Edexcel Physics A-Level

Topic 3.2 - Resistance and Resistivity

Flashcards

What three physical factors affect the resistance of a wire?

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1. Length
2. Cross-Sectional Area
3. Resistivity

How does increasing the length of a conductor affect its resistance?

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The longer the conductor is, the higher its resistance, assuming all other factors remain the same.

How does increasing the cross-sectional area of a conductor affect its resistance?

How does increasing the cross-sectional area of a conductor affect its resistance?

The larger the cross-sectional area of a conductor, the lower its resistance, assuming all other factors remain the same.

What is resistivity?

What is resistivity?

A characteristic property of a material that determines its resistance to current flow.

Compare the resistance of two conductors of the same dimensions, but with different resistivities.

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The conductor with the higher resistivity, will have the higher resistance.

State the equation linking the factors affecting the resistance of a conductor.

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$$R = \frac{\rho l}{A}$$

What equation links the number of charge carriers in a metal, along with their drift velocity, to the current flow?

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$$I = nqvA$$

How does the potential along a uniform current-carrying wire vary as you move along it?

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The potential will increase as you move along the wire.

What is the electromotive force of a power supply?

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The electromotive force is the amount of energy that is transferred to each Coulomb of charge that passes through it.

What is the terminal potential difference of a power supply?

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The terminal potential difference of a power supply is the actual potential difference that is produced across the terminals of the supply and is provided to the circuit.

Why does the electromotive force of a supply differ from its terminal potential difference?

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Some of the energy that is transferred to the charges is used to overcome the internal resistance of the power supply.

Define internal resistance.

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The internal resistance of a power supply is the electrical resistance, when a current flows, due to the materials within the supply itself.

Describe a method to determine the terminal potential difference of a battery.

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Attach a voltmeter directly across the terminals of the battery when it is isolated. Since no current flows, no potential is lost due to internal resistance and so the voltmeter will read the value of the terminal p.d.

What is semiconductor?

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A semiconductor is a component that can change its resistance based on external conditions.

Give two examples of semiconductors and state what they are sensitive to.

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1. Thermistors are sensitive to temperature
2. LDRs are sensitive to light

Describe how the resistance of a thermistor changes as temperature decreases.

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As temperature decreases, the resistance of a thermistor will increase.

Explain why the resistance of a thermistor will decrease with an increase of temperature.

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As temperature increases, conduction electrons are liberated, meaning there are more charge carriers and so current can flow more easily.

Describe how the resistance of a LDR changes as light intensity increases.

Describe how the resistance of a LDR changes as light intensity increases.

As light intensity increases, the resistance of a LDR will decrease.

What is a potential divider?

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A potential divider is a pair of resistors used to split the potential difference over them in a given ratio.

What is the link between the resistances and the potential differences in a potential divider?

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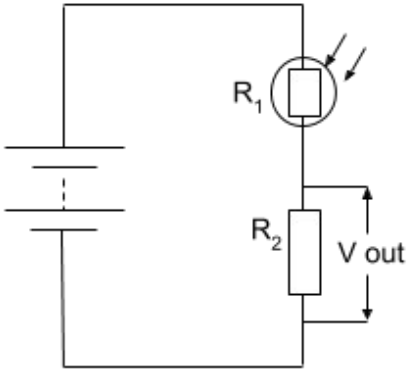
The potential difference of the circuit is split in the ratio of the resistances of the resistors.

How would the potential difference over R_2 change as the light intensity increases in the following circuit?



How would the potential difference over R_2 change as the light intensity increases in the following circuit?

As light intensity increases, the resistance over the LDR will decrease. This means that the fixed resistance R_2 will take a larger ratio of the circuit potential and the potential difference across it will increase.