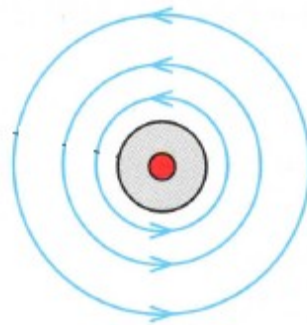


MODEL ANSWER
A2 PHYSICS
MAGNETIC FIELD & EM INDUCTION

2. Faraday's law of electromagnetic induction states that the magnitude of the induced electromotive force (e.m.f.) is directly proportional to the rate of change of magnetic flux linkage in the solenoid or the rate at which a conductor cuts through the magnetic flux.

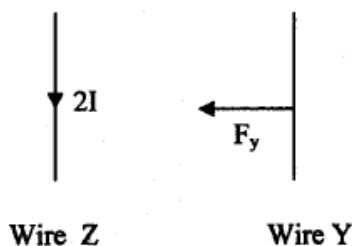
When a person speaks through the microphone, the diaphragm and the coil vibrate at a certain frequency. When the coil moves into the magnet, the change in flux linkage results in an induced e.m.f and induced current flows in the coil. When the coil moves out of the magnet, the change in flux linkage leads to an induced e.m.f., where the induced current flows in the reversed direction. Hence, an alternating current at a frequency equivalent to the frequency of the longitudinal sound wave, is produced and sent to an amplifier.



Concentric circles, where the distance become more widely spaced, due to the formula $B = \mu_0 I / 2\pi r$, B inversely proportional with r OR B directly proportional with $1/r$.

Given $B = 1.4 \times 10^{-5} \text{ T}$ and $r = 0.12 \text{ m}$

Using the formula, $B = \mu_0 I / 2\pi r$
 $I = 2\pi r B / \mu_0$
 $= [2\pi \times 0.12 \times 1.4 \times 10^{-5}] / [4\pi \times 10^{-7}]$
 $= \underline{8.4 \text{ A}}$



[USE FLEMING LEFT HAND RULE. REFER *VIDEO SOLUTION]

Due to the formula, $F = \mu_0 I_1 I_2 l / 2\pi r$, the ratio of F_y to F_z is 1:1

The magnitude of the F_y can be reduced by the decrease of current in wire Y, increase the separation

between the two wires, and reduce the length of the wire.

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