

Summary

Topic 3 - Thermal Physics

Subject	Year	Start date	Duration
Physics	IB1, IB2	Week 1, November	3 weeks 11 hours

Course Part

Core

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

Core

3. Thermal physics

3.1 – Thermal concepts

Nature of science:

Evidence through experimentation: Scientists from the 17th and 18th centuries were working without the knowledge of atomic structure and sometimes developed theories that were later found to be incorrect, such as phlogiston and perpetual motion capabilities. Our current understanding relies on statistical mechanics providing a basis for our use and understanding of energy transfer in science.

Understandings:

Molecular theory of solids, liquids and gases

Temperature and absolute temperature

Internal energy

Specific heat capacity

Phase change

Specific latent heat

Applications and skills:

Describing temperature change in terms of internal energy

Using Kelvin and Celsius temperature scales and converting between them

Applying the calorimetric techniques of specific heat capacity or specific latent heat experimentally

Describing phase change in terms of molecular behaviour

Sketching and interpreting phase change graphs

Calculating energy changes involving specific heat capacity and specific latent heat of fusion and vaporization

3.2 – Modelling a gas

Nature of science:

Collaboration: Scientists in the 19th century made valuable progress on the modern theories that form the basis of thermodynamics, making important links with other sciences, especially chemistry. The scientific method was in evidence with contrasting but complementary statements of some laws derived by different scientists. Empirical and theoretical thinking both have their place in science and this is evident in the comparison between the unattainable ideal gas and real gases.

Understandings:

Pressure

Equation of state for an ideal gas

Kinetic model of an ideal gas

Mole, molar mass and the Avogadro constant

Differences between real and ideal gases

Applications and skills:

Solving problems using the equation of state for an ideal gas and gas laws

Sketching and interpreting changes of state of an ideal gas on pressure–volume, pressure–temperature and volume–temperature diagrams

Investigating at least one gas law experimentally

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



Communicators



Balanced



Reflective

IB DP 12 PHY 6 HL (IB1)

Stream & Resources

Resources



Humayan Moyhuddin

Posted **1 file** on May 2, 2021 at 12:25 AM

3.1 - Thermal Concepts



Topic_3.1_-_Thermal_concepts.pptx
8 MB PowerPoint Presentation



Humayan Moyhuddin

Posted **1 file** on May 2, 2021 at 12:24 AM

3.2 - Modelling a gas



Topic_3.2_-_Modeling_a_gas__1_.pptx
2 MB PowerPoint Presentation



Humayan Moyhuddin

Posted **1 file** on May 2, 2021 at 12:23 AM

3.1 - Thermal Concepts



Topic_3.1_-_Thermal_concepts.pptx
8 MB PowerPoint Presentation