

# AQA Physics A-level

## RP11 - Magnetic Flux Linkage

### Practical Flashcards

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What pieces of apparatus can be used to measure the induced emf inside a current carrying circular coil?



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A search coil connected to an oscilloscope.



Why must an alternating current source be used in this experiment?



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An AC source should be used so that the magnetic flux through the search coil is constantly changing.



How can an oscilloscope be used to measure the induced EMF?



How can an oscilloscope be used to measure the induced EMF?

When connected to the search coil, the oscilloscope will show the waveform of the induced EMF. By turning the time base off, this will become a vertical line that gives the peak to peak value of the EMF.



What preliminary experiment will need to be undertaken before carrying this experiment out?





What preliminary experiment will need to be undertaken before carrying this experiment out?

A preliminary experiment will be needed to determine a suitable voltage and frequency for the circular coil. The induced emf must be large enough to be easily measured using the search coil and oscilloscope.



# What is magnetic flux?



## What is magnetic flux?

Magnetic flux is equal to the product of the magnetic flux density and the area through which it passes. It can be thought of as the number of field lines passing through a given area.



What equation is used to calculate magnetic flux when the area is at an angle to the field lines?



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$$\Phi = BA \cos\theta$$



Suggest how angle measurements could be taken in this experiment.



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A circular protractor card could be positioned under the circular coil and fixed in place with an optical pin. This allows the angle between the circular coil and search coil to be measured from the same position each time.



In what orientation will the maximum induced EMF and flux linkage occur in the search coil?





In what orientation will the maximum induced emf and flux linkage occur in the search coil?

The maximum induced emf and flux linkage will occur when the search coil is perpendicular to the magnetic field lines. This is when  $\theta$  is equal to 0 degrees.



Why might an ammeter be required when carrying out the preliminary experiment?



Why might an ammeter be required when carrying out the preliminary experiment?

As well as deciding suitable voltage and frequency values, it is important to ensure that the current passing through the coil doesn't exceed the manufacturer's guidelines.



In which orientation should the induced EMF be at a minimum?



In which orientation should the induced EMF be at a minimum?

The induced EMF should be zero when the search coil is parallel to the magnetic field lines. This is when  $\theta$  is equal to 90 degrees.



# What is magnetic flux linkage?



## What is magnetic flux linkage?

Magnetic flux linkage is equal to the magnetic flux passing through a coil, multiplied by the number of turns that cut this flux.



# What is the unit of magnetic flux?





What is the unit of magnetic flux?

Webers (Wb)

