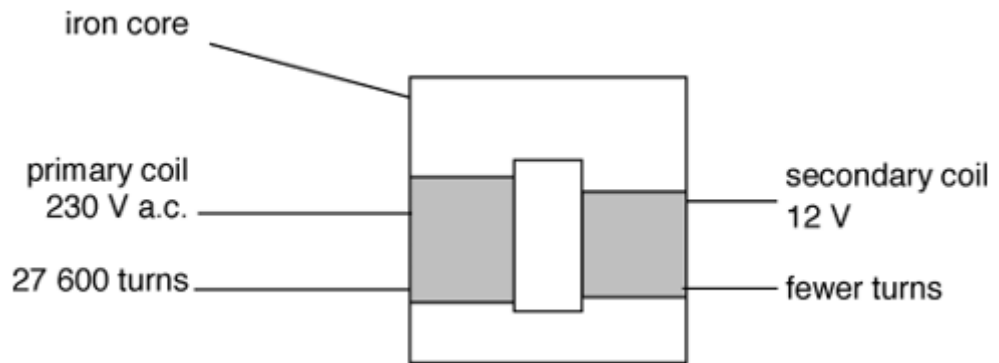


**GCSE Physics A (Gateway)**  
**J249/04 Physics A P5-P8 and P9 (Higher Tier)**

**Question Set 22**

The diagram below shows the structure of a transformer.



(a) The alternating current in the secondary coil is greater than in the primary coil.  
Explain why.

[3]

(b) The secondary coil produces an output of 12 V.  
Calculate the number of turns in the secondary coil.  
Show your working.

Number of turns = .....

[2]

(c) A transformer is used to increase voltage from 25 000 V up to 400 000 V before transmission through the National Grid. Therefore, the voltage increases by 16 times.

(i) Explain how this increase in voltage would affect the current, assuming that the power remains constant.

[2]

(ii) The formula to work out power is:

$$\text{power} = \text{current}^2 \times \text{resistance}$$

Explain, without using a calculation, why this increase in voltage is important to power loss in transmission cables.

[2]

**Total Marks for Question Set 22: 9**

## Equations in physics

$$(\text{final velocity})^2 - (\text{initial velocity})^2 = 2 \times \text{acceleration} \times \text{distance}$$

$$\text{change in thermal energy} = \text{mass} \times \text{specific heat capacity} \times \text{change in temperature}$$

$$\text{thermal energy for a change in state} = \text{mass} \times \text{specific latent heat}$$

$$\text{energy transferred in stretching} = 0.5 \times \text{spring constant} \times (\text{extension})^2$$

$$\text{potential difference across primary coil} \times \text{current in primary coil} = \text{potential difference across secondary coil} \times \text{current in secondary coil}$$

### Higher tier only –

$$\text{force on a conductor (at right angles to a magnetic field) carrying a current} = \text{magnetic flux density} \times \text{current} \times \text{length}$$

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