Answers To Chapter 12 Homework

12.1 Introducing Current Electricity

2 Current electricity flows at a steady rate through a conductor. It is predictable in its behaviour and controllable. This allows us to use it to our benefit. Static electricity does not always flow and it is not predictable in nature nor controllable.

3 Conductors are needed to wire a home because we do need electricity to flow to our electrical appliances from the power lines outside our homes. However, we also need to protect ourselves from the current electricity so there must be insulators as well. For example, wires are typically covered in insulating plastic.

4 For electrons to flow, there must an an area of high electron density and an area of low electron density. Electrons repel from each other and move to equal out the charges.

6 It would be challenging to use static electricity in your radio because static charges just move around randomnly. There are not controllable. An electrical device needs a steady flow of electrons.

12.2 Electric Circuits

2 **Switch** – turns circuit on and off. When open, the circuit is off – electrons do not flow. When closed, circuit is on – electrons flow.
Conductors – provides a path for the electrons to flow
Load – transforms electrical energy into other types of energy
Source of electrical energy – provides a high concentration of electrons that will flow in the wire.

4 The circuit does not have an on/off switch. The circuit will work,but a **SAFE** circuit should be one that has a switch to turn it off (just in case).

5 Circuit may not work because 1) the battery is dead 2) the switch is open 3) the filament (thin wire) in light bulb is broken 4) connection between any 2 parts could be incomplete.

6 A light and a motor would be considered a load. Both uses the electrical energy and converts it into another form. A light turns electrical energy into light energy and a motor turns electrical energy into kinetic (moving) energy.

12.3 Electrical Energy

1. Having a portable source of energy (battery) is very useful. It allows us to have iPods and cell phones. If you go camping, you can have light (flashlight!). My car requires a battery to start. These are just a few ideas.

3. Flashlight – primary (1 use – throw away) battery
Cell phone – secondary (reusable) battery
Computer / iPad – secondary battery
Watch – primary battery
Car battery – secondary (it recharges when you drive – especially on highway)

5 Space shuttle astronauts could use the 'waste' water of hydrogen cells.

8 It shouldn't register any current. You need one material to GIVE electrons away and one material to TAKE electrons just like carbon and zinc in a disposable battery. If you have 2 identical materials, they will both want to take/give electrons. This doesn't work. The lemon juice is an electrolyte and allows for the passage of electricity.

12.4 Forms of Current Electricity

2 Direct current means the electrons flow in one direction like the electrons from a battery. Alternating current means the electrons alternate (or switch) which way the go. They oscillate. This is the kind of current we get from our wall sockets.

4 a) The amp is likely plugged into the wall so AC current
b) the iPhone has a reusable battery – DC current
c) The watch has a small battery inside – often it is round – DC current
d) Christmas tree lights need to be plugged in – AC current

12.5 Generating Current Electricity

3 Disadvantages of burning Fossil Fuels – extraction of fuels destroys habitats – extraction of fuels requires burning of fossil fuels – burning oil and gas releases pollutants. – tankers carrying fuels can spill in oceans – fuels is non-renewable and will run out.

5 Renewable energy sources are becoming more popular because they won't run out! Our global population demands a lot of energy and we are using up some of our traditional non-renewable resources (fossil fuels).

6 Traditionally we have used non-renewable resources like burning coal, oil and natural gas and even using radioactive materials. We still use these methods even though they may be polluting and we will run out because that is what we know how to do. It will take time to develop alternative, non-traditional methods.

8 Reducing electrical energy consumption – solar panels on the roof, timers to turn off lights in house, walking/biking/carpooling to reduce use of gasoline, solar blankets on pools to keep heat in...

12.7 Electrical power & Efficiency

2 Various answers here: How can YOU use less energy – give examples of NOT using electrical devices or NOT leaving them on when you don't need them. There are lots! Think of all the electrical things you use in a typical day. Make sure when you use a large electrical device it is working at capacity – ie: it is FULL and not running ½ full.

3 When you buy a large electrical device you want to consider the actual cost of the item but also the cost of running it over time. The Energuide helps you with the cost of running it. The fewer kWh you use, the less it costs to run.

4 When purchasing an electrical device, you should consider the actual cost of the item but also (using EnerGuide) the cost to run it. Environmentally, the less energy they use, the less stress on energy generation and ultimately the environment.

5 30J / 95J x 100% = 32%

6 Cost = power (in KILOwatts) x time (hours) x cost rate
a) $12.00 or 1200 cents Better to convert to dollars – makes more sense to us.
b) $1.56
c) $28.80
d) $788.40 ** 365 days x 24 hours/day s = 8760 hours

7 13W CFL - cost to run = 0.013 kW x 100 hours x 11¢/kWh = 14.3 ¢

60W lightbulb - cost to run = 0.060 kW x 100 hours x 11¢/kWh = 66 ¢

Difference? 66 ¢ - 14 ¢ = 52 ¢ **It costs 52¢ more to run the 60 W bulb.**