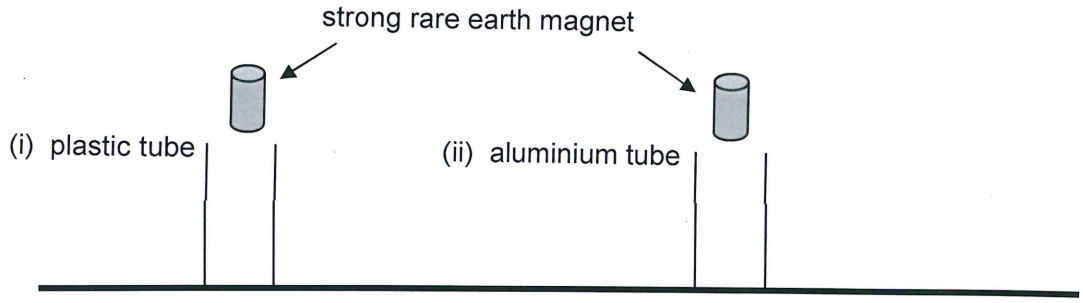
Exam Answers
Chapter 5.1 - Electromagnetic Induction
Answer 1 2010:1:10

(4 marks)

A physics teacher set up the equipment shown below.

One tube was made of plastic and the other of aluminium. The teacher dropped a strong rare earth permanent magnet down each tube.



The magnet falling through the plastic tube travelled much faster than the magnet falling through the aluminium tube.

Explain, indicating clearly the physics principles involved. (4 marks)

Description	Marks
Current induced in the aluminium tube due to changing magnetic flux.	1
Motion produces a magnetic field in the aluminium tube **only**.	1
This field acts to OPPOSE the motion of the magnet falling so the magnet travels more slowly.(Should be a good description of Lenz's Law for full marks)	1-2
	Total 4

Answer 2 2011:1:3

(3 marks)

A 12.5 cm long piece of copper wire is moved at a constant velocity of 6.56 m s^{-1} through a magnetic field of 0.150 T. Calculate the potential difference between the ends of the wire and indicate on the diagram which end of the wire is positive.

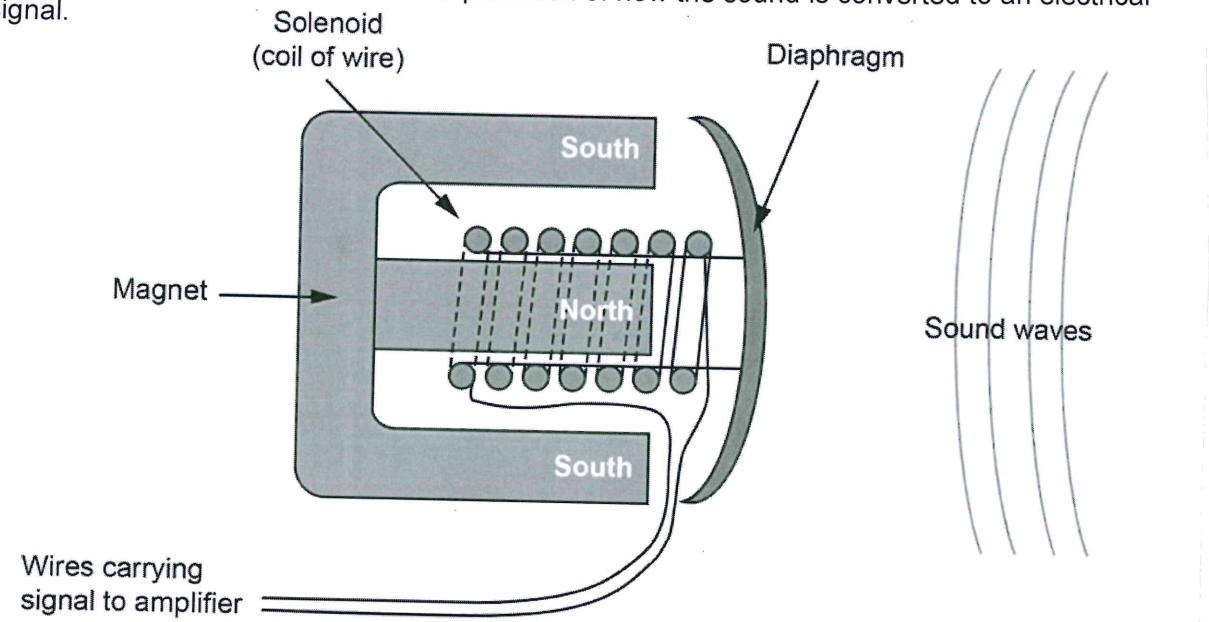
B field out of the page

Description	Marks
emf = $v\ell B = 6.56 \times 0.125 \times 0.150$	1
emf = 0.123 V	1
Bottom is positive	1
	Total 3

Exam Answers
Chapter 5.1 - Electromagnetic Induction
Answer 3 2011:1:11

(4 marks)

The diagram below shows a cross-section of a simple dynamic microphone. Describe how a musical note played near the diaphragm of the microphone can be detected by an amplifier. Your description should include an explanation of how the sound is converted to an electrical signal.



Description	Marks
Moving air particles cause the diaphragm to vibrate	1
The diaphragm causes the coil to move over the magnet which results in a changing flux through the coil.	1
By Faraday's Law the rate of change of flux produces an emf.	1
This causes a current to flow in the wires to the amplifier.	1
	Total 4