Section 10.3 Resisting the Movement of Charge – Answer Key

1) As the tunnel becomes narrower, the resistance of motion becomes **greater**. Only a **"small current"** of people can move through the tunnel.

2) What do the atoms of the filament resists?

The atoms of the filament resist the flow of electrons.

3) What is resistance?

Resistance is a property of a substance that hinders motion and converts electrical energy into other forms of energy.

4) What has a greater resistance, tungsten or copper? **Tungsten**

5) If you wanted to make a bright light bulb, which kind of wire would you use? Explain.

If I wanted to make a bright light bulb then I would use tungsten wire because the resistance of tungsten is 400 times greater than copper, making it produce more light and heat.

6) How is pushing a box across a room like electrical resistance?

The box is like the electrons and the floor is like the wire. If you try to slide a wooden crate (electrons) across a carpeted floor (highly resistant wire) then you are going to have a lot of resistance. If you try and slide a wooden crate (electrons) across a tiled floor (low resistance wire) then you are going to have a lot less resistance.

7) What is the formula for electrical resistance? **R = V/I**

8) Whom is the ohm named after? **Georg Simon Ohm**

9) What is the symbol for the ohm? **Ω**

10) What is the resistance of a heating coil of an electric heater, if a current of 12.5A runs through it, with a potential difference of 220V? Show all your work.

R = V/I R = 220/12.5 R = 17.6 ohms

11) How can resistors be used in circuits?

You can use them to control the current or potential difference in a circuit to suit the specific needs of other electrical devices in the circuit.

12) What are 3 characteristics of a wire that affect its electrical resistance? Include a short explanation for each.

Length – Resistance increases with length
Temperature – As the temperature of the wire increases, the resistance increases
Material – Due to the structure of their atoms, some metals allow electrons to more freely than others.
Cross Sectional Area – resistance decreases with area. If the cross sectional area doubles, the resistance is half as great.

13) A light bulb passes a current of 0.83A when the potential difference across the bulb is 120V. What is the electrical resistance of the bulb in ohms?

R = V/I R = 120/0.83 R = 144.6 Ω

14) What is the potential difference across an electric water heater element that has a resistance of 32 ohms when the current through it is 6.8 A?

R = V/I 32 = V/6.8 32 x 6.8 = V V = 217.6