



INGLESE

# PERCORSI PER STUDENTI NON ITALOFONI

tratti da *Intorno a te - Capire e vedere la Scienza* di Stefano Zanoli

PERCORSI PER STUDENTI  
NON ITALOFONI

1ª



CLASSE PRIMA



# Heat and temperature

## Il calore e la temperatura

### 1 What is temperature and how is it measured?

The temperature of a body is an estimate of the level of heat of that body. The instrument used for its measurement is called a thermometer.

### 2 What does temperature really measure?

Temperature is the measure of the velocity of molecular motion, called thermal agitation.

### 3 What is thermal expansion?

All materials, when heated, increase in volume, each according to its own characteristics. This phenomenon is called thermal expansion.

### 4 What is heat?

Heat is a form of energy, measured in calories or joules.

### 5 How is heat transferred?

Heat is always transferred from a body at higher temperature to a body at lower temperature. In solid bodies, heat is transferred by conduction: the energy is transferred through the molecular collision of those molecules which are located close to each other. In gases and liquids, on the other hand, heat is transferred through a material flow called convection.

### 6 What is irradiation?

Heat can be propagated via radiation without material movement. This phenomenon is called irradiation.

### 7 What are thermal conductors and insulators?

Materials which are capable of fast heat transfer are called conductors. Materials which are very slow in transferring heat are either insulators or poor conductors.

### 8 What is the specific heat of a material?

The specific heat of a material is the quantity of heat that is required for 1 gram of that material to raise its temperature by 1 °C.

### 9 What is the melting point temperature?

The temperature at which a material changes its state from solid to liquid.

### 10 What is the boiling point?

The temperature at which a material suddenly changes from a liquid to a vaporous or gaseous state.

### 11 What are sublimation and frosting?

The change of state directly from solid to vaporous form is called sublimation. The reverse of this, the change of state from vaporous to solid, is called frosting.





# The hydrosphere

## L'idrosfera

### 1 What makes up the hydrosphere?

All bodies of water on planet Earth are part of the hydrosphere. This includes oceans and continental waters.

### 2 What are continental waters?

Continental waters are only found inland, not in the oceans. They include rivers, glaciers, groundwater and lakes.

### 3 What is salinity?

Salinity is the quantity of salt dissolved in seawater, expressed in grams per litre. The average salinity of seawater is 35 g/L.

### 4 What are the chemical and physical properties of water?

Water is a powerful solvent and contains a large number of soluble compounds, especially minerals. Furthermore, it stores heat for a long period of time, since it has a high specific heat.

### 5 Why does ice float on water?

Water reaches its maximum density at 4 °C. When it cools down to 0 °C and becomes ice, it has a lower density and that is why ice floats on liquid water.

### 6 What is the principle of communicating vessels?

The principle of communicating vessels states that the level of a liquid in connected containers is always the same.

### 7 What is the force of cohesion?

The force that unites the molecules of a material is called the cohesion force. It is very strong in solids, but very weak in gases.

### 8 What is adhesion?

The force exerted between the molecules of a liquid and those of the contact surface.

### 9 Why does water rise more easily in a narrow tube?

It rises more easily due to capillarity.

### 10 Why doesn't an insect drown when it is on the surface of a body of water?

An insect does not drown because of the resistance provided by the surface of the water, known as surface tension.

### 11 What is the hydrological cycle?

Water continuously circulates from the sea to the land and then to the atmosphere in what is known as the hydrological cycle, which is in turn affected by the Sun's energy and the Earth's gravity.





# The plant kingdom

## Il regno delle piante

### 1 What are the characteristics of plants?

Plants are multicellular eukaryotic organisms. They produce their own organic material according to their needs and are thus considered autotrophic organisms.

### 2 What is the difference between vascular and non-vascular plants?

Non-vascular plants have a simple structure, without any differentiated organs; they include bryophytes, such as mosses. Vascular plants have differentiated tissues that make up organs such as roots, stems and leaves.

### 3 What are pteridophytes and how do they reproduce?

The most simple vascular plants are fern and horsetails, called pteridophytes. These plants reproduce through specific cells called spores.

### 4 What is the function of roots and stems in vascular plants?

In vascular plants, the roots anchor the plant to the ground and absorb water and mineral salts. The stem connects the roots to the leaves and it is lined with supply veins (vessels) which convey raw sap from the roots to the leaves, and processed sap from the leaves to other parts of the plant.

### 5 What are stomata?

Leaves are formed by many layers of cells. The openings found on their lower sides are called stomata and can open or close to let gas in and out.

### 6 What processes take place in plants?

Photosynthesis takes place largely in leaves. Here carbon dioxide combines with water to form glucose; the waste product of this process is oxygen. Respiration produces energy, transpiration eliminates excess water through the stomata.

### 7 What are the different groups of spermatophyte plants?

Spermatophytes are plants which reproduce by forming seeds. They are divided into gymnosperms, plants with seeds not enclosed in a fruit, and angiosperms, plants with seeds in a fruit.

### 8 What is the difference between pollination and fertilisation?

Pollination is the transportation of pollen (containing the male gametes) to the ovule (containing the female gamete) of flowers through insects (entomophilous pollination) or the wind (anemophilous pollination). Fertilisation occurs after pollination, in the female part of the flower: the fertilised ovule in the ovary develops into a seed, while the ovary is transformed into a fruit.

### 9 What do seeds contain?

Seeds enclose a miniature version of the plant, namely the embryo, plus nutrients.





CLASSE SECONDA





# The musculoskeletal system

## Il sostegno e il movimento

### 1 What is the function of the bones of the skeletal system?

The bones in the skeleton provide support to the body and the muscles. They protect several internal organs, create blood cells and represent a source of useful substances for the body.

### 2 What makes up the musculoskeletal system?

Along with the muscular tissue, the skeletal system makes up the musculoskeletal system, which allows the human body to move.

### 3 What tissues make up the bones?

Two connective tissues: cartilage and bone tissue.

Cells found in the cartilage are known as chondrocytes, immersed in collagen. The cells that make up bone tissue are called osteocytes and are immersed in a substance containing ossein and mineral salts. There are two types of bone tissues: compact bone tissue forms the external layer of all bones; the spongy bone tissue can be found inside the bone.

### 4 What are the different types of bones?

There are long bones, such as the femur and the humerus, flat bones such as those in the skull and the pelvis, and short bones, such as the bones in the hand and foot.

### 5 What are joints?

Joints are structures that connect one or more bones that enable the movement of different parts of the body. They can be distinguished into fixed, semi-mobile and mobile.

### 6 What are the different parts of the human skeleton?

The skeleton is a bone structure held together by means of elastic sheaths, known as ligaments. The human skeleton consists of three parts: the head, the trunk, which includes the vertebral column and the rib cage, and the upper and lower limbs.

### 7 What are muscles made of?

Muscles are made of muscle tissues. Muscle tissue cells, namely muscle fibres, have a layer-like structure and include nerve endings and blood vessels. Muscle fibres consist of myofibrils, which in turn contain actin and myosin filaments. Muscular contraction occurs thanks to myofibrils.

### 8 What type of muscles are there?

Striated muscular tissue makes up the musculoskeletal tissue or voluntary muscles; smooth muscular tissue makes up the involuntary muscles; the muscle tissue of the heart makes up the walls of the heart.

Antagonistic muscles work in pairs, carrying out opposing actions.





CLASSE TERZA





# The Earth's interior, volcanoes and earthquakes

## I vulcani e i terremoti

### 1 What are the different layers that make up the Earth?

The Earth is made up of the crust, the mantle, the outer core and the inner core. The crust has an irregular thickness: thinner below oceans, thicker under continents.

### 2 What is volcanism?

Volcanism is the process through which magma, composed of molten rocks and gases at extremely high temperatures, rises to the surface of the crust.

### 3 What happens during a volcanic eruption?

A volcano is a crack in the Earth's crust through which the magma reaches the surface, known as lava. In an effusive eruption, the magma is fluid and creates a lava stream; in an explosive eruption, the magma is thick and is released in the air along with gas and solid rock fragments.

### 4 Where are the main active volcanoes?

Most active volcanoes can be found along the edges of the Pacific Ocean, known as the Ring of Fire. The main active volcanoes in Italy are: Mount Vesuvius, Mount Etna, Mount Stromboli and Mount Vulcano.

### 5 Why can volcanoes be dangerous?

The characteristics that make a volcano dangerous are: explosions, ash fall, pyroclastic flows, gas emissions and lava streams.

### 6 What generates an earthquake?

An earthquake or seismic event is a shaking movement of the ground due to rapid vibrations. It is generated by the sudden release of accumulated energy in the fractured rocks: the fracture is called a fault.

### 7 What are the hypocentre and the epicentre of an earthquake?

The point at which the Earth's layer fractures and from which the earthquake originates is known as the hypocentre. The point at which the seismic waves reach the surface, directly above the hypocentre, is known as the epicentre.

### 8 How is the intensity of an earthquake measured?

The Mercalli scale measures the intensity of an earthquake based on the effects of a seismic wave on property and people; the Richter scale measures the magnitude of the earthquake, that is the energy released by the seismic wave. The instrument that takes these measurements is a seismograph.

### 9 How is a seismic risk calculated?

To calculate a seismic risk we need to take into account: the intensity level of the earthquake, human exposure and the vulnerability of buildings.





# The sensory organs

## Gli organi di senso

### 1 How do our senses work?

The senses respond to external stimuli (mechanical, chemical, thermal or luminous) through specific receptors which transmit the information to the brain, where it is processed and interpreted.

### 2 What is the function of sight?

Sight allows us to receive luminous stimuli and send them to the brain, which constructs images of the external environment. This function is carried out by the eyes.

### 3 What is the structure of the eye?

The eye consists of an ocular bulb, formed by three membranes: the sclera, the choroid and the retina. In the frontal part, the sclera becomes transparent and is called cornea. The iris is a circular ring that regulates the amount of light which enters the eye; the hole in its centre is the pupil. The lens is a transparent structure that can be deformed. A mechanism called adaptation allows us to focus on images.

### 4 What is the structure of the retina?

In the retina there are nerve receptors: the cones, sensitive to colours, and rods, sensitive to low light intensities. The optical nerves transmit the signals to the brain.

### 5 What is the structure of the ear?

The external ear collects sound from the environment. The auditory canal is a tube that terminates at a membrane called the eardrum. Sound vibrations make the eardrum vibrate and vibrations are transmitted to a series of tiny bones: the hammer, the anvil and the stirrup; this ossicle leans on a membrane, the oval window. The inner ear is formed by the vestibule, the cochlea and three semicircular canals. These cavities are filled with a liquid called endolymph, which transmits vibrations to the hairs of the acoustic receptors.

### 6 Where is the balance centre in the ear?

In the semicircular canals. Sensory cells are stimulated by small pebbles, called otoliths.

### 7 How does taste work?

The sense of taste allows us to detect various flavours. Its receptors are mainly located on the tongue and are organised into structures called taste buds.

### 8 How does smell work?

Smell allows us to detect various odours. Its receptors are located in the olfactory mucus found in the upper part of the nasal cavity.

### 9 What kind of receptors are responsible for touch?

Tactile sense, or skin sensitiveness, is due to many types of receptors in the skin which respond to temperature, pressure and pain.

