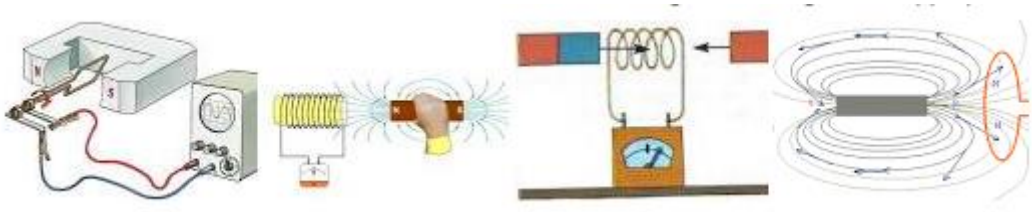
Modulo Interdisciplinare CLIL

Titolo del Modulo: "An Introduction to Electromagnetic Induction "

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Obiettivi:

1) Sapere cos'è un campo magnetico
2) Sapere quali sono le sorgenti di un campo magnetico
3) Conoscere in quale caso il campo esercita una forza su un conduttore
4) Migliorare le competenze della lingua inglese
5) Espandere il patrimonio lessicale in L1 ed L2

Prerequisiti

Disciplinari	Linguistici
- Concetti di carica elettrica, - Campo elettrico e corrente - Definizione di resistenza elettrica - Prima legge di Ohm	- Conoscere le principali strutture linguistiche di livello intermedio. - Capire parole o espressioni scritte e orali inerenti al modulo - Enunciare in forma scritta e orale definizioni e proprietà - Eseguire correttamente istruzioni richieste

Competenze disciplinari

Conoscenze

- Definizione di campo magnetico;
- Confronto fra poli magnetici e cariche elettriche;
- Campi magnetici generati da una corrente elettrica;
- Forze magnetiche sui fili percorsi da corrente;
- Interazione tra fili paralleli percorsi da corrente;

Abilità

- Applicare la legge che descrive l'interazione fra fili rettilinei percorsi da corrente;
- Determinare il campo magnetico prodotto in un punto dalla corrente che scorre in un filo rettilineo;
- Determinare la forza su un filo percorso da corrente ;

Competenze linguistiche

- The first aim for the students is to be able to understand the linguistic function giving directions, understanding tasks which is used to introduce all the activities they have to carry out.

The expression used are concerned with:

- The imperative (complete, work out, find, explain, prove,…)
- To have to…
- The second purpose is to know and to be able to use the microlanguage used in their activities

- The third objective is to be able to produce the language used to express the rules necessary to work out the activities.

L'attività è stata svolta con metodologia CLIL, secondo le fasi di seguito indicate:

1) **LEAD-IN**: In questa fase sono state proposte:
   a) attività motivazionali di warming up;
   b) attività lessicali finalizzate ad orientare gli alunni alla comprensione dei testi;
   c) eventuali attività di contestualizzazione disciplinare.
2) **READING AND LISTENING**: Sono stati proposti testi di *reading and listening* come *core activity* del Modulo. In altre parole tali testi hanno presentato il "contenuto" del Modulo. Per favorire l'assimilazione graduale delle informazioni, i testi sono stati suddivisi in paragrafi spesso intercalati da brevi domande di comprensione immediata dei punti principali. L'approccio didattico è stato diversificato per mantenere alte la motivazione e la concentrazione degli alunni. Al termine è stata proposta la lettura delle domande di *comprehension questions*. In questa fase gli studenti hanno lavorato in piccoli gruppi o in coppia secondo uno svolgimento cooperativo e socializzante.

3) **PRACTICE**: In questa fase sono state proposte attività di consolidamento, rinforzo, approfondimento e verifica in cui gli alunni hanno adoperato le conoscenze e le abilità disciplinari e linguistiche obiettivo del Modulo, e cioè:
   a) attività di comprensione del testo;
   b) attività di consolidamento/ampliamento lessicale;
   c) esercizi applicativi correlati alla dimensione disciplinare e linguistica del testo-

   Nelle attività *a* e *b* gli studenti hanno lavorato in piccoli gruppi o in coppie; l'attività *c* è stata invece svolta individualmente.

4) **PRODUCTION**: In questa fase sono state proposte delle attività che hanno consentito agli studenti di trasferire in contesti diversi e più ampi le **conoscenze** e le **abilità** acquisite nel Modulo trasformandole in **competenze**. Ciò ha contemplato attività di ricerca e di approfondimento disciplinare attività di produzione linguistica varia.

Metodologia (lezione frontale, partecipata, cooperativa, autoformazione,ecc.)

- Lezione frontale
- Lezioni multimediali di ascolto e visione
- Lavoro a gruppi
- Lezioni cooperative e partecipate

Strumenti (testi, materiali, attività, risorse)

- Schede;
- Lavagna;
- Lavagna multimediale;
- Computer;

AN INTRODUCTION TO ELETTROMAGNETIC INDUCTION

LEAD-IN

- ***Working in groups of three or four, state whether the following sentences are true or false, and correct the false ones.***

1 If you move magnet towards a compass and then away from it, the needle deflects in one direction and then in the other T F

2 Wearing a metal bracelet near a strong magnetic field can be hazardous T F

3 Magnetic fields have many uses, but you can't cook food with them. T F

- ***Match the terms (1-9) to their corresponding definitions (a-i).***

☐ 1-Eelectric current a) The property of the space around a magnet or current–carrying medium. When any other magnets or compass needles enter it, they experience a force.

☐ 2- Magnetic field b) An instrument for indicating a reference direction relative to Earth.

☐ 3-Compass c) A closed path of circuit in which a current can circulate.

☐ 4-Electric field d) Electromotive force.

☐ 5- Electric loop e) An instrument designed to measure the magnitude of electric current.

☐ 6- Galvanometer f) At a given point, their tangent indicates the direction of the vector field. The number of them per unit area on a perpendicular surface is proportional to the magnitude of the field in that region.

☐ 7- *emf* g) The net transfer of unit charge per unit time.

☐ 8- Ammeter h) An instrument used to measure a small electric current. It works by detecting a mechanical movement derived from electromagnetic forces produced by the current.

☐ 9- Field lines i) The property of the space around a charged object. Any other charged objects entering it will experience a force.

READING AND LISTENING

Introduction

LISTENING ACTIVITY:

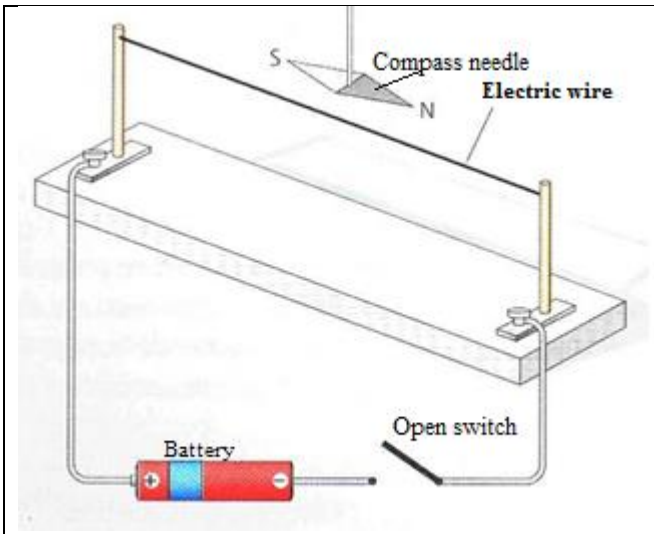
With your partner, consider the gaps in the text below. Try to put the right word in each gap. The words are the following:

An electric current
Magnetic fields
Two opposite poles
Current flowing in a wire
Different phenomena

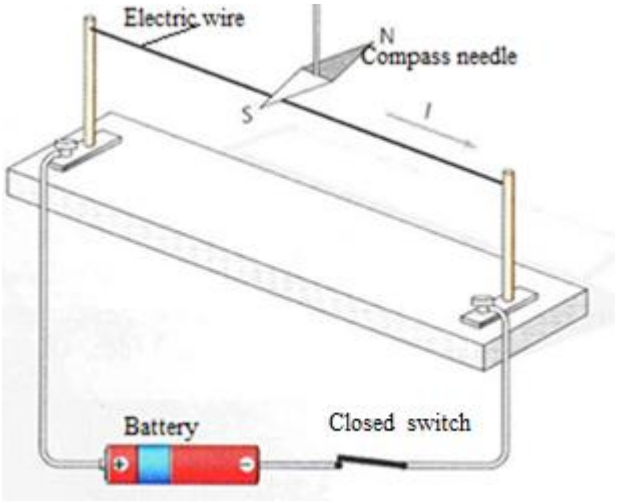
At the beginning of the 19th century there was a great debate between scientists who believed that electricity and magnetism were completely……, and those who believed that a strong connection existed between them. This latter point of view was sustained by followers of the philosophy of Nature (German: Naturphilosophie), which was widespread in the German cultural

atmosphere. It involved the search for unity in nature, and revolved around the concept of……. continuously attracting or repulsing each other.

This climate probably influenced the Danish scientist Hans Christian Oersted(1777-1851), who first observed the relationship between electricity and magnetism. In 1819, he noticed that a current flowing through a wire deflected a compass needle. Since compasses are only affected by magnetic field, Oersted deduced that an electrical current generates a magnetic field.
This is often referred to as " current-magnet interaction"

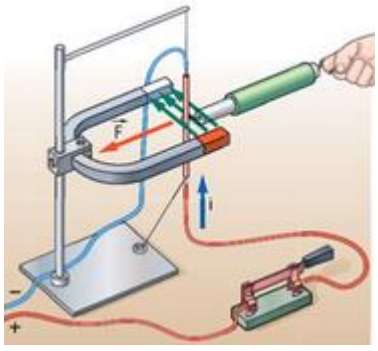


Oersted's apparatus: the switch is open and wire is placed parallel to a magnetised needle.



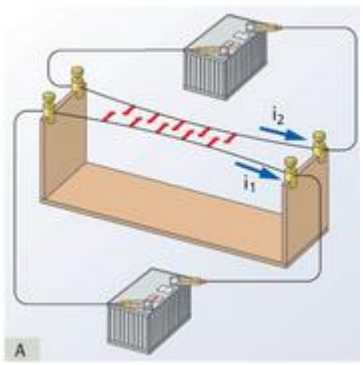
When the switch is closed , a current flows and the needle moves.

In the same period. Michael Faraday(1791-1867) proved that……..will experience the effect of a force exerted by a nearby magnet. The wire was attracted or repulsed by the magnet, depending on the direction of the current. This interaction is often referred to as" magnet-current interaction"

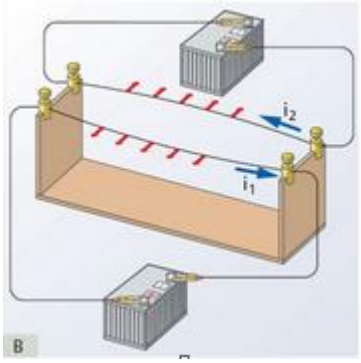


Faraday's experiment: magnetic-current interaction

Andrè Marie Ampere, at around the same time, determined the intensity of the reciprocal force exerted by two separate, parallel wires that were being traversed by currents. He assumed that the wires produced this force through the interaction of the …….. generated by their currents. This phenomenon is referred to as "current-current interaction".



The currents flow in the same direction, so the wires attract each other.



The currents flow in opposite directions, so the wires repel each other.

All of these experiments demonstrated that current generates a magnetic field, and scientists all over the world tried to understand whether or not the converse was true: they wondered whether a magnetic field could produce an electric current as well.

Michael Faraday and Joseph Henry in the United States each showed that there is a relationship between electricity and magnetism, demonstrating that a variable magnetic field is able to produce …….in a circuit.

After reading this passage, answer the following questions:

1) ***Which phenomena did Oersted discover to be related?***
2) ***More specifically, what caused the deflection of Oersted's compass needle?***
3) ***What kind of connection did Faraday Henry try to demonstrate?***