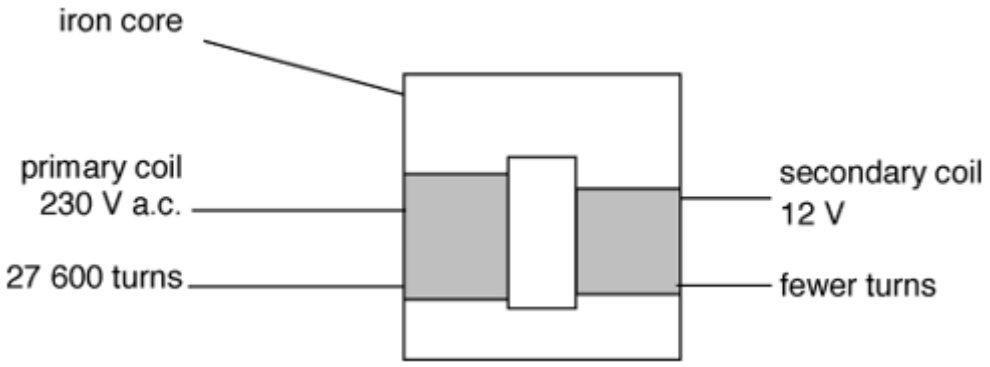
Oxford Cambridge and RSA

GCSE Physics A (Gateway)

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

Question Set 22

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:

power = current^2 × 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

(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance

change in thermal energy = mass × specific heat capacity × change in temperature

thermal energy for a change in state = mass × specific latent heat

energy transferred in stretching = 0.5 × spring constant × (extension)^2

potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil

Higher tier only –

force on a conductor (at right angles to a magnetic field) carrying a current = magnetic flux density × current × length