Name: _____ Class: _____

Additional Science Homework

P2 Physics for your future

Topic 2: Controlling and Using Electric Current

2.14 Distinguish between the advantages and disadvantages of the heating effect of an electric current

For each of these scenarios, state if the heating effect of an electric current is a use or a danger.

If the heating effect of an electric current is a use, describe how it is used.

Use / Danger

_____
_____
_____
_____
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Use / Danger

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Use / Danger

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Use / Danger

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2.15 Use the equation: electrical power (watt, W) = current (ampere, A) × potential difference (volt, V) P = I × V

A 230V hair drier draws a current of 0.15A. Calculate the power of the hair drier.

V=_____
I=_____
P=??

Equation: _____

Insert values: _____

Answer: P=_____ unit:_____

An electric wheelchair has a motor rated at 450W, connected to a 12V battery. Calculate the current drawn when the motor is at full power.

P=_____
V=_____
I=??

Equation: _____

Rearranging:

Insert values: _____

Answer: I =_____ unit:_____

An electric drill has a power rating of 0.75kW. It draws a current of 50A. Calculate the potential difference across the motor.

P=_____
I=_____
V=??

Equation: _____

Rearranging:

Insert values: _____

2.16 Use the equation: energy transferred (joule, J) = current (ampere, A) × potential difference (volt, V) × time (second, s) E = I × V × t

A computer draws a current of 1.3A at mains voltage. If it is used for 190 seconds, calculate the energy transferred.

V=_____
I=_____
t=_____
E=??

Equation: _____

Insert values: _____

Answer: E=_____ unit:_____

A mains voltage television is on for 20 minutes, converting 540kJ of energy. Calculate the current which flows through it.

V=_____
E=_____
t=_____
I=??

Equation: _____

Rearranging:

Insert values: _____

Answer: I =_____ unit:_____

A 12V torch bulb converted 216J, with a current of 0.03A flowing through it. Calculate how long it was on for.

E=_____
I=_____
V=_____
t=??

Equation: _____

Rearranging:

Insert values: _____

Answer: t =_____ unit:_____

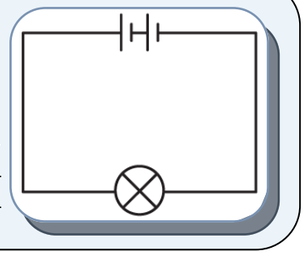
2.1 Describe how an ammeter is placed in series with a component to measure the current, in amps, in the component

Label the components in this simple circuit. Draw an Ammeter in the circuit which will measure the current flowing through the bulb.

I have placed the ammeter here because:_____

_____

_____



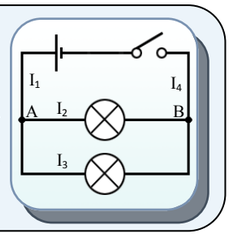
2.2 Explain how current is conserved at a junction

Complete this equation: $I_1 = \_\_\_ + \_\_\_$

At point A, the current:_____

At point B, the current:_____

The current is never used up, it just carries _____ to the bulbs from the _____ .



2.3 Explain how the current in a circuit depends on the potential difference of the source

Potential difference _____ current. If the potential difference across a component is doubled:_____

_____

Potential difference is a measure of the _____ carried by each unit of charge. The units are _____.

Current is a measure of the rate of _____ of charge. The units are _____.

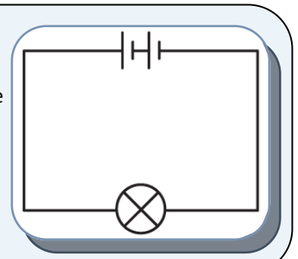
2.4 Describe how a voltmeter is placed in parallel with a component to measure the potential difference (voltage), in volts, across it

Label the components in this simple circuit. Draw a voltmeter in the circuit which will measure the potential difference across the bulb.

I have placed the voltmeter here because:_____

_____

_____



2.5 Demonstrate an understanding that potential difference (voltage) is the energy transferred per unit charge passed and hence that the volt is a joule per coulomb

When a 1.5 volt cell causes current to flow through a bulb, each _____ of charge transfers ___ joule of energy to the bulb.

The equation linking potential difference, energy and charge is:_____

2.6 Investigate the relationship between potential difference (voltage), current and resistance

If the potential difference across a resistor is increased, the current _____.

If the resistance of the resistor is increased, the current _____.

2.7 Explain how changing the resistance in a circuit changes the current and how this can be achieved using a variable resistor

Draw a circuit diagram to show how a variable resistor can be used to control the current in a simple circuit with a bulb.

To reduce the brightness of the bulb:_____

_____

This works because:_____

_____

_____

_____

_____

2.8 Use the equation: potential difference (volt, V) = current (ampere, A) × resistance (ohm, Ω) V = I × R

A simple circuit contains a component with a resistance of 35Ω with a current of 0.042A flowing through it. Calculate the potential difference across the component.

R=_____

I=_____

V=??

Equation: _____

Insert values: _____

Answer: V=_____ unit:_____

A component is connected to a 12v battery and has a current of 5A flowing through it. Calculate the resistance of the component.

V=_____

I=_____

R=??

Equation: _____

Rearranging:

Insert values: _____

Answer: R=_____ unit:_____

A component with resistance 75Ω is connected to a 240v power supply. Calculate the current flowing through the component.

V=_____

R=_____

I=??

Equation: _____

Rearranging:

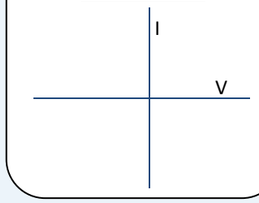
Insert values: _____

Answer: I=_____ unit:_____

2.9 Demonstrate an understanding of how current varies with potential difference for filament lamps, diodes and fixed resistors

For each component, draw a graph showing how current varies with potential difference, describe what your graph is showing you and explain why the component behaves in this way.

Fixed Resistor



_____

_____

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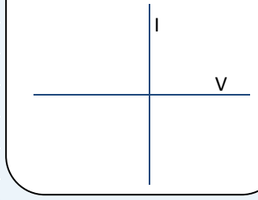
Diode



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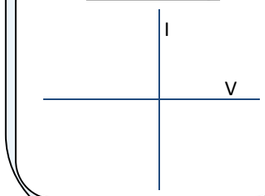
Filament Lamp



_____

_____

_____

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_____

2.10 Demonstrate an understanding of how the resistance of a light dependent resistor (LDR) changes with light intensity

As the light intensity on an LDR increases, the resistance of the LDR _____. This is because:_____

_____

2.11 Demonstrate an understanding of how the resistance of a thermistor changes with change of temperature (negative temperature coefficient thermistors only)

As the temperature of a thermistor increases, the resistance of the thermistor _____. This is because:_____

_____

2.12 Explain why, when there is an electric current in a resistor, there is an energy transfer which heats the resistor

2.13 Explain the energy transfer in 2.12 as the result of collisions between electrons and the ions in the lattice

When an electric _____ flows, _____ energy transfers into _____ energy. This happens because:_____

_____

_____

_____

_____

_____

_____

_____