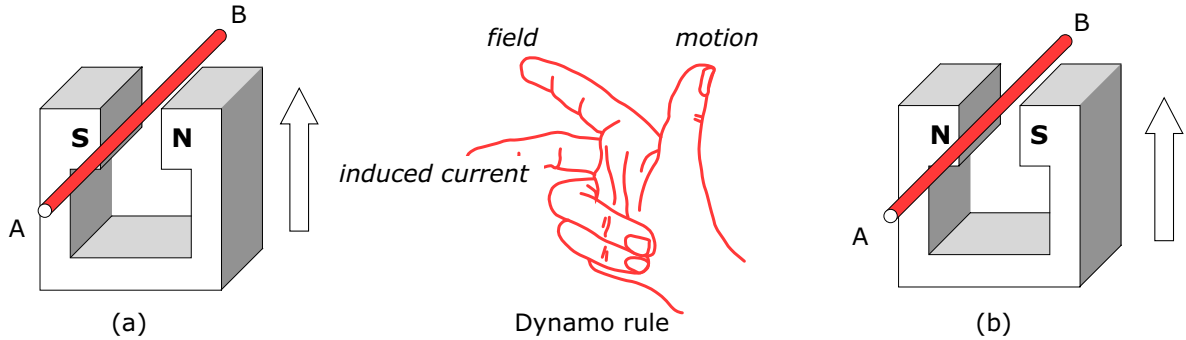


Electromagnetic induction 1

Name & Set

- 1 Use the right hand dynamo rule to predict which way the induced current flows through the conductor AB in diagrams (a) and (b) below.



- (i) Diagram (a): Magnet stationary, conductor moves in the direction of the arrow.

Induced current flows from _____ [1]

- (ii) Diagram (a): Magnet moves in the direction of the arrow, conductor stationary.

Induced current flows from _____ [1]

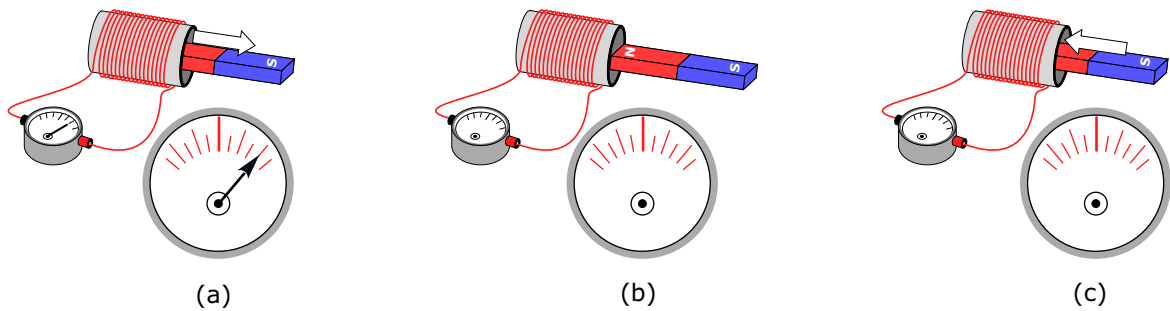
- (iii) Diagram (b): Magnet stationary, conductor moves in the direction of the arrow.

Induced current flows from _____ [1]

- (iv) Diagram (b): Magnet moves in the direction of the arrow, conductor stationary.

Induced current flows from _____ [1]

- 2 Diagrams (a), (b) & (c) show a bar magnet being moved in an out of a coil. A galvanometer shows the size and direction of the induced current.



- (i) If the deflection of the galvanometer needle in diagram (a) is as shown, draw the position of the needle in diagram (b), when the magnet is temporarily at rest and in diagram (c) when it is moving into the coil. [2]

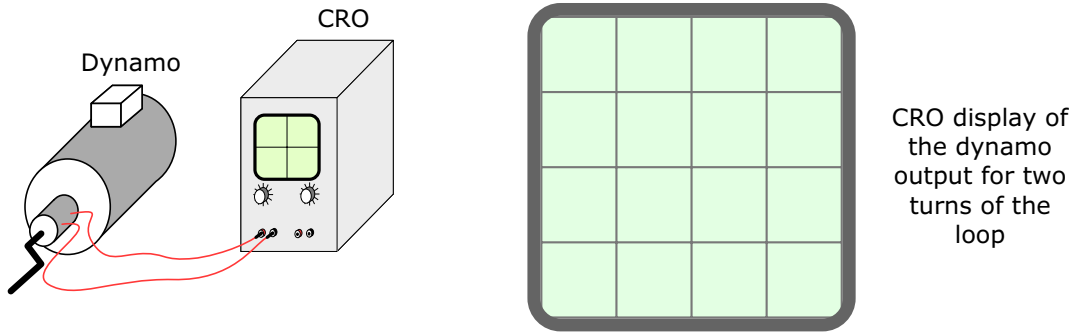
- (ii) How, if at all, would the movement of the galvanometer needle differ from that shown if the magnet was moved more rapidly?

_____ [1]

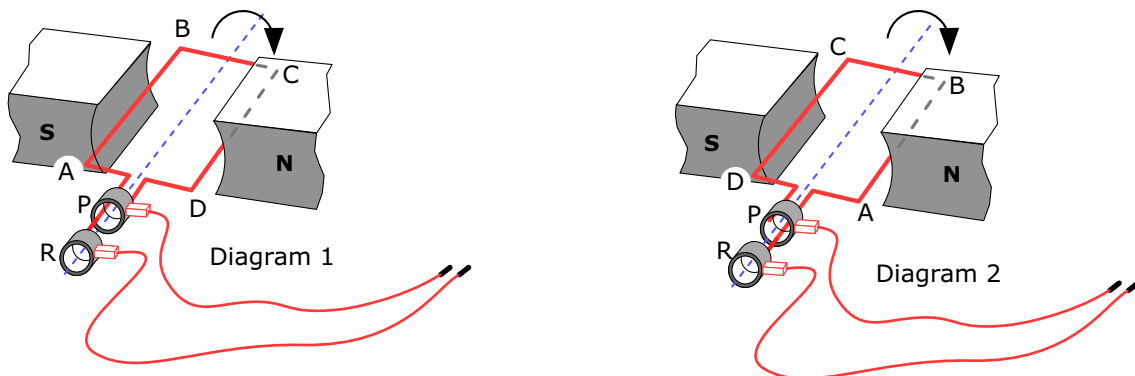
- (iii) What changes to the apparatus would result in an *increase* in the induced current?

_____ [2]

- 3 The diagram below shows a simple hand-cranked dynamo connected to a CRO which shows its output.



The dynamo consists of a single loop, ABCD, of wire rotating between the poles of permanent magnet. The loop rotates clockwise as shown in the diagrams below. Slip ring P is connected to the end D of the loop and slip ring R is connected to the end A of the loop.

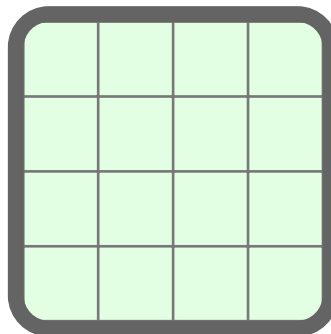
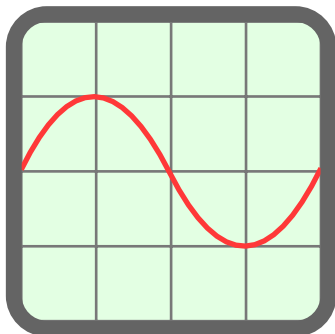


- (i) Use the dynamo rule to predict which way around the loop the induced current will flow in diagrams 1 and 2 as the loop rotates.

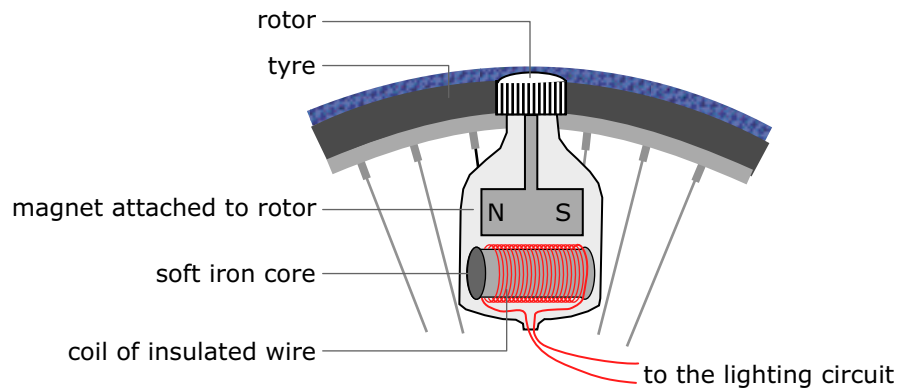
Diagram 1 _____ [1] Diagram 2 _____ [2]

- (ii) Is the output of the coil a.c. or d.c.? Explain your answer by describing the output of the dynamo over of complete rotation of the loop..

- (iii) Sketch two cycles of the output from this dynamo as it would appear on the CRO. [4]
- (iv) The rate at which the loop rotates is doubled. Complete the right hand diagram below to show how the display of the CRO will change when this is done. [2]



4 The diagram shows a cross-section of a bicycle dynamo.



(a) Outline the steps by which this dynamo produces an electric current.

[4]

(b) In the experiments on induction that you carried out using magnets and coils, the induced current was very small. Not enough to light even a small light bulb. What features of the bicycle dynamo ensure that the induced current is large enough to light the bulb in a bicycle lamp?

(i) How does the rate of change in the magnetic field to which the coil is subjected in this dynamo create a large current?

[2]

(ii) What features of the dynamo's coil contribute to the size of the induced current?

[2]

(c) In what major way does the design of the bicycle dynamo differ from other types of dynamo.

[2]

5 The dynamo is not the only device from which we obtain electrical energy.

Complete the table below of **four** different sources of electrical energy that don't depend on one another. Begin with the advantages and disadvantages of dynamo.

In each case there may be **more** than one advantage or disadvantage. List at least two for each.

Source	Principle	Advantages	Disadvantages
<i>Dynamo</i>	<i>e.m. induction</i>		
<i>Battery</i>			
Photo-voltaic			
Thermo-electric			