MECHANICS SET ME1
NT-01.00.00

NEO-TECH
NTEC
EXPERIMENT
CASE

ME1 - Basics

15 experiments

- Measurement of length 1 & 2
- Volume of solid bodies
- Density of solid materials
- Density of liquids
- Densité de l'eau salée
- Force and rubber band elongation
- Force and coil spring extension (Hooke's law)
- Determination of acceleration due to gravity 'g'
- First-class lever
- Centre of gravity
- Second- and Third-class levers
- Archimedes' principle (buoyancy)
- Action/reaction applied to buoyancy in water

ME1

Necessary accessories

- Universal stand base
- Balance 1.200g x 0,1 g

MECHANICS SET ME2
NT-02.00.00
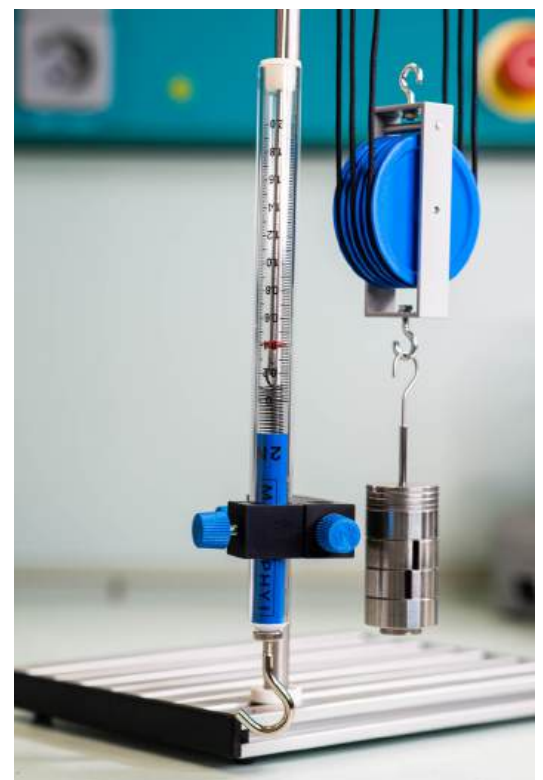
ME2 - Forces

13 experiments

- The law of inertia (Newton's 1st law)
- Using the law of inertia
- Action and reaction
- The force of friction
- Force on a rope
- Forces on a fixed pulley
- Forces on a loose pulley
- Forces on a block and tackle
- Resolution of forces
- Forces on an inclined plane 1
- Forces on an inclined plane 2
- Efficiency
- Conversion of mechanical energy

ME2

Necessary accessories

- Universal stand base
- Universal track

MECHANICS SET ME3+
NT-03.00.80

ME3+ - Kinematics/Dynamics/Energy /Impulse

20 experiments

- Time and distance (what is a second)
- Personal reaction times
- Frames of reference
- Uniform motion
- Instantaneous velocity
- Uniformly accelerated motion
- Free fall
- Parabolic movement
- Force and acceleration
- Mass and acceleration
- Coil spring pendulum (2 exp.)
- String pendulum
- The law of conservation of energy in m...
- Kinetic energy
- Non harmonic (irregular) oscillations
- Momentum conservation (Newton's 2nd law)
- Inelastic collision
- Elastic collision (2 exp.)

ME3+

Necessary accessories

- Mechanics set ME2 (mandatory to be functional)
- Universal stand base
- Universal track

REQUIRES SET ME2

MECHANICS SET ME4
NT–51.00.00

ME4 - Liquids and gases

15 experiments

- Pressure in liquids and gases
- Aneroid manometer
- Hydrostatic pressure
- The cause of hydrostatic pressure
- Connected vessels
- Artesian well
- Buoyancy (Archimedes' principle)
- Buoyancy force and counter force
- Floating, hovering, sinking
- Determining density with the buoyancy method
- Circular area and diameter
- The hydraulic press
- Effects of air pressure
- The Boyle-Mariotte law
- The Gay-Lussac law

ME4

Necessary accessories

- Universal support stand
- Balance 1.200g x 0,1 g

MECHANICS SET ME6
NT-54.00.00

## ME6 - Vibrations and waves

16 experiments

- Period and amplitude (2 exp.)
- Period and mass (2 exp.)
- Period and spring stiffness
- Period and pendulum length
- Damping and frequency
- Damping and amplitude
- Undamped oscillations
- Forced oscillations
- Superposition of oscillations (2 exp.)
- Coupled pendulum
- Standing transverse waves
- Standing longitudinal waves
- Polarisation

ME6

Necessary accessories

- Universal support stand
- Universal track
- Lab power supply 6/12V AC / 0-12V DC
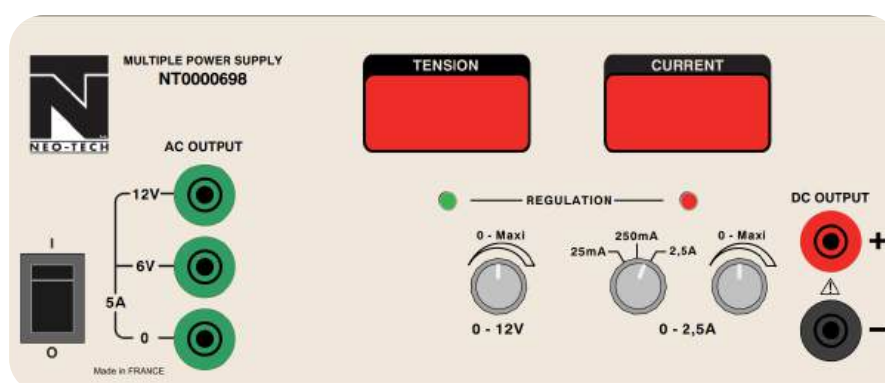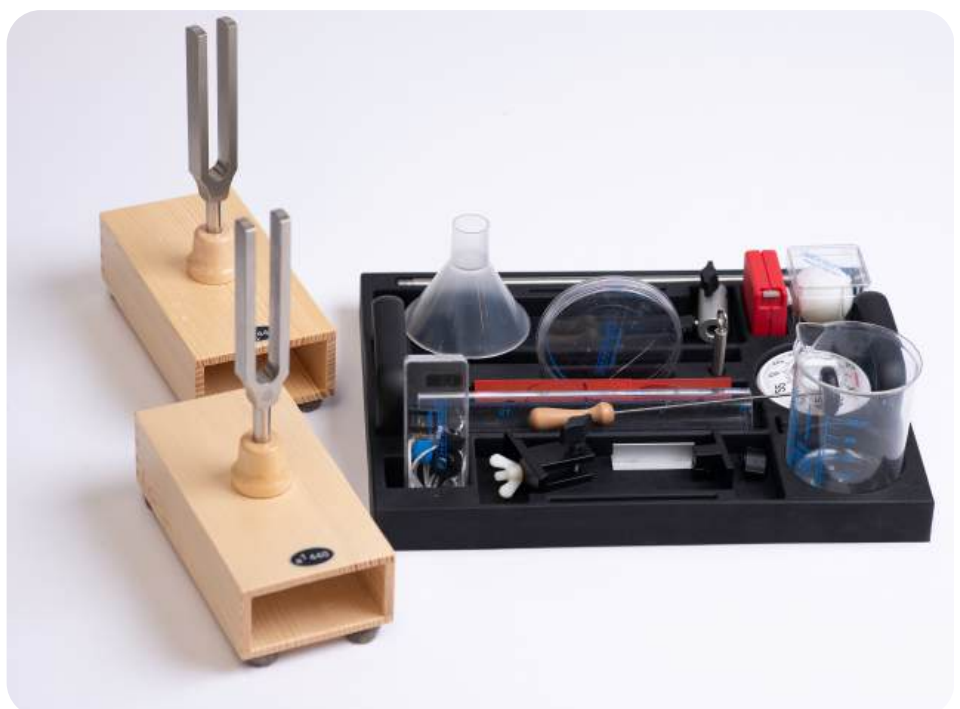
AC1 - Basics

11 experiments

- Types of sound we can hear
- Creating tones and sounds
- Tones and volume
- Oscillating columns of air
- Propagation of sound in air
- Resonance
- Propagation of sound in solids
- Sound focusing
- Sound insulation
- Beats
- Directionality of hearing


AC1

Necessary accessories

- Universal test stand
- Rider

RIPPLE TANK SET ME8
NT-16.00.00

NEO-TECH
NTec
EXPERIMENT CASE

ME8 - Ripple tank

15 experiments

- Micro-controller based digital control
- Compact and self-contained unit with adjustable frequency
- Clear LED displays shows wave and strobe frequencies individually
- Convenient membrane keypad for straightforward control
- Allows the study of essential wave phenomena: Reflection, Refraction, Interference and Diffraction
- 13 accessories included
- 50 - 175Hz operation with 1Hz resolution

AC1

Reflected wave

Incident wave

$i = r$
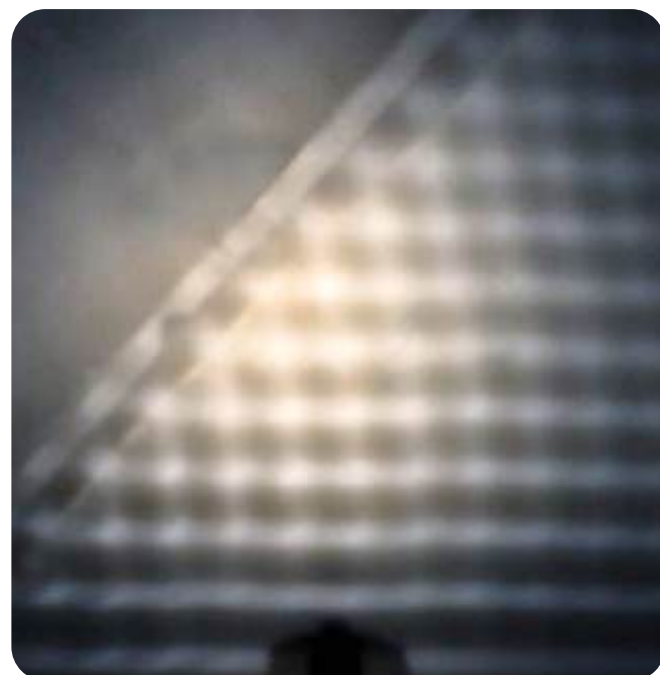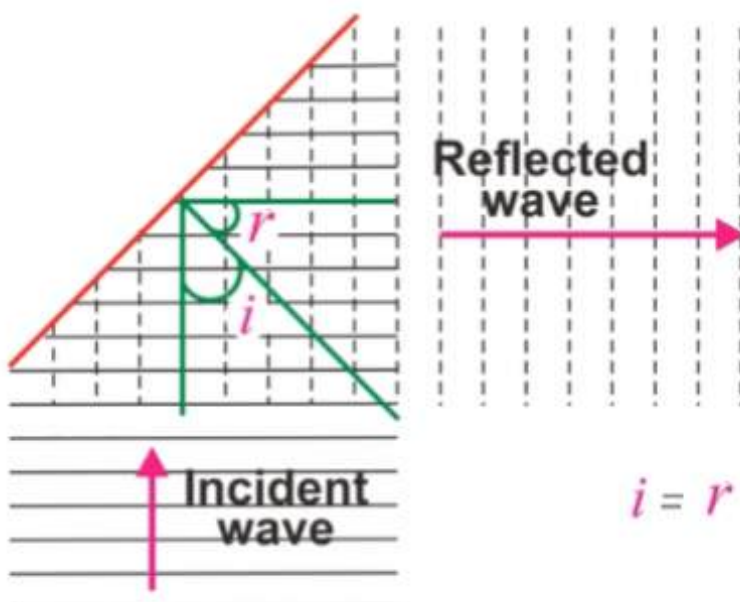
THERMODYNAMICS SET TH1
NT-44.00.50

NEO-TECH
NTEC
EXPERIMENT CASE

TH1- Basics

15 experiments

- Subjective perception of heat
- Expansion of liquids
- Calibration of a liquid thermometer
- Expansion of air
- Expansion of solids
- How does a bi-metallic strip work
- Propagation of heat
- Conduction of heat
- Convection
- Black bodies and white bodies
- Heat insulation (2 exp.)
- Effect of salt to ice
- Structure of a flame
- Brownian motion

TH1

Necessary accessories

- Universal support stand
- Pack of tea candles

THERMODYNAMICS SET TH2
NT-10.00.00

NEO-TECH
NTEC
EXPERIMENT CASE
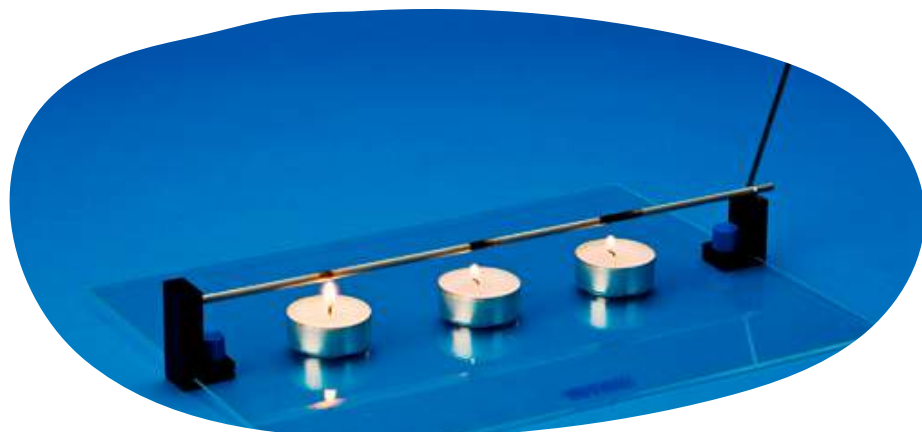
TH2- Heat capacity and energy

11 experiments

- Electric heat
- Calibration of a liquid thermometer
- Brownian motion
- Internal energy and temperature rise
- Specific heat capacity of water
- Mixing experiments
- Water equivalent of a calorimeter
- Specific heat capacity of water
- Latent heat of melting ice
- Electrical energy and internal energy
- Use of an NTC as a thermometer

TH2

Necessary accessories

- Lab power supply 6/12V AC / 0-12V DC
- Analog mltimeters

OPTICS SET OG1
NT-04.00.00

NEO-TECH
NTEc
EXPERIMENT CASE
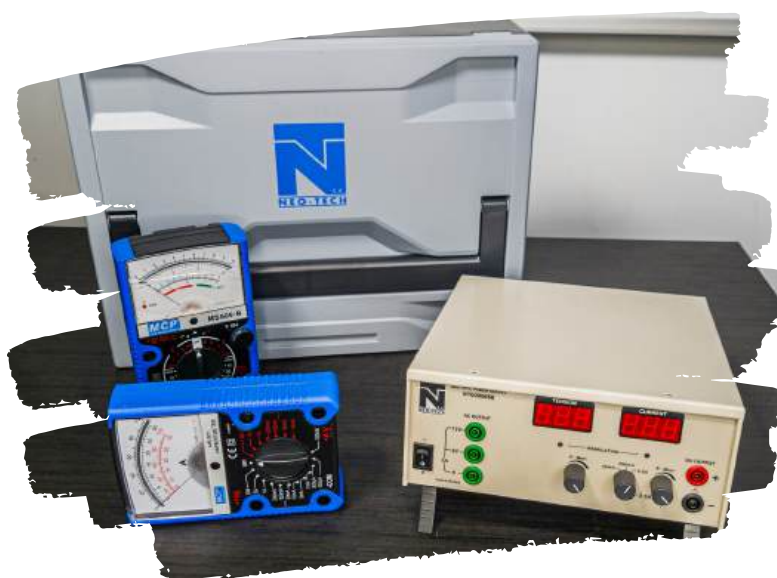
OG1- Geometry optics

20 experiments

- Light beams and rays
- Reflection from a plane mirror
- Apparent location of a mirror image
- Angled mirrors
- Focal point of a concave mirror
- Important rays of a concave mirror
- Refraction of light
- Parallel-sided blocks
- Refractive index between air & water
- Critical angle for total reflection
- Total internal reflection in prism
- Fibre optics
- Convex and concave lenses: focal points, important rays - (4 exp.)
- Combination of lenses
- Dispersion of white light
- Additive and substractive colour mixing
- Crossing of light beams

OG1
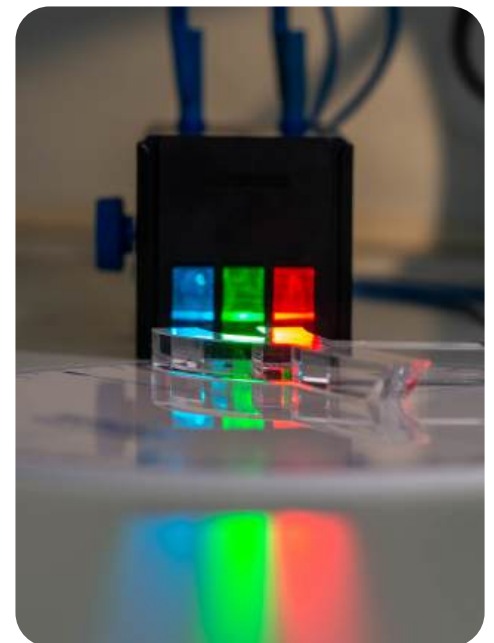
Necessary accessories

- Low voltage power supply
- Spare light bulb

OPTICS SET OW1
# NT-05.00.50

OW1- Wave optics

18 experiments

- Formation of shadows
- Pinhole camera
- Virtual and real Images from a concave mirror
- Real images from a converging lens
- Magnifying glasses
- Microscopes
- Telescopes (astronomical, Galileo, reflecting) - 3 exp.
- Eye defects
- Stereoscopic vision
- Spectrum produced by a prism
- Polarisation of light - 2 exp.
- Rainbows
- Diffraction : Young's double slit
- Diffraction from a grating - 2 exp.

OW1
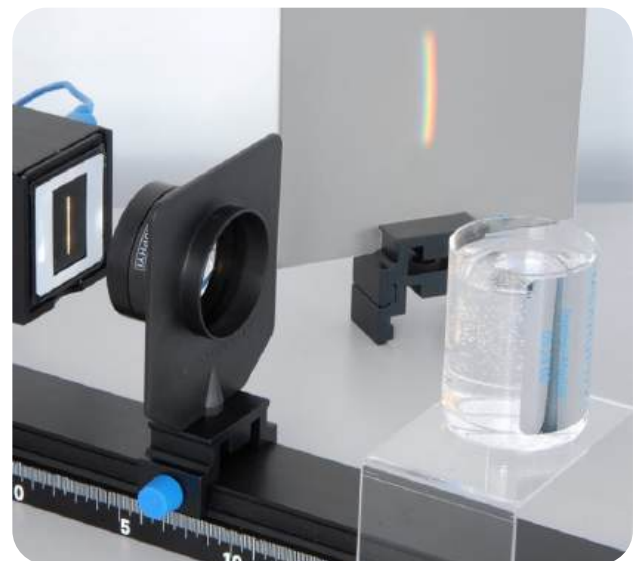
Necessary accessories

- Optics set OG1 (mandatory to be functional)
- Low voltage power supply
- Universal track

REQUIRES SET OG1
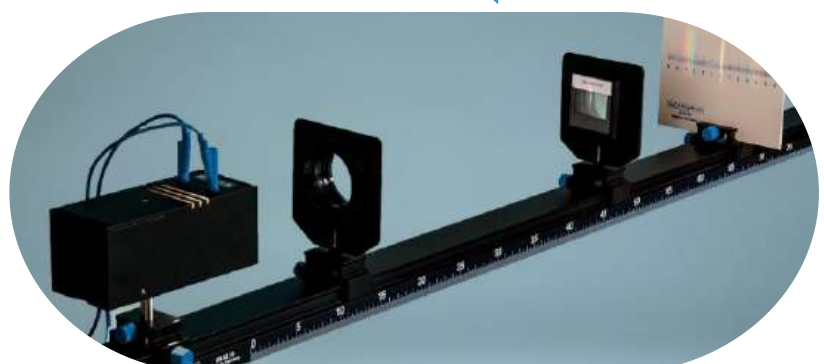
EL1 - Electric circuits

17 experiments

- Electric current
- Solid electric conductors
- Liquid electric conductors
- AND/OR and two-way circuits
- The Oersted experiment
- Relays and bells
- Voltaic cells
- Wiring of voltage source
- V-I characteristics
- Ohm's law
- Two lamps
- Resistors in series
- Resistors in parallel
- Combination of resistors
- Internal resistance of a battery
- Taking readings from an analog multimeter
- Electric power in circuits

EL1

Necessary accessories

- Low voltage power supply AC/DC
- Analog multimeters (2 pc)
- 9V Flat battery (2 pc)
- Sulfuric acid
- Spare light bulbs
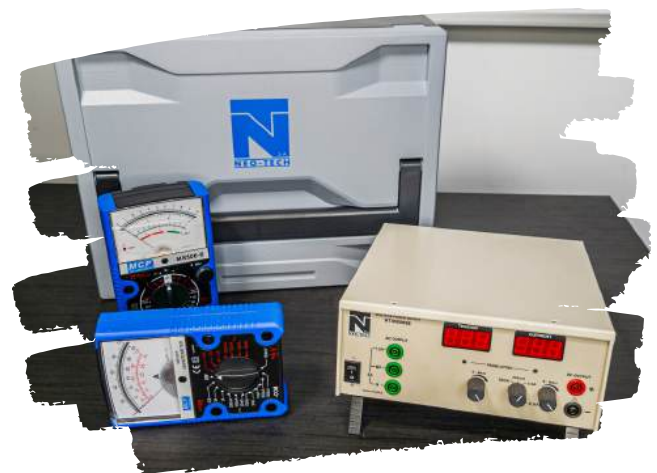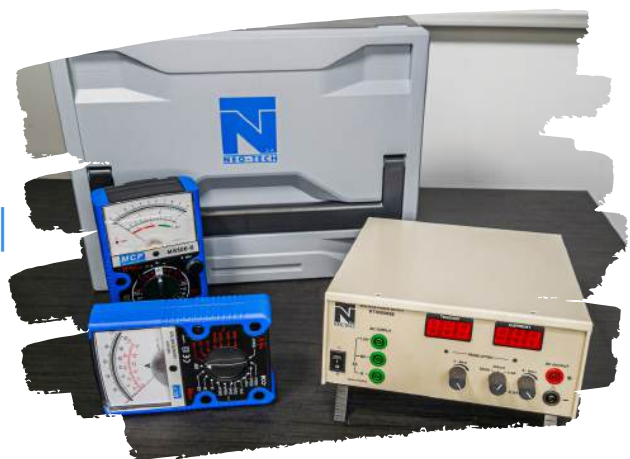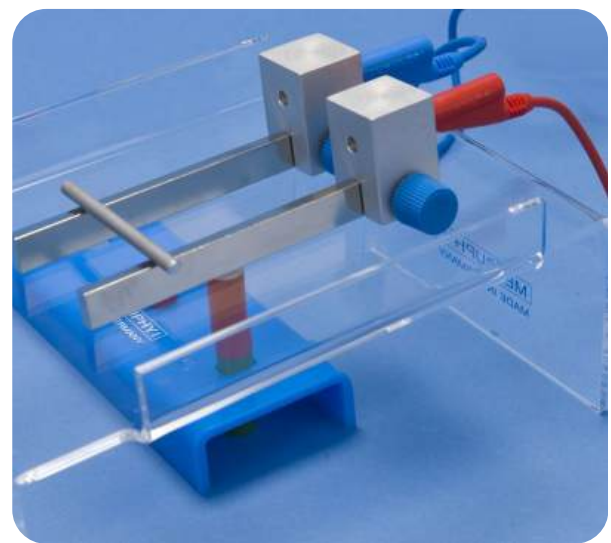
ELECTRICITY SET EL2+
NT-07.00.50

EL2+ - Electro-, Magneto-statics, Induction, Lorentz force

21 experiments

- Ferromagnetic materials
- Magnetic poles
- Magnetism (3 exp.)
- Magnetic field lines
- Magnetic filed in a coil
- A magnet for on/off switching
- Soft iron instruments
- Electrostatic force
- Electroscope
- The sign of electric charge
- Electromagnetic induction (2 exp.)
- Lorentz force
- Lenz's law
- Self-induction
- The transformer laws
- AC generator
- DC motor
- Eddy currents

EL2+

Necessary accessories

- Laboratory power supply 6/12V AC | 0-12V DC
- Analog multimeters (2 pc)
- 9V Flat battery (2 pc)
- Eddy current accessories

ELECTRICITY SET EL3
NT-09.00.00

NEO-TECH
NTec
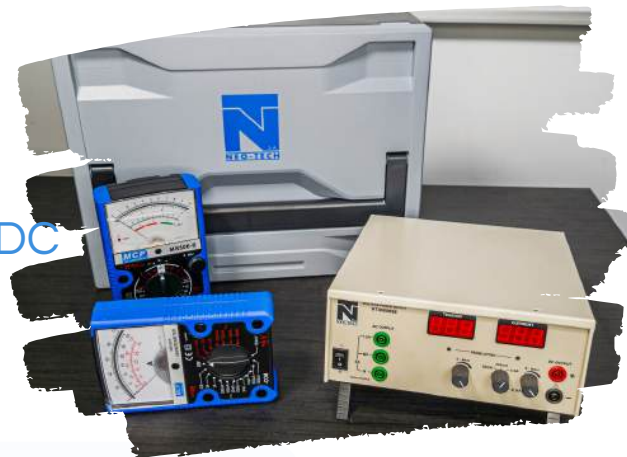EXPERIMENT CASE

EL3 - Specific resistances

9 experiments

- Ohmi conductor
- Effect of conductor's length
- Effect of conductor's cross-section
- Resistivity
- Wheatstone's bridge
- Resistors in series
- Resistors in parallel
- Measurements using 4-wire sensing
- Contact resistance

EL3

Necessary accessories

- Lab power supply 6/12V AC | 0-12V DC
- Analog multimeters (2 pc)
- 9V Flat battery (2 pc)

ELECTRICITY EL4
NT-18.00.00

NEO-TECH
NTec
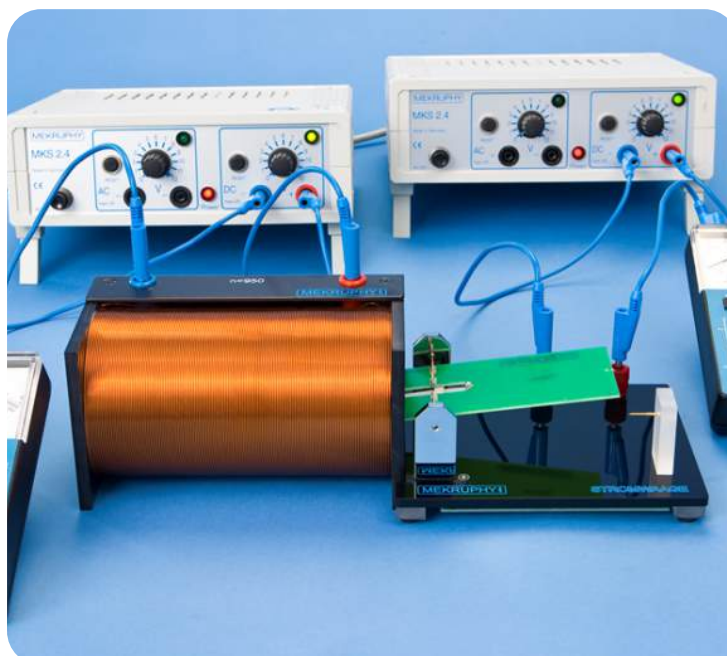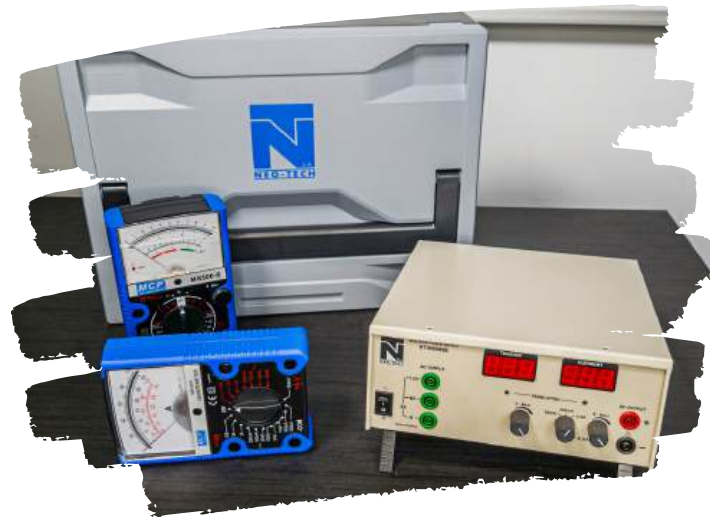EXPERIMENT
CASE

EL4 - Lorentz force

6 experiments

- Vector properties of the Lorentz force
- Lorentz force and magnetic field strength
- Lorentz force and current
- Lorentz force and length of conductor
- Lorentz force and angle between the field and the current flow
- Determining magnetic field

EL4

Necessary accessories

- Lab power supply 6/12V AC | 0-12V DC
- Analog multimeters (2 pc)
- 9V Flat battery (2 pc)
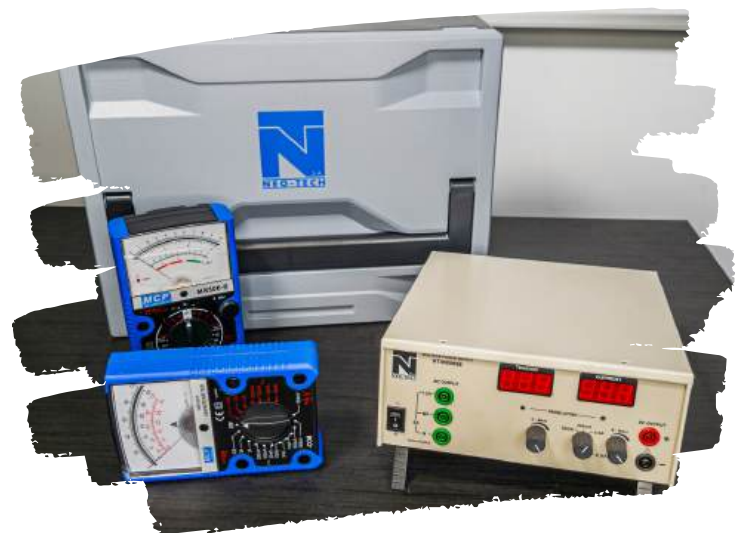
EL7 - Electronics 1

14 experiments

- Potentiometer circuits
- Light Dependent Resistors
- Characteristics of Ge and Si diodes
- Light-emitting diodes (LEDs)
- Zener diodes
- Characteristics of a transistor
- Use of transistors for switching
- Base-collector current characteristic of a transistor
- Use of transistors for amplification
- Touch switches
- Voltage across a capacitor
- Multivibrators
- Voltage characteristics of an operational amplifier (op-amp)
- Earth magnetic field detection

EL7

Necessary accessories

- Lab power supply 6/12V AC | 0-12V DC
- Analog multimeters (2 pc)
- 9V Flat battery (2 pc)
- Coil 300/600 windings

ELECTRICITY SET EL8
# NT-59.00.00

EL8 - Electronics 2

19 experiments

- Coils in AC and DC circuits
- Ohmic resistance of a coil
- Inductive resistance
- Inductance
- Self-induction when power to a coil is switched on and off
- Capacitors in DC circuits
- Voltage across a capacitor
- Charge/discharge of a capacitor (3 exp.)
- Capacitor in AC circuit
- Voltage drop across a capacitor
- Capacitive resistance
- Time switch
- Operational amplifier (op amps)
- Wien-Robinson oscillator
- Resonance in series circuits
- Resonance in parallel circuits
- Meissner oscillator
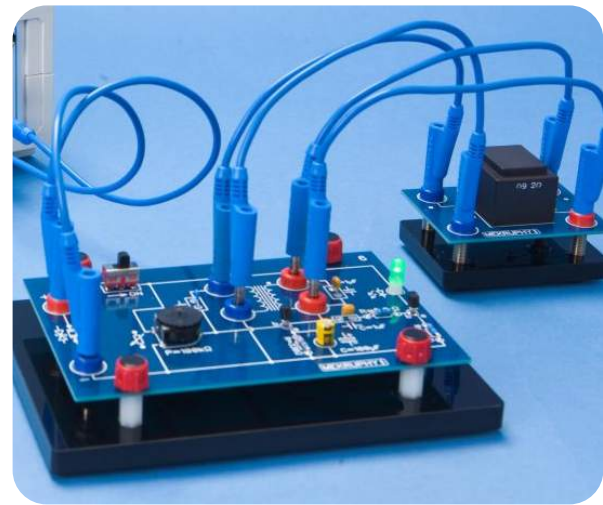
Necessary accessories

- Lab power supply 6/12V AC | 0-12V DC
- Analog multimeters (2 pc)
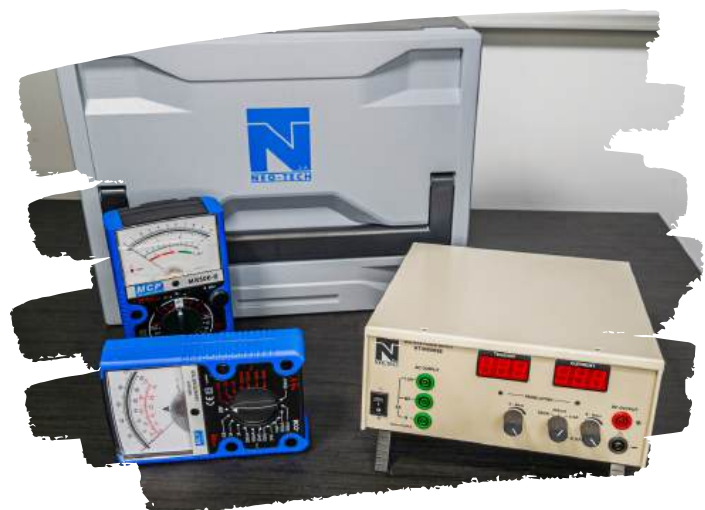
TECHNOLOGY SET TE1
NT–45.00.50

TE1 - Machines and bridges

16 experiments

- Measurement of forces
- Inclined plane
- Pulleys
- Wheels
- First-class levers
- Second and third class levers
- Belt drives
- Transmission ratio
- Sprocket and chain
- Gears
- Redirection of rotary motion
- Beam bridge
- Bridges with piers
- Arched bridges
- Suspension bridges
- Bowstring bridges

TE1

Necessary accessories

- Universal support stand (2 pc)
- Balance 1.200g x 0,1g

ARTIFICIAL INTELLIGENCE SET INFO1
NT–74.00.00

NEO-TECH NTec EXPERIMENT CASE

INFO1 - Artificial Intelligence
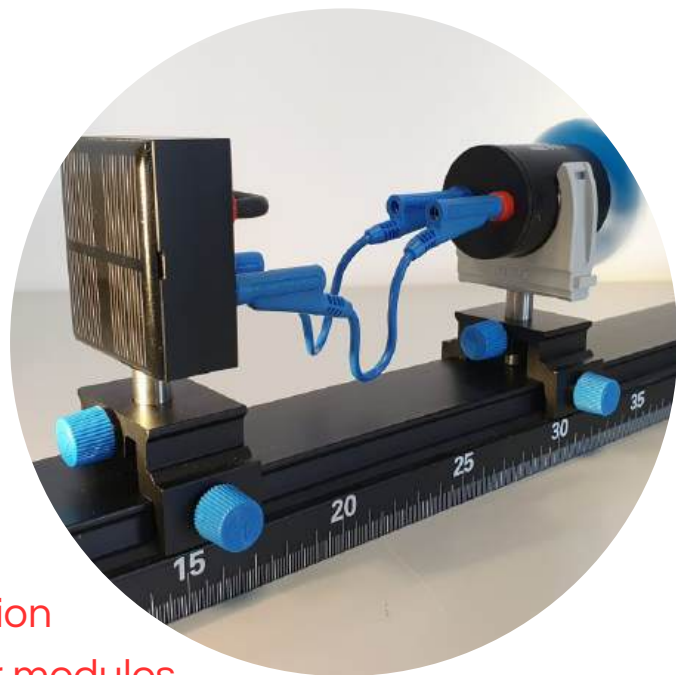
5 experiments

INFO1

- AI wins
  (Reinforcement learning)
- Decision tree algorithm
  (classification, creation,
  optimization of depth, accuracy)
- k-nearest neighbor algorithm
  (optimization of k)
- Perceptron - artificial neuron
- Experiments about AI basics
  (Greedy algorithm, 5x5 encoding)
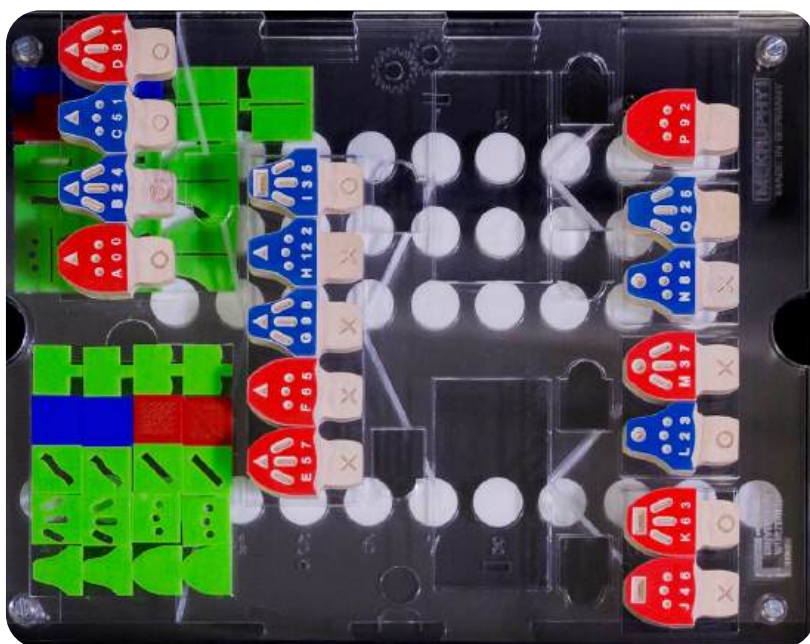
TE2 - Energy

22 experiments

- Potential energy (2 exp.)
- Conservation of energy
- Conversion of potential energy to electrical energy
- Electrical energy
- Conversion of electrical energy to mechanical energy
- Conversion of kinetic energy to internal energy
- Friction and increased internal energy
- Heat insulation
- Conduction of heat
- Flow of heat
- "Ice" motor
- Cooling machines/refrigerators
- Efficiency of a heat pump
- Absorption of light
- Short-circuit current of a solar cell
- Open-circuit voltage of a solar cell
- Short-circuit current & radiation direction
- Series and parallel connection of solar modules
- Wind energy
- Energy storage
- Greenhouse effect

TE2

Necessary accessories

- Universal track
- Power supply 6/12V AC | 0-12V DC
- Analog multimeters (2 pcs)
- Free-fall tube

TECHNOLOGY SET TE3
NT902300-AUTO1

NEO-TECH
NTEc
EXPERIMENT CASE

TE3 - Automation: microcontrollers

10 experiments

- Switching a LED with a push-button
- LED switching with two push-buttons
- LED switching on rising edge
- LED switching with delay
- Flashing LED
- Emergency cut-off switches
- Automated door : open with one button, close with another
- Automated door : manual opening, automated time-delayed closure
- Automated door : fast opening, slow time-delayed closure
- Back and forth movement with adjustable speed

TE3
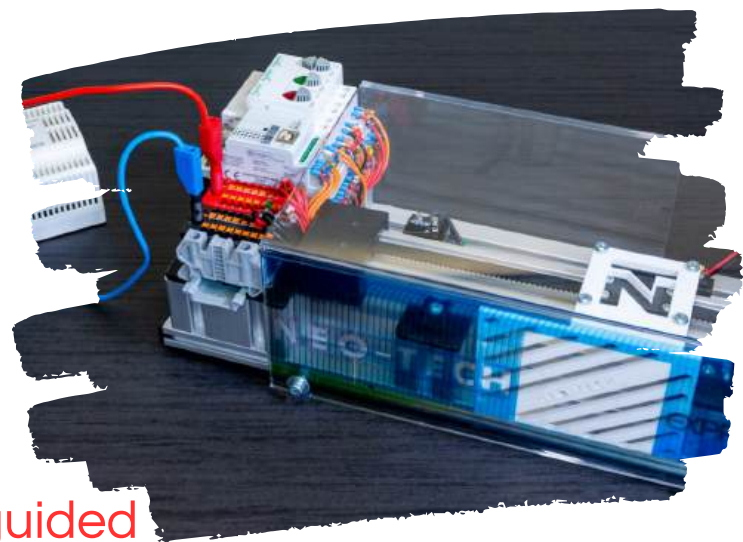
DC linear axis with belt-driven guided carriage with μ-controller or PLC drive

- Industrial components (limit switches, push-buttons, LED)
- DC motor, 24V power supply
- Based on Arduino Uno:
  8 inputs [4A/D - 2A - 2D] /
  8 digital outputs incl. 3 PWM / 6 relays
- IEC 61131-3 standard programming
- SCADA extension available

TE4 - Electropneumatics

Pneumatic manipulator arm

Mounted on aluminum profile plate with industrial components:

- 2 double-acting guided cylinders
- 1 pneumatic clamp
- 1 double acting cylinder
- 4 5/2 solenoid valve
- 6 REED position sensors
- 2 auto-switch position sensor
- 1 double push-button
- 24V power supply

IEC 61131-3 standard programming

Arduino IDE μ-controller programming

Ethernet and USB interface

Industrial microcontroller

- 12 Analog/Digital inputs
- 6 Digital inputs
- 6 Digital outputs 2A, all PWM
- 8 relays 6A/250V AC -30V DC
- 2 Analog inputs 0-10V
- 2 Analog outputs 0-10V / 0-20 mA
- Status LEDs for in/outputs

TE4

CHEMISTRY SET CH1
NT-20.00.00
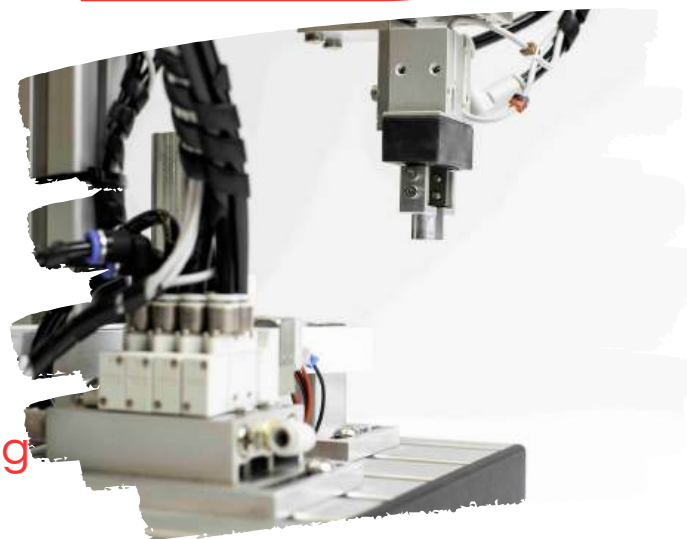
CH1 - Basic equipment 1

Always requires set CH2

The set consists of:

- Glass beaker tongs
- Universal clamp x 2
- Gas lighter
- Combustion spoon
- Spatula
- Straight, blunt-ended tweezers
- Lab knife
- Test tube clamp
- Crucible tongs
- Wooden splint x 10
- Digital thermometer -50°C to +300°C
- Graduated cylinder 50 ml, glass
- Rubber stopper 5/9 mm
- Rubber stopper 10/14 mm x 2
- Rubber stopper 14/18 mm (4x no hole, 1x with hole)
- Rubber stopper 16/21 mm (1x no hole, 1x with hole)
- Rubber stopper 31/38 mm (1x no hole, 1x 1 hole, 1x 2 holes)
- Glass stirring rod (1x long, 2x short)
- Evaporating dish, porcelain Ø63mm
- Pipettes with bulb x 2
- Watch glass Ø60 mm x 4
- Cobalt glass 50x50 mm x 2
- Bended transfer tube, glass (1x short, 1x long)
- Piece of silicon tubing x 4
- Hose clamp x 2

Necessary accessories

- Universal support stand
- Balance 1.200g x 0,1g
- Chemicals kit

CH2 - Basic equipment 2 - Add-on

Always requires set CH1

The set consists of:

- Petri dish Ø80mm, glass with lid
- Glass beaker 25 ml BORO
- Glass beaker 250 ml BORO
- Glass beaker 150 ml BORO
- Conical flask 100 ml, wide neck
- Glass funnel
- Test tube 12 x 100 mm BORO x2
- Test tube 16 x 160 mm BORO x5
- Heat resistant test tube
- Test tube with side arm
- Small glass plate x2
- Mortar, porcelain Ø80 mm
- Pestle, porcelain
- Safety goggles x2
- Filter paper Ø150 mm, 100 pcs
- Universal indicator paper
- Test tube rack for 8 tubes, made of aluminum, with 3 different hole sizes
- 50 ml Glycerol in dropping bottle
- Glass tube, straight, l = 80 mm
- Wash bottle 250 ml

CH2

Necessary accessories

- Universal support stand
- Balance 1.200g x 0,1g
- Chemicals kit

CHEMISTRY SET EC1
NT-22.00.00

NEO-TECH
NTec
EXPERIMENT
CASE

EC1 - Electrochemistry 1

18 experiments

REQUIRES SETS CH1 & CH2

- Electrical conductivity (4 exp.)
- Ion conductors
- Galvanization
- Electrolysis
- Ionic migration
- Metals and metal ions
- The electrochemical series
- The voltaic cell
- Daniell cell
- Leclanché battery
- Lemon battery
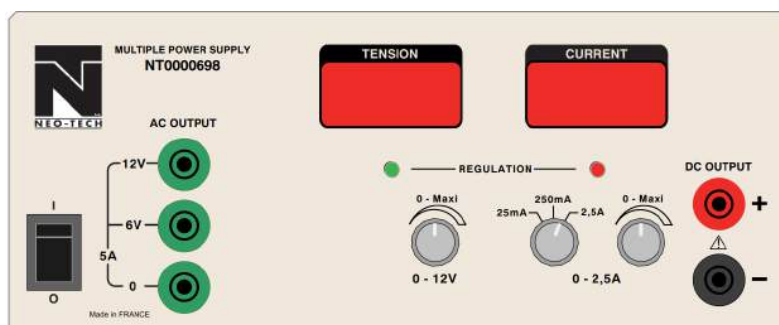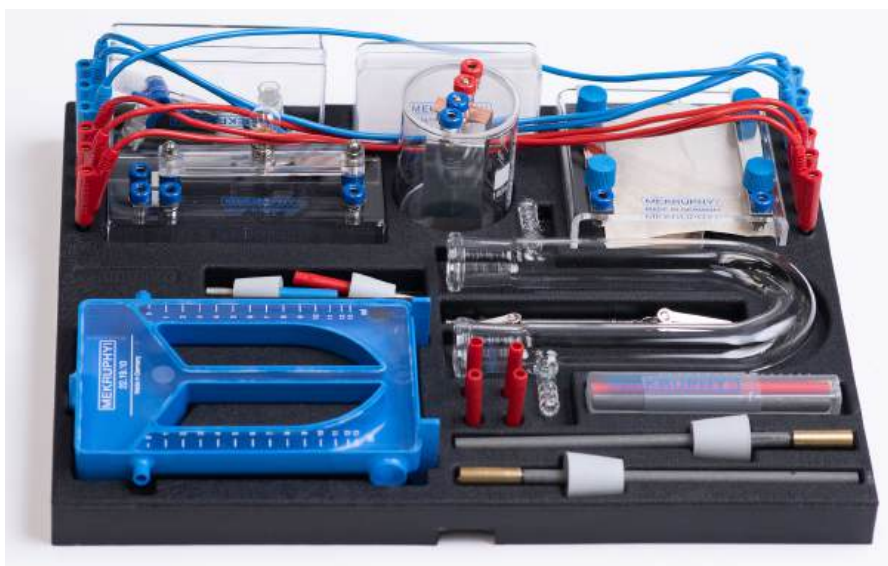- Rechargeable battery
- Faraday's laws (3 exp.)

CH4
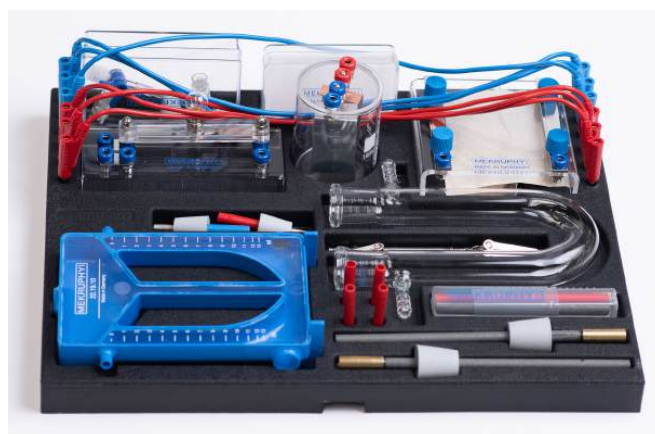
Necessary accessories

- Lab power supply 6/12V AC | 0-12V DC
- Universal support stand
- Multimeter
- Pocket balance
- Chemicals kit

EC1 - Electrochemistry 1

The set consists of:

- Material sample carrier with crocodile clip x2
- Graphite electrode with stopper x2
- BORO glass beaker 100 ml without spout
- 4 mm coupling sleeve x4
- Beaker lid with electrode holder and four 4 mm sockets
- Zinc plate electrode with 4mm plug
- Copper plate electrode with 4mm plug x2
- Aluminum plate electrode with 4mm plug
- Iron plate electrode with 4mm plug
- Device to study the conductivity of solid substances
- Set of 8 material samples in container
- Ionic migration device with two 4 mm sockets
- TLC foil strips (10 pcs)
- Three-way valve system with Luer-Lock for Hoffmann's electrolysis apparatus
- U-tube with side arms, (with taper glass joints corresponding to electrode stoppers size)
- Platinum electrode with stopper and blue 4 mm socket
- Platinum electrode with stopper and red 4 mm socket
- Hoffmann apparatus
- 4 mm experiment lead, l=34 cm, blue x3
- 4 mm experiment lead, l=34 cm, red x3
- 4 mm plug-in component with light bulb E10 6V 2,4A

BIOLOGY SET BB1
NT–31.00.00

BB1 - Biology, basic equipment

Ideal for earth & live science

BB1

The set consists of:

- Glass beaker 25 ml BORO
- Universal clamp x 2
- Glass beaker 100 ml BORO x2
- Glass funnel
- Straight, blunt ended tweezers
- Test tube 12 x 100 mm BORO x2
- Test tube 16 x 160 mm BORO x4
- Lab knife
- Wooden test tube clamp
- Chemical spatula with spoon end
- Digital thermometer -50°C to +300°C
- Scissors for microscopy
- Graduated cylinder, glass 50 ml
- Rubber stopper 14/18 mm x2
- Test tube rack for 8 tubes, made of aluminum, with 3 different hole sizes
- Pipette with bulb x2
- Measuring tape, l = 2 m

Necessary accessories

- Universal support stand
- Pocket balance

BIOLOGY SET BM1
NT-30.00.00

BM1 - Biology: microscopy

8 experiments

- First observations with a magnifier
- Insect jar : observation from the top and/or bottom
- Using a beaker magnifier with squared grid bottom
- Making biological drawings
- The parts of a microscope
- Operating principle and use of a microscope
- First sample: Brownian motion
- Disruptive phenomena and sources of errors

BM1

The set includes:

- Different hand-held magnifiers
- Beaker magnifier with scale
- Two-way magnifying jar for insects
- Dissecting kit
- Different types of microscope slides
- Cover slips
- Petri dish
- Dropping bottle, brown glass
- Microtome

Necessary accessories

- Microscope
- Set of chemicals for microscopy

BIOLOGY SET BP1
NT-32.00.00

NEO-TECH
NTec
EXPERIMENT CASE

BP1 - Biology: Plants 1

30 experiments

- Water absorption and swelling in bean seeds
- Structure of a bean seed
- Swelling pressure
- Identifying the nutrients stored in seeds
- Conversion of stored nutrients into sugar
- Cellular respiration in germinating seeds
- Germination conditions
- Root hair growth
- Germination and growth of bean seeds
- The effect of heavy metals on the germination process
- The separation of the leaf pigments
- Chlorophyll solution fluorescence
- Oxygen production during photo-synthesis
- Starch production during photo-synthesis
- The dependence of photosynthesis on chlorophyll
- Photosynthesis and light intensity
- Photosynthesis and light quality
- Photosynthesis and carbon dioxide
- The temperature dependence of photo-synthesis
- Acid metabolism in CAM plants
- Evaporation of water in plants
- Acid metabolism in CAM plants
- Evaporation of water in plants

BP1

- The location of stomata in leaves
- Stomatal size and density
- The water transport system in plants
- Capillary effects
- Water uptake through the roots
- Root pressure
- Investigating diffusion and osmosis using a model
- Plasmolysis and deplasmolysis
- Selective nutrient uptake in plants

Necessary accessories

REQUIRES SET BB1

- Universal support stand
- Pocket balance

NEO-TECH
NTec
EXPERIMENT CASE

## MTH1 - Geometry 1

20 experiments

- Classification of angles
- Angle measurement
- A few Greek letters
- Angles on lines
- Angles on parallel lines
- Special triangles
- Special quadrilaterals
- Symmetric quadrilaterals
- The sum of angles in a triangle
- Thales's theorem
- Area measurement
- The area of a kite
- The area of a parallelogram
- The trapezoid and its area
- The area of a triangle
- The Pythagorean theorem
- Euclid's altitude theorem
- Euclid's cathetus theorem
- The intercept theorem
- Tirgonometric functions in right angled triangles

MTH1

NEO-TECH
NTEC
EXPERIMENT CASE
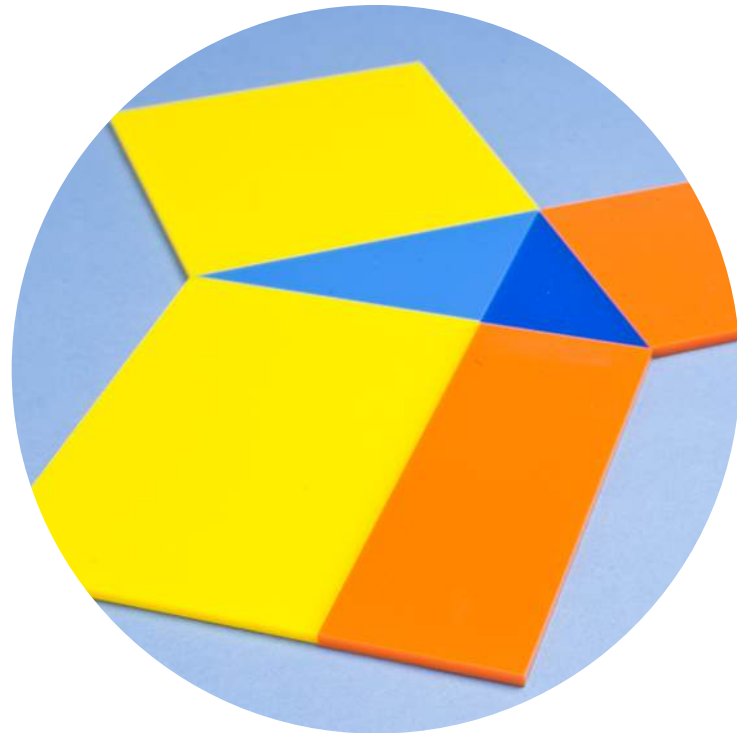
## MTH2 - Geometry 2

18 experiments

MTH2

- Skew lines
- Surface and space diagonals of a cube
- Symmetry planes on the cube
- Surface and space diagonals of a rectangular parallelepiped
- Symmetry planes on the rectangular parallelepiped
- Surface and net of the rectangular parallelepiped
- Volume of the rectangular parallelepiped
- Right triangular prism
- Cavalieri's principle

- Angle between line and plane (2 exp.)
- Intersection angle of 2 planes
- Straight square pyramid:
    - Net
    - Heights
    - Angles
    - Volume
- Regular tetraedron
- Regular octaedron
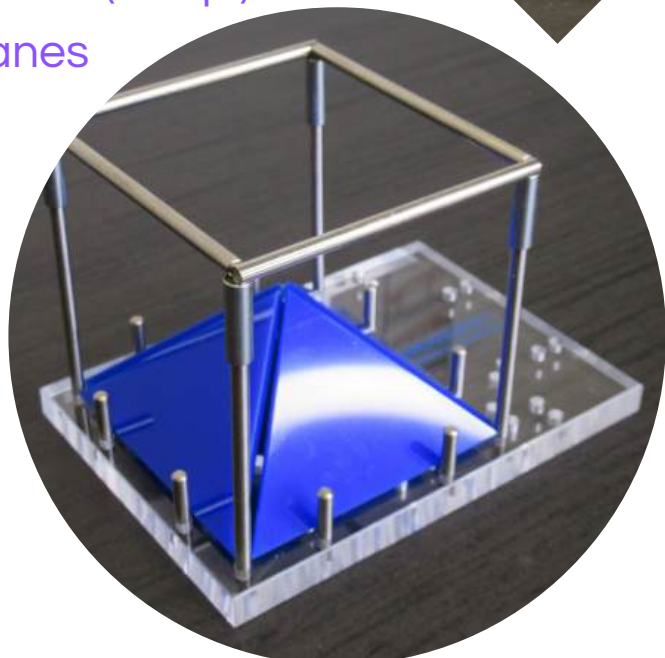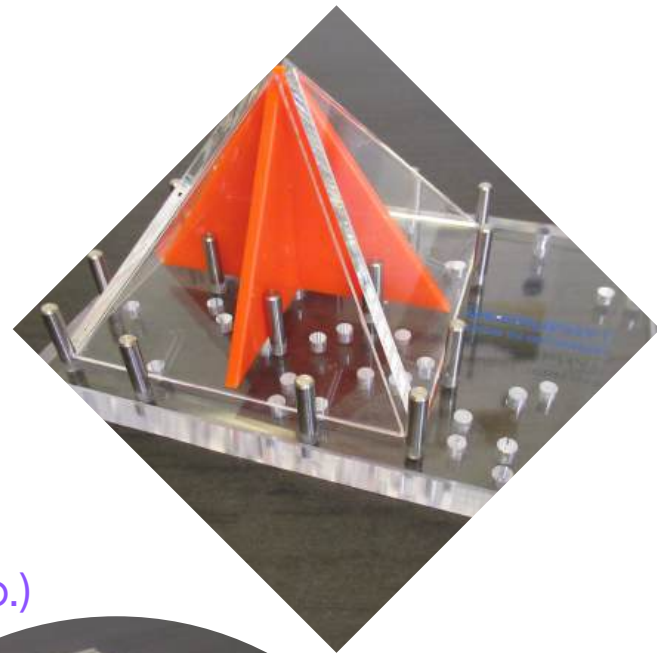
MTH3- Fractions

12 experiments

- Formation of fractions
- Classification of fractions
- Conversion of improper fractions
- Multiplication of fractions
- Simplification of fractions
- Addition of fractions
- Subtraction of fractions
- Sieve of Eratosthenes
- Multiplication with a natural number
- Division by a natural number
- Multiplication with a fraction
- Division by a fraction

MTH3
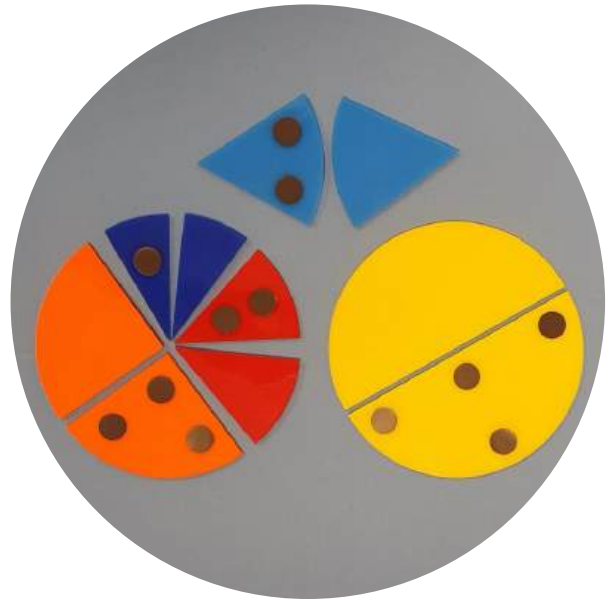
MTH4- Integers

17 experiments

- Arabic and Roman numerals
- Place value and step numbers
- Addition of natural numbers
- Written addition
- Adding Roman numerals
- Subtraction of natural numbers
- Written subtraction
- Origin of negative numbers
- The set of whole numbers
- Addition of whole numbers
- Commutative law of addition
- Subtraction of whole numbers
- Multiplication of whole numbers
- Written multiplication
- Distributive law of multiplication
- The square numbers from 1 to 625
- Division by whole numbers
- Written division

MTH4