

## Electricity Unit Review

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2. (a) The particles are negatively charged electrons.
- (b) Electrons are negatively charged particles that orbit the positively charged nucleus of an atom. Because the electrons are not fixed in the nucleus but rather in motion around the nucleus, they can be rubbed off by the action of feet on the carpet.
3. (a) The law of attraction states that opposite charges attract.
- (b) The law of repulsion states that similar charges repel.
4. The charge on an object can be detected by observing the interaction between it and an object of known charge. An electroscope is typically used for this purpose. First, the electroscope is charged with an object of known charge, and then the object with unknown charge is brought near the electroscope. If the leaves of the electroscope separate from one another further, then the unknown charge is the same as that which was used to charge the electroscope. If the leaves of the electroscope approach one another, then the unknown object has the opposite charge to the charge of the known object.
5. Students' diagrams should indicate a charged object inducing charge separation in a neutral object, causing an attractive force between the charged object and the locally charged area of the neutral object.
6. There may be no effect if the materials do not have mobile electrons or if they are very close to one another in the triboelectric series.
7. (a) Balloon B is also negatively charged.
- (b) If the balloons attract one another, then balloon B could be positive or neutral, since negatively charged balloon A will attract both neutral and positively charged objects.
8. (a) Object D has a positive charge.  
(b) Object C has a negative charge.

16.

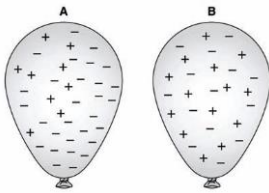
Quantity	Definition	Abbreviation	Unit	Symbol
Potential difference (voltage)	Difference in electric potential energy between two points in a circuit	V	Volt	V
Current	Amount of charge flowing past a point in an Electric circuit per second	I	Ampere	A
Resistance	The degree to which a substance opposes the flow of electric current through it	R	Ohm	$\Omega$

17.(a) The four factors affecting resistance in a wire are material, temperature, length, and cross-sectional area.

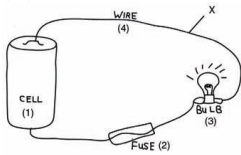
(b) Both increased length and temperature increase the resistance of a wire. Increased cross-sectional area decreases resistance. The material the wire is made from also affects the resistance of the wire depending on how good a conductor the material is.

18. The light bulb lights up immediately because electrons in the wire are pushed into the light bulb; they do not need to travel all the way from the switch.

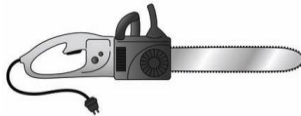
19. (a)



(b)



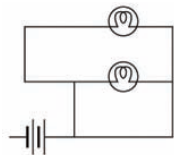
(c)



20. (a)



(b)



(c) More current flows in the parallel circuit.

(d) Both bulbs will go dark if one of the bulbs in circuit (a) is removed.

(e) There will be no difference in brightness in the remaining bulb in circuit (b) if one of the bulbs is removed.

21. (a) Voltage  $V_1$  in the circuit is 6.0 V.

(b) Current  $A_1$  in the circuit is 2.0 A.

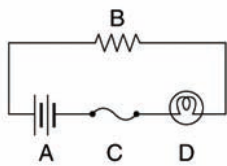
(c) It is a series circuit.

22. (a) Voltage  $V_1$  in the circuit is 3.0 V.

(b) Current  $A_1$  in the circuit is 1.0 A.

(c) It is a parallel circuit.

23.



24. Ohm's law states that the voltage drop across a resistor is equal to the current flowing through the resistor multiplied by the resistance of the resistor.

25. If the resistance of a load becomes larger, less current will flow through the load. Resistance and current are inversely proportional.

28. (a) Renewable energy sources can be replenished by naturally occurring processes in a relatively short period of time, whereas non-renewable energy sources cannot be replenished once they are used up.

(b) Solar and wind power are renewable energy sources; oil and coal are non-renewable energy sources.

29. Steam is used to turn turbines that are attached to generators.

30. If you lived on a small farm, solar, wind, geothermal, and microhydroelectricity would be possible sources of electrical energy.

31. (a) Wind farms have the potential to threaten the migration of birds and bats and disturb their habitat.

(b) Hydroelectric dams can result in the flooding of river valleys and loss of environment and habitat. Run-of-river projects have potentially fewer environmental impacts.

33. (a) Solar power is expensive, not appropriate for use in all locations, and unpredictable because it is dependent on the weather.

(b) Tidal power is appropriate only in certain locations on Earth and may pose a hazard to marine animals.

35. Electrical energy consumption is typically measured in kilowatthours (kW•h).
36. The efficiency of a device is the ratio of its useful energy output to the total energy input.
37. An EnerGuide label states how much energy the appliance uses on a monthly or annual basis and compares the usage of the appliance to other appliances in the same class.
38. The Energy Star label on an appliance indicates that the appliance is one of the most efficient units in its class.
39. The EnerGuide and Energy Star labels could be used to help determine which appliances are the most efficient and will result in the lowest long-term energy cost of operation.