

Summary

Topic 10 - Fields

Subject	Year	Start date	Duration
Physics	IB1, IB2	Week 3, September	3 weeks 11 hours

Course Part
IB2 Additional

Curriculum

Aims

- Appreciate scientific study and creativity within a global context through stimulating and challenging opportunities
- Acquire a body of knowledge, methods and techniques that characterize science and technology
- Apply and use a body of knowledge, methods and techniques that characterize science and technology
- Develop an ability to analyse, evaluate and synthesize scientific information
- Develop a critical awareness of the need for, and the value of, effective collaboration and communication during scientific activities
- Develop experimental and investigative scientific skills including the use of current technologies
- Develop and apply 21st century communication skills in the study of science
- Become critically aware, as global citizens, of the ethical implications of using science and technology
- Develop an appreciation of the possibilities and limitations of science and technology
- Develop an understanding of the relationships between scientific disciplines and their influence on other areas of knowledge

Objectives

Demonstrate knowledge and understanding of

- facts, concepts and terminology
- methodologies and techniques
- communicating scientific information

Apply

- facts, concepts and terminology
- methodologies and techniques
- methods of communicating scientific information

Syllabus Content

Additional higher level

10. Fields

10.1 – Describing fields

Nature of science:

Paradigm shift: The move from direct, observable actions being responsible for influence on an object to acceptance of a field's "action at a distance" required a paradigm shift in the world of science.

Understandings:

Gravitational fields

Electrostatic fields

Electric potential and gravitational potential

Field lines

Equipotential surfaces

Applications and skills:

Representing sources of mass and charge, lines of electric and gravitational force, and field patterns using an appropriate symbolism

Mapping fields using potential

Describing the connection between equipotential surfaces and field lines

10.2 – Fields at work

Nature of science:

Communication of scientific explanations: The ability to apply field theory to the unobservable (charges) and the massively scaled (motion of satellites) required scientists to develop new ways to investigate, analyse and report findings to a general public used to scientific discoveries based on tangible and discernible evidence.

Understandings:

Potential and potential energy

Potential gradient

Potential difference

Escape speed

Orbital motion, orbital speed and orbital energy

Forces and inverse-square law behaviour

Applications and skills:

Determining the potential energy of a point mass and the potential energy of a point charge

Solving problems involving potential energy

Determining the potential inside a charged sphere

Solving problems involving the speed required for an object to go into orbit around a planet and for an object to escape the gravitational field of a planet

Solving problems involving orbital energy of charged particles in circular orbital motion and masses in circular orbital motion

Solving problems involving forces on charges and masses in radial and uniform fields

ATL Skills

Approaches to Learning

Thinking

- In this unit, we will

ask students to formulate a reasoned argument to support their opinion or conclusion

give students time to think through their answers before asking them for a response

reward a new personal understanding, solution or approach to an issue

ask open questions

set students a task which required higher-order thinking skills (such as analysis or evaluation)

build on a specific prior task

help students to make their thinking more visible (for example, by using a strategy such as a thinking routine)

require students to take an unfamiliar viewpoint into account when formulating arguments

ask questions that required the use of knowledge from a different subject from the one you are teaching

include a reflection activity

make a link to TOK



Social

- In this unit, we will

have students work in small groups

allocate, or ask students to allocate among themselves, different roles in a classroom discussion or activity

have students peer assess their group performance or process

support students in resolving a conflict in a team

give a group assessment task

give students feedback on how they worked as a group

have students discuss their understanding of a text or idea among themselves and come up with a shared understanding

provide an opportunity for students to analyse the impact of their behaviour on the class or on a group performance

encourage students to consider alternative points of view or to take the perspective of others

provide opportunities for students to make decisions



Developing IB Learners

☆ Learner Profile



Inquirers



Knowledgeable



Thinkers



Reflective