Unit Review Answers (Student textbook pages 326–333)

1. Answers may vary. For example:

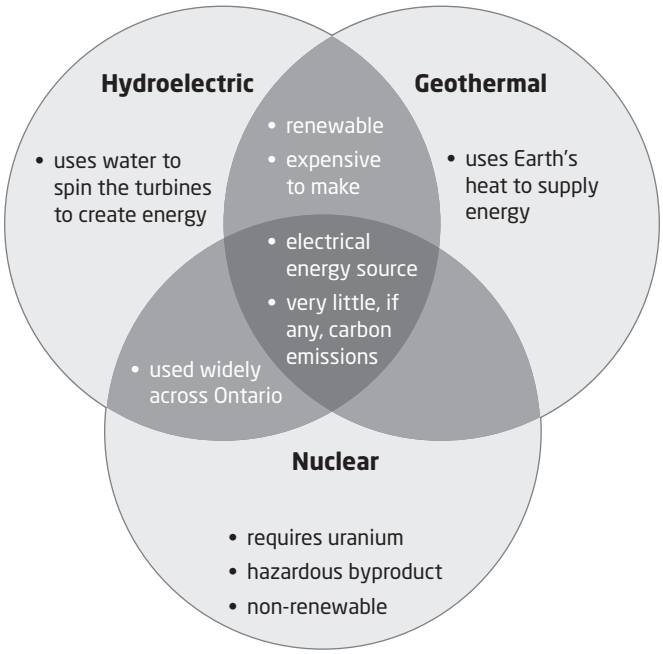
Energy Source	General Advantages	General Disadvantages	Three Examples of Each Source
Renewable energy sources	• clean • sustainable	• expensive to manufacture • the "fuel" is not always readily available, for example, night time or cloudy days prevent solar panels from performing optimally	• solar • wind • hydroelectric
Non-renewable energy sources	• cheap to use • easy to mine	• resources are depleting, may eventually run out • harm the environment with carbon emissions	• coal • oil • nuclear

2. Answers may vary. For example: I believe the most reasonable choice for this new electrical generation plant would be to use solar power. I understand there may be some drawbacks that could make you hesitant about creating a solar power plant. I realize it would cost more to build a solar power plant than other power plants; However, a er this initial cost, there is minimal operation costs. Power plants that use fossil fuels such as coal and oil use this fuel continuously, and with the cost of fossil fuels ever increasing, it seems prudent to lessen the reliance on them. e initial cost can also be seen as an investment for our future. Solar plants emit no greenhouse gases or pollutants and there is an endless supply of fuel. If we do not change our energy patterns, eventually we will run out of fossil fuels, and there will be irreversible damage to the environment.

3.

Static	Current
• electrons stay on the surface • requires an insulator to keep electrons in place	• electrons move through the circuit • requires a conductor so the electrons have move through

4. Answers may vary. For example:



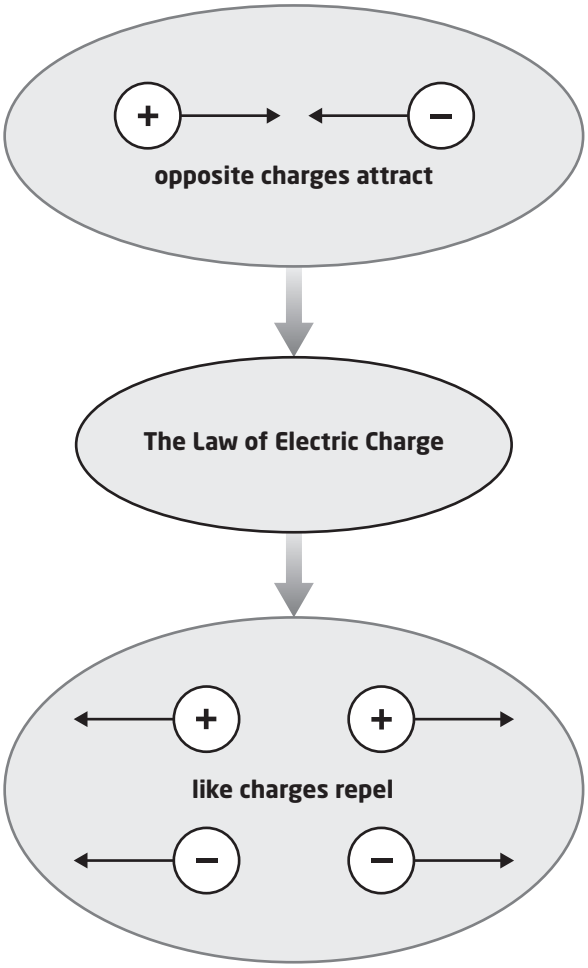
5. Fossil fuels and uranium come in a nite supply on the Earth. It takes much too long for fossil fuels to replenish to consider them renewable. Once we use up all these resources, it is likely we will not have these resources ever again.

6. ere is an endless supply for the fuel required for wind, water, and solar energy because we are harnessing natural processes that will continue on inde nitely. Since the fuel supply is unlimited, we consider these fuel sources as renewable.

7. Answers may vary. For example:

Positive	Negative
• comes from an excess of protons • protons cannot move	• comes from an excess of electrons • electrons can move

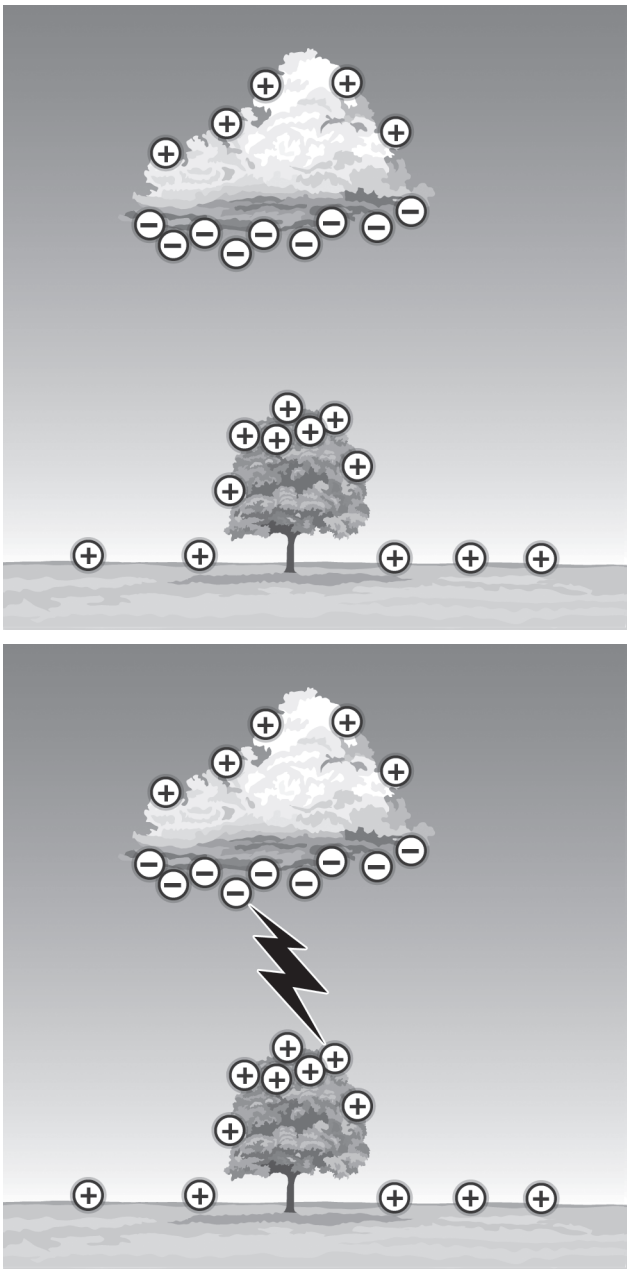
8.



9. A conductor, such as copper, gold, or silver, allows electrons to ow easily through the substance. An insulator, like rubber, wood, or plastic are poor conductors and inhibit the movement of electrons.

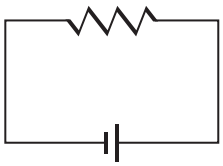
10. Contact and induction both charge particles by allowing the movement of electrons from one substance to another. However, charging my contact involves direct contact like touching a charged object to a neutral object whereas charging by induction has no direct contact between the charged substance and the neutral object. To charge by induction, a third conductor is required.

11. Turbulence in thunderclouds causes many collisions between water droplets and ice crystals. is somehow causes charges to separate so that the bottoms of the clouds become negatively charge and the tops of the clouds become positively charged. e negative bottom of the clouds induces a charge on the ground and objects on the ground. When the attractions between the negative charges in the clouds and positive charges on the ground are great enough, charges jump between the clouds and the ground.

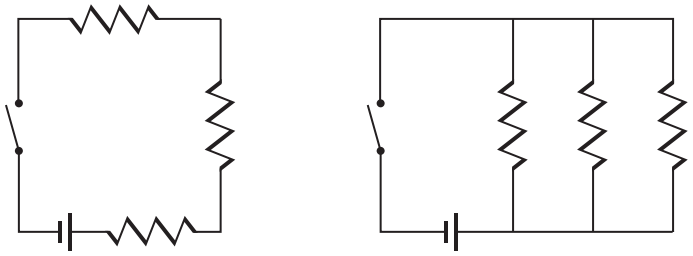


12. ere are many narrow wires in a hair dryer. As electrons ow through these wires, there are many collisions which generate heat.

13. Answers may vary. For example:



14. Answers may vary. For example:



15. e current in a series circuit is the same at every point in the circuit. e sum of the potential di erences across each load equals the potential di erence across the source.

16. e current in each branch in a parallel circuit is less than the current through the source. e potential di erence across each branch is the same as the potential di erence across the source.

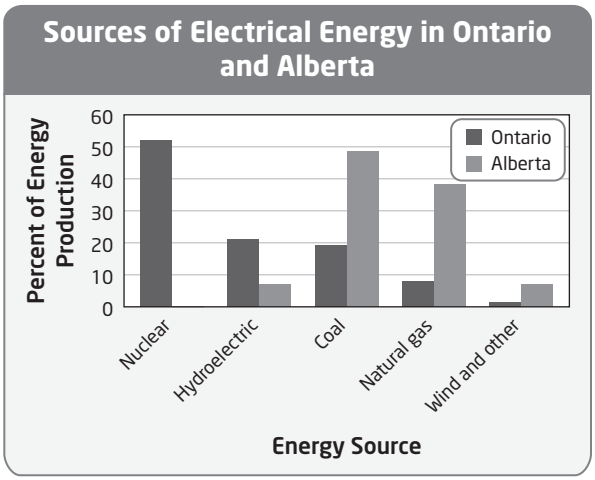
17. Turning o the television is like removing the resistance in a circuit. So even though the television is not on, the circuit is still completed and electricity will still pass through. us, there is a useless current wasting energy. By unplugging the television, there no longer is a source and the circuit is open. us, there is no current and no wasted energy.

18. Initially, the rice pu s cling to the ebonite rod because the negatively charged rod is repelling the electrons in the surrounding pu s creating a positively charged surface. en, the positively charged surface is attracted to the ebonite rod. e electrons ow from the ebonite rod to the positively charged surfaces of the rice pu s. Since the rice pu s were initially neutral, they have all become negatively charged. Since like charges repel, all the rice pu s will repel each other ying o in all directions.

19. e telephone handset is likely made from an insulating material such as plastic. As the handset rests on her shoulder, the slight movements that may occur while she talks may be enough for the handset to rub against her clothing and create a static charge in the receiver. e receiver becomes negatively charged. is induces a charge in our bodies near the handset causing a static discharge.

20. Plastic is an insulator capable of carrying a very high charge. As the electronic parts slide through the plastic tube, static charges are building up which eventually sweep over to the electronic parts. e electrostatic discharge can cause great damage to electronic parts.

21. a)



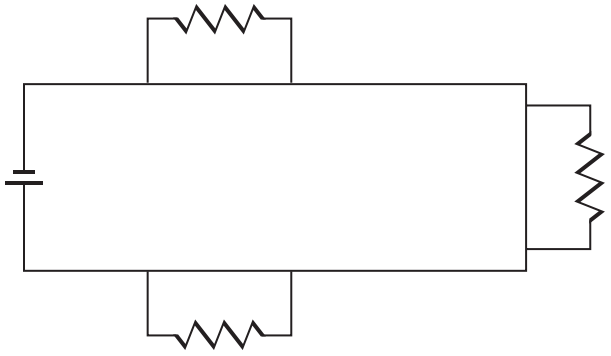
b) Ontario predominantly uses nuclear and hydroelectric energy while Alberta uses mostly coal and natural gas.

c) Answers may vary. For example: Alberta has many coal and natural gas deposits, so these resources are more readily available. is may be one why Alberta focuses on these fossil fuels for power while Ontario does not.

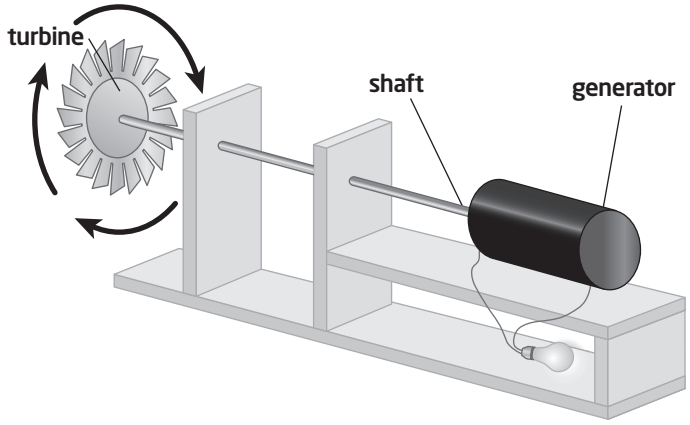
22. a) e bulbs are connected in series, so if one bulb burned out, it would open the circuit and all the bulbs would go out.

b) Answers may vary. For example: I could try replacing each individual bulb until all the lights come back on. I know once I replace the burnt out bulb, it will complete the circuit and all the lights will return.

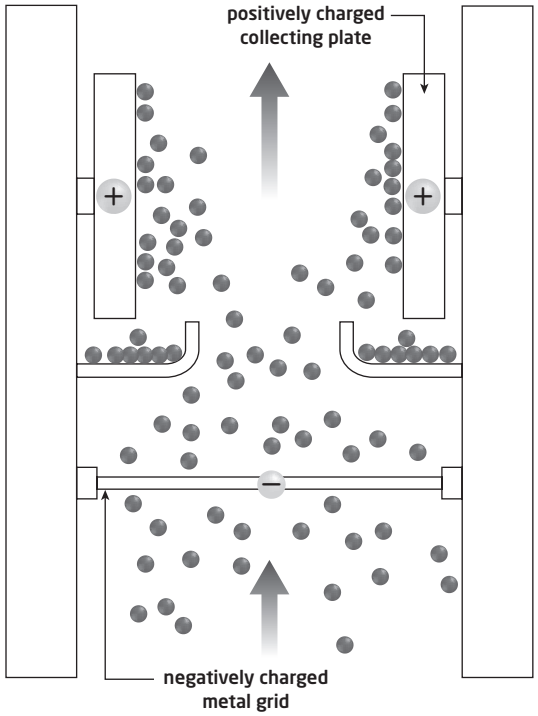
c) Answers may vary. For example:



23. Answers may vary. For example: As the turbine spins, it makes the sha and rotor spin. e kinetic energy of the rotor is converted into electrical energy inside the generator.

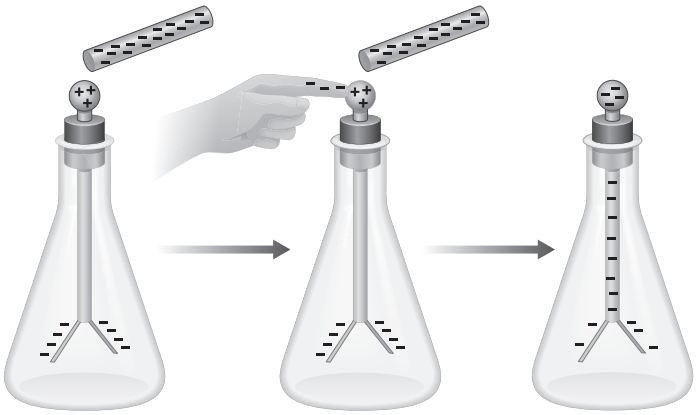


24. Answers may vary. For example:



25. Charged particles can be charged by contact.

Charged particles can be charged by induction.



26. Answers may vary. For example:
By plugging in many appliances we are increasing the resistance of the circuit. Each additional resistance will contribute to the heat in the wires. If too many appliances are plugged in, it may cause a re.

27. Answers may vary. For example:

Electricity

All the appliances we use, from the stove to TV,
run o of a fuel we call electricity.
Now we burn many fossil fuels, to give us electric forces,
but we must start using renewable resources.

28. a) television, iron, toaster, hair dryer, lamp, electric toothbrush

b) Answers may vary. For example: Energy is lost as light and heat. To generate the amount light needed for a television or the heat required for an iron would demand a great deal of energy.

29. Answers may vary. For example: When fossil fuels are burned, greenhouse gases are emitted as a byproduct.
ese gases have entered our atmosphere trapping excess heat raising the Earth's temperature greatly.

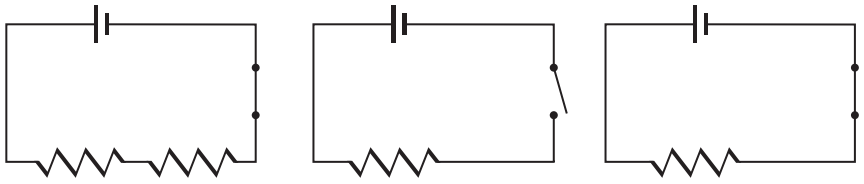
30. e heating element of a toaster is used for heating. To generate heat, we need many electron collisions to occur in the wire, so we would like a great deal of resistance in the wire. If we used copper for the heating element, the electrons would pass through easily because copper is such a good conductor and there would be very few collisions and there would not be much heat generated.

is is why toasters typically choose metal wires that are poor conductors, so that there will be an increased resistance and more heat generated. Conversely, copper wires are generally used as connector wires so that less energy is lost in the form of heat.

31. To get the strongest possible signal, we would want to ensure each speaker receives a su cient voltage. If we chose to create the circuit in series, then the voltage would be split amongst the speakers. If we created the circuit in parallel, the voltages at each speaker would be the same as the voltage at the source, so the speakers in parallel would have a higher voltage, and a stronger signal.

32. Answers may vary. For example: is claim is true, but this is not to be confused with the idea that the byproducts of coal-burning plants are more radioactive than the byproducts of nuclear plants. Materials from nuclear power plants are much more radioactive than the y ash emitted by coal plants. However, since it is well documented that nuclear waste is incredibly radioactive, there have been many precautions to shield the environment from the e ects. Fly ash however does carry some radioactive material, but since the dosage of radiation is low, not as many precautions are needed. So y ash does introduce more radiation into the environment than nuclear waste, but this is more so because nuclear waste is meticulously contained, whereas y ash does not need to be so carefully contained due to its low amount of radioactive material.

33. a)



The switch is closed, so the circuit is completed and the lights will go on.

The switch is open, so the circuit is not completed and the light will not go on.

The switch is closed, so the circuit is completed and the light will go on.

34. b)

35. c)

36. a)

37. c)

38. b)

39. b)

40. Answers may vary. For example:
Benjamin Franklin believed that lightning was produced by static electricity in the thunderclouds. To prove his theory, he tied a kite to a string with an iron key attached. A er a few minutes, he brought his knuckles to the key and a spark ew from the key to his knuckles, verifying his hypothesis.