Learning Objectives Junior Cert Chapters in Science

- All learning objectives for each chapter are listed here from the syllabus.
- Underlined objectives are examinable at Higher Level only.
- Black ink objectives – covered in First Year
- Blue Ink Objectives – covered in Second Year
- Red ink objectives – covered in Third Year

Mandatory experiments are in **Bold**

Remember revision tools:

www.studyclix.ie

www.skoool.ie

I hope this helps!!

Learning Objectives Junior Cert Chapters
Biology
Food:

Can you.....

OB1 recall that a balanced diet has six constituents: carbohydrates (including fibre), fats, proteins, vitamins, minerals and water, each with different functions

OB2 describe a food pyramid and give examples of types of food recommended in a balanced diet

OB3 carry out qualitative food tests for starch, reducing sugar, protein and fat

OB4 read and interpret the energy values indicated on food product labels and compare the energy content per 100 g of a number of foods, and identify the food types on the label that form part of a balanced diet

OB5 investigate the conversion of chemical energy in food to heat energy

Digestion

Can you.....

OB6 identify and locate the major parts of the digestive system including the mouth, oesophagus, stomach, liver, pancreas, small intestine and large intestine, and know their functions

OB7 identify molars, premolars, canines and incisors, and describe their functions

OB8 investigate the action of amylase on starch; identify the substrate, product and enzyme

Breathing and Respiration

Can you.....

OB9 describe the process of aerobic respiration by means of a word equation and understand that aerobic respiration requires the presence of oxygen

OB10 demonstrate the products of aerobic respiration

OB11 carry out qualitative tests to compare the carbon dioxide levels of inhaled and exhaled air

OB12 describe how oxygen is taken into the bloodstream from the lungs and how carbon dioxide is taken into the lungs from the bloodstream during gaseous exchange and how these processes are affected by smoking

The Circulatory System:

Can you.....

OB13 describe the function and composition of blood, and know that blood contains white blood cells, red blood cells and platelets in a liquid called plasma

OB14 understand the structure and function of the heart, identify the four chambers of the heart, and explain the difference between the left and right ventricles

OB15 describe the passage of blood through the heart and lungs via arteries and veins, identify the pulmonary artery and vein, aorta and vena cava, and distinguish between arteries, veins and capillaries

OB16 demonstrate the effect of exercise and rest on pulse and breathing rate and understand that a balance of each promotes good health

OB17 recall that the average pulse rate for an adult at rest is 70 b.p.m., and explain why exercise results in increased pulse and breathing rates

OB18 recall that the normal temperature of the human body is 37 °C, and understand that illness may cause a change in body temperature

OB19 understand that the products of digestion are absorbed into the bloodstream and are thus circulated around the body

The Excretory System

Can you.....

OB20 understand the structure and function of the urinary system: the bladder, renal artery, renal vein, ureter, urethra and kidney

OB21 name the products of excretion: CO_2, water and urea

OB22 understand the function of the skin in the excretion of waste products made in the body

OB23 recall that waste products are removed from the bloodstream by filtration in the kidneys in the form of urine, which contains urea, water and salts, and that urine is stored in the bladder before being released from the body.

The Skeleton and Muscular System:

Can you.....

OB24 identify the main parts of the human skeleton and understand that the functions are support, movement and protection

OB25 locate the major bones in the human body including the skull, ribs, vertebrae, collarbone, shoulder blade, humerus, radius, ulna, pelvis, femur, tibia and fibula, using a diagram or a model skeleton

OB26 understand the function of joints and muscles (including antagonistic pairs), tendons and ligaments, and the relationship between these and bones

OB27 describe the general structure and action of different types of joints: fused, ball and socket and hinged, and identify examples of each: skull, shoulder, elbow, hip, knee

The Sensory System:

Can you.....

OB28 recall five sense organs in the human (eyes, ears, nose, skin, and tongue) and understand how these enable humans to gather information from their surroundings

OB29 describe the role of the central nervous system and the sensory and motor functions of nerves

OB30 locate the main parts of the eye on a model or diagram and describe the function of the cornea, iris, lens, pupil, retina, optic nerve and ciliary muscle

Human Reproduction

Can you.....

OB31 use wall charts or other illustrative diagrams to identify and locate the main parts of the male and female reproductive systems

OB32 recall that the menstrual cycle lasts about 28 days and that menstruation occurs at the start of the cycle

OB33 understand the following in relation to human reproduction:

- fertile period in the menstrual cycle
- sexual intercourse
- fertilisation is the fusion between male and female gametes (sperm and egg) resulting in a zygote; a zygote undergoes cell division and develops within the womb into a foetus
- pregnancy and birth
- growth and puberty

OB34 understand that there are many forms of contraception, and that some of these prevent fertilisation

Genetics

Can you.....

OB35 understand that humans have inheritable and non-inheritable characteristics, and that inheritable characteristics are controlled by genes

OB36 recall that genes are located on chromosomes and that in a human there are 23 pairs of chromosomes, which are located in the nucleus

OB37 recall that chromosomes are made of DNA and protein.

Classification and Living Things:

Can you.....

OB38 understand how to use a simple key to identify plants and animals, including vertebrates and invertebrates

OB39 **investigate the variety of living things by direct observation of animals and plants in their environment; classify living organisms as plants or animals, and animals as vertebrates or invertebrates**

OB40 identify the basic life processes and characteristics common to all living organisms: nutrition, respiration, excretion, growth, reproduction, movement and response

Cells and the Microscope:

Can you.....

OB41 recall that living things are composed of cells, tissues, organs and systems, and understand that growth results from cell division

OB42 identify, and understand the functions of, the main parts of a microscope (light microscope only) and use it to examine an animal cell and a plant cell

OB43 draw one example each of an animal cell and a plant cell, identifying the nucleus, cytoplasm and cell wall (plant cell), and indicate the position of the cell membrane

OB44 **prepare a slide from plant tissue and sketch the cells under magnification**

Structure and transport within Flowering Plants:

Can you.....

OB45 identify the main parts of a typical flowering plant and their functions; the root, stem, leaf and flower

OB46 understand that the xylem transports water and minerals in the plant and that the phloem transports food

OB47 carry out simple activities to show the path of water through plant tissue, and show that water evaporates from the surface of a leaf by transpiration

Photosynthesis and Plant Responses:

Can you.....

OB48 describe, using a word equation, how plants make their own food through photosynthesis

OB49 **show that starch is produced by a photosynthesising plant**

OB50 investigate the growth response of plants to gravity (geotropism) and light (phototropism)

Plant Reproduction:

Can you.....

OB51 distinguish between asexual and sexual reproduction in plants and describe a way in which a named plant can reproduce asexually

OB52 locate and identify the main parts of the flower: sepals, petals, carpel and stamen

OB53 use a suitable flower to identify the stigma, style, ovary, anther and filament

OB54 understand that the stamen (anther) produces pollen, the carpel (ovary) produces the egg cell, the pollen produces the male gamete for fertilisation, the ovary produces the female gamete for fertilisation, and pollen is transferred by wind and by insects

OB55 recall that seed formation follows fertilisation, and describe seed dispersal

OB56 describe seed structure (testa, food supply, radical, plumule)

OB57 understand that seed germination is necessary to produce a new plant

OB58 **investigate the conditions necessary for germination**

Ecology:

Can you.....

OB59 study a local habitat, using appropriate instruments and simple keys to show the variety and distribution of named organisms

OB60 understand that living things are affected by their environment and respond to changes that occur in that environment, and understand that their numbers depend on the availability of food and the presence or absence of other organisms

OB61 list examples of producers, decomposers and consumers in an ecosystem

OB62 select a food chain and a food web from a named habitat and identify examples of adaptation, competition and interdependence

OB63 understand the importance of conservation, pollution and waste management to the environment, and identify ways in which living things contribute to these, both individually and as a community

OB64 consider and discuss how human activity affects the environment, both positively and negatively (two examples in each case)

Microbiology:

Can you.....

OB65 **investigate the presence of micro-organisms in air and soil**

OB66 state two uses of biotechnology in industry and two uses of biotechnology in medicine

OB67 list three common illnesses caused by viruses and three caused by bacteria.

Learning Objectives Junior Cert Chapters
Chemistry

Solids, Liquids and Gases:

Can you.....

OC1 name three states of matter and know their characteristics

Separating Techniques:

Can you.....

OC2 separate mixtures using a variety of **techniques: filtration, evaporation, distillation and paper chromatography**

Elements, Compounds and Mixtures:

Can you.....

OC3 understand what an element is and recall that all known elements are listed in the Periodic Table; understand what a compound is and what a mixture is; recall that when elements combine to form compounds they may lose their individual properties

OC4 examine a variety of substances and classify these as
- elements or compounds (using the Periodic Table as a reference)

OC12 compare the properties of the simple compounds H_2O, CO_2, MgO and FeS to those of the constituent elements

Metals and Non- Metals, The Periodic Table

Can you.....

OC4 examine a variety of substances and classify these as
- elements or compounds (using the Periodic Table as a reference)
- metals or non-metals

OC5 list the physical properties (state and colour only) of two examples of metallic and two examples of non-metallic elements

OC6 recall that metals conduct electricity and heat

OC7 identify everyday applications of metals, for example in industry, in the making of jewellery

OC8 recall the symbols of the metallic elements Cu, Zn, Al, Fe, Ag, and Au

OC9 recall the symbols of the non-metallic elements C, O, S, H and N

OC10 understand that metals are shiny (lustrous), can be beaten into shape (malleable) and can be stretched (ductile)

OC11 understand that solder, steel, brass and bronze are alloys, and state one use of each alloy

OC12 compare the properties of the simple compounds H_2O, CO_2, MgO and FeS to those of the constituent elements

OC13 compare mixtures and compounds made from the same constituents, and understand that an alloy is a mixture

OC45 understand that rusting is a chemical process that changes iron into a new substance

OC46 **carry out an experiment to demonstrate that oxygen and water are necessary for rusting**

OC47 list three examples of methods of rust prevention: paint, oil, galvanising

OC48 describe the general properties of the alkali metals and understand that alkali metals are in Group I of the Periodic Table and have similar properties

OC49 describe the reactions of the alkali metals with air and water (word equations for reaction with water)

OC50 understand that Group II elements are the alkaline earth metals

OC52 investigate the relative reactivities of Ca, Mg, Zn, and Cu based on their reactions with water and acid (equations not required)

Solutions and Crystallisation:

Can you.....

OC15 investigate the solubility of a variety of substances in water and the effect of temperature on solubility

OC16 examine the difference between a dilute, concentrated and saturated solution

OC17 **grow crystals using alum or copper sulfate**

Acids and Bases:

Can you.....

OC18 use litmus or a universal indicator to test a variety of solutions, and classify these as acidic, basic or neutral

OC19 **investigate the pH of a variety of materials using the pH scale**

OC20 give examples of everyday acids and bases.

OC35 state the names and formulae of common strong acids and bases: H_2SO_4, Hcl, NaOH, $Ca(OH)_2$, and understand that alkalis are soluble bases

OC36 show the neutralisation of an acid with a base using an indicator

OC37 understand that, when an acid reacts with a base, a salt and water are formed

i. $HCl + NaOH \rightarrow NaCl + H_2O$ (word equation O.L.)

ii. $2HCl + CaCO_3 \rightarrow CaCl_2 + CO_2 + H_2O$ (word equation O.L.)

OC38 **titrate HCl against NaOH, and prepare a sample of NaCl.**

OC51 investigate the reaction between zinc and HCl, and test for hydrogen (word equation and chemical equation)

The Atmosphere:

Can you.....

OC21 understand that air is a mixture of gases, and state the composition of air (approximately 78% N_2 and 21% O_2, with CO_2, water vapour and other gases making up the balance)

OC22 show that approximately one fifth of the **air is oxygen; show that there is CO_2 and water vapour in air**

OC23 demonstrate and describe what happens when (i) a wooden splint and (ii) a piece of magnesium are burned in air

OC24 **prepare a sample of oxygen by decomposing H_2O_2 using MnO_2 as a catalyst (word equation and chemical equation)**

OC25 investigate the ability of oxygen to support combustion in a wooden splint and a candle, and state two uses of oxygen

OC26 burn carbon and magnesium in oxygen, and test the products using moist litmus paper

OC27 **prepare carbon dioxide (word equation and chemical equation), and show that it does not support combustion**

OC28 carry out simple tests on carbon dioxide involving its reaction with limewater (word equation and chemical equation), and with moist litmus paper

OC29 investigate the density of carbon dioxide relative to air (qualitative only), and state two uses of carbon dioxide

Water and Water Hardness:

Can you.....

OC14 use cobalt chloride paper or anhydrous copper sulfate to test for water

OC30 conduct a qualitative experiment to detect **the presence of dissolved solids in water samples, and test water for hardness (soap test)**

OC31 understand that some dissolved compounds, including compounds of calcium and magnesium, cause hardness in water, and that water hardness can be removed using an ion-exchanger

OC32 carry out a simple distillation, and obtain a sample of water from sea-water

OC33 describe the processes involved in the treatment of water supplied to domestic consumers

OC34 investigate the de-composition of water by electrolysis; recall the composition of water

Fossil Fuels:

Can you.....

OC54 list two examples of fossil fuels

OC55 describe the role of the combustion of fuels and of SO_2 in the production of acid rain, and describe the effects of acid rain

OC56 describe the effect of acid rain on limestone and on plants

OC57 understand that natural gas is mainly methane

Plastics:

Can you.....

OC58 identify everyday applications of plastics, and understand that crude oil products are the raw material for their production

OC59 relate the properties of plastics to their use

OC60 describe and discuss the impact of nonbiodegradable plastics on the environment

OC61 understand that chemistry has an important role in pharmacy, medicine and the food industry.

The Atom

Can you.....

OC39 describe the structure of the atom, state the location, relative charge, and atomic mass of the sub-atomic particles, and define atomic number and isotope

OC40 draw the Bohr structure of the first 20 elements

Chemical Bonding:

Can you.....

OC41 understand how atoms of elements combine to form compounds

OC42 recall that ionic bonding is an attraction between positive and negative ions; describe the bonding in NaCl and MgO as examples

OC43 state what a molecule is, understand that covalent bonds involve the sharing of pairs of electrons, and describe the bonding in H_2, O_2, H_2O, CH_4 as examples of covalent bonding

OC44 investigate the ability of ionic and covalent substances to conduct electricity

Learning Objectives Junior Cert Chapters
Physics

Measurement:

Can you.....

OP1 measure length, mass, time and temperature, and perform simple calculations based on these to find the derived quantities: area, volume, density, speed, velocity, and acceleration; understand that units of measurement follow the SI system

Density and Flotation:

Can you.....

OP2 measure mass and volume of a variety of **solids and liquids and hence determine their densities**

OP3 investigate flotation for a variety of solids and liquids in water and other liquids, and relate the results of this investigation to their densities

Forces:

Can you.....

OP4 understand the concept of force, recall that the newton is the unit of force, and describe forces and their effects

OP5 investigate examples of friction and the effect of lubrication

OP6 **investigate the relationship between the extension of a spring and the applied force**

OP7 understand that weight is the force of gravity and that weight varies with location; recall that mass in kilograms multiplied by 10 is approximately equal to weight in newtons on the surface of the earth

Moments, Levers and Centre of Gravity:

Can you.....

OP8 find the centre of gravity of a thin lamina; investigate the role of centre of gravity in design for stability and equilibrium

OP9 investigate the law of the lever; recall two everyday applications of levers

Pressure:

Can you.....

OP10 understand the relationship between pressure, force and area; perform simple calculations using this relationship

OP11 investigate the relationship between pressure and depth for a liquid

OP12 show that air has mass and occupies space

OP13 understand that the atmosphere exerts pressure and that atmospheric pressure varies with height

OP14 examine weather charts to observe variations in atmospheric pressure and relate these to weather conditions

Work, Power and Energy:

Can you.....

OP15 define and give the units for work, energy and power, state the relationship between work and power, and perform simple calculations based on this relationship

OP16 classify sources of energy as renewable or non-renewable

OP17 state the principle of conservation of energy

OP18 explain why the sun is considered our primary source of energy and how this is important in food production and energy supply

OP19 list the advantages and disadvantages of different energy sources, including nuclear sources of energy, as part of the solution to national energy needs

OP20 identify different forms of energy and carry **out simple experiments to show the following energy conversions:**

a. chemical energy to electrical energy to heat energy

b. electrical energy to magnetic energy to kinetic energy

c. light energy to electrical energy to kinetic energy

OP21 give examples of energy conversion from everyday experience.

Heat and Heat Transfer:

Can you.....

OP22 understand that heat is a form of energy and that it can be converted into other forms of energy

OP23 **investigate and describe the expansion of solids, liquids and gases when heated, and contraction when cooled**

OP24 demonstrate the expansion of water on freezing

OP25 measure the temperature of various solids and liquids at, above and below room temperature; determine the melting point of ice and the boiling point of water

OP26 investigate the effect of pressure on the boiling point of water

OP27 explain the difference between heat and temperature

OP28 carry out experiments that involve changes of state from

i. solid to liquid and liquid to solid
ii. liquid to gas and gas to liquid

OP29 plot a cooling curve and explain the shape of the curve in terms of latent heat

OP30 understand that all hot bodies radiate heat

OP31 **carry out simple experiments to show the transfer of heat energy by conduction, convection and radiation; investigate conduction and convection in water**

OP32 identify good and bad conductors of heat and compare insulating ability of different materials

Light:

Can you.....

OP33 To undertsand that Light is a form of energy, and that it can be converted into other forms of energy.

OP34 **Show that light travels in straight lines and to understand how shadows are formed.**

OP35 understand that luminous objects are a source of light while non-luminous objects are seen as a result of light reflected from them

OP36 recall that white light is made up of different colours which can be separated by dispersion

OP37 produce a spectrum of white light using appropriate apparatus, and list the colours of the spectrum

OP38 **investigate the reflection of light by plane mirrors, and illustrate this using ray diagrams; demonstrate and explain the operation of a simple periscope**

OP39 show the refraction of light as it passes from: air to glass, air to water, glass to air, water to air; show refraction of light through a lens; demonstrate the operation of a magnifying glass

Sound:

Can you.....

OP40 show that sound is a form of energy, and understand that sound is produced by vibrations

OP41 show that sound transmission requires a medium and that echoes are reflected sound

OP42 understand that the ear detects sound vibrations and that exposure to very loud sounds can cause damage to hearing

OP43 recall that the speed of sound is less than the speed of light

OP44 explain the time lag between seeing and hearing the same event.

Magnetism:

Can you.....

OP45 carry out simple experiments to show attraction and repulsion between magnets, and test a variety of materials for magnetism

OP46 **plot the magnetic field of a bar magnet**

OP47 demonstrate that the Earth has a magnetic field, and locate north and south

Static and Current Electricity:

Can you.....

OP48 use simple materials to generate static electricity; demonstrate the force between charged objects and the effect of earthing

OP49 **test electrical conduction in a variety of materials, and classify each material as a conductor or insulator**

OP50 **set up a simple electric circuit, use appropriate instruments to measure current, potential difference (voltage) and resistance, and establish the relationship between them**

OP51 demonstrate simple series and parallel circuits containing a switch and two bulbs

OP52 perform simple calculations based on the relationship between current, potential difference (voltage), and resistance

Uses and Effects of Electricity:

Can you.....

OP53 describe the heating effect, the chemical effect, and the magnetic effect of an electric current, and identify everyday applications of these, including the action of a fuse

OP54 distinguish between direct and alternating current; recall that the voltage of the mains supply is 230 volts a.c.

OP55 recall that the unit of electrical energy used by electricity supply companies is the kilowatt-hour, and calculate the cost of using common electrical appliances, based on their power rating

OP56 describe how to wire a plug correctly, and explain the safety role of a fuse or circuit breaker in domestic electrical circuits

Electronics:

Can you.....

OP57 understand that a diode is a device that allows current to flow in one direction only, and that a light emitting diode (LED) requires less current than a bulb

OP58 set up simple series circuits using switches, buzzers, LEDs and resistors

OP59 measure the resistance of a light-dependent resistor (LDR) under varying degrees of brightness of light

OP60 identify everyday applications of the diode, including the LED, and of the LDR.