

# Classe 1C

Liceo Morgagni di Roma

## Programma di Fisica

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Libri adottati: "Complete Physics for Cambridge IGCSE, third edition" di S.Pople ed. Oxford University Press

"Complete Physics for Cambridge IGCSE Workbook" di S. Lloyd ed. Oxford University Press

1. Introduction to physics
  - Birth of physics
  - Scientific method: induction and deduction
  - Historical period of physics: classical physics, modern physics, contemporary physics
  - Fundamental forces in nature
  - Science and technique
2. Making measurements
  - Standard form, mixed form
  - International System of units of measurements: fundamental units of measurements, definition of meter, kilogram and second
  - Time interval, length, area, volume and density. Definition of liter.
  - Conversion among different units
  - Measuring instruments: sensitivity, capacity and promptness
  - Vernier caliper
  - Absolute errors, relative errors
  - Mean value
  - Significant figures and roundings: measurements with errors
  - The parallax error
  - Direct and indirect measurements
  - Error on sum, difference (composition rule),
  - Error on product and ratio (using the number of significant figures)
3. How to make a laboratory report
  - Aim of the experiment
  - Instruments and materials
  - Procedure
  - Data taking
  - Data analysis
  - Conclusions
4. Representation of data and phenomena
  - How to read a formula: inverse formulae
  - Cartesian graph
  - Direct and inverse proportionality
  - Linearity and non linearity

- How to plot errors on graph
- Graphical fit with the estimation of slope
- 5. Describing motion
  - Vectors: definition, sum and difference of vectors, decomposition along given directions
  - Understanding speed: distance-time graphs
  - Understanding acceleration: speed-time graphs
  - Difference between speed and velocity
  - Calculating speed and acceleration
- 6. Forces and motion
  - Mass, weight and gravity
  - Sliding, rolling friction, drag
  - Falling and turning
  - Terminal velocity
  - Force, mass, acceleration
  - Action and reaction
  - Moving in circles
  - Linear momentum and the impulse theorem
- 7. Turning effects of forces
  - Centre of mass
  - The moment of a force
  - Calculating moments
  - Stretching and compressing
  - Lever of three different classes
  - Equilibrium: stable, unstable, neutral
- 8. Forces and matter
  - Forces acting on solids
  - Stretching springs
  - Hooke's law
- 9. Pressure
  - Pascal's principle and Stevin's law, hydraulic jack
  - Pressure measurements: manometer
  - Atmospheric pressure: barometer
  - Archimedes' law
- 10. Energy transformations and energy transfer
  - Forms of energy: energy store and transfer
  - Energy conversions
  - Conservation of energy: efficiency
  - Energy calculations
- 11. Work and power
  - Doing work
  - Potential energy, kinetic energy and mechanical energy
  - The conservation of mechanical energy
  - Power and efficiency
  - Calculating power
- 12. Energy resources
  - The energy we use: renewables and non-renewables, wind and wave, biomass, fossil and nuclear fuels, geothermal energy
  - Energy from the sun

13. The kinetic model of matter
  - States of matter
  - The kinetic model of matter: Brownian motion
  - Forces and the kinetic theory
  - Gases and the kinetic theory
14. Thermal properties of matter
  - Temperatures and temperatures scales
  - The law of thermal expansion (bimetal strip and bimetal thermostat)
  - The thermal bath and Boyle's law
  - Designing a thermometer (fixed points)
  - Thermistor and thermocouple
  - Thermal capacity
  - Specific heat capacity (s.h.c.)
  - Liquid and vapours
  - Specific latent heat (s.l.h.)
15. Thermal (heat) energy transfers
  - Conduction
  - Convection
  - Radiation
  - Some consequence of thermal (heat) energy transfer
16. Climate changes
  - global warming
  - pollution
17. IGCSE assessment
  - Meaning of Core and Extended syllabuses
  - Papers and mark schemes
  - The "Alternative to practical" paper

Laboratory experiences:

- Length
- Density
- Speed (mini-cars)
- Gravity (egg drop)
- Energy transformations (balloon-propelled car)
- Static friction

Roma, 06/06/2022

Il docente del corso

prof. Enrico Campagna

I rappresentanti degli studenti