

Combined Science - Physics - Key Stage 4 - Electricity

Domestic Electricity Review Worksheet

Miss Walrond



Q1.

The National Grid has many power lines at high voltage.

The National Grid uses two high voltages.

- $4.00 \times 10^5 \text{ V}$
- $2.75 \times 10^5 \text{ V}$

Answers as discussed in this slide have not been seen or verified by OCR.

Both voltages are used to transfer $2.0 \times 10^9 \text{ W}$ of electrical power.

Calculate the current in the power lines at each voltage and explain why the higher voltage is better for power transmission through the National Grid.

At a voltage of $4.00 \times 10^5 \text{ V}$

answer A

At a voltage of $2.75 \times 10^5 \text{ V}$

answer A

Explanation

[3]

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Q2.

The generator in the power station produces alternating current (AC).

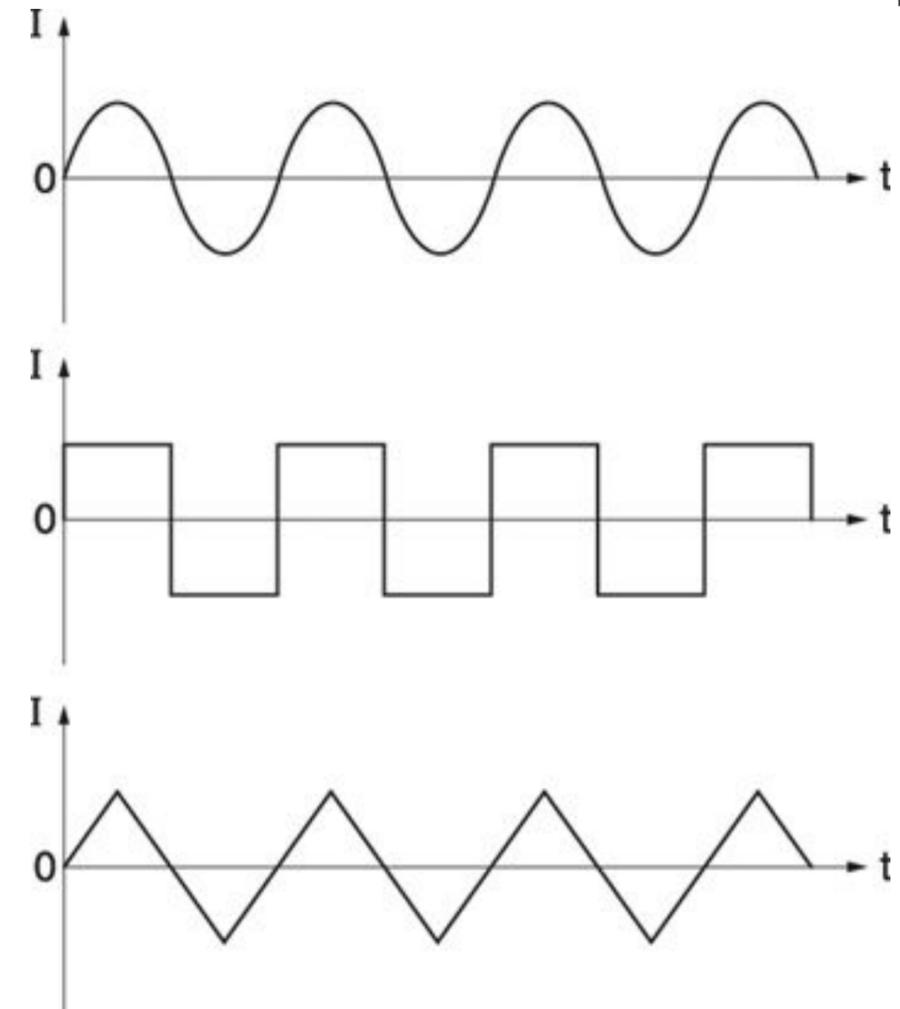
i. Name the type of current a battery produces.

ii. Look at the three different current-time graphs.

Describe why all the graphs show alternating currents. **[1]**

Answers as discussed in this slide have not been seen or verified by OCR.

[1]



Q3.

Look at the diagram of a plug for an appliance.

Describe the functions of the live, neutral and earth wires.

Answers as discussed in this slide have not been seen or verified by OCR.

[3]



Answers



Q1. - 3. Answers

1. **At a voltage of 4.00×10^5 $5(.00) \times 10^3$ **or** 5000 (A) [1]**

At a voltage of 2.75×10^5 7.273×10^3 **or 7.273×10^3 **or** 7273 **or** 7272 (A) [1]**

(higher voltages best because) lower current / keeps wires cooler / reduces heat loss or energy waste [1]

1. i. Direct (current) [1]

ii. Readings are positive and negative **or** flow in two directions during a cycle [1]

2. EARTH - safety wire / stops appliance becoming live / to allow current or flow of charge to go to Earth [1]

Live - contains fuse, or provides high voltage / current / energy / power [1]

NEUTRAL - completes the circuits [1]



In lesson questions



Independent Task - Examination question

- (a). Look at the diagram of a plug for an appliance.
Complete the table.

| Wire | Colour | Function |
|---------|----------------|--------------------------|
| earth | green / yellow | ----- |
| live | ----- | carries the high voltage |
| neutral | ----- | completes the circuit |

[3]

- (b). Some appliances are double insulated.
They have only two wires.
Write down the names of these two wires.

_____ and _____

[1]

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Independent Task - Examination question

Kyle has a wireless computing system.

Look at the information in the diagram.

The monitor plugs into a 230 V supply and uses a current of 0.5 A.
Calculate the power of the monitor.

Answer W

[2]

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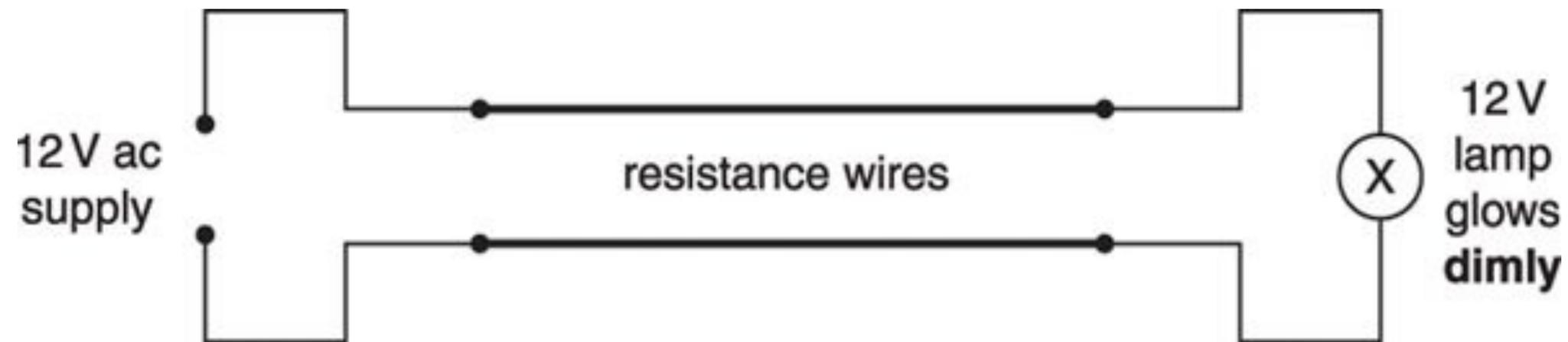


Worked example - Examination question

Ian is learning about power transmission and the National Grid.

His teacher demonstrates how power loss can be reduced in a model transmission line.

She first sets up a system like this and the light glows dimly.



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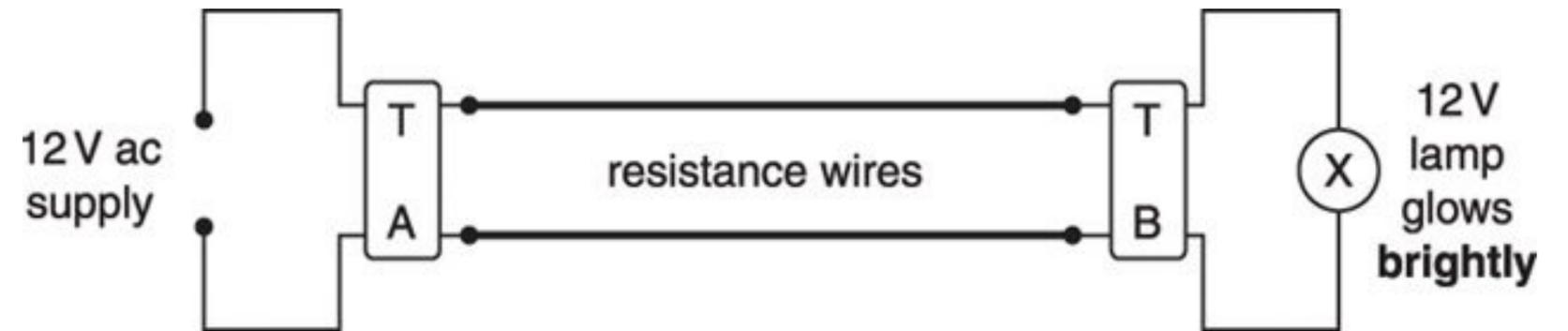
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Worked example - Examination question

She adds two transformers (TA and TB) before and after the resistance wires.

The lamp now glows brightly.



Explain these observations, and how this type of arrangement is used to reduce energy losses in the National Grid.

 The quality of written communication will be assessed in your answer to this question.

Answers as discussed in the next slide have not been seen or verified by OCR.

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Independent Task: The National Grid

Elin's mains supply is 230 V.

The electricity company transmits electricity through the National Grid at a higher voltage of 400 000 V.

This reduces energy waste for the company.

Explain why.

[2]

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Worked Example: Synoptic Question

Sheree researches fuses in electrical plugs.

She finds the information below

Sheree has an electric drill with a power rating of 750 W.

It is plugged into the 230 V mains.

There is no fault with the drill but the fuse wire in the plug melts when she switches the drill on.

Sheree decides to use a different fuse.

Use calculations to explain why the original fuse wire melts, and explain which size fuse is the safest to use if the drill develops a fault.

 *The quality of written communication will be assessed in your answer to this question.* **[6]**

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Worked Example: Synoptic Question

Use calculations to explain why the original fuse wire melts, and explain which size fuse is the safest to use if the drill develops a fault.

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Answers



Independent Task - Examination question

(a). Look at the diagram of a plug for an appliance.

Complete the table.

| Wire | Colour | Function |
|-------------|----------------|-------------------------------------|
| earth | green / yellow | Safety wire / prevents shock |
| live | brown | carries the high voltage |
| neutral | blue | completes the circuit |

[3]

(b). Some appliances are double insulated.

They have only two wires.

Write down the names of these two wires.

Live and **neutral**

[1]

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Independent Task - Examination question

Kyle has a wireless computing system.

Look at the information in the diagram.

The monitor plugs into a 230 V supply and uses a current of 0.5 A.

Calculate the power of the monitor.

$$P = I \times V = 0.5 \times 230 \quad [1]$$

$$P = 115 \text{ W} \quad [1]$$

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Review - Independent Task: The National Grid

Elin's mains supply is 230 V.

The electricity company transmits electricity through the National Grid at a higher voltage of 400 000 V.

This reduces energy waste for the company.

Explain why.

The high potential difference lowers the current [1]

This reduces the heating effect in the cables. [1]

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