

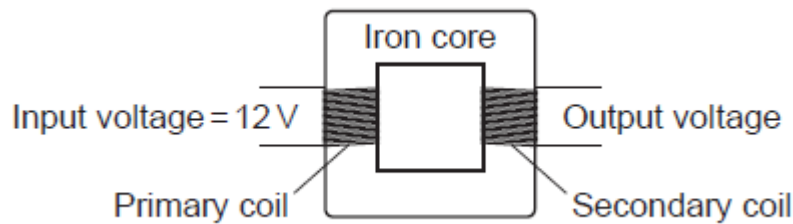
**GCSE Physics A (Gateway)**  
**J249/03 Physics A P1-P4 and P9 (Higher Tier)**

**Question Set 13**

1

A student investigates building model transformers in the laboratory.

Look at the diagram.



The student builds four different transformers, each with different primary and secondary coils. Using an input voltage of 12V the student measures the output voltage.

Look at the results.

Attempt	Number of turns in primary coil	Number of turns in secondary coil	Output voltage (V)
A	100	200	23
B	200	100	6
C	300	600	23
D	600	300	6

- (a)\* Explain how a transformer works and if this data supports the expected output voltages.

When an alternating current is supplied to the primary coil, a magnetic field is produced in the primary coil which changes as the current changes. The iron core increases the strength of the magnetic field this induces a changing potential difference in the secondary coil. This induced potential difference produces an alternating current. [6]

Using the formula  $\frac{V_P}{V_S} = \frac{n_P}{n_S}$  attempt B and D support the expected output.  $\frac{12}{V_S} = \frac{200}{100} \rightarrow V_S = 6$


The output voltage of A and C is very close to the calculate output voltage of 24 therefore the data supports the expected output voltage

$$\frac{12}{V_S} = \frac{100}{200} \rightarrow V_S = 24.$$

A student completes a project on how dynamic microphones work.

Look at her project. The student uses two incorrect words in her work

Dynamic Microphones



A sound wave is a pressure wave.  
Sound waves cause areas of high and low pressure.  
As the diaphragm moves in and out so does the coil. The coil is surrounded by a magnet.  
A resistance is induced across the ends of the wire. This is the electrical signal that the microphone produces.  
A microphone is similar to a motor.

- (i) Identify **one** of the incorrect words **and** write a correct sentence to replace the mistake.

Incorrect word ..... resistance .....

Corrected sentence ..... a current is induced across the ends of the wire. ..... [2]

- (ii) Name a device which uses this effect in reverse.

a loudspeaker [1]

**Total Marks for Question Set 13: 9**

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