Exercise 1. Units

What is the unit of power? Show that IV, I^2R, and V^2/R all have units of power.

Exercise 2. Lightbulb

Suppose you are told that a dc lightbulb uses 60 [W], and has a potential difference of 120 [V]. What is the current?

(a) 0.5 [A] ***
(b) 1 [A]
(c) 2 [A]
(d) 4 [A]

Exercise 3. Resistivity I

Find the resistivity of a square bar of cross sectional area 2 [cm^2], length 15 [cm], and resistivity 30 [Ω m].

(a) 30.0 [Ω]
(b) 35.8 [Ω]
(c) 113 [Ω]
(d) 225 [Ω] ***

Exercise 4. Resistivity II

Find the resistivity of a square bar of cross sectional area 2 [cm^2], length 15 [cm], and resistivity $30x$ [Ω m], where x is the distance along the bar.

(a) 422 [Ω]
(b) 844 [Ω]
(c) 1688 [Ω] ***
(d) 3375 [Ω]

Exercise 5. Lightning I

Suppose we are told that a lightning bolt carries 15 [C] of charge at a current of 30000 [A]. How long does the bolt last?

(a) 0.0005 [s] ***
(b) 0.005 [s]
(c) 0.05 [s]
(d) 0.5 [s]

Exercise 6. Lightning II

Suppose that the lightning bolt goes through a potential difference of 10000000 [V]. What is the average power?

(a) 300 [W] ***
(b) 300000 [W]
(c) 300000000 [W]
(d) 300000000000 [W] ***

Exercise 7. Lightning III

What is the total power transferred?

(a) 1500000 [J]
(b) 15000000 [J]
(c) 150000000 [J] ***
(d) 1500000000 [J]

Exercise 8. Lightning IV

Why is the path of lighting jagged rather than straight?

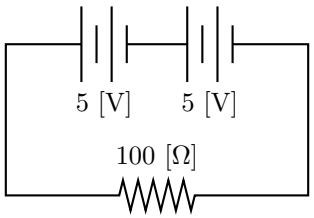
Exercise 9. Lightning V

Electrons are always transferred from the sky to the ground during a lightning strike, but never the reverse.

(a) True
(b) False ***

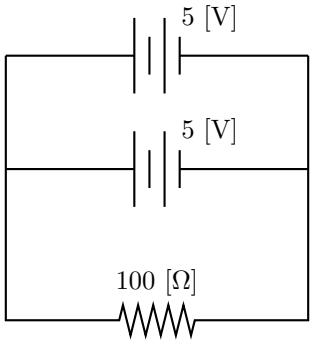
Exercise 10. Batteries in Series

Label the voltage and current on each wire.



Exercise 11. Batteries in Parallel

Label the voltage and current on each wire.

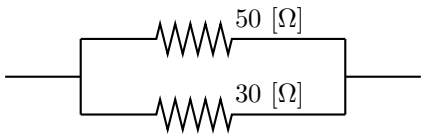


Exercise 12. Resistance I

Determine the equivalent resistance:

Exercise 13. Resistance II

Determine the equivalent resistance:



Exercise 14. Diode I

A diode behaves as a resistor in one direction, and an insulator in the other direction. Determine the equivalent resistance in both directions:

Exercise 15. Diode II

A diode behaves as a resistor in one direction, and an insulator in the other direction. Determine the equivalent resistance in both directions: