





### Adaptation and survival Concept (1.1)




## Living systems (adaptation and survival)

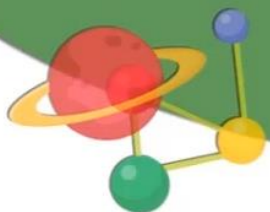


Lets remember :

## Adaptation

Is a **change** made over generations that help animals to **survive** and **reproduce** in the ecosystem.





## Living systems (adaptation and survival)



Solve Problems  
Like a Scientist

### Unit Project: Bat Chat

#### 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.



Bats Sleep Upside Down



## Living systems (adaptation and survival)



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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.





## Can You Explain?

### Have you ever seen a desert lizard before?

This starred agama keeps cool by finding shade during a hot sunny day .



## Camouflage

It is an example of **adaptation** in which some animals hide from predators or preys by **blending in with** surrounding environment.



## Living systems (adaptation and survival)



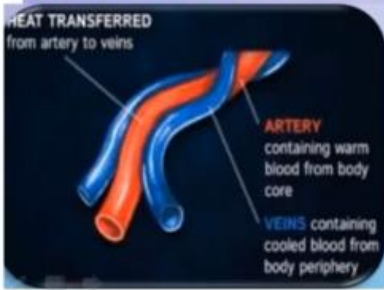
Activity 2

Ask Questions Like a Scientist

### How penguin keeps its toes feet from freezing?:

Due to the way of movement of blood in blood vessels through the penguin's feet

The **warm blood vessels** from body **weave around** the **cold blood vessels** from feet to heat up.



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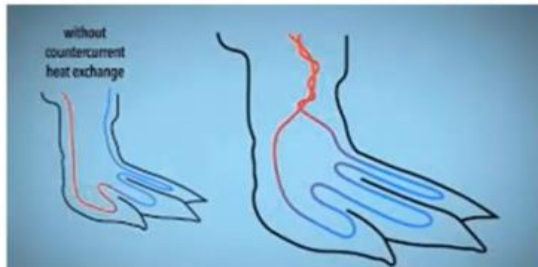
## Living systems (adaptation and survival)



### Note:

**Warm blood from body move down**

**Cold blood from feet move up.**



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## Living systems (adaptation and survival)



### Arctic region

#### Polar bear

Its habitat : Arctic region

Its adaptation:

- Has **white fur**

To help it blends with snow to sneak up on its prey

- Has **thick fur**

To keep it warm in cold arctic



## Living systems (adaptation and survival)



### Forest

#### Brown bear and dark bear

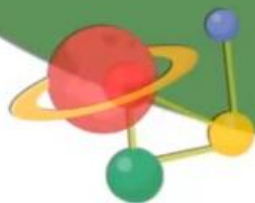
Its habitat : Forests

Its adaptation:

Have **dark fur**

To stay hidden between trees as they hunt





## Living systems (adaptation and survival)



### Desert

#### Caracal

Its habitat : Desert

Its adaptation:

Have **sandy (tan) colored fur**

To hide and blend with desert landscapes



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## Living systems (adaptation and survival)



**Fennec fox** Its habitat : Desert

Its adaptation:

Have **sandy (tan) colored fur**

To hide and blend with desert landscapes

- It has **extra-large ears** that help the fennec fox to lose the heat to cool its body.
- It has a **special shape of ears** that allow excellent hearing to help fennec fox hunts.





# Lesson 2 Types of adaptation

PRIMARY 4

## adaptation and survival (types of adaptation)



### Types of adaptation

1. Structural adaptation.  
(physical adaptation)

2. Behavioral adaptation.



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PRIMARY 4

## adaptation and survival (types of adaptation)



1. Structural adaptation.

It is a change in the **structure** of animal's body to adapt its environment



## PRIMARY 4

## Adaptation and survival (types of adaptation)



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.



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## PRIMARY 4

## adaptation and survival (types of adaptation)



## Arctic fox

## Behavioral adaptation

It lives in burrows which are excellent places for it to stay warm at night.



It eats different kinds of food, like insects, fruit, plant roots and even leftovers from another animal's prey because food can be hard to find at the cold tundra.



## adaptation and survival (types of adaptation)

### Arctic fox

#### structural adaptation

It has a thick fur coat to keeps its body warm in extreme cold climate.

Its fur coat is white during winter, but turns brown in summer when the snow melts to help it sneaks up on prey in any season.

It has short ears and legs to help it stays warm.

It has a special shape of ears that allow excellent hearing to help arctic fox hunts.



## adaptation and survival (types of adaptation)

### Think as a scientist

\*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, fruits, plant roots and the remaining part of prey of another animal.

Arctic fox its fur is white during winter turn brown in summer when snow melts.

## Living systems (adaptation and survival)



### Bull shark:

- ✓ It can live in fresh and salt water.
- ✓ It has countershading or dark coloration on top and light coloration on the underbelly.

**Structural Adaptation**

- ✓ This helps the animal to blend into the water and catch their preys.



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## Living systems (adaptation and survival)



### Bull shark:

- It has sharp teeth to help it sneak up its preys and tear their flesh.

**Structural Adaptation**

- It can hunt in different places like salt water or fresh water, so it can feed on different types of food.

- It hunts in the day as well as the night, so its prey cannot predict when this shark will hunt next time.

**Behavioral Adaptation**







## adaptation and survival (types of adaptation)



### Panther Chameleon

Ways of adaptation	How it helps the animal?
1. Its body is covered with <b>colourful scales.</b>	-Chameleons can hide between the green leaves and colourful flowers to catch their preys and hide from enemies.



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## adaptation and survival (types of adaptation)



### Panther Chameleon

Ways of adaptation	How it helps the animal?
2. They have <b>V-shaped</b> feet.	-Chameleons <b>attach to roots and branches of trees</b> , spending all the night in hunting (catching) preys..



PRIMARY 4 adaptation and survival (types of adaptation)

**Panther Chameleon**

Adaptation

**Ways of adaptation**

**How it helps the animal?**

**3. Tail.**

Chameleons curl their tails **to hold objects.**



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PRIMARY 4 adaptation and survival (types of adaptation)

**Panther Chameleon**

structural Adaptation

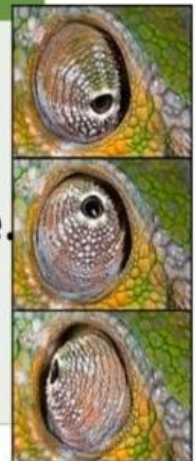
**Ways of adaptation**

**How it helps the animal?**

**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.**






**PRIMARY 4 adaptation and survival (types of adaptation)**

**Panther Chameleon**

**Behavioral Adaptation**

Ways of adaptation	How it helps the animal?
<b>5. Body and mouth.</b> 	<b>-Chameleons can flatten out to appear bigger, then open their jaws widely to scare their enemies.</b>

## Lesson 3 Plant Adaptations

**PRIMARY 4 adaptation and survival (types of adaptation)**

**Activity 7**  
**Think Like a Scientist**

**Adaptation in plants**

**-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.**

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**PRIMARY 4 adaptation and survival (types of adaptation)**

**Two terrific trees**

(A) **Acacia** trees adapt with the hot and drought habitats and as they grow in savannah forests in southern Africa .

(B) **Kapok tree** grows in rainforests of Amazon in Brazil .



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**PRIMARY 4 adaptation and survival (types of adaptation)**

**Acacia tree ( umbrella acacia )**

**Structural Adaptation**

Ways of adaptation	How it helps the tree to adapt ?
1. Small leaves at the top of the trees.	- To help it <b>hold in water</b> while soaking up sunlight needed to make food .







## adaptation and survival (types of adaptation)



### Acacia tree ( umbrella acacia )

#### Ways of adaptation

2. It has very long roots reaches to depth of 35 m.



#### How it helps the tree to adapt ?

- a. To fix the tree.
- b. To reach to the underground water.

**Structural Adaptation**

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## adaptation and survival (types of adaptation)



### Acacia tree ( umbrella acacia )

#### Ways of adaptation

3. Its Trunk is very long .



#### How it helps the tree to adapt ?

So most animals except giraffe can't reach its leaves to feed on .  
**It stores water in its trunk .**

**Structural Adaptation**

## adaptation and survival (types of adaptation)



### Acacia tree ( umbrella acacia )

#### Ways of adaptation

#### How it helps the tree to adapt ?

4. It is too long and has spines (thorns) around the leaves.

To stop the animals from eating its leaves, except the giraffes.

Structural  
Adaptation



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## adaptation and survival (types of adaptation)



### Acacia tree ( umbrella acacia )

#### Ways of adaptation

#### How it helps the tree to adapt ?

5. Leaves secrete poison.

To stop the animals from feeding on it, by making it taste badly.



Behavioral  
Adaptation



**PRIMARY 4 adaptation and survival (types of adaptation)**

**Note**

**Behavioral Adaptation**

>>Acacia tree sends a smelly message in the wind to acacia trees nearby telling them to start making the same poison.

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**PRIMARY 4 adaptation and survival (types of adaptation)**

**Kapok tree**

**Structural Adaptation**

Ways of adaptation	How it helps the tree to adapt ?
1. It has hand-shaped leaves with narrow parts .	To allow the wind to move more gently through the leaves.




## adaptation and survival (types of adaptation)



### Kapok tree

#### Behavioral Adaptation

#### Ways of adaptation

#### How it helps the tree to adapt ?

2. It use the wind to send a different types of messages than the acacia.




where the kapok tree invites bats to come visit its delicious-smelling flowers through theses smelly message



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## adaptation and survival (types of adaptation)



### Kapok tree

#### Behavioral Adaptation

Ways of adaptation	How it helps the tree to adapt ?
<p>3. The wind also carries the tree's fluffy yellow seeds across the forest .</p>	<p>To reproduce, because the wind blows the seeds away.</p>






**PRIMARY 4** adaptation and survival (types of adaptation)

**Kapok tree** **Structural Adaptation**

Ways of adaptation	How it helps the tree to adapt ?
4. Large buttress root. <b>-Some of these roots can start up to 5 meters above the ground.</b>	a. To support the plant. b. Fix the roots deeper in the sand and muddy soil.

Buttress roots of the Kapok Tree

**PRIMARY 4** Adaptation in plants



**other examples**

**1- Mangrove tree**

**-Structural adaptations:**

**It has long and strong roots.**

**The long and short roots help the plant to resist the waves.**

## Adaptation in plants



### other examples

#### 2. Water lily:

##### -Structural adaptations:

It has a **wide leaves** that float on the water surface.

The wide leaves help the plant to **absorb a big amount of sunlight**



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## Adaptation in plants



### other examples

#### 3. Palm tree:

##### -Structural adaptations:


It has thick roots.

It has small leaves .


Both thick roots and small leaves help the plant to **resist the strong winds** .







## Adaptation in plants



### other examples



#### 4. Pine tree:

**-Structural adaptations:**


This tree have a triangular shape to allow the snow to slide easily over it so its branches don't break.

It has short branches


It has needle leaves to prevent the plants from losing water

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## Adaptation in plants



### other examples



#### 5. Acacia tree:

**-Structural adaptations:**

Very long roots.

This trait helps the plant to survive, because:

To reach to the deep underground water.

## Adaptation in plants



### other examples

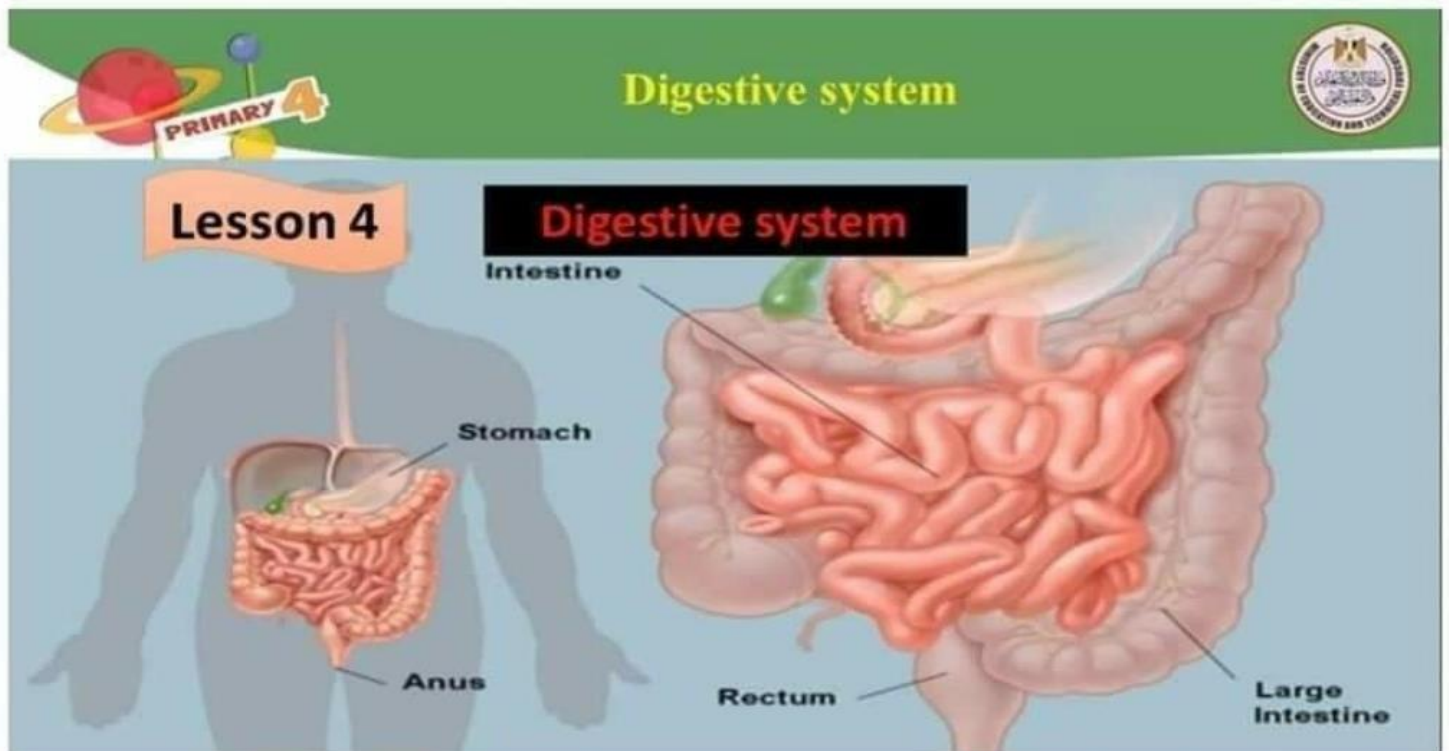
#### 6. Barbary fig in desert

##### -Structural adaptations:


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



## Lesson 4 Digestive system









**Digestive system**

Observe like a scientist

**Why is digestion important?**

Living things need **energy** to survive .  
The digestive system breaks down the food so the body can use it for energy.



**Digestive system**

Observe like a scientist

**Explain how the mouth helps digest food?**

The mouth breaks up food mechanically by chewing.

The teeth and tongue also break down the food with the help of saliva.

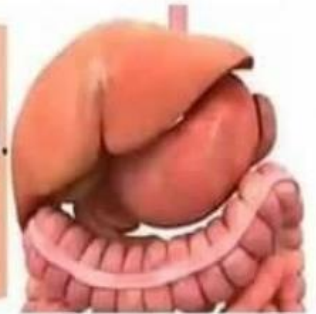



## Digestive system



Compare and contrast the digestion that takes place in the stomach , small intestine , and large intestine .

In the stomach , food is broken down into smaller pieces and juices are added to make liquid. -This juices are **acids** that break food down into its component chemicals.



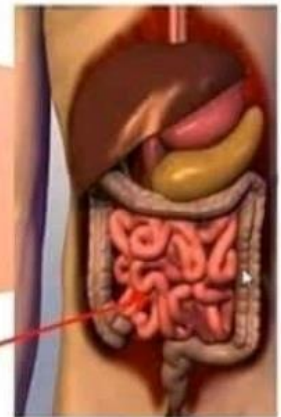
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## Digestive system




### Small intestine


In small intestine food also broken down . The small intestine absorbs the food nutrients to move into the blood .








Digestive system




large intestine

In the **large intestine** ...


- the food that remains is moved to the large intestine .
- large intestine **absorbs the water** from the wastes .
- no digestion takes place in the large intestine .




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Digestive system





Activity 10

Analyze Like a Scientist

**-Like human ,animals need to get nutrients and energy from the food they eat.**

**-Animal digestive systems are adapted to digest different types of food.**

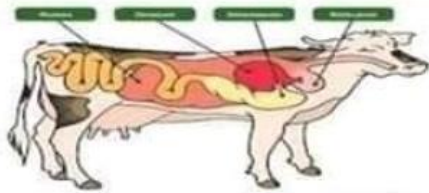
**Did you know that a cow's stomach has four compartments?**

## Digestive system

Why is a cow's stomach different from a dog's stomach?

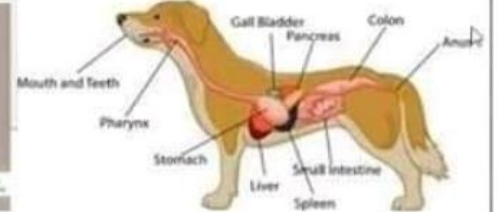
### Cows

-Its digestive system is **long**.  
It has **more than one stomach** to digest **grass** easily.



### Dogs

Its digestive system is **short** and has **one stomach** because it eats **meat**.



## Digestive system

Why is a cow's teeth different from a dog's teeth?

### Cows

-it has a **similar** teeth because it eats grass.



### Dogs

It has a **sharp** (pointed) teeth because it eats meat.







**PRIMARY 4**

**respiratory system**


observe as a scientist

Have you ever felt out of breath after running for a minute or two?

Or noticed that sometimes your **breath quickens** when you need more air?



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**PRIMARY 4**

**respiratory system**

observe as a scientist

Like getting **nutrients from food** ,getting **oxygen from the air** is a complex process that depends on many organs working together.

## respiratory system



Observe like a scientist

**What is meant by respiratory system ?**

It is a process of entering the air carrying **oxygen** into the body and pushing the air carrying **carbon dioxide** out of the body.



## respiratory system



### Respiration

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







## respiratory system



Take a deep breath

When you **breathe in** or inhale , air rushes in through your nose and mouth and down your **throat**.



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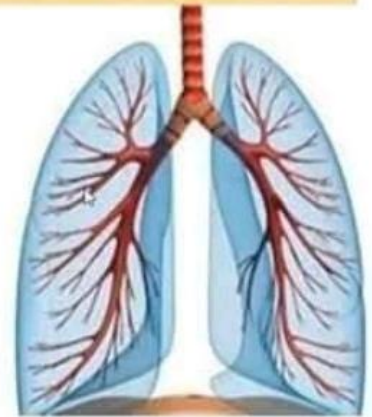
## respiratory system



Take a deep breath

From there , the air travels down your **trachea** into your **lungs**.

Your lungs fill up like two balloons  
Now what?



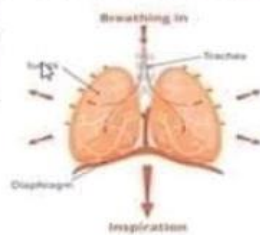
## respiratory system



Explain how the **diaphragm** helps us breathe in and out?

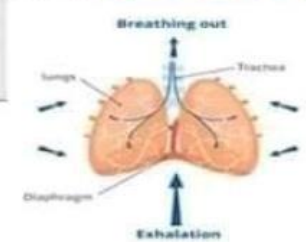
### When you breathe in (inhalation)

-the diaphragm **contracts**.  
This **expands** the chest and  
makes more space for air to  
**enter** the lungs.



### When you breathe out (exhalation)

The diaphragm **relaxes**.  
This **decreases** the space in the  
chest and the air is **forced out**.



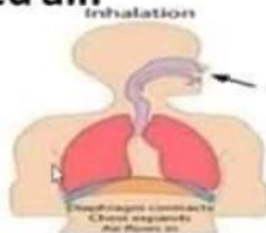
## respiratory system



Compare the **air you breathe in** with the **air you breathe out**?

### The air you breathe in (inhalation)

It is rich in **oxygen**.  
The lungs absorb the oxygen  
from the inhaled air.



### The air you breathe out (exhalation)

It is rich in **carbon dioxide**.  
Carbon dioxide is created as waste  
product.







## respiratory system



ask as a scientist

How does the respiratory system get oxygen to the body cells?

Lungs **absorb the oxygen** from the air that we breathe in.

After oxygen is absorbed by the lungs, the **bloodstream** carries it to the body.



## respiratory system

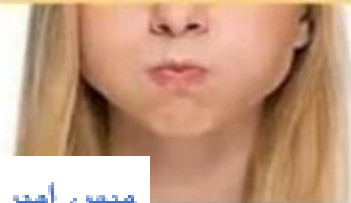


ask as a scientist

Why can we not hold our breath for very long?

When we hold our breathe :

1. **oxygen** does not enter the body.
2. **carbon dioxide** is not removed from the body.



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## respiratory system



### inside the lungs

--Air passage are divided into smaller and smaller passages that look like branches of a tree.

--At the end of these tubes are the alveoli, Which are little sacs surrounded by **blood vessels**.

--It is here that oxygen moves into your blood stream.



## respiratory system




### observe as a scientist

Why can we not hold our breath for very long?

If this happens for too long , the body will fail to function properly.







### respiratory system


ask as a scientist

How fish breathe?


Unlike humans, fish use gills to take oxygen out of the water and release carbon dioxide.

Gills are found on the sides of a fish's head.

Water enters the mouth of the fish and passes across the gills.



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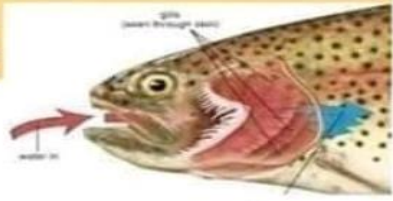
### respiratory system

ask as a scientist

How fish breathe?

Just like in our lungs, blood vessels then carry oxygen to the rest of the body.

Gills are unique structural adaptation that allow fish to live and breathe under water.



## respiratory system



How do you think water pollution impacts the fish that live nearby?

Just as we need to breathe clean air to stay healthy , fish need clean water to survive.



## respiratory system



ask as a scientist

What are the similarities between the human respiratory system and the fish respiratory system ?what are the differences?

### Similarities

Both take in oxygen ,release carbon dioxide, and send oxygen through blood and body.

### differences

Humans have lungs and take in oxygen from air .  
Fish have gills and take in oxygen from water







## Human effect on the environment



Some changes may affect the ecosystem:

### (1) Natural changes:

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



## Human effect on the environment



Some changes may affect the ecosystem:

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

## Human effect on the environment



Some changes may affect the ecosystem:

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

- They farm ,clear lands, and build communities.
  - They **cut down** forests and **plow** grasslands.
  - They introduce plants and animals that where never part of the ecosystem.
- These types of changes can cause the **disappearance** of plants and animals that once lived in an environment.



## Human effect on the environment



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.







## Human effect on the environment



**\*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.



## Human effect on the environment



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

- The animals move from one ecosystem to another to get their needs and survive.





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## Human effect on the environment



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 **damage our lungs** and causes **Asthma** and **heart problems**.



## Human effect on the environment



Can the man return the ecosystem to its origin?

**Yes, if you:**

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







## Senses at work



## Pizza and the nervous system



Imagine you are standing outside a kitchen or restaurant.



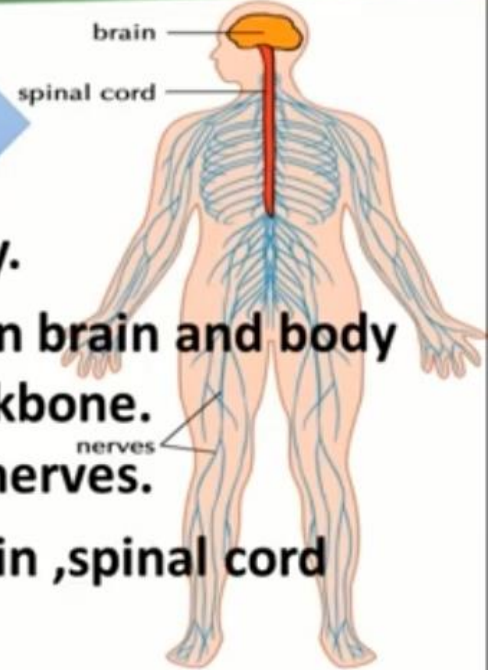
If you cannot see what is being cooked, **how do you think your senses could help you figure out what food is being prepared?**

## Pizza and the nervous system

### Nervous system

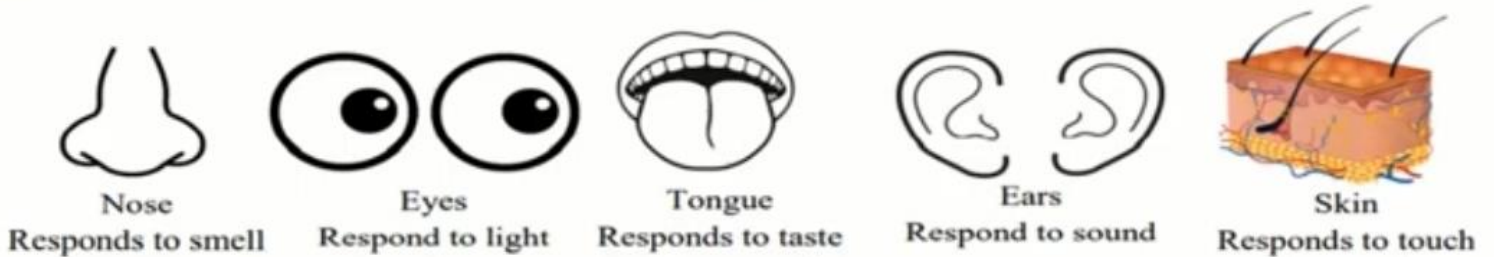
**Nervous system** of mammals (elephants, humans and dogs) consists of:

1. **Brain.** **Main** control center of the body.
2. **Spinal cord.**
  - Carries messages between brain and body
  - It passes through the backbone.
  - It branches into smaller nerves.
3. **Nerves.** Carry messages between brain ,spinal cord and the body .



## Pizza and the nervous system

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







## Pizza and the nervous system



### Examples of some of the dangers facing humans:

- 1- **Touching** a hot cup of tea or the spines of cactus /Barbary fig plant.
- 2- **Smelling** something burn near you.
- 3- **Seeing** a car comes towards you during crossing a street.
- 4- **Hearing** a car horn during crossing a street or an alarm ring or a siren .

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## Pizza and the nervous system



### Nervous system

- \* Some nerves are directly connected to the brain (eyes & heart)
- \* Nerves are found in different places of the body.
- \* Nerves are responsible for **receiving** information from the surroundings.

### Sensory receptors

Sensory receptors in sense organs send signals along the nerves to brain.

## Pizza and the nervous system



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.



## Pizza and the nervous system



Small nerves extend (emerge) from the spinal cord passing by all the body parts **and** are connected to the muscles and other body cells.





## Pizza and the nervous system



### How does the body respond to external stimuli?

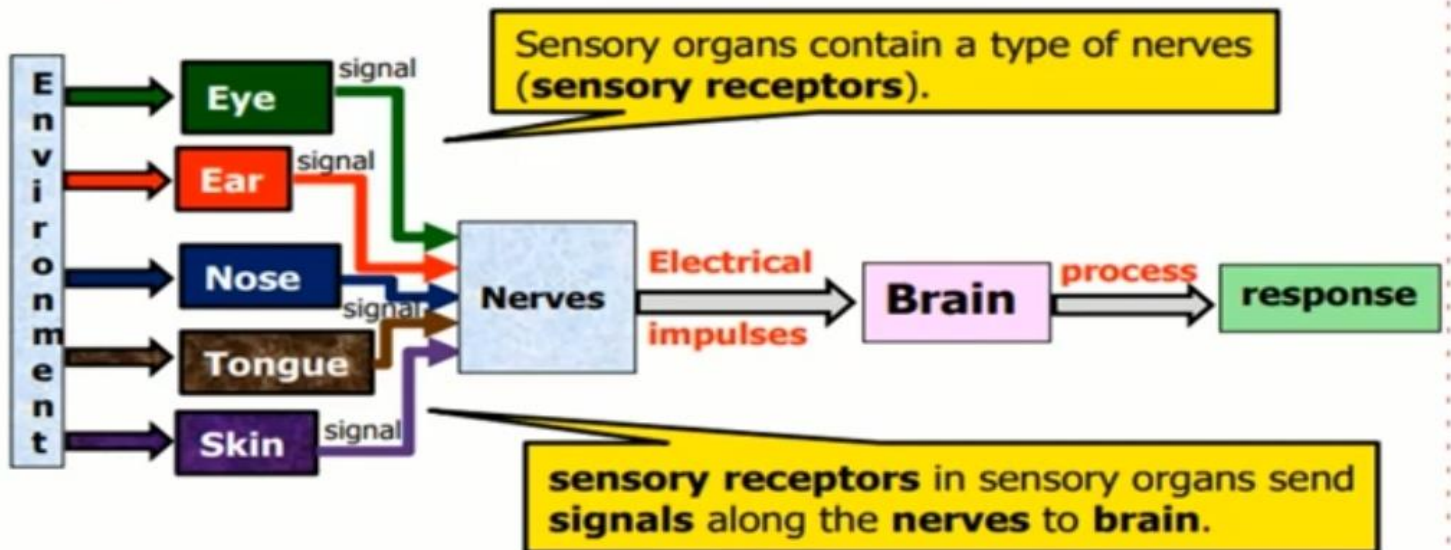
1. Sensory organs receive the information from the environment.
2. The nerves **connect** the sensory organs with the brain.
3. The nerves receive the information from the sensory organs, then send the signals to the brain.

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## Pizza and the nervous system



### Information Processing



نتشرف بانضمامكم لقناه اليوتيوب يلا نذاكر ساينس مع ماما لحل اسئله الوزارة و لمتابعه المراجعات و التلخيصات



## Pizza and the nervous system



### Importance of the nervous system

1. It **collects** information.
2. It **understands** and **interprets** the meaning of this information.
3. It **sends** the signal to the body to do its mission.



## Pizza and the nervous system



### How it works?

The nervous system collects information about what happens inside and outside the body, then sends it to the brain.

Sensory organs are responsible for transferring information, such as: eyes, ears, nose, mouth and skin that are responsible for collecting data.





## Pizza and the nervous system



### Example:

When your ears hear sound waves resulted from **bird** chirps, the **ear nerves** carry a message to the brain to interpret it, then it sends this signal to the body to do the suitable action, such as: (**find the place of this bird on the tree**)



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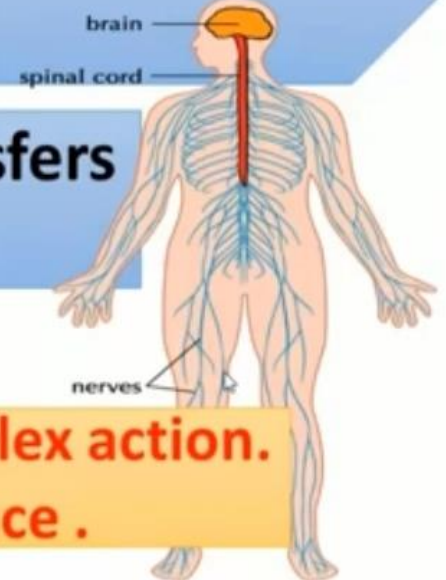


## Pizza and the nervous system



The brain receives a message from the body, called **reflex action** (reflexes).

**Reflex action** which is fast that transfers to the body, then to the brain.



Breathing signals are an example of **reflex action**.  
Which is automatically takes place .

now?

## Sensing the environment



Dolphins and bats get their food by using **echolocation** to know the place of the prey.

**Sensory organs** help the animals to adapt and survive in their environments.

If they don't have sensory organs, they will die.



## Pizza and the nervous system



Example:



When you smell the pizza:

- You **receive** this information through the nose.
- The nerves **send** this signal to the brain.
- The signal **transfers** in the form of **electrical impulses** through the nerves from the **sensory organ** to the **brain** to **respond** to it.



PRIMARY 4

## Sensing the environment



## Feeling the environment

## Egyptian jerboa

A very small rodent.

It has large ears.

It is called the "jumping jerboa".



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PRIMARY 4

## Sensing the environment



## Egyptian jerboa

Organ	Modification
1. The legs like that of kangaroo.	-Jump 3 meters.
2. Hairy legs.	-Catch the sand and jump in curved ways.
3. Large ears.	-Listen to the sound of predators, so it can escape quickly. -It can feel the presence of snakes.





## Sensing the environment



**How can the jerboa feel the presence of snakes?**

It can feel the presence of snakes.

The sensory receptors transfers (moves) from the snakes to the ears of jerboa.

Then pass through the nerves to reach the brain.



## Sensing the environment



**How can the jerboa feel the presence of snakes?**

The brain interprets this message, then orders the legs to start moving.

This happens in less than a part of a second, and known as: **"Response time"**.



**PRIMARY 4**

## Sensing the environment

**Long hind (back) legs:**  
can jump (hop) in zigzag paths to run away from a danger (snake).

**Large ears:**  
can hear snakes.

**Small Eyes.**

**Hairy feet & toes:**  
catch (hold) sand when it jumps.

**Desert Rodent species**

\* When snakes make noise as they approach a jerboa :

**Reaction time**

Sensory receptors in Jerboa's Ears → Nerves → Brain → Translate message → response → Alert legs → Action (jump)

**PRIMARY 4**

## Sensing the environment

### Response time

It is the amount of time that takes places between when we perceive something to when we respond to it.

## Sensing the environment



### Activity 10 : Reaction time

#### Tools:

Stick



Stick

Chair



Chair

Stop watch



Stopwatch



## Sensing the environment



#### Steps:

1-One of your friends stands on a chair holding the tip of the stick , while another friend sits on the floor.

2-The first friend drops the stick and the other friend will try to catch it as fast as he can . **Depending on his sense of sight.**





## Sensing the environment



**3-Calculate the reaction time taken to catch the stick using the stopwatch**

**4-Repeat the above steps three more times , given that the stick must be at the same height from the floor.**

**5-Write down your notes in a table and then draw a circle around the average reaction time.**



## Sensing the environment



**6-Repeat the previous steps three times , while his eyes are closed and depending on his sense of hearing .**

**7-Record your notes in another table and then draw a circle around the average reaction time .**

## Sensing the environment



Data table of the second part of the experiment relaying on the sense of **hearing**.

Distance	Trial	Reaction Time
1 m	1	4 seconds
1 m	2	③ seconds
1 m	3	2 seconds



## Conclusion

## Sensing the environment



You could catch the ruler faster when you saw it fall , because the brain can process what you see **faster** than what you hear.



PRIMARY 4

## Sensing the environment



## Conclusion

The duration of the response to a stimulus differs according to the type of the used sensory organ.

**Example:** Using sight helps me to hold the ruler better than using the sense of hearing.

Sensory organs help the animals to adapt and survive in their environments.

If they don't have sensory organs, they will die.

## Concept 1.3 light and sight



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## Communication and information transfer



Human and animals send and receive information with different communication system: -

1- They use their senses .G.R?

To gather information about the environment.



## Communication and information transfer



2-They use light and sound. G.R?

To send and receive information.

3- They use sound, watching, movements and display light .G.R?

To communicate.





## Communication and information transfer



6-Whales use hearing sense as songs tones. **G.R?**

To communicate with each other.



## Communication and information transfer



4- Human use speaking, writing and reading **G.R?**

To communicate with each other.

5- Animals use Echolocation **G.R?**

To communicate with each other as (dolphin and bat)

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## Communication and information transfer



**Example :**

**Fireflies or lightning bugs or Glow beetles**

-The light show of beetles occurs on **mangroves** in **Thailand**.



## Communication and information transfer



**A chemical reaction** takes place inside the beetles' bodies, **causing them to light up.**

Glow beetles **do not belong to flying insects**, but use their wings **to release flashes** to warn about presence of predators or to **attract the opposite sex** to make babies, flashing at regular periods.





## Communication and information transfer



### Flashing patterns are messages

If there are two groups of them they will flash until they are arranged into one group.



## Communication and information transfer



It is clear that nature interacted by imitation of technology, just as man interacted with nature in many ways that **we saw** and **did not see**.

Some researchers used a light show to affect the beetles to **imitate them and succeeded in that**.

**Artificial lights** are disrupting firefly **mating**, putting them on the road to extinction.



## Communication and information transfer



There are many ways to **communicate** and **sending message**:

### Human

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1- use **alphabet** and **written Language** to communicate

2- use **speaking, writing** and **reading** to communicate with each other.



## Communication and information transfer



Paper in old ages:



1- Human (Chinese) created a paper from **mulberry** and **bamboo** plant .

2- Human (Ancient Egyptians) Created a paper from **papyrus** plant.







## Communication and information transfer



At the beginning of the **15th** century BC, many cultures improved the writing system using letters after that letters were developed into the **alphabet**.

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## Communication and information transfer



### The importance of written language:

Written language **facilitates communication** between people these days and **helps to understand the past** and **share ideas** with future generations.



## Communication and information transfer



**Animals** do not speak like humans, but they communicate with each other using their **own systems** and use their **senses** to send and receive information.



## Communication and information transfer



### Song of Whales

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**Dolphins and whales:** use sound energy to communicate with each other

**Fireflies:** use light energy to communicate with each other .

**Humans:** use language to communicate with each other .





## Communication and information transfer



### Humpback whales:-

1- It uses hearing sense as they sing under water a wide range of tones and songs series **G.R?**

To communicate with each other.

2-They sing during the winter months which is the **mating seasons**, and during summer months and for **feeding**.



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Miss Amira

## Communication and information transfer



### Humpback whales:-

### Sound is described as:-



High pitched sound

Soft sounds such as women voice

Low pitched sound

Rough sounds such as man voice

## Communication and information transfer



**Humpback whales:-**

**Sound is described as:-**



**In winter months**

The songs of humpback whales have **high-pitched** sounds .

**High-pitched** sounds travel better through **cold** water.

**In summer months**

The songs of humpback whales have **low-pitched** sounds

**Low-pitched** sounds travel better through **warm** water.



## Communication and information transfer

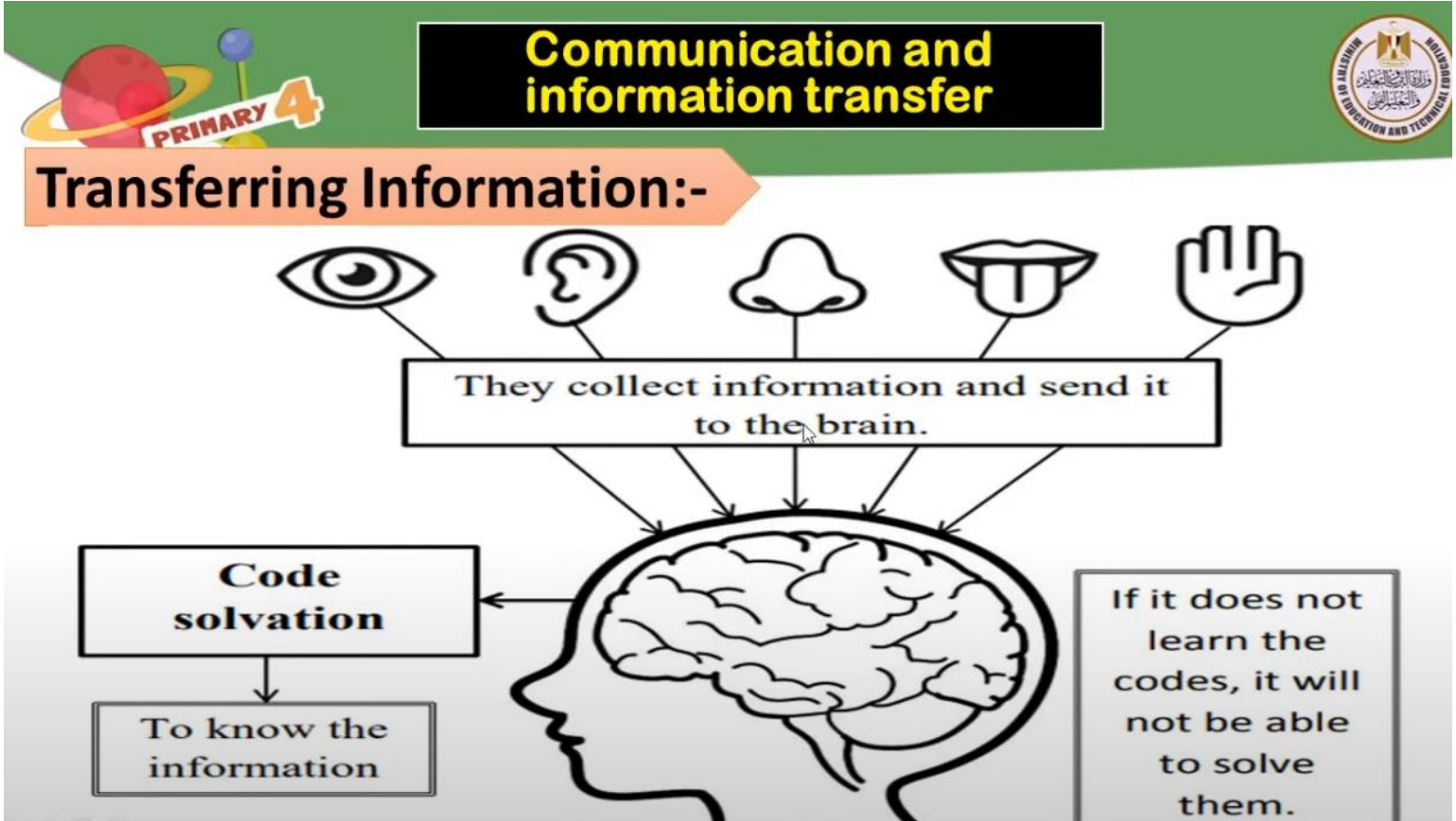


**Transferring Information:-**

Sense organs **collect** information then **send** it to the brain through **nerves** for processing .

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**Communication and information transfer**

In ancient times, people used fire (**smoke**) to communicate over long distances using the **sense of sight**.



Sailors used to use **mirrors** to bring helicopters to save them.



## Communication and information transfer



The different kinds of information that the eye receive:

1- when someone waving at you from a distance you understand what he means.



2- when your eye sees a red traffic it sends a signal to stop.



## Communication and information transfer



3- people uses a **rescue flare** to communicate with each other.



4- Many hikers (travelers) use **mirror** for flashing to attract the attention of rescue helicopter and communicate with them





## Communication and information transfer



5- lighthouses **encode** information in flashes of light that tell sailors where they are



## Communication and information transfer



The code :

**The code** is a pattern that has meaning.

Human use **codes** to transmit information.

## Communication and information transfer



1- **Thumbs-up code**: means that you say “Yes”.



**Thumbs-down code**: means that you say “No”.



2- **Face expressions**:



## Communication and information transfer



3- **Languages have different codes.**



4- **Writing code**: symbols form use sense of sight to communicate.





## Communication and information transfer



### Inventing a code

**Fireflies:** use flashing light patterns to communicate.

**Humans:** designed **Morse Code** system using sound or light.

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## Communication and information transfer



### Morse Code:

"it's a communication system developed by **Samuel Morse** in the **19th** century"



## Communication and information transfer



### Morse Code:-

1- A communication system that depend on sound or light energy .

2- A simple code consists of short beeps known as **dots** and long beeps known as **dashes**.



## Communication and information transfer



### Morse Code:

"it's a communication system developed by **Samuel Morse** in the **19th** century"





## Communication and information transfer



### Morse Code:-

1- A communication system that depend on sound or light energy .

2- A simple code consists of short beeps known as **dots** and long beeps known as **dashes**.



## Communication and information transfer



**Dots:** The short beeps of sound (short flashes of light) in **Morse code**.

**Dashes:** The long beeps of sound (long flashes of light) in Morse code

### International Morse Code

A ·-·	N -·-	1 ·-·-·-
B -·-·	O ---	2 ·-·-·-
C -·-·-	P ·-·-·	3 ·-·-·-
D -·-·	Q -·-·-	4 ·-·-·-
E ·	R ·-·-	5 ·-·-·-
F ·-·-·	S ·-·-	6 ·-·-·-
G -·-·	T -	7 -·-·-·
H ·-·-·	U ·-·-	8 -·-·-·
I ··	V ·-·-·	9 -·-·-·
J ·-·-·-	W -·-·-	0 -·-·-·-
K -·-·	X -·-·-	· -·-·-·-
L ·-·-·	Y -·-·-·	· -·-·-·-
M -·-	Z -·-·-	? -·-·-·-



## Communication and information transfer



**Dots and dashes:** represent different letters of alphabet.

To improve your code: use simple code - use distinct letters.

A •-	J •--	S •••
B -•••	K -•-	T -
C -•-•	L •-••	U ••-
D -••	M --	V •••-
E •	N -•	W •--
F ••-•	O ---	X -••-
G --•	P •--•	Y -•--
H ••••	Q --•-	Z --••
I ••	R •-•	