

Classe 2M a.s. 2018-2019 Fisica – Attività svolta

Testo in uso: Pople – Complete Physics – Oxford University Press

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Thermal Effects

Lezione : Fasi della materia. Energia interna; temperatura. Termometro tarato in gradi Celsius.

Compresenza : Par. 5.03: Temperature (2) (cont'd). Fixing a temperature scale using fixed points (review). Calibrating a thermometer (review). Linear scale. Absolute zero and the Kelvin scale. Liquid-in-glass thermometers. Sensitivity. Range. Responsiveness. Linearity. Examples. Par. 5.04: Expanding solids and liquids. Linear expansion (with formula). Comparing expansions. Examples. The bimetal strip.

Lezione : Trasferimento di energia termica; Leggi dei gas.

Compresenza : Par. 5.06: Thermal conduction. Fourier's formula for thermal conduction. Thermal conductors and insulators. Examples from past IGCSE Physics papers.

Lezione : Trasferimenti di energia termica: conduzione, convezione, irraggiamento, spettro radiazione e.m

Compresenza : Par. 5.07 (Convection), Par. 5.08 (Thermal radiation). Exercises from past IGCSE Physics paper 0625/61/MJ/2014 involving conduction in solids and thermometers.

Passaggi di fase.

Compresenza : Par. 5.08: Thermal radiation (cont'd). Emitters and absorbers. Examples. Greenhouse effects. The solar panel. The vacuum flask. Par. 5.09: Liquids and vapours. Evaporation. Boiling. The cooling effect of evaporation. Examples. Condensation. Exercise about specific heat capacity and latent heat.

Compresenza : General review involving Conservation of Energy, Power, Efficiency and Thermal Physics (thermometers, expanding solids and liquids, ideal gas laws, conduction, convection, thermal radiation, evaporation vs. boiling, specific heat capacity, latent heat). Review exercises from Chapter 5 (Thermal Physics): n. 3, 4, 5.

Waves and light rays

Compresenza : Chapter 6: Waves, Sounds, and Vibrations. Par. 6.01: Transverse and longitudinal waves. Mechanical waves. Electromagnetic waves. Describing waves (introduction).

Compresenza : Par. 6.01: Transverse and Longitudinal waves (cont'd). Describing waves: amplitude, wavelength, frequency, period. The wave equation. Par. 6.02: Wave effects. Ripple tank. Reflection. Refraction.

Lezione : Onde: definizioni e problemi.

Attività di laboratorio : Dimostrazioni con l'ondoscopio. Misura della lunghezza d'onda

Compresenza : Laboratory practice: wave effects in a ripple tank. Some further remarks and explanations about Refraction. Exercise from past IGCSE Physics test involving Refraction.

Trattamento dei dati sperimentali: incertezze assolute e relative; incertezze in addizioni/sottrazioni e in moltiplicazioni/divisioni; come si scrive un risultato sperimentale. Retta di best fit.

Compresenza : Par. 6.03: Sound waves. The nature of sound waves. Par. 6.04: Speed of sound and echoes. The speed of sound. Measuring the speed of sound (see Par. 13.06). Refraction of sound. Exercise from past IGCSE Physics test 0625/3/MJ2006 involving sound waves (compressions/rarefactions).

Compresenza : Chapter 7: Rays and Waves. Par. 7.01: Light rays and waves. Features of light. Wavelength and colour. The electromagnetic spectrum (see diagram Par. 7.10).

Lezione : Leggi ottica geometrica ed esercizi.

Compresenza : Laboratory Practice: Snell's law (refraction).

Lezione : Legge di Snell ed esercizi

Compresenza : Physics. Refraction (cont'd). Par. 7.06: Refraction calculations. Snell's law. Refractive index. Examples. Calculating the critical angle (with proof). Examples. Par. 7.05: Total internal reflection

Lezione : Problemi rifrazione.

Compresenza : Par. 7.07: Lenses (1). Convex lenses (converging). Concave lenses (diverging). Real images formed by convex lenses. Finding an image by using ray diagrams and standard rays for converging lenses (complete scheme with applications). The thin lens equation.

Compresenza : Real and virtual images (see Par. 7.07 and 7.08). Par. 7.02: Reflection in plane mirrors (1). The laws of reflection. Image in a plane mirror. Real and virtual images. Finding the position of an image in a mirror (see Paper 0625/61/s2014). Rules for image size and position. Par. 7.03: Reflection in plane mirrors (2). Finding an image position by construction. Method 1. Method 2.

Compresenza : Par. 7.02: Example from IGCSE Physics paper 0625/61/s2014 about reflection (complete solution scheme, including graph and Gradient). Par. 13.03.

Electricity an magnetism

Attività di laboratorio : Fenomeni elettrostatici; elettricità ella materia.

Compresenza : Physics. Chapter 8: Electricity. Par. 8.01: Electric charge (1). Negative and positive charges. Examples. Coulomb's law for electrostatic charges (with formula). Coulomb's law vs. Newton's law for Gravitation (see Par. 2.09). Where charges come from. Conductors, insulators and semiconductors. Par. 8.02: Electric charge (2). Attraction of uncharged objects (introduction). Unit of charge.

Compresenza : Par. 8.02: Electric charge (2). Attraction of uncharged objects. Earthing. Induced charges. Examples. Leaf electroscope. Par. 8.03: Electric fields. Electric field patterns: single positive/negative source charge, Dipole.

Lezione : Corrente elettrica e differenza di potenziale.

Compresenza : Par. 8.04: Current in a simple circuit. Components of a circuit: battery (generator), switch, bulbs (resistors), connecting wires, Ammeters, Voltmeters. Examples and symbols. Measuring current by using Ammeters and Galvanometers. Charge and current (equation and units). Current direction. Par. 8.05: Potential difference (introduction). Definition of P.D. and its units. Series and parallel circuits: brief introduction (see Par. 8.09).

Attività di laboratorio : Circuiti resistivi ed uso della strumentazione di base.

Compresenza: Par. 8.06: Resistance (1). Definition of Resistance. Units. Some factors affecting resistance. Resistance and heating effect. Par. 8.07: Resistance (2). V, I, R equations: Ohm's law. How current varies with PD for a metal conductor (introduction). Par. 8.08: More about resistance factors. The effects of length and area. Ohm's second law. Resistivity. Some typical resistivity values (see table).

Attività di laboratorio : Verifica del funzionamento delle batteria a frutta e dell'elettroforo di Volta realizzate in gruppo.

Compresenza :Par. 8.09: Series and parallel circuits (1). Bulbs in series and parallel. Circuits and switches. Basic circuit rules. Cell arrangements. Examples. Par. 8.10: Series and parallel circuits (2). Combined resistance of resistors in series (with proof). Combined resistance of resistors in parallel (with proof). Examples. Question 3. Solving circuit problems: example from past Physics test about series/parallel circuit.

Lezione : Circuiti in corrente continua.

Attività di laboratorio : Determinazione sperimentale del valore di una resistenza.

Compresenza : Par. 8.06: Resistance (1). Resistance components: Resistors, Variable resistors (rheostats), Thermistors, Light- dependent resistors (LDRs), Diodes. Par. 8.07: Resistance (2). How current varies with PD for a metal conductor: finding Ohm's law experimentally. Current-PD graphs: tungsten filament and Diode. Par. 10.02: More on components. Diodes. Forward/reverse biased Diode

Compresenza : Par. 8.11: Electrical Power. Power: definition, units, examples. Electrical Power equation (with proof). Power dissipated in a resistor (with proof). Par. 8.12: Mains electricity. Live (or active) wire, Neutral (or cold) wire, Switch, Fuse, Earth wire, Double insulation. Plugs.

Compresenza : Par. 10.02: More on components. Diode as polarized P-N junction. Potential divider (with formula and examples). A brief description of Transistors. Par. 10.03: Electronic switching. A light-sensitive switch. A temperature-sensitive switch.

Lezione : Seminario tenuto dalla laureanda in Fisica Federica Demattè su "NMR Imaging"

Lezione : Campo magnetico; materiali magnetici, magnetizzazione, elettromagneti.

Lezione : Legge di Biot e Savart. Elettromagneti, relais.

Lezione : Forza elettrica e magnetica su di una particella carica.

Compresenza : Chapter 9: Magnets and Currents. Par. 9.01: Magnets. Magnetic poles. Induced magnetism. Permanent and temporary magnets. Making a magnet. Where magnetism comes from. Par. 9.02: Magnetic fields. Magnetic field patterns (brief review). Par. 9.03: Magnetic effect of a current. Magnetic field around a wire: Biot-Savart's law (with formula). A rule for field direction. Magnetic fields from coils: Solenoid (with formula). A rule for poles. Making a magnet.

Compresenza : Par. 9.05: Magnetic force on a current. Fleming's left-hand rule. Exercises from past IGCSE Physics papers. Turning effect on a coil. Ammeter. Par. 9.06: Electric motors. A simple DC motor. Split ring (as commutator) and brushes. Practical motors.

Attività di laboratorio: dimostrazioni sull'induzione elettromagnetica.

Compresenza : Par. 9.05: Magnetic force on a current (review). Par. 9.06: Electric motors. A simple DC motor (review). Par. 9.07: Electromagnetic induction. Induced EMF and current in a moving wire. Faraday's law of electromagnetic induction (with formula). Induced EMF and current in a coil. Par. 9.08: More about induced currents. Induced current direction: Lenz's law. Induced current direction: Fleming's right-hand rule. Examples. Eddy currents.

Compresenza : Par. 9.08: More about induced currents. Induced current direction: Lenz's law. Examples. Induced current direction: Fleming's right-hand rule (review). Eddy currents and examples. Par. 9.09: Generators. A simple AC generator. Simple AC generator vs. DC motor.

Compresenza : Introduction to Transformers. Par. 9.12: Power across the country. Transmission issues. AC or DC? High or low voltage? Overhead or underground? Par. 9.11: Coils and transformers (2). Step-up and step-down transformers. Equation for a transformer. Power through a transformer. Practical transformers.

Lezione : Principi di funzionamento di un trasformatore ideale.

Nel corso dello stage presso la Bell's School di St. Albans (UK) è stato svolto il modulo "Electronics".

Bologna, 12 giugno 2019.

