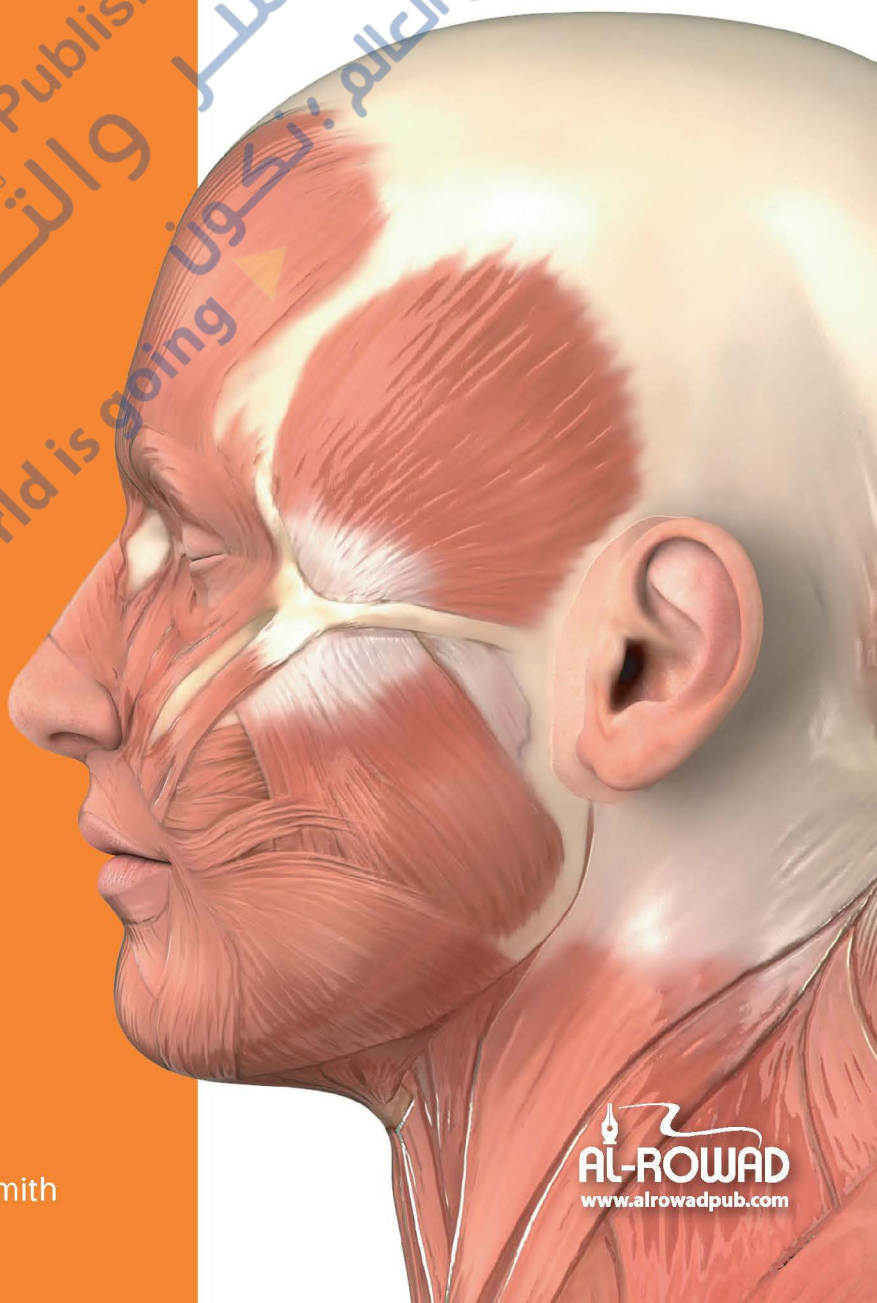
New

Science Basics 6

Second Edition



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Contents

Some things around us are living, and some are non living. Plants and animals are living things. Rocks, chairs and water are non living things.

All living things have at least five features in common.
1. Living things are made up of cells.
2. Living things grow and change.
3. Living things need energy.
4. Living things respond to their environment.
5. Living things reproduce.

Do you know?
Living things that are made up of only one cell are called unicellular organisms. An amoeba is a unicellular organism.
Living things that are made up of several cells are called multicellular organisms. Humans are multicellular organisms.

Living Things Are Made Up of Cells

A cell, is the smallest part of a living thing. Most cells are so small that we can only see them with the help of a microscope. Every part of the body of plants and animals is made up of cells. Some living things are so small that they are made up of a single cell. Large animals have millions of cells in their bodies.

onion cells
(100 times larger then they actually are)

Living Things Grow and Change

Puppies grow into dogs. Buds change into flowers. Flowers wither and change into fruits. Animals stop growing after some time. You will not grow any taller after a few years, nor will your body parts increase in size. But, a plant keeps on growing as long as it lives, new leaves and branches keep appearing on it.

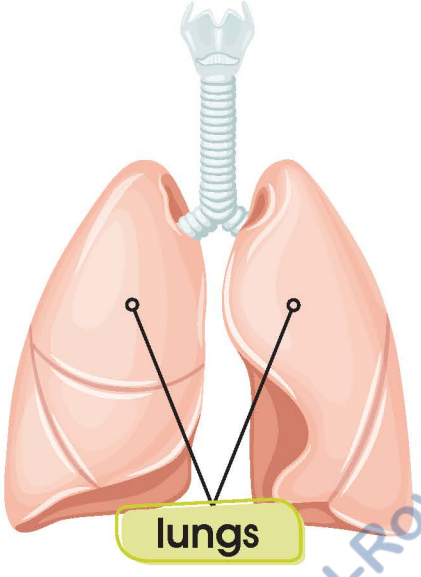
The size of the cells of a living thing does not grow very much. Living things grow by producing more cells. The more cells you have, the bigger you are.

microscope

Living Things Need Energy

They get energy from food. Animals have to find and eat food. Plants make their own food by a process called photosynthesis.

Plants use carbon dioxide from the air, water from the soil and sunlight to make their food. This takes place in green leaves, in the presence of a green substance called chlorophyll. Chlorophyll traps the energy of the sun for photosynthesis.



Food is required by living things to grow, to move around and to keep their bodies healthy.

Food is converted into energy inside the cells. Some living things require oxygen from the air to get energy from food. This is why all living things respire. During respiration, oxygen from the air is breathed in and reaches the cells. After food is converted into energy, carbon dioxide is given off by the cells. This is breathed out during respiration.

What is a microscope?
By what age does growth of a child stop?
How many times do you normally breathe in a minute?

Animals respire in different ways. Some animals such as mammals have lungs, insects have tiny holes called spiracles and fishes have gills which absorb oxygen dissolved in water. Plants respire through tiny holes in their leaves called stomata.

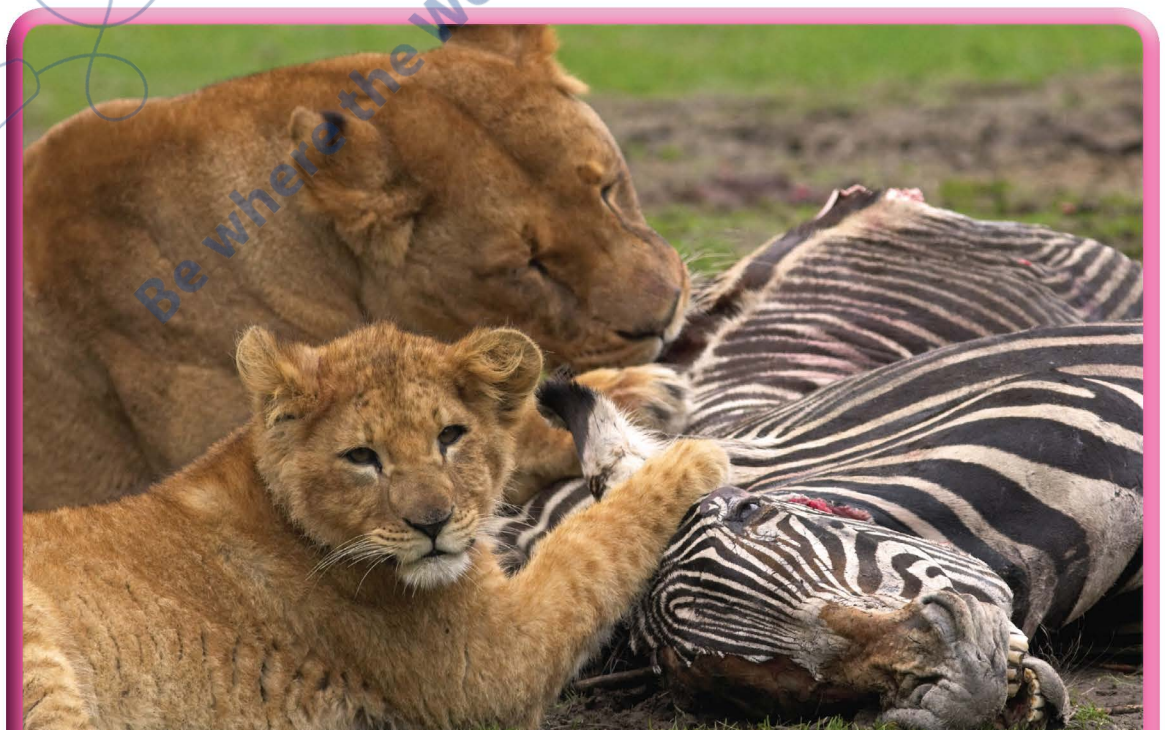
Living Things Respond to Their Environment

An environment is everything around a living thing. Sunlight and weather are a part of the environment. Most animals sense their environment with the help of their sense organs - eyes, ears, nose, skin and tongue. They respond to it in various ways. When an animal sees food, it moves towards it to catch it. When it feels cold, it tries to find shelter. When you see good food, saliva starts flowing in your mouth.

Plants do not have sense organs, but they can also feel changes around them. A plant can feel the Sun and responds by growing towards it. The leaves of the 'touch me not' plant can feel something touching them and respond by closing.

Sunflowers respond to the sun by turning towards it.

Animals respond to their need for food and shelter by moving around in search of them. Plants do not need to look for food and shelter, they make their own food. Plants remain fixed in one place.



Living Things Reproduce

All living things can reproduce. New living things come from adult living things. Animals reproduce by giving birth to babies, or by laying eggs from which babies come out. Most plants produce seeds from which plants come out.

Remember

1. Living things have at least five things in common: they are made up of cells, they grow and change, they need energy which they get by taking food and respiring, they respond to their environment and they reproduce.
2. Life functions are performed by living things in different ways.

Put a ✔ for true or an ✖ for false.

Give an explanation why you put true or false.

a) Living things grow because the size of their cells grow. ☐

Explanation _____

b) Some living things are made up of only one cell. ☐

Explanation _____

c) Plants stop growing after some time. ☐

Explanation _____

d) Living things cannot get energy from food in the absence of oxygen. ☐

Explanation _____

e) Sunlight provides energy to plants to make their food. ☐

Explanation _____

Name these.

a) the building blocks of all living things: _____

b) your friend who is bigger than you has more of them: _____

c) they absorb oxygen dissolved in air: _____

d) it consists of everything around you: _____

How do plants and animals differ in:

a) growth: _____

b) taking food: _____

c) respiration: _____

d) reproduction: _____

e) movement: _____

Give an example of a plant responding to its environment.

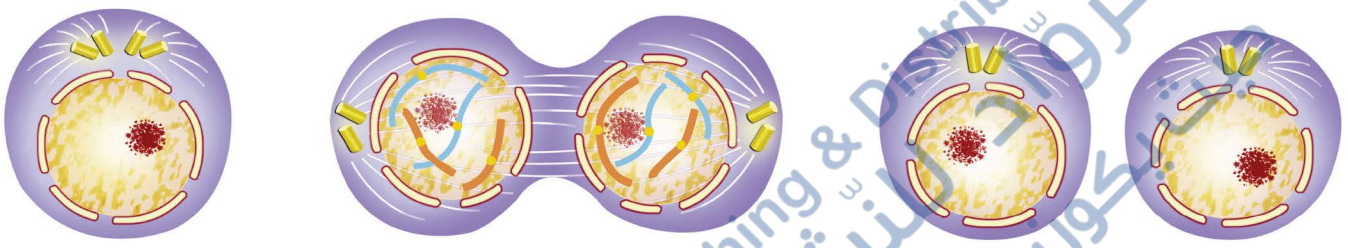
_____

_____

AWARENESS BEYOND THE CLASSROOM

How new cells are made

All animals and plants start their life from a single cell, then form more and more cells. Their number increases quickly. The process by which new cells form is very interesting. After a cell has grown to its full size, it begins to split in half. It forms two separate cells which are exactly alike. These cells again split into two, after they have grown to their full size. This process goes on and on. Some of these new cells replace dead cells in your body. Others make you grow.



In young children, new cells are produced faster. Your body makes millions of new cells every minute. When you become an adult, your cells will split slowly. They are not required for growth. They are only required to replace dead cells.

Project

See cells.

You will need:
- an onion
- tweezers
- window pane

Peel an onion. Peel away the thin inner surface using tweezers. You have an onion skin that is only one cell thick. It is thinner than tissue paper. Carefully, stick the skin to a windowpane. Using a powerful hand lens, you can make out the cells. Ask your teacher to show you the onion peel under a microscope.

Our body is made of flesh and blood built on a framework of bones. Without our bones, we could not stand up or move around.

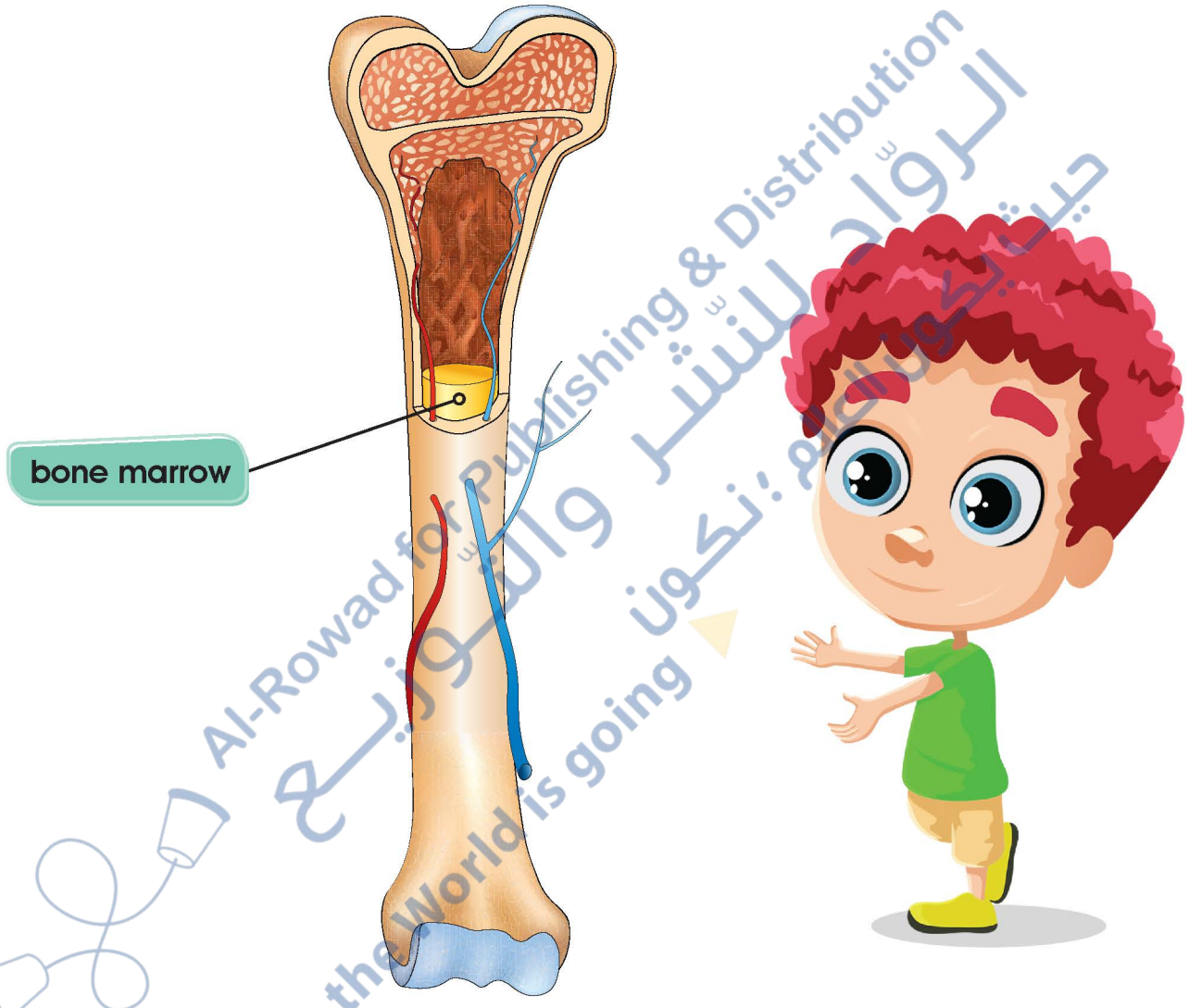
We would be as floppy as a suit of clothes without a hanger. We can walk, jump and run because our bodies are composed of many separate bones, all joined together by bands of muscles. Some of the bones are actually joined together so that they cannot be moved alone. This gives them extra strength. Our skull, for example, is made of 22 flattened bones which are linked like a jigsaw. Other bones meet at moveable joints which are like hinges and make us flexible and bendy.

As well as allowing us to move, our bones and muscles protect very important organs inside our body. Our rib cage encloses the heart and lungs. Our skull protects the brain. Our spinal cord, a bundle of nerves, runs safely through the center of the spinal column bones. Our hip bones and spine shield the liver, intestines and stomach.

human skeleton

The Skeletal System

As our body has a number of soft parts, it is necessary to have a hard framework supporting these parts. Otherwise, the body will collapse. This framework is provided by the bones and is called the skeleton. It gives shape and strength to the body. It also protects the soft, inner organs of our body such as the heart and lungs.



Did You Know?

Each of us has about 206 bones of all shapes and sizes and over 600 muscles.
The lower jaw is the only bone in the skull that can move. It enables us to eat and talk.
We use 15 muscles when we smile.

As a child, we had more than 350 bones. But, as we grow, some of them join together. An adult normally has 206 bones. From outside, bones feel smooth and hard. However, they are softer and spongy on the inside. The inner substance of a bone is called the bone marrow. This is where most blood cells are made.

Although the individual bones are hard, several of them can move at the places where they are joined to other bones. That is why we can move several parts of our body. The human skeleton consists of the following main parts.

The Skull

The skull is the bony structure that surrounds and protects our brain. The upper portion is made up of 8 flat bones joined together. The face and jaw contain 14 bones. The skull bones are just under the skin. There are holes in the bones of the face for our eyes, nostrils, mouth and ears. The teeth are fixed to the jaw bones.

human skull

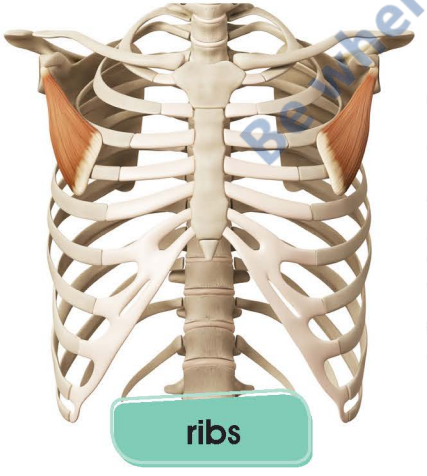
The Backbone or Spine

The spine, or vertebral column, is attached to the skull.
It is made up of 33 small bones. These are called vertebrae.
The spine forms the center supporting rod for the skeleton.
It also protects the delicate spinal cord which contains nerves and blood vessels. The vertebrae can move over each other, which allow you to bend and twist your back.

backbone or spine

The Limbs

Nearly half of our bones are in the hands, wrists, feet and ankles.
The biggest bone of the body is the thigh bone or the femur.
The upper bone of the arm is attached to the spine by the collar bone and the shoulder girdle. The femur is attached to the hip girdle.



ribs

The Ribs

The ribs are narrow curved bones that form a cage to protect the heart and lungs, there are twelve pairs of ribs. They are joined to the backbone at the back and the breast bone in the front. Two pairs of ribs, however, are joined only to the backbone, they are called floating ribs.

Joints

Joints occur wherever two bones meet. They are strong enough to with stand sudden movement. There are several joints in the body. Different joints allow different types of movement. Only the skull joints do not allow any movement. We can move our lower leg only in one direction, because our knee joint does not allow movement in other directions. However, we can twist our ankle because the ankle joint is different from the knee joint. Let us see how.

Investigate

Which is the strongest bone of your body? Which is the biggest muscle of your body? What do athletes do to keep their body fit? Look at one of your hands. How may bones can you find in it?

Knees and elbows are hinge joints. They can only move up and down, or backward and forward, like door hinges.

hinge joint

Shoulders and hips are ball and socket joints. One of the bones ends in a ball that fits into the hole (or socket) of the other bone. The bone that ends in a ball (femur and upper arm bone), can move in any direction.

ball and socket joint

The skull is connected to the top vertebra in the spine with a pivot joint. It allows the head to rotate and to move upward and downward.

Wrists and ankles have sliding joints where bones can slide over each other. This allows you to move your hand and foot from side to side as well as backward and forward.

pivot joint

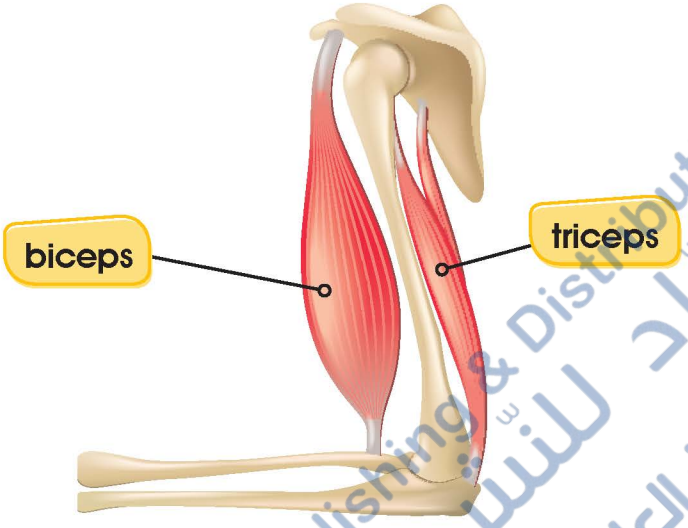
The Muscular System

About half the weight of the body is muscles. They are made up of bundles of fibers. They make our body move. We have about 650 muscles and each one produces a particular movement. The muscles that move our body parts are attached to our bones by strong fibers called tendons.

Muscles work by pulling on a bone, they cannot push. Therefore, at least two separate muscles are needed to move a joint. For example, our arm movements are controlled by two muscles, biceps and triceps.

muscular system

When we want to pull up our arms, the biceps which are joined to the arm in front, become shorter and pull up the lower arm bone. When we want to lower our arms, our triceps, which are at the back, become shorter and pull the lower arm bone. Several movements of the body require many muscles working together.



Types of Muscles

All movements of our body are controlled by our muscles. There are three kinds of muscles in the body. Some muscles are under our control. We can move them when we want. These voluntary movement muscles are called skeletal muscles. When we move our hands or legs, we use skeletal muscles.

The smooth or involuntary muscles work on their own, we have no control over them. They cause movements of the inner parts of the body, such as the stomach and intestines. They keep the body systems working properly.

The third type of muscles are cardiac muscles. They cause the heart to pump blood to the body. They work throughout our life without stopping and without getting tired.

The more we use a muscle, the bigger and stronger it gets. So, if you want strong muscles, exercise them regularly.

Remember

1. The skeletal system consists of bones and gives our body its shape. It also protects all the soft organs Inside.
2. The main parts of the skeleton are the skull, the backbone, the ribs and the limbs.
3. Joints occur where two bones meet. There are different types of joints.
4. The muscular system consists of muscles. It controls the movement of all parts of the body.
5. There are three types of muscles. Skeletal muscles, smooth muscles and cardiac muscles.

Put a ✔ for true or an ✘ for false.

Give an explanation why you put true or false.

a) Bones are hard on the outside but soft in the inside. ☐

Explanation _____

b) A new born child has 206 bones. ☐

Explanation _____

c) Blood cells are made inside the bones. ☐

Explanation _____

d) The skull contains several moveable bones. ☐

Explanation _____

e) Floating ribs are not joined to the breast bone. ☐

Explanation _____

f) The knee has a hinge joint. ☐

Explanation _____

g) The ball and socket joint allows movement in an up and down direction only. ☐

Explanation _____

h) Muscles can pull or push a bone to make it move. ☐

Explanation _____

Name these.

a) this system gives the body its shape: _____

b) the small bones that make up the spine: _____

c) the biggest bone of the body: _____

d) the type of joint by which the skull is connected to the top vertebra: _____

e) the strong fibres that attach muscles to the bones: _____

f) the muscles that shorten if you want to lower your arm: _____

g) muscles which work on their own, over which you have no control: _____

h) the tireless muscles that work throughout our life without stopping: _____

What functions does the skeleton perform?

_____

_____

What functions do the following bones perform?

a) The spine. _____

_____

b) The ribs. _____

_____

What is a joint?

_____

_____

Why are at least two muscles needed to move any joint in the body? _____

_____

Explain the structure of the ball and socket joint.

_____

What kind of movement does a ball and socket joint allow?

_____

What is the difference between voluntary and involuntary muscles?

_____

_____

Discuss and answer. What would happen if the spine consisted of one long bone?

_____

_____

_____

When Ali stretches his arm to lift a brick and when he tiptoes to get a book from the shelf, there is a change in the muscles in his body. State one function of the muscles.

_____

_____

What is the structure shown in the diagram on the right side? State one of its functions.

_____

_____

Look at the diagram of the human skeleton.
Label the "thigh bone" and "hip bone".
Can you label some other bones too?