

Electricity Review

Questions 1-6: Urone, Paul Peter and Roger Hinrichs. Chapter 18. Physics. OpenStax, Rice University. Houston, TX. March 2020. <https://openstax.org/books/physics/pages/1-introduction>.

1. There are very large numbers of charged particles in most objects. Why, then, don't most objects exhibit static electric effects?
 - (A) Most objects are neutral.
 - (B) Most objects have positive charge only.
 - (C) Most objects have negative charge only.
 - (D) Most objects have excess protons.

2. Can an insulating material be used to charge a conductor? If so, how? If not, why not?
 - (A) No, an insulator cannot charge a conductor by induction.
 - (B) No, an insulating material cannot charge a conductor.
 - (C) Yes, an uncharged insulator can charge a conductor by induction.
 - (D) Yes, a charged insulator can charge a conductor upon contact.

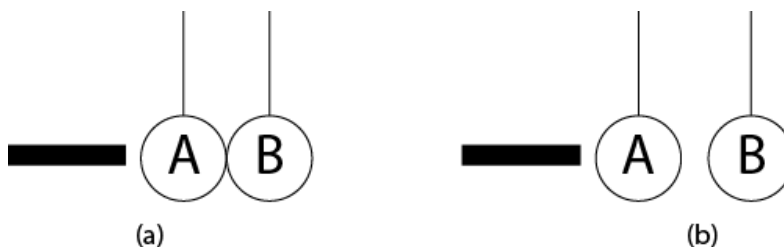
3. True or false—A liquid can be an insulating material.
 - (A) true
 - (B) false

4. If you dive into a pool of seawater through which an equal amount of positively and negatively charged particles is moving, will you receive an electric shock?
 - (A) Yes, because negatively charged particles are moving.
 - (B) No, because positively charged particles are moving.
 - (C) Yes, because positively and negatively charged particles are moving.
 - (D) No, because equal amounts of positively and negatively charged particles are moving.

5. Two identical conducting spheres are charged with a net charge of $+5.0\text{ C}$ on the first sphere and a net charge of -8.0 C on the second sphere. The spheres are brought together, allowed to touch, and then separated. What is the net charge on each sphere now?
 - (A) -3.0 C
 - (B) -1.5 C
 - (C) $+1.5\text{ C}$
 - (D) $+3.0\text{ C}$

6. How is the charge of the proton related to the charge of the electron?
- (A) The magnitudes of charge of the proton and the electron are equal, but the charge of the proton is positive, whereas the charge of the electron is negative.
 - (B) The magnitudes of charge of the proton and the electron are unequal, but the charge of the proton is positive, whereas the charge of the electron is negative.
 - (C) The magnitudes of charge of the proton and the electron are equal, but the charge of the proton is negative, whereas the charge of the electron is positive.
 - (D) The magnitudes of charge of the proton and the electron are unequal, but the charge of the proton is negative, whereas the charge of the electron is positive.
7. Which one of the following statements best explains why tiny bits of paper are attracted to a charged rubber rod?
- (A) Paper is naturally a positive material.
 - (B) Paper is naturally a negative material.
 - (C) The paper becomes polarized by induction.
 - (D) The paper acquires a net positive charge by induction.
8. A charged conductor is brought near an uncharged insulator. Which one of the following statements is true?
- (A) Both objects will repel each other.
 - (B) Both objects will attract each other.
 - (C) Neither object exerts an electrical force on the other.
 - (D) The objects will repel each other only if the conductor has a negative charge.
 - (E) The objects will attract each other only if the conductor has a positive charge.

9. Two uncharged conducting spheres, A and B, are suspended from insulating threads so that they touch each other as shown in (a). While a negatively charged rod is held near, but not touching sphere A, the two spheres are separated as shown in (b).



How will the spheres be charged, if at all?

	Sphere A	Sphere B
(A)	neutral	neutral
(B)	negative	positive
(C)	positive	negative
(D)	positive	neutral

10. Each of three objects has a net charge:

Objects A and B attract one another.
 Objects B and C also attract one another.
 Objects A and C repel one another.

Which one of the following table entries is a possible combination of the signs of the net charges on these three objects?

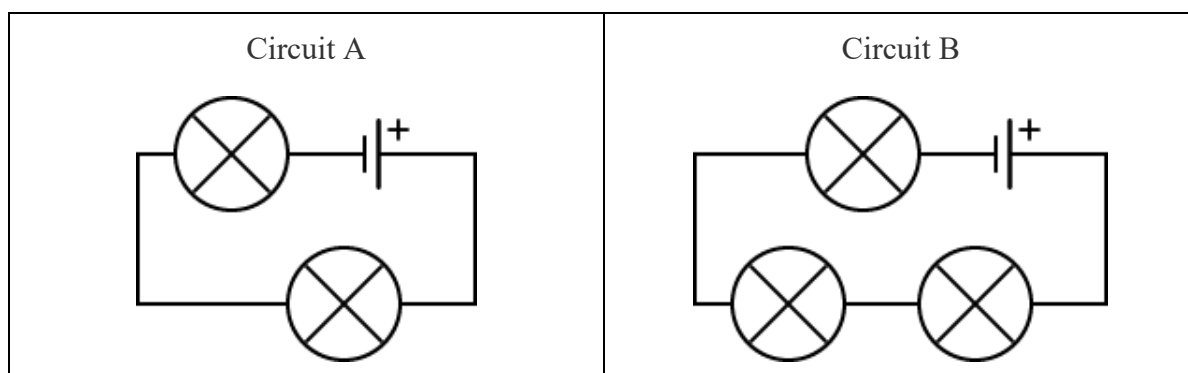
	A	B	C
(A)	+	+	-
(B)	-	+	+
(C)	+	-	-
(D)	-	+	-
(E)	-	-	+

11. The rate at which charge flows through a circuit is referred to as the
- (A) current.
 - (B) resistance.
 - (C) potential difference.
 - (D) power.
12. Which one of the following expressions is a current?
- (A) 4.0Ω
 - (B) 1.5 V
 - (C) 7.5 Watt
 - (D) 2.0 A
13. Which types of observations can be used to indicate the rate at which charge flows?
- (A) Observe the bulb brightness.
 - (B) Observe the number of the wires.
 - (C) Observe the color of the wires.
14. Potential difference is a measure of
- (A) the energy the of the charges.
 - (B) the number of charges in the wire.
 - (C) how fast the charges move.
 - (D) the rate at which charge flows.
15. Resistance is
- (A) the opposition to the flow of charge.
 - (B) the rate at which charge flows.
 - (C) the energy of the charges.
 - (D) the rate at which energy is dissipated.
16. How does a resistor dissipate power?
- (A) A resistor dissipates power in the form of heat.
 - (B) A resistor dissipates power in the form of sound.
 - (C) A resistor dissipates power in the form of light.
 - (D) A resistor dissipates power in the form of charge.

17. A circuit with a light bulb has a current of 2.0 Amps. A second light bulb is added to the circuit in series with the other light bulb. How does the resistance and the current in the circuit change?

	Resistance	Current
(A)	increases	increases
(B)	increases	decreases
(C)	decreases	increases
(D)	decreases	decreases

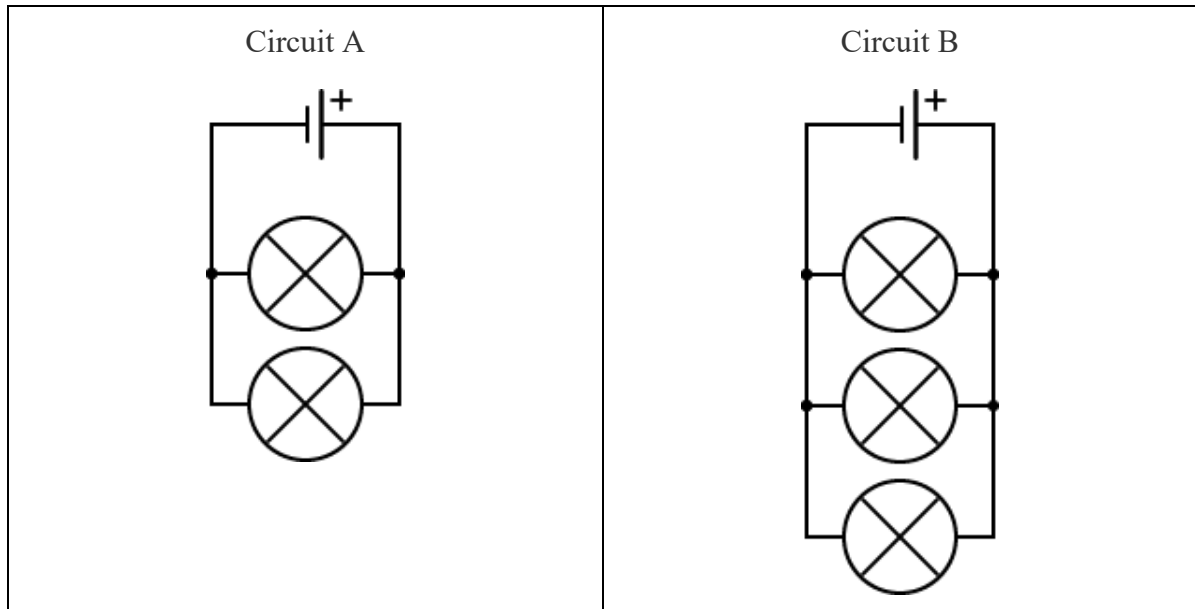
18. The batteries and bulbs of the two circuits shown below are identical. In which circuit will the bulbs shine the brightest?



- (A) The bulbs will shine the brightest in Circuit A.
 (B) The bulbs will shine the brightest in Circuit B.
 (C) The bulb brightness will be the same in both circuits.
19. What affect will adding more light bulbs in parallel have upon the resistance and current in a circuit?

	Resistance	Current
(A)	increases	increases
(B)	increases	decreases
(C)	decreases	increases
(D)	decreases	decreases

20. The batteries and bulbs of the two circuits shown below are identical. In which circuit will the bulbs shine the brightest?



- (A) The bulbs will shine the brightest in Circuit A.
(B) The bulbs will shine the brightest in Circuit B.
(C) The bulb brightness will be the same in both circuits.
21. The function of a _____ is to prevent current overload in a circuit.
- (A) switch
(B) circuit breaker
(C) outlet
(D) extension cord

22. 6.0 C of charge pass through a wire in 20.0 s. Calculate the current in the wire.
23. A current of 0.5 A flows through a wire. How much charge passes through in 1.0 minute?
24. Electrons with a charge of 1.6×10^{-19} C have an electrical potential of 12 V. Calculate the energy of each electron.
25. The charges flowing in the circuit have 8.0×10^{-19} J of energy. Given a charge of 1.6×10^{-19} C, calculate the electric potential of the charges.
26. The label on a hairdryer says that it uses 100W of power. If the hairdryer is used for 10 minutes, how much energy is transformed?

27. A TV uses 10 kWh per month. If electricity costs 9 ¢/kWh, how much would it cost per year?

28. An oven uses 3600W of power to bake. How much does it cost to use the oven for 30 minutes using a cost of 9 ¢/kWh?

29. Draw a schematic diagram showing a 9.0 V battery, a switch, a light bulb, and a resistor connected in series.

30. Draw a schematic diagram showing a 9.0 V battery connected to a resistor and a light bulb in parallel.