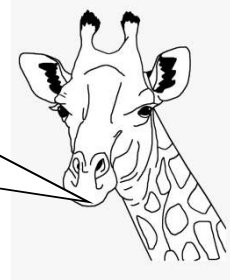


## 1.1 Adaptation and survival

### **Some problems face the survival of living organisms in different habitats:**

1. Increasing or decreasing of temperature.
2. Shortage or plenty of water.
3. Food availability.
4. Shelter.

What are the factors affecting survival of living organisms?



## **Adaptation**

It is a way that helps the living organism to adapt and survive in its environment.

## **Bats**



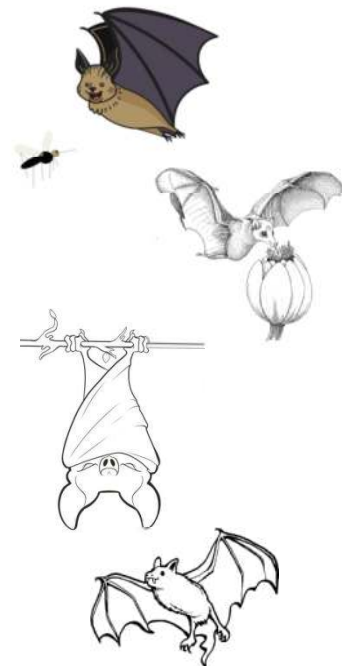
### **How do bats adapt to their environment?**

1. Most bats eat insects, as: mosquitoes.

2. Bats act as bees and butterflies in helping plants and flowers.

3. Bats hang (sleep) upside down.

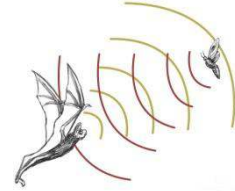
4. Although bats aren't birds, they can fly.



5. Bats are nocturnal animals.  
(i.e.: They are active at night.)



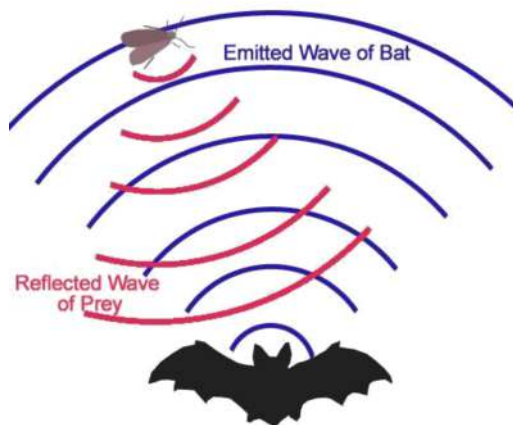
6. Bats use a technique, called "echolocation" to find their preys, as they can't see at night.



## Echolocation

It is a way that some animals use to find the location of things.

- Bats hunt for food in total darkness.
- Echolocation is important for them to survive.
- Bat produces sound.
- This sound travels through the air until it hits a surface.
- Then, it returns back to the bats' ears, causing them to hear.



## Life applications on Echolocation:



Vibrating walking stick inspired by bats

### Main idea:

- ✓ It produces very high sound like bats that can't be heard by the man's ears.

### How it works?

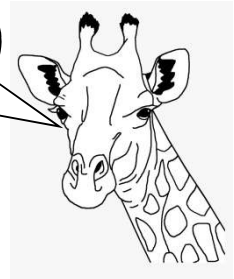
- ✓ The blind people use the vibrating walking stick during walking.
- ✓ The stick receives the echo.
- ✓ Then, the stick changes this echo into vibrations.
- ✓ The blind people feel these vibrations with their thumb.
- ✓ The vibration buttons can tell the human the direction of the objects and how far the object is from the person.



Think like a scientist.

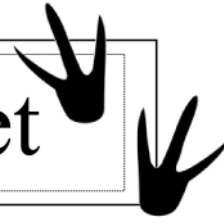


Mention a  
bat-like  
technology.

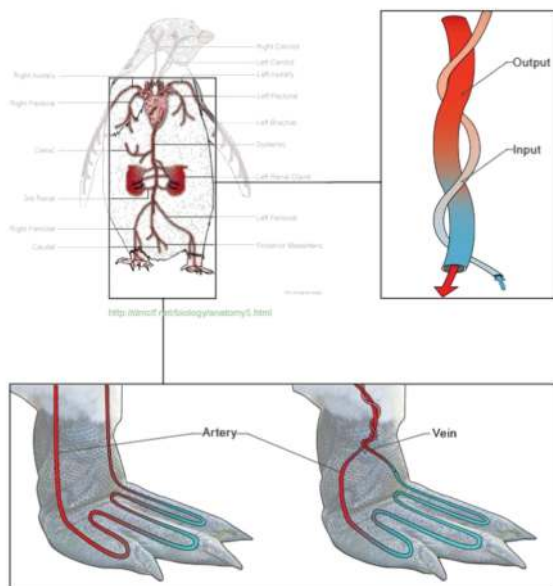


How did the scientists use the adaptation of an animal to design a new invention?

# Penguin's feet



- ✓ Penguins are cold-adapted for living in Antarctica where it is very cold.
- ✓ Penguin's feet keep warm due to the blood flow inside blood vessels within these feet.
- ✓ Penguins have specially arranged blood vessels which helps recycling their body's warmth, where:
  - a. Some blood vessels carry the cold blood from the feet.
  - b. Other blood vessels carry the warm blood found in the the rest of the covered body parts with fur **into the feet**.
- ✓ The blood vessels carrying the warm blood from the warm parts of the penguin's body coil around the other blood vessels carrying the cold blood from the cold feet.
- ✓ This lead to transferring of heat into the feet.



Penguin's feet work like a heat exchange system.



# Ways of adaptation

They are the properties that help the living organisms to survive (remain alive) in their environment.

## ☒ Examples:

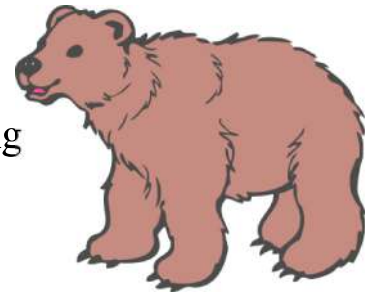
### **1. Polar bear:**

- ✓ It has thick white fur to:
  - a. Keep warm.
  - b. Blend with snow to catch its prey.



### **2. Brown or black bear:**

- ✓ It has dark brown fur to:
  - a. Help it to hide between trees during catching its prey.



### **3. Caracal:**

- ✓ It is a mammal.
- ✓ It is a carnivorous animal (i.e.: eats meat).
- ✓ It has golden fur, to help it hide in desert.



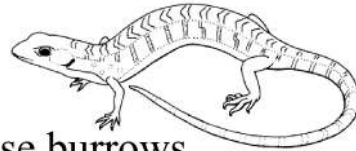
#### **4. Fennec fox:**

- ✓ It is the smallest of all the foxes.
- ✓ It has large ears.
- ✓ It has golden fur, to help it hide in desert.



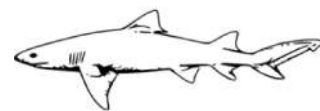
#### **5. Lizards:**

- ✓ They have colourful scales that help them to hide between coloured rocks in the desert to:
  - a. hide from enemies.
  - b. catch preys.
- ✓ In very high temperature, lizards use burrows and go to shady places as a means of adapting to the desert heat.



#### **6. Bull shark:**

- ✓ It can live in fresh and salt water.
- ✓ It has countershading or dark coloration on top and light coloration on the underbelly.
- ✓ This helps the animal to blend into the water and catch their preys.



## 7. Chameleon:



Ways of adaptation	How it helps the animal?
1. Its body is covered with colourful scales.	Chameleons can hide between the green leaves and colourful flowers to catch their preys and hide from enemies.
2. They have V-shaped feet.	Chameleons attach to roots and branches of trees, spending all the night in hunting (catching) preys.
3. Tail.	Chameleons curl their tails to hold objects.
4. Eyes.	Chameleons can move each eye independently to watch two different things at the same time. This helps them to catch preys and hide from enemies.
5. Body and mouth.	Chmeleons can flatten out to appear bigger, then open their jaws widely ti scare their enemies.

❖ Animals live in different habitats, such as: polar habitat, desert habitar, ocean habitat, ... etc.

## Types of adaptation

1. Structural adaptation.
2. Behavioral adaptation.

P.O.C	Structural adaptation	Behavioral adaptation
1. Definition	A feature involves some parts of the animal's body (shape, body covering, ....)	Activities or behaviors that help an animal to survive.
2. Examples	<ol style="list-style-type: none"> <li>1. Thick white fur of polar bear to keep it warm.</li> <li>2. Large ears of fennec fox to listen for sounds of the prey in sand.</li> </ol>	<ol style="list-style-type: none"> <li>1. Birds migrate in winter to get food.</li> <li>2. A spider spinning its web.</li> <li>3. Hiding within sands or rocks to keep the body cool.</li> <li>4. Hiding in caves under the snow to keep the body warm</li> </ol>



Fennec fox	Arctic fox
1. It lives in dry desert climate.	1. It lives in tundra.
2. It has a pale brown fur, to help it hide in sand and to be protected from the sun rays.	2. It has thick white fur, to help it in hunting and catching its preys easily.
3. It depends on panting, to regulate its body temperature.	3. Its short ears and legs can keep it warm.

- ✓ Fennec fox has large ears to help it loss heat, to keep its body cold.
  - ✓ Both foxes eat all kinds of the found food, such as: insects, fruirs, plant roots and the remainig part of prey of another animal.
- Some animals are cold-blooded to survive in the environment.

## **Cold-blooded animals**

They are animals whose blood temperature changes with the temperature of air or water.

- **Examples of the cold-blooded animals:**
  1. Fishes.
  2. Snakes.
  3. Lizards.
  4. Chameleon.

## Evaluation

### **Q<sub>1</sub>) Choose the correct answer:**

1. Bats sleep (hang) .....  
a. on backs                      b. upside down                      c. upright
2. .... is a technique used by bats to know the location of the prey.  
a. Echolocation                      b. Adaptation                      c. Countershading
3. Bull shark can live in .....  
a. fresh water only                      b. sea water only                      c. (a) and (b)
4. Chameleons have .....-shaped feet.  
a. U                      b. V                      c. S
5. Caracal is a ..... animal.  
a. herbivorous                      b. carnivorous                      c. no correct answer

### **Q<sub>2</sub>) Write the scientific term:**

1. An animal that can hide from its enemies through countershading.  
[ ..... ]
2. An animal that has large ears to hear its preys on sand.  
[ ..... ]
3. A bat-like technology. [ ..... ]
4. A type of adaptation includes activities or behaviors that help an animal to survive. [ ..... ]
5. A type of adaptation includes changing some parts of the animal's body (shape, body covering, ....). [ ..... ]

### **Q<sub>3</sub>) Complete each of the following:**

1. .... can move each eye independently to watch two different things at the same time.
2. Chameleon has ..... Or dark coloration on top and light coloration on the underbelly.

3. Migration of birds in winter to get food is an example of ..... adaptation.
4. Bats are ..... animals.
5. Penguin's feet keep ..... Due to the blood flow inside blood vessels within feet.

**Q3) Give a reason for:**

1. Bats are important to the humans.

.....  
.....

2. Penguin's feet keep warm.

.....  
.....

3. Chameleon has V-shaped feet.

.....  
.....

**Q4) What happens when:**

1. The blood vessels carrying the warm blood from the warm parts of the penguin's body coil around the other blood vessels carrying the cold blood from the cold feet.

.....  
.....

2. A polar bear blend with snow.

.....  
.....

## Plant adaptation

- Plants grow in all the places reached by the Sun, even at the bottom of iced marine surfaces. These plants have the ability to adapt in their environment.
- Savannah is found in south Africa, where the temperature is moderate.
- Savannah faces severe shortage of water, during the drought seasons that last for half a year.
- Most plants can't overcome the drought, except Acacia tree.

## Two giant trees

(A) **Canopy acacia trees** adapts with the hot and drought habitats.

Way of adaptation	How it helps the tree to adapt?
1. Small leaves at the top of the trees.	a. It works like cover. b. It absorbs sunlight to make food.
2. Tap roots reaches to depth of 35 m.	a. To fix the tree. b. To reach to the underground water.
3. Trunk.	It stores water.
4. It is too long and has spines (thorns) around the leaves.	To stop the animals from eating its leaves, except the giraffes.
5. Leaves secrete poison.	To stop the animals from feeding on it, by making it taste badly.

## Notes:

>>The canopy acacia tree that was being eaten gave off a warning gas (bad scent) to neighbouring trees to start producing the same poison.

(B) **Kapok tree** grows in rainforests of Amazon in Brazil  
The height of these trees reaches to 70 metres.

Way of adaptation	How it helps the tree to adapt?
1. Palmately compound (hand-shaped) leaves.	To allow the wind to pass through them.
2. White and pink flowers make an odour.	To attract the bats which when moving from one flower to another facilitate the pollen.
3. They rely on wind.	To reproduce, because the wind blows the seeds away.
4. Large buttress root.	a. To support the plant. b. Fix the roots deeper in the sand and muddy soil.

### • **Other examples:**

#### **1. Mangrove tree:**

##### ✓ Structural adaptations:

Aerial roots (above-ground roots).

##### ✓ This trait helps the plant to survive, because:

It helps the plant to withstand against waves.



## **2. Water lily:**

### ✓ Structural adaptations:

Upper surface of the leaf is covered with wax.

### ✓ This trait helps the plant to survive, because:

To keep the water away from the leaves.



## **3. Palm tree:**

### ✓ Structural adaptations:

Some of them have spines (thorns) on their leaves and trunks.

### ✓ This trait helps the plant to survive, because:

To protect themselves against animals.



## **4. Pine tree:**

### ✓ Structural adaptations:

Short branches and thorns instead of leaves.

### ✓ This trait helps the plant to survive, because:

To protect themselves against animals.



### **5. Acacia tree:**

- ✓ Structural adaptations:  
Very long roots.
- ✓ This trait helps the plant to survive, because:  
To reach to the deep underground water.



### **6. Prickly pear:**

- ✓ Structural adaptations:  
A lot of spines.
- ✓ This trait helps the plant to survive, because:  
To stop the animals from eating them.



## Evaluation

### **Q<sub>1</sub>) Choose the correct answer:**

1. .... of canopy acacia trees secrete (produce) poisons.  
a. Leaves                      b. Roots                      c. Trunk
2. Kapok tree has .....-shaped leaves.  
a. foot                      b. hand                      c. V
3. The ..... surfaces of the leaves of water lily plant are covered with wax.  
b. lower                      b. upper                      c. (a) and (b)
4. Chameleons have .....-shaped feet.  
b. U                      b. V                      c. S
5. Acacia tree has very long roots to .....  
a. reach deep underground water.  
b. keep the water away from it.  
c. protect itself from the animals.  
d. no correct answer.

### **Q<sub>2</sub>) Put (✓) or (✗):**

1. White and pink flowers of kapok trees produce and odour (smell) to let the bats go away from them. ( )
2. The upper surface of water lily leaf is covered with thorns to keep the animals away from it. ( )
3. The tap roots of Canopy acacia trees reach to the depth of 15 metres only. ( )
4. Mangrove tree has a very special type of roots, called aerial roots. ( )
5. The canopy acacia tree that was being eaten gave off a warning gas. ( )

**Q3) Give a reason for each of the following:**

1. Large buttress roots are very important for Kapok trees.

.....  
.....

2. The canopy acacia tree gave off a warning gas.

.....  
.....

3. The leaves of canopy acacia tree produce poison.

.....  
.....

4. Acacia tree has very long roots.

.....  
.....

5. Some pine trees have short branches and thorns instead of leaves.

.....  
.....

**Q4) What happens when:**

1. The upper surface of the water lily leaf isn't covered with wax.

.....

2. The prickly pear has no spines.

.....

3. Roots of Acacia tree are very short.

.....

4. Mangrove tree has no aerial roots.

.....

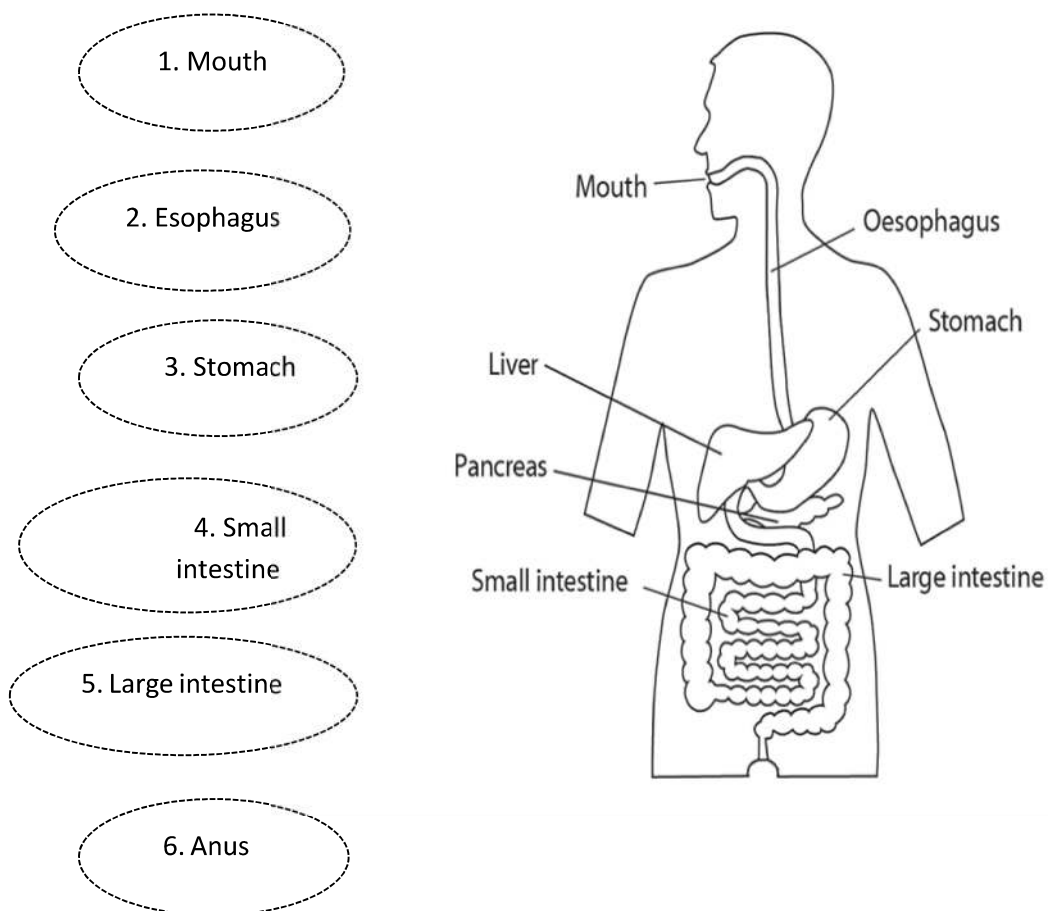
5. The canopy acacia tree can't produce a warning gas.

.....

## Human digestive system

- We eat food to give us energy needed to do several activities such as : walking, running, playing.....etc.
- Your body gets nutrients from the food you to do biological processes such as: heartbeats, respiration or lungs movement.
- The digestive system is responsible for digesting food and changing it from complex form into a simple one.
- Digestive system consists of a group of organs which help in digesting food.

### **Digestive system consists of :**



## 1. Mouth



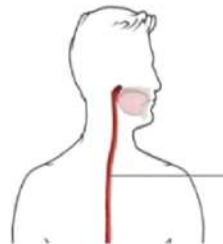
➤ The digestion process starts in the **mouth**.

The mouth consists of:

-**Saliva**: It softens the food to be easy to swallow.

-**Tongue and teeth**: They grind food and mix it with saliva.

## 2. Esophagus



\* A long tube which allows food to pass from pharynx to stomach.

## 3. Stomach



➤ It mixes the food with the digestive juices.

➤ Food remains inside the stomach for hours till it becomes in a liquid form

## 4. Small intestine



A long tube with **6 meters** long.

➤ Food is **completely** digested in the small intestine by the help of **digestive juices** secreted by liver and pancreas.

- Food changes into nutrients then it moves through very thin blood capillaries to reach the blood, then it is distributed to all body parts.

## 6. Large intestine



- It absorbs (take in) liquids from the indigested food which is then expelled outside the body through the anus opening.

## 7. Anus

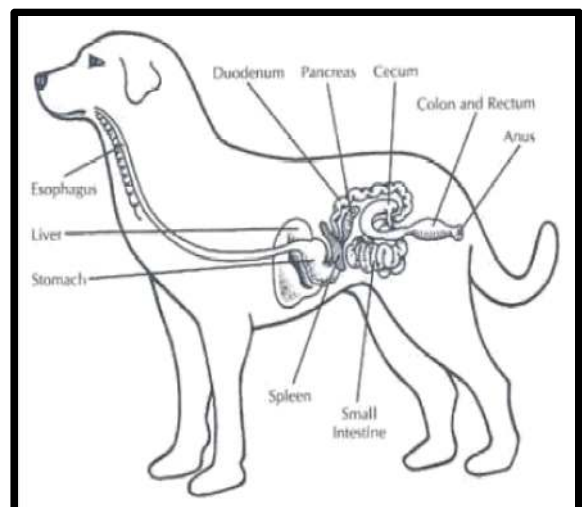
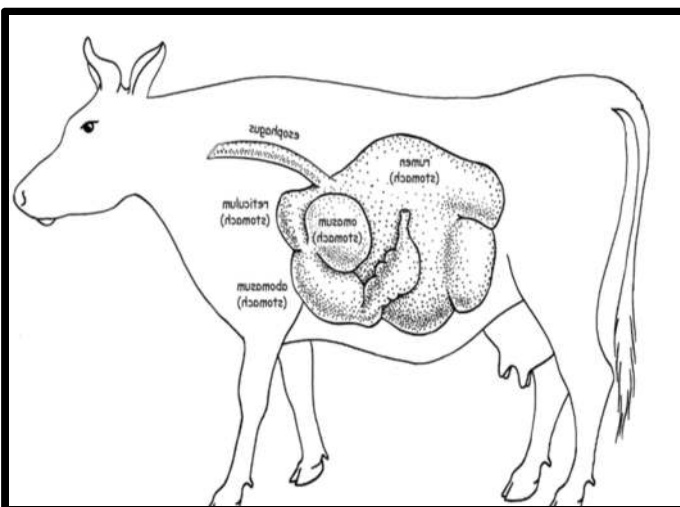


## 7. Anus

- An opening at the end of large intestine where the indigested food is expelled outside the body.

- ✓ Both animals and humans need nutrients to gain energy.
- ✓ The digestive system of some animals allows them to adapt according to the kind of food that they eat.

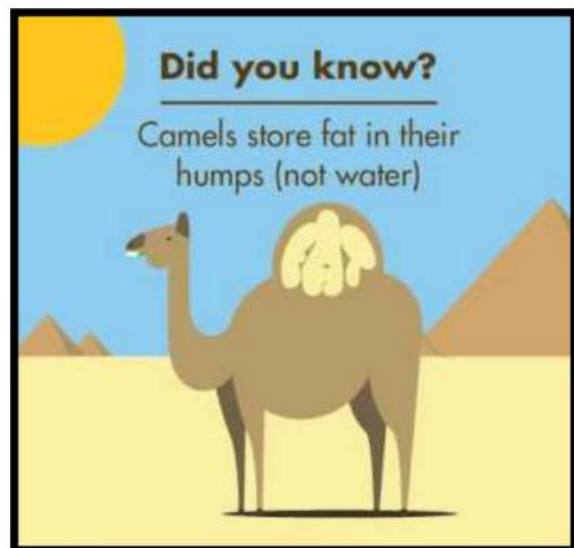
➤ **Look at the 2 figures then compare:**



<b><u>P.O.C</u></b>	<b>Cow</b>	<b>Dog</b>
Digestive system	<ul style="list-style-type: none"> <li>* Its digestive system is <b>long</b>.</li> <li>* It has <b>more than</b> one stomach to digest grass easily.</li> </ul>	<ul style="list-style-type: none"> <li>* Its digestive system is <b>short</b> and has <b>one stomach</b> because it eats meat.</li> </ul>
Teeth	<ul style="list-style-type: none"> <li>* It has <b>similar</b> teeth because it eats <b>grass</b>.</li> </ul>	<ul style="list-style-type: none"> <li>* It has <b>sharp</b> (pointed) teeth because it eats <b>meat</b>.</li> </ul>

### **How do camels store food for hours?**

- After they digest food, they store fats in their humps to adapt to the desert environment.



## Evaluation

### Choose the correct answer:

1. Digestion process starts in the.....  
a. mouth              b. stomach              c. esophagus              d. small intestine
2. The .....help in mixing and grinding food .  
a. Stomach              b. Tongue              c. Teeth              d. b and c
3. .... allows food to pass from pharynx to stomach.  
a. Small intestine              b. Mouth              c. Esophagus              d. Liver
4. The size of small intestine is about .....  
a. 6 meters              b. 60 meters              c. 6 cm              d. 60 cm
5. The ..... is responsible for absorption process.  
a. mouth              b. stomach              c. small intestine              d. large intestine
6. The ..... is (are) responsible for grinding food and mixing it with saliva.  
a. teeth              b. intestine              c. stomach              d. esophagus
7. The indigested food is expelled outside the body through.....  
a. anus opening              b. small intestine              c. large intestine              d. mouth
8. Dogs teeth are sharp because they .....  
a. eat grass              b. eat meat              c. drink water              d. a and b
9. Cows have straight teeth because they eat.....  
a. grass              b. meat              c. fish              d. a and c

**Q<sub>1</sub>) Correct the underlined words in each of the following:**

1. The digestive system of the dog has more than one stomach.  
[.....]
2. Digestion process starts in the stomach.  
[.....]
3. Saliva is responsible for grinding and mixing food.  
[.....]
4. Camels store food in their legs.  
[.....]
5. Food is completely digested in the stomach.  
[.....]
6. Small intestine is 60m long.  
[.....]

**Q<sub>2</sub>) Give a reason for:**

1. Dogs have sharp pointed teeth.  
.....
2. Presence of teeth and tongue inside your mouth.  
.....
3. Digestive system of cows is long and has more than one stomach.  
.....

**Q<sub>3</sub>) Mention the importance of each of the following:**

**1. Mouth**

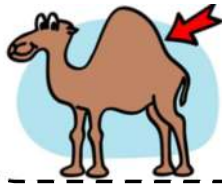
.....  
.....



## 2. Dogs sharp teeth



## 3. Camels hump



# Human respiratory system

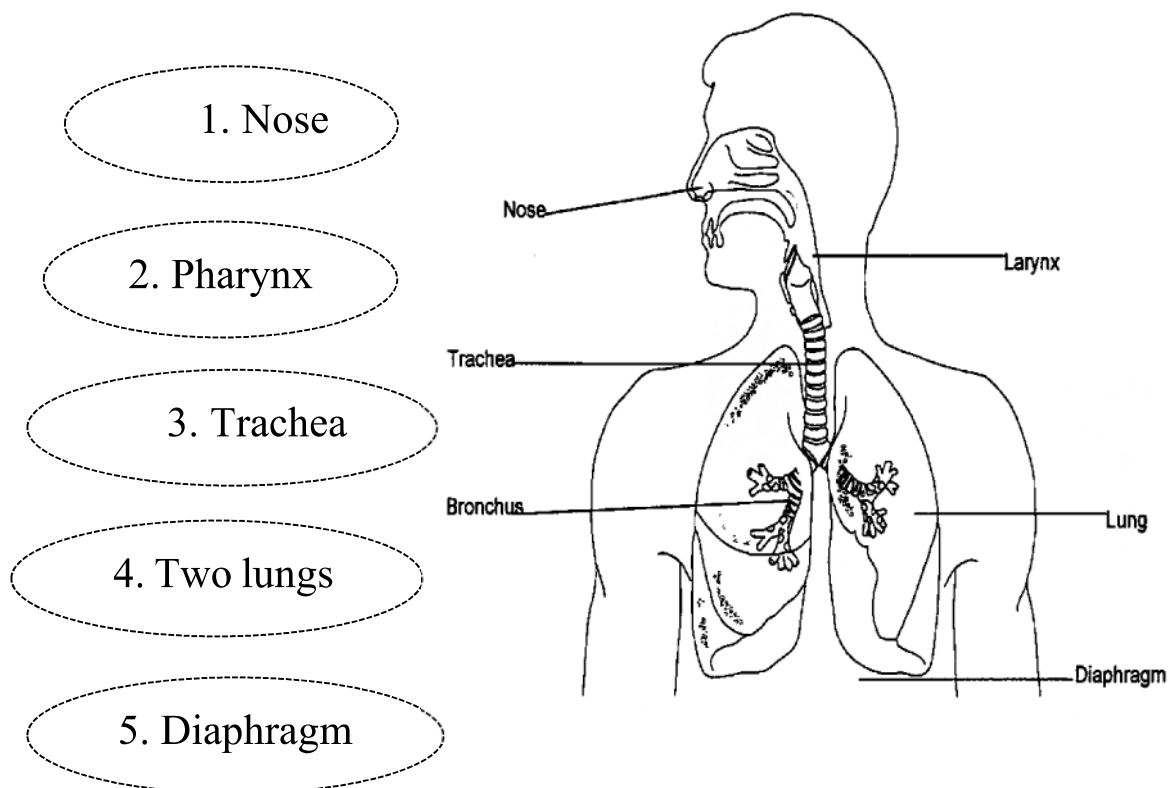
Our body needs **oxygen** from the air to be able to do different activities.

- **Oxygen** gas is very important to our body .
- The respiratory system is responsible for the **entry of oxygen** gas and **getting rid of carbon dioxide** gas.

## Respiration

A process by which a human body gets energy and oxygen from the air.

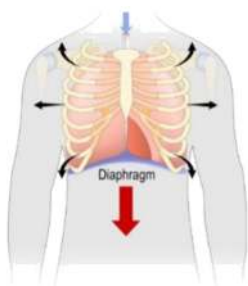
Respiratory system consists of :



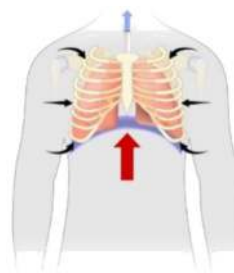
- The respiration process is a complicated process which depends on many organs.
- Each lung contains **bronchus** which is divided into **bronchioles**.
- Bronchioles end in tiny air sacs called **alveoli**.
- Alveoli have thin walls surrounded by **blood capillaries**, where the **exchange of gases** occurs.
- **Diaphragm** is a muscle that separates the chest (thoracic) cavity from the abdominal cavity and it helps in the mechanism of respiration process.
- The products of respiration process are **carbon dioxide gas** and **water vapor**.

➤ **Respiration process includes two processes which are:**

### 1. Inhalation process



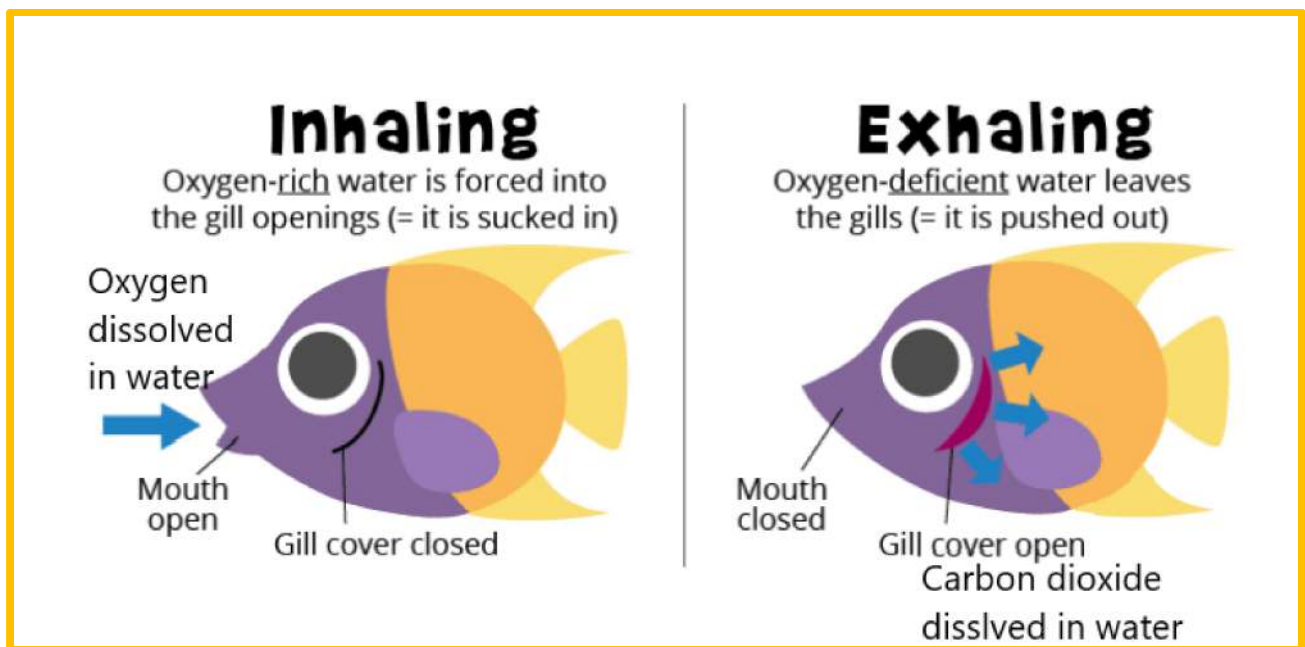
### 2. Exhalation process



P.O.C	Inhalation process	Exhalation process
Definition	A process by which the air rich in <b>oxygen gas</b> enters the lungs through the <b>nose</b> .	A process by which the air rich in <b>carbon dioxide gas</b> and <b>water vapor</b> is expelled outside the lungs through the <b>nose</b> .
Diaphragm muscle	It <b>contracts</b> and moves <b>downwards</b> .	It <b>relaxes</b> and moves <b>upwards</b> .
The ribs	Moves <b>upwards</b> .	Moves <b>downwards</b> .
Size of chest cavity	<b>Enlarges</b> in size .	Becomes <b>narrow</b> .

## How do fish breath under water?

- Fish use **gills** to take in oxygen gas and get rid of carbon dioxide gas.
- Gills are found at both sides of the fish's head, they open and close to allow gases in and out.
- Fish take in water from their **mouth** and allow water out from their **gills**.
- **Blood vessels** in the fish's body give blood to all body parts.
- **Gills** are considered an example of **structural adaptation** which allow fish to live, survive and breath under water.



P.O.C	Similarities	Differences
Digestive system of humans and fish	They both <b>take in oxygen gas</b> and <b>get rid of carbon dioxide gas</b> .	Digestive system in humans uses <b>lungs</b> while digestive system in fish uses <b>gills</b> .

## Evaluation

### **Choose the correct answer:**

1. During exhalation process ,the diaphragm muscle contracts and.....

- a. stays in place                      b. moves up                      c. moves down

2. Fish has gills which allow it to.....

- a. breath under water  
b. eat under water  
c. swim under water

3. A process by which human takes in oxygen gas and get rid of carbon dioxide gas is called.....

- a. inhalation  
b. exhalation  
c. digestion

4. A complicated process which depends on many organs.....

- a. feeding  
b. respiration  
c. swimming

5. During inhalation process, size of chest cavity.....

a. enlarges

b. stay the same

c. becomes smaller



6. Fish use.....to breath under water.

a. Lungs

b. Gills

c. Mouth

### **Complete the following**

1. ....muscle help in the mechanism of respiration process.

2. Respiration process includes.....process and.....process.

3. Exhaled air contains.....and.....

4. Diaphragm moves.....during inhalation and moves.....during exhalation.

5. ....gas is necessary for breathing.

6. Humans take in.....gas and get out .....gas during respiration process.

7. ....is a process by which living organisms can get oxygen and energy.

### **Compare between each of the following:**

1. Respiration in humans and respiration in fish.

2. Inhalation process and Exhalation process.

## Human effect on the environment

- Some changes may affect the ecosystem:

### (1) Natural changes:

- Temperature.
- Rainfall.
- Extreme weather conditions.
- Forests fires.
- Floods.



[This causes increase or decrease in the number of predators or that of preys]

### (2) Changes caused by human activities:

- Agricultural works, flattening of the land to build communities.
- Deforestation and soil dredging for agriculture.
- Swamp filling and removing sand dunes on beaches.



- The main results of the human activities:

#### (1) Air pollution:

It results from a large number of cars and factories that work in an improper way.



#### (2) Water and soil pollution:

Due to throwing garbage.

- **The human activities causing air and water pollution:**

- The human enters kinds of plants, animals and diseases to the environment that weren't exist before.
- This kind of changes stray origin types of plants and animals for many centuries.

**The polluted air, soil and unclean water cause:**

- The animals move from one ecosystem to another to get their needs and survive.
- Humans are affected if the crops don't grow, water is polluted or there is a difficulty in breathing because of the smoke.
- Humans have to change their life style and move to other places less polluted.
- A long exposure to pollution destroys our lungs and causes Asthma and heart diseases.

**Can the man return the ecosystem to its origin?**

Yes, if he:

1. replants the forests again and gets rid of pollutant factors for water and air.
2. saves the origin plants and animals.

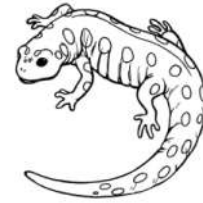


## The relation between body systems and adaptation



### ❖ Small amphibians:

1. Examples: Frogs, toads and Salamanders.
2. Habitat: Desert habitat.
3. Needs: Water like human but in a different way.
4. They respire through the lungs as human, but they are able to take oxygen from water. **(How it happens?)**



Think like a scientist.



The body of the amphibians is covered with moist skin, that allows gas and water to pass through it.

## The role of scientific research in saving amphibians

You have learned that:

- Amphibians live in a moist environment.
- They need clean water, because the pollution destroys their natural habitat and they are highly sensitive to the effects of pollution and the presence of viruses inside the water.
- (ARC) project in Panama aims to saving and protecting frogs that live in rainforests and in danger of extinction by studying



the reasons of their disappearance with scary rates around the world.

The result of this project:

- 90 species (types) of amphibians throughout 20 years were exposed to extinction, in addition to 124 other species.

Try to help the scientists to solve this problem.



## Evaluation

### **Q<sub>1</sub>) Choose the correct answer:**

1. .... is an example of the changes caused by the human affecting the environment.  
a. Flood                      b. Deforestation                      c. Forest fires
2. A Salamander is an example of .....  
a. Amphibians              b. mammals                      c. birds
3. .... pollution results from a large number of cars and factories that work in an improper way.  
a. Water                      b. Air                      c. No correct answer
4. A long exposure to pollution ..... our lungs and causes Asthma and heart diseases.  
a. saves                      b. strengthen                      c. destroys
5. .... is an example of natural changes affecting our ecosystem.  
a. Swamp filling              b. Removung sand dunes              c. Temperature

### **Q<sub>2</sub>) Put (✓) or (✗):**

1. Water pollution takes place by throwing garbage in oceans.              (   )
2. If the human replants the forests again and gets rid of pollutant factors for water and air, the ecosystem can return back to its origin.              (   )
3. Rainfall is a natural change affecting the environment.              (   )
4. Amphibians live in a dry environment.              (   )
5. (ARC) is a project in Panama aims to saving and protecting frogs that live in rainforests.              (   )

**Q3) Give a reason for:**

1. The body of the amphibians is covered with moist skin.  
.....
2. Animals move from one ecosystem to another.  
.....
3. Amphibians need clean water.  
.....
4. Water and soil pollution take place.  
.....
5. Air pollution takes place.  
.....
6. Natural changes affect the environment badly.  
.....

**Q4) Complete each of the following statements:**

1. .... is a project in Panama aims to saving and protecting frogs that live in rainforests.
2. Amphibians are able to take ..... from water.
3. A long exposure to pollution destroys our ..... and causes Asthma and ..... diseases.
4. ...., ..... and ..... are examples of amphibians.
5. The animals move from one ecosystem to another to get their ..... and survive.
6. .... and ..... are examples of natural changes affecting our environment.
7. .... and ..... are examples if changes caused by the human affecting the ecosystem.
8. Amphibians live in a ..... environment.

## 1.2 How do senses work?

How can Egyptian Mongooses communicate with each other?

- Egyptian mongooses chatter incessantly to each other, and combine discrete units of sound to communicate with another mongoose on moving from one place to another or searching for food and other important messages.



- Some animals see using their eyes, hear with their ears like what the human does.
- But, some animals have strong sense of sight or hearing or any other senses. They communicate with each other using sounds or movements.

### Super Capabilities of dolphins

- Dolphins have strong sensory organs. (G.R.F.)

To:

1. Survive.
2. Search for food.
3. Protect themselves under the water in darkness.



- Dolphins can use the sense of "echolocation" under the water, by which:
  - The dolphin produces high frequency clicks.
  - These clicks move through the water, then the sound waves return back to the dolphin.
  - So, echo is formed.

This helps the dolphin to know the place of its preys and the place of other objects.

## Using the five senses

- Humans and animals use their 5 senses to explore the world around them.

### Sensitivity in animals:

- My pet knows me through my smell.

Purpose	Sense	Examples
1. Avoid danger.	Sight, hearing, Taste	
2. Searching for food.	Smell, Sight, Touch	
3. Know friends.	Sight, Smell	
4. Know the objects.	Sight, Smell, Touch, Taste, Hearing	

- How do animals receive stimuli from the environment and how can they respond to such stimuli?

### Sensory response:

- ❖ Imagine that you're touching an ice cube with your finger.

Do you know in which part the information that tells you that this object is cold is processed? Circle the correct answer.

- (a) Index finger (b) Hand  
(c) Nerve endings (d) Spinal cord (e) Brain

- Seeing the objects at night differs from that during the day. The normal objects during the day seems a little bit strange at night.
- We can hear the sound, but it may be difficult to see clearly.

- The animal can know the place of its food (How..?)  
By hearing at night.
- Fortunately, the human spends most the day hours in doing his activities, so there is no need to search for food in the darkness.

- Nocturnal animals are active at night. (G.R)  
Because some areas may suffer from the very high temperature during the day and the animal go to search for food at night depending on darkness to surprise and catch their preys.

- How can nocturnal animal catch their preys at night without the need of light?

Animal	Sensory adaptations	Purpose (Use)
1. Snakes	- Using a certain part in the head.	To know the places of their preys.
2. Bats	- Echolocation	To know the places of objects.
3. Owls	- Super capability of hearing. - Rotation of the head in all the directions.	To know the weak and far movement and search for their preys.

- ❖ How can the animals respond to the sensory stimuli?

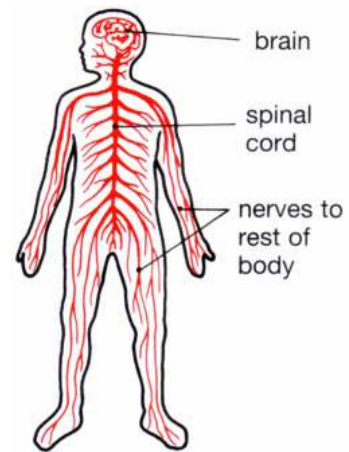
## Nervous system and pizza

- ❖ Imagine that you are standing outside the restaurant or the kitchen and you can't see the food. How can you know the type of food served to you?

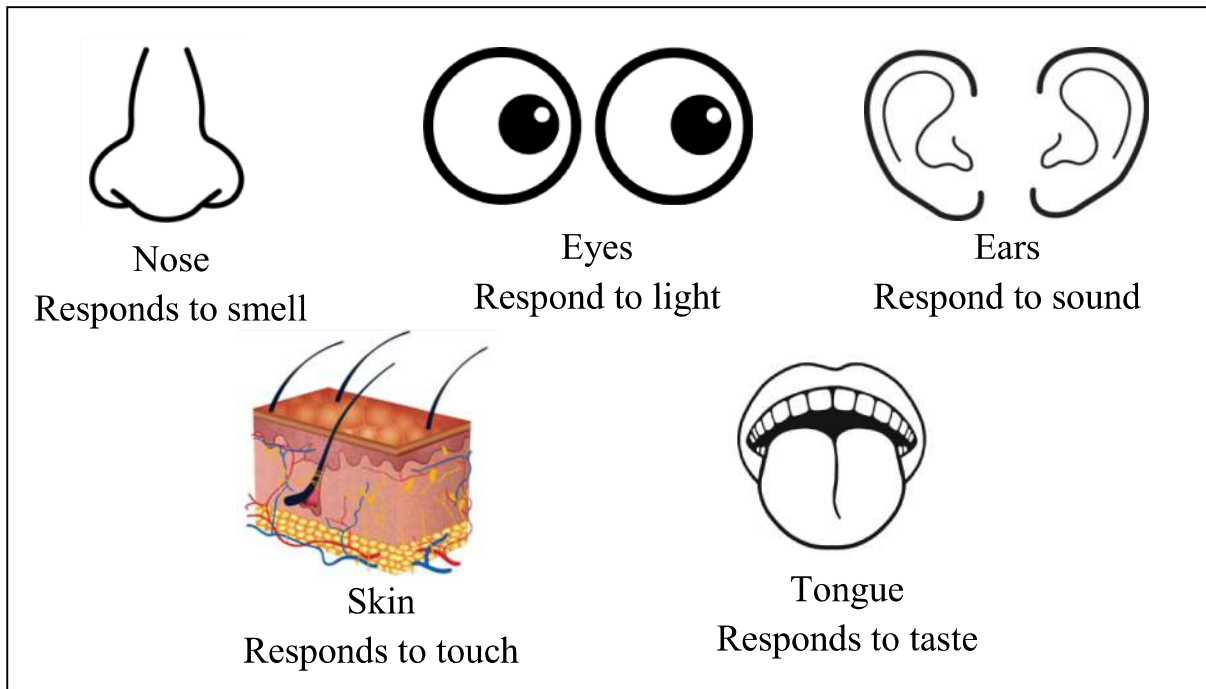
## Nervous system

- Nervous system of mammals (elephants, humans and dogs) consists of:

1. Brain.
2. Nerves.
3. Sensory organs.



- Humans use 5 sensory organs to respond to environmental changes, which are as follows:



- The **nervous system** controls everything you do, including: breathing, walking, thinking and feeling.
- **Brain** is connected to a group of nerves passing by the backbone.
- **Spinal cord** inside the backbone sends signals between the brain and other body parts.
- Small nerves extend (emerge) from the spinal cord passing by all the body parts and are connected to the muscles and other body cells.

#### **4. Fennec fox:**

- ✓ It is the smallest of all the foxes.
- ✓ It has large ears.
- ✓ It has golden fur, to help it hide in desert.



#### **5. Lizards:**

- ✓ They have colourful scales that help them to hide between coloured rocks in the desert to:
  - a. hide from enemies.
  - b. catch preys.
- ✓ In very high temperature, lizards use burrows and go to shady places as a means of adapting to the desert heat.



#### **6. Bull shark:**

- ✓ It can live in fresh and salt water.
- ✓ It has countershading or dark coloration on top and light coloration on the underbelly.
- ✓ This helps the animal to blend into the water and catch their preys.



## Ways of adaptation

They are the properties that help the living organisms to survive (remain alive) in their environment.

### ☒ Examples:

#### 1. Polar bear:

- ✓ It has thick white fur to:
  - a. Keep warm.
  - b. Blend with snow to catch its prey.



#### 2. Brown or black bear:

- ✓ It has dark brown fur to:
  - a. Help it to hide between trees during catching its prey.



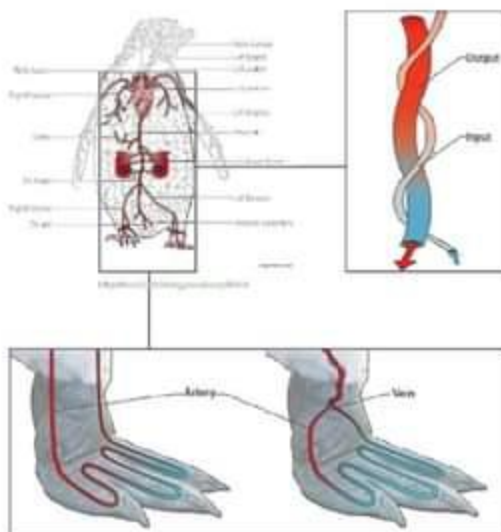
#### 3. Caracal:

- ✓ It is a mammal.
- ✓ It is a carnivorous animal (i.e.: eats meat).
- ✓ It has golden fur, to help it hide in desert.



# Penguin's feet

- ✓ Penguins are cold-adapted for living in Antarctica where it is very cold.
- ✓ Penguin's feet keep warm due to the blood flow inside blood vessels within these feet.
- ✓ Penguins have specially arranged blood vessels which helps recycling their body's warmth, where:
  - a. Some blood vessels carry the cold blood from the feet.
  - b. Other blood vessels carry the warm blood found in the the rest of the covered body parts with fur **into the feet**.
- ✓ The blood vessels carrying the warm blood from the warm parts of the penguin's body coil around the other blood vessels carrying the cold blood from the cold feet.
- ✓ This lead to transferring of heat into the feet.



Penguin's feet work like a heat exchange svstem.



## Life applications on Echolocation:



Vibrating walking stick inspired by bats

### Main idea:

- ✓ It produces very high sound like bats that can't be heard by the man's ears.



### How it works?

- ✓ The blind people use the vibrating walking stick during walking.
- ✓ The stick receives the echo.
- ✓ Then, the stick changes this echo into vibrations.
- ✓ The blind people feel these vibrations with their thumb.
- ✓ The vibration buttons can tell the human the direction of the objects and how far the object is from the person.

Think like a scientist.



Mention a bat-like technology.



How did the scientists use the adaptation of an animal to design a new invention?



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5. Bats are nocturnal animals.  
(i.e.: They are active at night.)



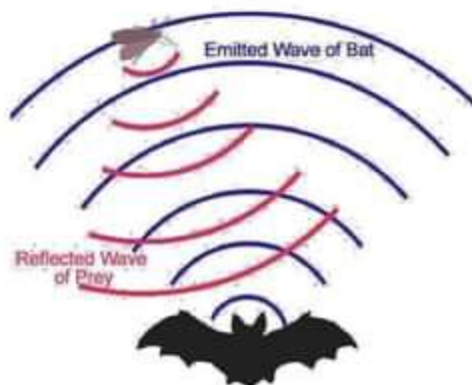
6. Bats use a technique, called "echolocation" to find their preys, as they can't see at night.



## Echolocation

It is a way that some animals use to find the location of things.

- Bats hunt for food in total darkness.
- Echolocation is important for them to survive.
- Bat produces sound.
- This sound travels through the air until it hits a surface.
- Then, it returns back to the bats' ears, causing them to hear.



## 1.1 Adaptation and survival

### Some problems face the survival of living organisms in different habitats:

1. Increasing or decreasing of temperature.
2. Shortage or plenty of water.
3. Food availability.
4. Shelter.

What are the factors affecting survival of living organisms?



### **Adaptation**

It is a way that helps the living organism to adapt and survive in its environment.

## Bats



### How do bats adapt to their environment?

1. Most bats eat insects, as: mosquitoes.
2. Bats act as bees and butterflies in helping plants and flowers.
3. Bats hang (sleep) upside down.
4. Although bats aren't birds, they can fly.



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Answer (Antarctica- arctic region)

**3-the structural adaptaion of benguin is -----**

هنا بيسألك ايه هي الحاجة اللي في تركيب البطريق بتساعده عالتكيف ؟

Answer:(insulating layer of fat and thick downy feather)

**4-the animal that has thick and white fur is-----**

Answer: ( polar bear)

**5-the blood vessels bring -----blood to the foot of penguin**

Answer( warm)

**6-the blood vessels is considered----- adaptation**

Answer:( structural)

**7-the polar bear survive and reproduce at the same habitat of-----**

Answer( penguin)

**8-the thick fur of polar bear helps it to-----**

Answer: Keep body warm

**9-the white fur of the polar bear helps it to ---**

Answer: blends in the snow as it sneaks up on its prey

العلوم دا حكاية  
مع ميس/ منى عزام





ال bear دا صاحبي الانتيم دا بيعيش هنا في ال Arctic region (منطقة القطب الشمالي)

طبعاً منة كانت واقفة مرعوبة من شكل ال polar bear دا بس انا بقي مكننش خايفة منه خالص روحت طبطبت عليه كدا ولاقيت \*عنده فرو كثيف ولونه ابيض جمييل اووي وقولتله ايه الفرو الحلو دا يا bear

رد وقالى دا الفرو الابيض بتاعي ودا اللي ببساعدي اني اصطاد الفريسة بتاعتي-

\*قولتله لا فهمني يا bear ازاي الفرو هو اللي بيخليك تصطاد

- رد ال bear وقالى لا بقي شكلك عايز انا نبقي صحاب تعالى هحكبك الحكاية من اولها -وبدا ال bear يتكلم معايا ويقولى
- انا ربنا خلقتي فرو ابيض وكمان كثيف - وهقولك بقي حكمة ربنا في الموضوع دا:

الفرو الكثيف/عشان يدفيني arctic region اللي احنا فيها دي

انما بقي الفرو ابيض/ عشان يبقي لوني نفس لون الجليد اللي انا عايش فيه دا فلما اجي اصطاد الفريسة متاخدش بالها ان انا موجود في وسط الجليد

وفجأة لاقيت منة بتطلع كشكول البحث وبدأت تكتب المعلومات اللي bear قالها لي قبل ما تنساها : فكتبت الاتي

\*Adaptation : it is the characteristics of living organisms that allows them to change over generation and helps them to survive and reproduce in ecosystem

1-the polar bear has white and thick fur

2-the thick fur helps it stay warm

3-the white fur helps it blends in the snow as it sneaks up on its prey

2-although the penguin have no feather or fat on its foot it can stand on ice due to movement of blood on blood vessels through the penguin feet

وبدأت منة تفهم الكلام اللي ال penguin قالهولي وبعدين سألت المديرية :

Can you tell me the way of moving blood to keep the feet warm ?

وانا عرفت ان منة بتسأل ميس ( سما ) ازاي الدم دا بيتنقل خلال الاوعية الدموية ؟ وردت عليها المديرية وقالتلها

1-blood vessels bring( cold blood ) up from the feet

2-then other vessels bring warm down to the feet

وبعدين انا اتدخلت في الكلام بين منة والمديرية وقولتلهم وطبعاً نوع ال adaptation دا هو structural adaptation (تكيف تركيبى) وبعدين وانا بكلم المديرية ومنه فجأة بنص وانا لاقينا دب كبيبيير وال penguin قالنا متخفوش متخفوش دا ال polar bear صاحبي



اول حاجة : انا مبحسش بالساقعة لان ربنا خالقلي علي جسمي ريش ناعم وكمان طبقة دهون تحت الريش دا والطبقة دي طبقة عازلة بتحبس الهوا الدافي علي جسمي فمش بحس بسقوعة الجليد اللي انا عايش فيه دا

وتاني حاجة بقي : تعرفي ان رجلي مش عليها ريش ولا حتي دهون وبرغم كدا متدفية برضو

**وهنا سألت البطريق طب رجلك متدفية ازاي يا penguin ؟؟**

رد وقال بصي يا ست الكل مش انا جسمي كله متدفي بالريش -يعني الدم اللي في جسمي دا سخن مش بارد طالما متدفي بالريش

ف انا بقي عندي اوعية دموية في رجلي دي شغالة زي التاكسي طول اليوم تجلي الدم الدافي من جسمي توصله لرجلي وبعدين تاخذ الدم البارد من رجلي وهكذا عشان كدا انا بتفضل رجلي متدفية علي طول -الحمد لله ان ربنا خلي في تركيب جسمي اوعية ادموية تبقي هي السبب ان رجلي تفضل دافية علي طول

- وهنا سألت ال penguin : ايه دا هي الاوعية دي في تركيب جسمك ؟ يعني كدا الاوعية دي تكيف تركيبني ؟ يعني انت بتقدر تتكيف بالمعيشة في البيئة الساقعة دي بالتركيب بتاع جسمك اللي ربنا خلقت بيه - رد وقال اه بالضبط كدا

-وطبعا منة واقفة هنتجنن لانها مش بتفهم عربي وعاززة حد يترجمها لانها لو مفهمش اللي اتقال عن البطريق مش هتقدر تكتب البحث المطلوب منا -

-ومديرة المدرسة قعدت ساعة تفهم منة الكلام اللي اتقال بيني وبين ال penguin و تقولها :

**1-Penguin has insulating layer of fat and thick feathers that trap warm air against the skin**  
To keep the body warm

وهنا منة صرخت بصوت عالي وقالت ابييه دا penguin

-وهنا سألت منة المديرية: ياميس هو ال penguin قادر يعيش في التلج دا ازاي ؟

ردت عليها المديرية وقالتلها كل حيوان ربنا خلقه يقدر يتكيف في البيئة اللي هو عايش فيها زي ماحنا قادرين نعيش عالارض هو كمان قادر يعيش عالجليد ....

-هنا ردت منة وقالتلها : بس ازاي يا ميس بيقدر يعيش في ال antarctica وهي one of the coldest place in the earth

-وهنا ردت المديرية وقالت: لا بقي كدا انتو عايزين تعرفو التكيف او ال (Adaptation) بتاع ال penguin وازاي البطريق دا بيعيش تعالو هحكياكم الحكاية :

**الموطن بتاع البطريق -its habitat**

المكان اللي بيعيش فيه ال penguin هو واحد من اسقع اماكن الارض ولسة المديرية هتكمل كلامها وفجأاً.....

- ومديرية المدرسة بتتكم لاقينا اللي بيقول انتو ميبين وايه اللي جابكم هنا ؟ بصينا لاقينا البطريق اللي بيتكلم ----

- ردت منة عالبطريق وقالتله احنا فرقة استكشافية وجايين علشان نتعرف عليك يا ابو البطريق

-رد ال penguin وقالها طب عايزة تعرف ايه عني ؟

**منة/ يعني لو ممكن نقولنا ال adaptation بتاعك**

وهنا انا ترجمت للبطريق : وقولتله بتقولك احكي لي عن التكيف بتاعك هنا يعني بتعيش ازاي مثلاً في وسط التلج دا ؟؟

رد البطريق وقالنا انا اساساً مش بيعيش غير في التلج والاماكن القطبية

( polar region ) وكل البطريق اللي زيي مش بيعيشو غير ف الاماكن دي

وبدا البطريق يتكلم ويقول / بص يا استاذة منة انا عندي حاجتين مخليني عايش هنا ومبسوط ومش بحس بالساعة خالص

وراحت من المدرسة اليوم دا طيارة من الفرحة بس كنت خايفة اخسر التحدي اودام الفائزة الثانية اللي معايا لانها كانت طالب امريكية وشاطرة جدا خاصة في مادة الساينس \* ...

- وجه يوم الرحلة جهزت ادواتي وكشكول البحث بتاعي واتجمعنا كلنا وركبنا الباص اللي هنبدا بيه الرحلة - والمديرة معانا بتقول ستكون الرحلة الاولى الي القطب الشمالي ( polar climat )



وطبعا كل كلمة المديرة كانت تقولها كانت تفضل تترجمها علشان منه امريكية ومش بفهم عربي .....

واول ما وصلنا ال - polar climat سواق الباص قال اهلا بيكم في ال Antarctica ودي اسقع مكان في عالارض كله يلبس البالطو بتاعه علشان هننزل نقف عالجليد وفجأة والسواق سكت فجأة وبعدين بصوت عالي قال للمديرة يا ميبيبيس سما الحقي انا شوفت ايه - كلنا بصينا وفجأة لاقينا بطريق (penguin)



حدوتة (٢) جزء اول-ساينس رابعة ابتدائي-العلوم دا حكاية .....

من ٢٥ سنة كنت لسة في رابعة ابتدائي وكانت مديرة المدرسة بتطلع رحلة كل شهر للطلبة اللي بتجيب الدرجة النهائية في مادة الساينس - وفضلت اذاكر ليل نهار علشان اكون من الفايزين بالرحلة.....

وجه يوم النتيجة ووقفت ميس (سما) مديرة المدرسة في الفصل وبدأت تقول اسامي الفائزين-

الفائز الاول في هذه المسابقة هي الطالبة /منى عزام

الفائز الثاني هي الطالبة /منة الله



واستكملت المديرة كلامها :وسوف تكون هذه الرحلة عبارة عن رحلة استكشافية الي ٣ اماكن مختلفة وعلي كل من فاز بالرحلة عليه العودة منها ببحث كامل عما راه وصاحب البحث الافضل سيحصل علي مكافئة مادية قيمتها ٥ الاف جنيه.

