voltage source.
 - (c) _____: hotter wires usually have a higher resistance than colder wires.
 - (d) _____: All metals are excellent conductors but some conduct better than others.
6. Fill in the table below. ($V = IR$, $R = V/I$, $I = V/R$)

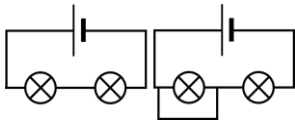
Light Globe Type	Power Output (Watts)	Voltage, V	Current, I	Resistance, R
Car headlight (incandescent)	60 Watts	12 V	5 A	
Household Incandescent	60 Watts	240 V	0.25 A	
Household LED	6 Watts	240 V		9,600 Ω

(Please note: a 6 W LED globe produces about the same amount of light as a 60 W incandescent.)

7. Comment on the different design characteristics of the three light globes. _____

8. What is nichrome and why is it used to make toaster filaments? _____

Part C



9. Two light globes are connected in series and then a wire is placed in parallel across one of the light globes. What happens and why? _____

10. If a really low resistance wire is connected directly to a large voltage source, a large / small amount of current will flow and a large / small amount of heat will be generated. (circle the correct words and cross out the incorrect words.)

11. Laws specify that car battery terminals must be covered with plastic covers. Why?

Part D

12. What is a circuit breaker (and what does it do)? _____

13. (a) If you connect a 2,400 Watt electric heater to a 240 V plug, it will draw about 10 A. How much current will be drawn (in total) if you connect a second heater to the same plug? _____

(b) What is likely to happen if you connect a third heater to the same power outlet? _____

Part E

14. Under normal circumstances, the Earth wire does not carry any electric current. When does it carry an electric current and what happens when it does? _____

15. Revision Question. In a simple circuit where a battery is connected to a light globe, how does the size of the electric current flowing out of the battery compared to the size of the electric current flowing into the battery? _____

16. What are Residual Current Devices (RCDs) and what do they do? _____
