

Syllabus

Syllabus for International Junior Science Olympiad (I J S O)

(Adapted from International Baccalaureate program)

- 1) **Science Skills and Safety:** Understanding the scientific method and working in the laboratory.
 - identify and use basic laboratory equipment
 - draw scientific diagrams of apparatus
 - follow instructions for an experiment
 - explain safety rules in the laboratory
 - follow safety techniques when using equipment
 - measure temperature and volume
 - make observations using the five senses
 - make inferences based on observations
 - describe the scientific method
 - record a science experiment using standard headings
 - collect, represent & interpret data in tables and graphs
 - use scientific language

- 2) **Pushes and Pulls:** Understanding of what forces are and what they can do.
 - describe what forces are and what they can do
 - measure force using a spring balance
 - carry out experiments with friction, gravity and density
 - calculate the density of an object
 - explain the difference between mass and weight
 - explain things in terms of the pull of gravity
 - say that friction is and explain how it can be helpful or a nuisance

- 3) **Survival in the Environment:** Understanding of how physical and behavioural adaptations help animals survive.
 - list characteristics that help an organism survive
 - define the terms habitat and adaptation
 - distinguish between an animals living and physical environment
 - list the physical conditions that affect aquatic animals
 - classify adaptations as structural or behavioural
 - make inferences from observations
 - research, carry out and write up a study of a particular environment

- 4) **Solids, Liquids & Gases:** Understanding of the differences between solids, liquids and gases.
 - describe the three states of matter
 - recall the boiling point of water and the melting point of ice
 - measure the temperature of melting ice
 - draw simple graphs
 - measure mass using a balance
 - calculate the density of materials
 - using a particle model

- 5) **Responding:** Understanding of how our bodies senses help us respond to our environment.
 - describe the various senses in our body
 - define the terms stimulus and response and how they relate
 - describe how nerves carry messages
 - explain how muscles move arms and legs
 - investigate the senses
 - investigate how fast our muscles react

- 6) **Energy:** Understanding of the different types of energy and energy changes.
 - describe what energy is and where it comes from
 - identify and describe the various forms of energy
 - understand how sound is caused
 - explain the difference between stored energy and energy in action
 - explain everyday happenings in terms of energy changes
 - understand that fossil fuels are a non-renewable resource
 - conduct an experiment involving energy changes
 - use different forms of energy to make an object move

- 7) **How Life Begins:** Understanding of how new life is created in humans.
 - describe the differences between animal and plant cells
 - describe the sex cell of humans
 - describe the human reproductive organs
 - understand the changes that take place in boy's and girl's bodies during puberty
 - observe the development of a baby during pregnancy

- 8) **Solving Problems in Science:** Understanding the scientific method.
 - describe the scientific method
 - write up reports of experiments
 - write a hypothesis
 - design an experiment using the scientific method
 - test a hypothesis by doing an experiment

- 9) **Acids and Bases:** Understanding what are acids and bases.
- describe the properties of acids and bases
 - understand pH and its practical uses
 - define neutralization
 - use and make indicators
 - use pH paper to check acidity
 - use acids and bases safely
 - apply knowledge of acids and bases to everyday situations
 - to be aware of the formation and effect of acid rain
- 10) **Interdisciplinary "Space" Studying the Universe:** Understanding our solar system and space exploration.
- know the order of the planets
 - describe key features of each planet
 - distinguish between comets, asteroids and meteors
 - describe spiral, elliptical and irregular galaxies
 - explain the significance of star colour
 - identify major constellations
 - to be aware of the impact of space exploration
 - to make a scale model of the planets
 - to design and make a space mobile or building from recycled materials
 - to plot positions of stars
- 11) **Materials from the Earth:** Understanding natural resources, where they are found and what they are used for.
- name useful substances made from natural materials eg glass and concrete
 - understand what natural resources are
 - find out whether or not natural resources are renewable
 - present information on renewable resources
 - understand how fossil fuels, uranium and water are used to provide energy
 - understand how minerals and rocks are mined and how they are used
 - map the locations of various mineral resources around the world
- 12) **Science & Technology:** Understanding of how technology has been used to solve problems.
- explain the difference between science and technology
 - find out about some inventors and inventions
 - beware of the impact of inventions
 - design a test to solve an everyday problem
 - carry out a science fair experiment
 - research to find relevant information

- 13) **Keeping Healthy:** Understanding the digestive and circulatory systems.
- explain what the parts of the digestive system do during digestion
 - use a model to explain how food passes from the small intestine to the bloodstream
 - describe the importance of fibre in the diet
 - describe how the blood carries food and oxygen to the body cells
 - understand the effect of exercise on pulse and breathing rates
 - investigate the structure and care of teeth
 - describe the structure of the heart and how to take care of it
- 14) **Batteries and Bulbs:** Understanding of batteries' concept and circuits.
- make simple circuits
 - draw circuit diagrams
 - know the difference between series and parallel circuits
 - describe the properties of conductors and insulators
 - understand about resistance and short circuits
 - explain how electrical safety devices work (fuses and earths)
 - understand the rules for using electricity safely
 - know the components of electrical plug
- 15) **Atoms and Molecules:** Understanding of atoms, molecules, elements and compounds.
- describe the particle theory to explain the properties of solids, liquids and gases
 - explain that matter is made of atoms and molecules
 - know the names of some common molecules
 - understand the basic structure of the atom
 - describe what elements and compounds are
 - explain the difference between elements and compounds in terms of atoms and molecules
 - know the first twenty elements and their symbol from the periodic table
 - know about some of the people who discovered different elements
 - know the formula of some common compounds
 - write a simple word equation
- 16) **Cycles in Nature:** Understanding of food chains and webs.
- use food chains to show the link between animals and plants
 - describe how bacteria and fungi recycle substances
 - know the difference between scavengers and decomposers
 - construct food webs

- 17) What are Things made of: Understanding of the concept of the periodic table and the elements covered in Year 2 Atoms and Molecules
- revue particle theory, atoms, molecules, elements and compounds
 - understand basic patterns of the periodic table
 - learn the first 20 elements by symbol and name
 - learn to write simple equations
 - know the basic structure of the atom protons, neutrons, electrons
 - look at where metals and other important materials come from and what they are used for
 - know about alloys
- 18) **Disease** : understanding of how infectious disease is caused and transmitted
- describe the microorganisms that cause disease
 - know which organisms cause common diseases
 - understand how our body fights disease
 - understand the history of disease and vaccination
 - understand about how antibiotics are used to fight disease
- 19) **Global Consumer Science** : Understanding of scientific testing of consumer products and the impact of consumer products on our health and environment.
- use the steps of scientific testing
 - understand the difference between objectives and subjective testing
 - calculate the waste from packaging
 - understand how long different substances take to break down
 - research recycling
 - know about the argument surrounding genetically modified foods
 - understand the impact of consumer products on our environment
- 20) **Science and the Road** : Understanding of Newtons First Law (Inertia), Friction, Reaction Time, Acceleration, Car safety.
- understand the main reasons for car accidents
 - know about car safety features
 - be aware of road safety
 - calculate speed and acceleration
 - measure reaction time
 - list the factors affecting stopping time

- 21) **Interdisciplinary "The Body" Life Goes On** : Understanding of human reproduction and inheritance.
- describe the structure and function of the male and female reproductive system
 - to recognise variation in human characteristics
 - describe the role of genes and chromosomes in human inheritance
 - use family trees to determine the features of family members
 - be able to calculate the chances of children being born male or female using a model
 - use of grids to predict variation in offspring characteristics
 - describe genetic engineering and social implications
- 22) **Light and Colour**: Understanding of how light and colour are produced.
- explain why things are coloured
 - list the colours of the spectrum
 - describe how long and short sightedness can be corrected with lenses
 - find out how we see colours and why colour blindness occurs
 - observe how light travels in straight lines
 - investigate how different colours are made
 - predict the colour produced when filters are used
 - investigate how lenses bend light to form images
 - observe how images form when light reflects from mirrors
- 23) **Forensic Science**: Understanding of how science is used in crime detection.
- describe the job of a forensic scientist
 - understand how scientists collect and interpret the physical evidence from a crime
 - investigate hypothetical crimes
 - examine fingerprints
 - use chromatography to examine ink samples
 - use indicators to detect the presence of certain substances
 - examine evidence using a microscope
 - understand about ballistic and genetic evidence
 - understand about the use of atomic absorption spectrophotometers to examine traces of chemicals
 - construct evidence tables and detect patterns
 - write hypothetical forensic reports
- 24) **Mathematics Ability**: Understanding of the
- Fractions
 - Statistic
 - Simple Trigonometry
 - Simple Geometry
 - Logarithm
 - Arithmetic and Geometric Arrays
 - Quadratics Equation
 - Power, Root square