

Physics

Aims and objectives IB

Curriculum model

SL Total teaching hours	150
Theory	110
Core	80
Options	30
Practical work	40
Investigations	30
Group 4 project	10
HL Total teaching hours	240
Theory	180
Core	80
Additional higher level (AHL)	55
Options	45
Practical work	60
Investigations	50
Group 4 project	10



Physics is one of the group 4 subjects.

Through studying any of these subjects, you should aware of:

- how scientists work and communicate with each other;
- The "scientific method" involves the formation, testing and modification of hypotheses through observation and measurement;
- What distinguishes the experimental sciences from other disciplines



Aims

- To apply and use a body of knowledge, methods and techniques which characterize science
- Develop an ability to analyze, evaluate and synthesize scientific information
- Develop experimental and investigative scientific skills



Aims

- Raise awareness of the moral, ethical, social, economic and environmental implications of using science and technology
- Develop an appreciation of the possibilities and limitations associated with science and scientists



You should achieve:

- Demonstrate an understanding of: scientific facts and concepts, scientific methods and techniques, scientific terminology;
- Apply and use: scientific facts and concepts, scientific methods and techniques, scientific terminology;



You should achieve:

- Construct, analyse and evaluate: hypothesis, research questions and predictions, scientific methods and techniques, scientific explanations;
- Demonstrate the personal skills of cooperation, perseverance and responsibility appropriate for effective scientific investigation and problem solving



Syllabus of Pre-IB course

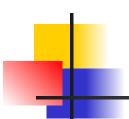
- Physics and physical measurements
- Mechanics
- Thermal physics
- Electric field
- Electric current
- Practical work

Some physical concepts

- Quantity 1)the aspect or property of anything that can be measured, weighed, counted, etc; 2) a specified magnitude or amount;
- Magnitude a number assigned to a quantity, such as weight, and used as a basis of comparison for the measurement of similar quantities
- Value a particular magnitude, number, or amount

Some physical concepts

- Unit a standard amount of a physical quantity, such as length, mass, energy, etc., specified multiples of which are used to express magnitudes of that physical quantity
- Physical phenomenon any change in nature



- Define give the precise meaning of a word or phrase as concisely as possible
- Draw represent by means of pencil lines
- List give a sequence of names or other brief answers with no elaboration, each one clearly separated from the others



- Measure find a value for a quantity
- State give a specific name, value or other brief answer
- Annotate add brief notes to a diagram, drawing or graph
- Distinguish give the differences between two or more different items



- Estimate find an approximate value for an unknown quantity, based on the scientific knowledge
- Identify find an answer from a number of possibilities
- Outline give a brief account or summary



- Deduce reach a conclusion from the information given
- Derive manipulate a mathematical equation to give a new equation or result
- Evaluate assess the implications and limitations



- Solve obtain an answer using algebraic and/or numerical methods
- Suggest propose a hypothesis or other possible answer
- Explain give a clear account including causes, reasons or mechanisms

What is Physics?

Universal:

Some sciences study specific objects or phenomena, for example

- The fish is an animal (biology)
- The stone consists of granite (geology)
- The battery is a source of electric voltage (engineering)

Physics studies properties which These have in common (universal phenomena)

- -The stone/ fish/battery weighs 50 g (physics)
- The stone/ fish/battery falls down because of gravity (physics)

The stone/ fish/battery consists of atoms (physics)

What is Physics?

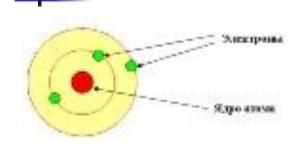
Experimental:

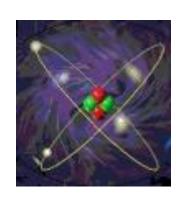
Mathematical:

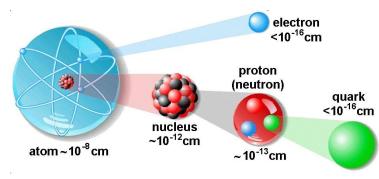
This means that what is ultimately true is decided by experimental tests.

Both experiments and theories in physics often involve mathematical descriptions and analyses.

The realm of Physics





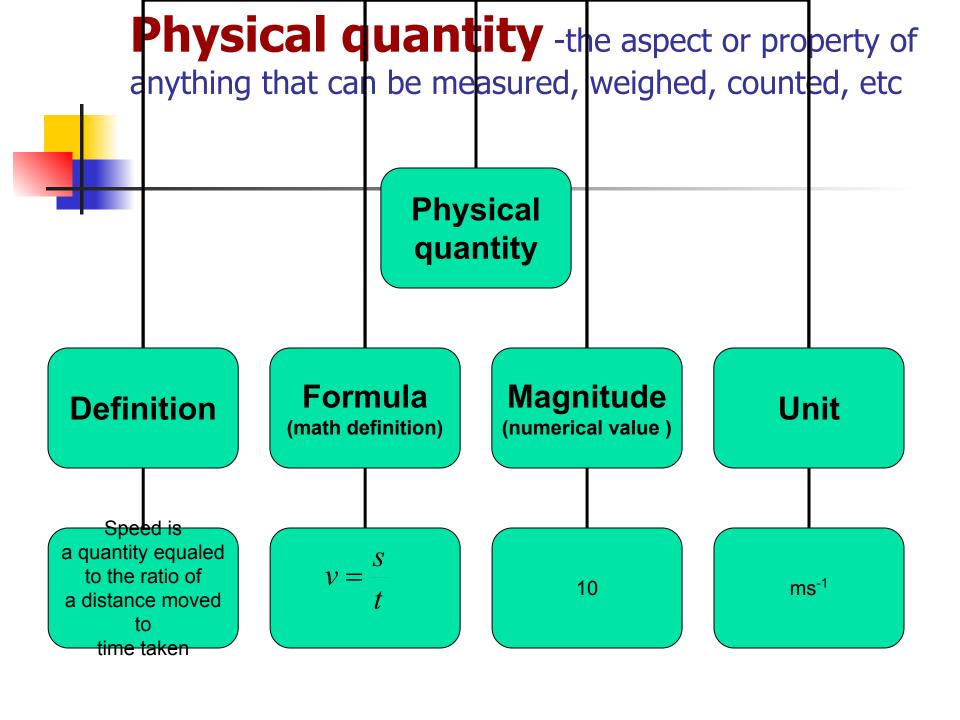




Diameter of solar system -10^{13} m



Diameter of Universe – 10²⁶ m



Physical quantity —

is a physical property that can be quantified. This means it can be measured and/or calculated and expressed in numbers.

- Example:
- The value of power is written as $P = 45.3 \times 10^3 W = 45.3 \text{ kW},$

Then

P represents the physical quantity of power 45.3×10^3 is a numerical value K is the SI prefix kilo, representing 10^3 W is the symbol for unit of power [P], the watt

The SI system

Fundamental (basic)

Mass	Kilogram	kg
Length	Meter	m
Time	Second	s
Electric current	Ampere	Α
Amount of substance	Mole	mol
Temperature	Kelvin	K
Luminous intensity	candela	cd

The SI of units (derived)

Physical Quantity	Symbol	Name and Symbol SI Unit	Fundamental Units Involved	Derived Units involved
frequency	f or v	hertz (Hz)	s ⁻¹	s ⁻¹
force	F	newton (N)	kg m s ⁻²	kg m s ⁻²
work	W	joule (J)	kg m ² s ⁻²	Nm
energy	Q, Ep, Ek, Eelas	joule (J)	kg m² s-²	Nm
power	P	watt (W)	kg m ² s- ³	J s ⁻¹
pressure	P	pascal (Pa)	kg m ⁻¹ s ⁻²	N m ⁻²
charge	Q	coulomb (C)	A s	A s
potential difference	Q V	volt (V)	$kg\ m^2\ s^{\text{-}3}\ A^{\text{-}1}$	J C-1
resistance	R	ohm (Ω)	$kg m^2 s^{-3} A^{-2}$	V A-1
magnetic field intensity	В	tesla (T)	kgs ⁻³ A ⁻¹	NA ⁻¹ m ⁻¹
magnetic flux	Φ	weber (Wb)	kg m ² s ⁻² A ⁻²	T m ²
activity	A	becquerel (Bq)	s ⁻¹	S ⁻¹
absorbed dose	W/m	gray (Gy)	$m^2 s^{-2}$	J kg ⁻¹



Units in accepted SI format

Note the use of the accepted SI format.

For example, the unit for acceleration is written as $m s^{-2}$ and not m/s/s or m/s^2 .

No mathematical denominators are used but rather inverse numerators are the preferred option.



Submultiple			
pico	p	10 ⁻¹²	
nano	n	10 ⁻⁹	
micro	μ	10 ⁻⁶	
milli	m	10 ⁻³	

Multiple			
kilo	k	10 ³	
Mega	М	10 ⁶	
Giga	G	10 ⁹	
Tera	T	10 ¹²	

Scientists tend to use scientific notation when stating a measurement rather than writing lots of figures.

1.2 * 10⁶ is easier to write and has more significance than 1 200 000.

In order to minimise confusion and ambiguity, all quantities are best written as a value between one and ten multiplied by a power of ten.

For example, we have that, $0.06 \text{ kg} = 6 * 10^{-2} \text{ kg}$