

# GCSE Biology

## Edexcel Topic – Cells and Control

### Cell division

- Cell cycle & mitosis
- Cancer
- Stem cells

### Growth and differentiation

- Growth
- Cell differentiation

### Central Nervous System

- Brain structures and functions
- CT and PET Scanning (Biology HT ONLY)
- Limitations of treating problems in the CNS (Biology HT ONLY)
- Structure and function of neurons
- Reflex arc
- Eye – structure, functions and defects (Biology ONLY)



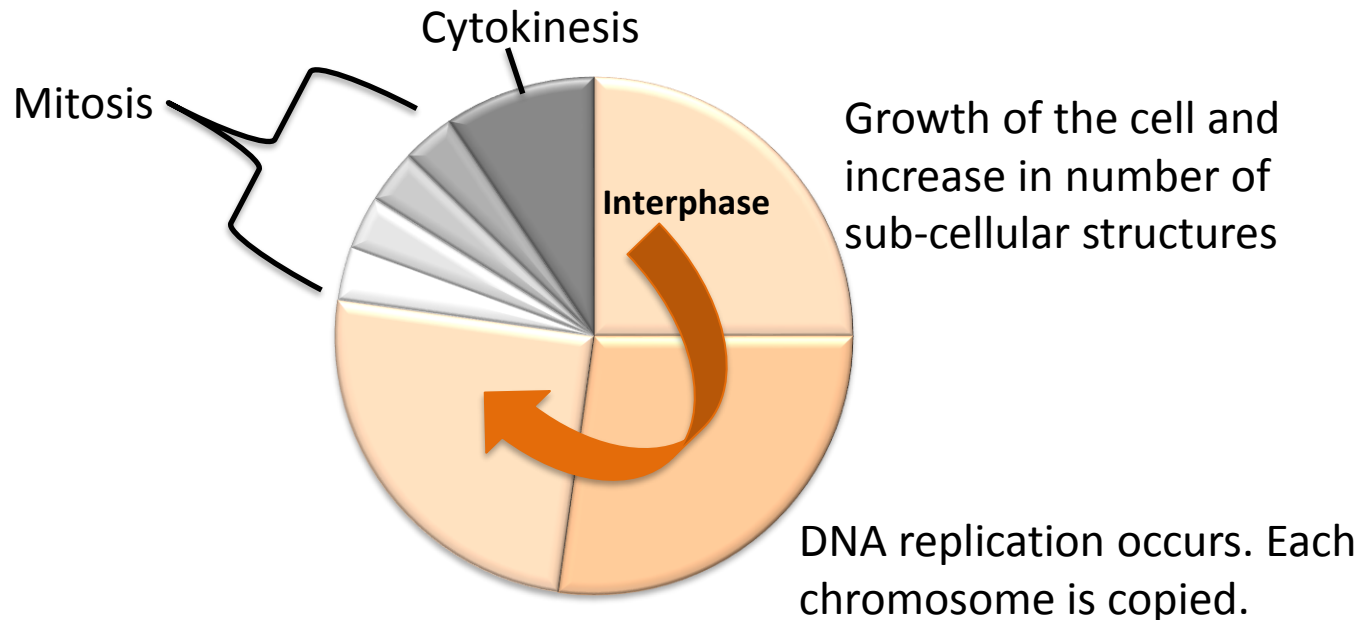


# Mitosis and the cell cycle

**Mitosis** is a type of **cell division**.

Mitosis occurs during **growth** when the number of cells needs to increase and also to **repair** or replace damaged cells.

**Asexual reproduction** occurs by mitosis in plants and simple animals. The overall process of growth and division is known as the **cell cycle**.



# Mitosis and the cell cycle

In the **cell cycle**, cells divide by **mitosis** in a series of **stages**. The **genetic material** is **doubled** and then **divided** into **two identical cells**.

**During interphase in the cell cycle...**

**Growth must occur:** Before a cell can divide it needs to grow and increase the number of sub-cellular structures such as ribosomes and mitochondria. DNA is then duplicated to form two copies of each chromosome.

Interphase is the longest stage in the cell cycle.

**Mitosis now begins. Four stages occur...**

**Prophase:** the nuclear membrane dissolves and the chromosomes become shorter and fatter.

**Metaphase:** the spindle forms and the chromosomes line up on the equator.

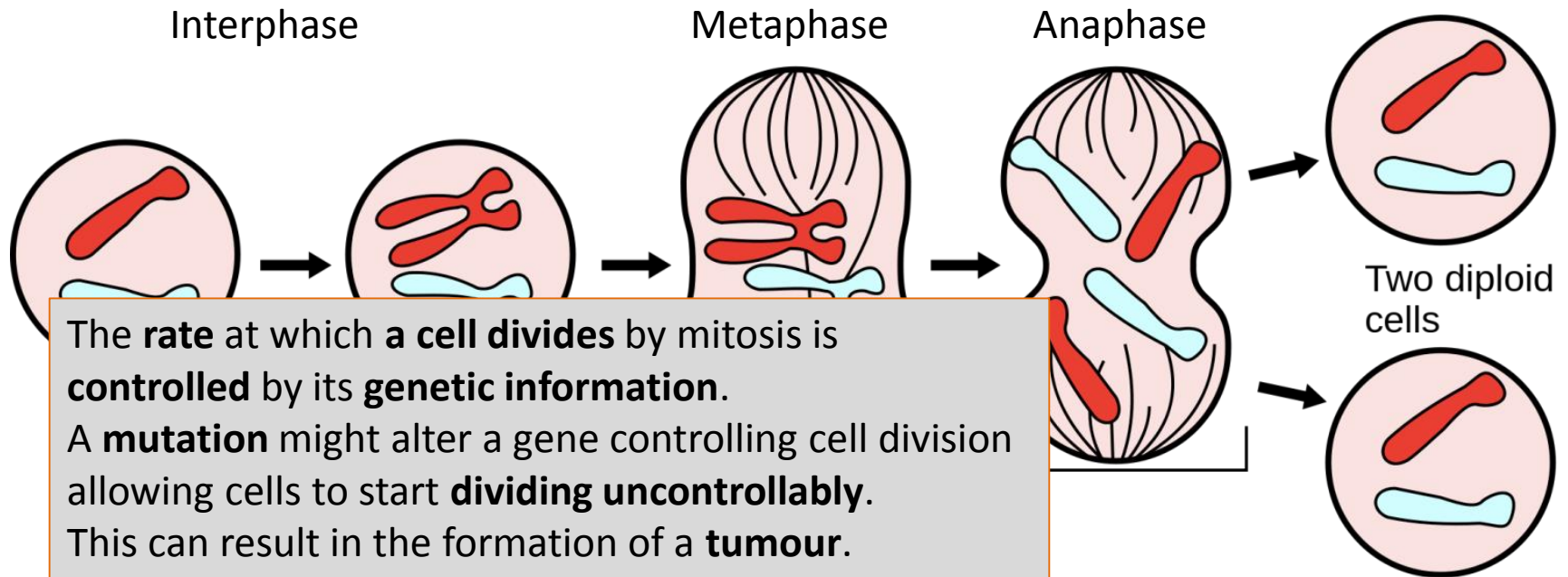
**Anaphase:** the spindle fibres pull the identical chromosomes apart to opposite ends of the cell.

**Telophase:** Membranes form around the outside of each set of chromosomes. These are the nuclei of the 2 new daughter cells. The cytoplasm and cell membrane divide and two new identical cells are formed. This process of splitting is called **cytokinesis**.

*You need to remember the stages of mitosis and what occurs.*

# Mitosis and the cell cycle

Not all stages of mitosis have been pictured.



The **rate** at which a **cell divides** by mitosis is **controlled** by its **genetic information**.  
A **mutation** might alter a gene controlling cell division allowing cells to start **dividing uncontrollably**.  
This can result in the formation of a **tumour**.

Two diploid daughter cells are produced each with identical sets of chromosomes in the nucleus to each other and the original parent cell.

# Cancer

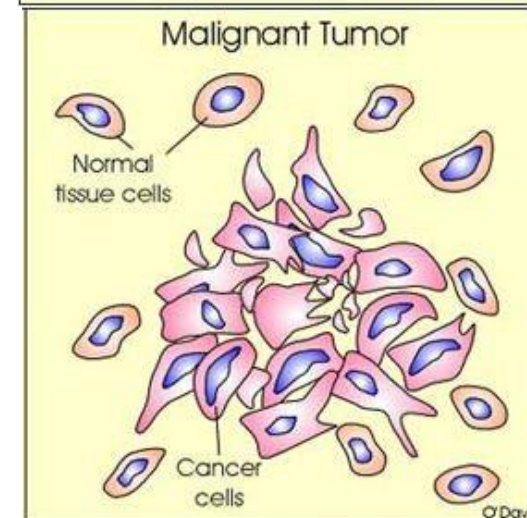
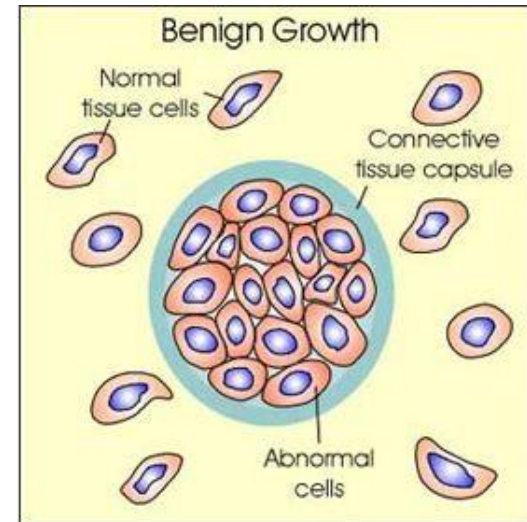
**Uncontrolled cell division** and **growth** results in the formation of a **tumour** (mass of cells), these can be **BENIGN** or **MALIGNANT**, **not all** tumours are cancerous.

- **Benign tumours:**

- Growths of abnormal cells
- Contained in one area
- Usually within a membrane surrounding the cells
- They do not invade other parts of the body [Video - Benign Brain Tumour](#)

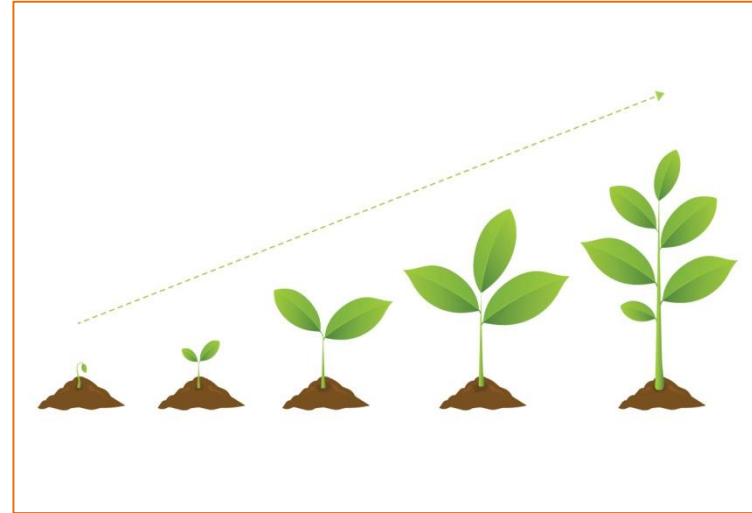
- **Malignant tumour (CANCER):**

- Growths of abnormal cells
- These are **cancerous**
- Invade neighbouring tissues and spread to different parts of the body in the blood where they form secondary tumours
- Can be caused by lifestyle or genes [Video - What is Cancer?](#)



# Growth

**Growth** is defined as an **increase in size** or **mass**.



Growth occurs in **young animals** by **rapid cell division** all over the body. As animals get **older** most cell division is simply to **replace or repair** damaged cells.

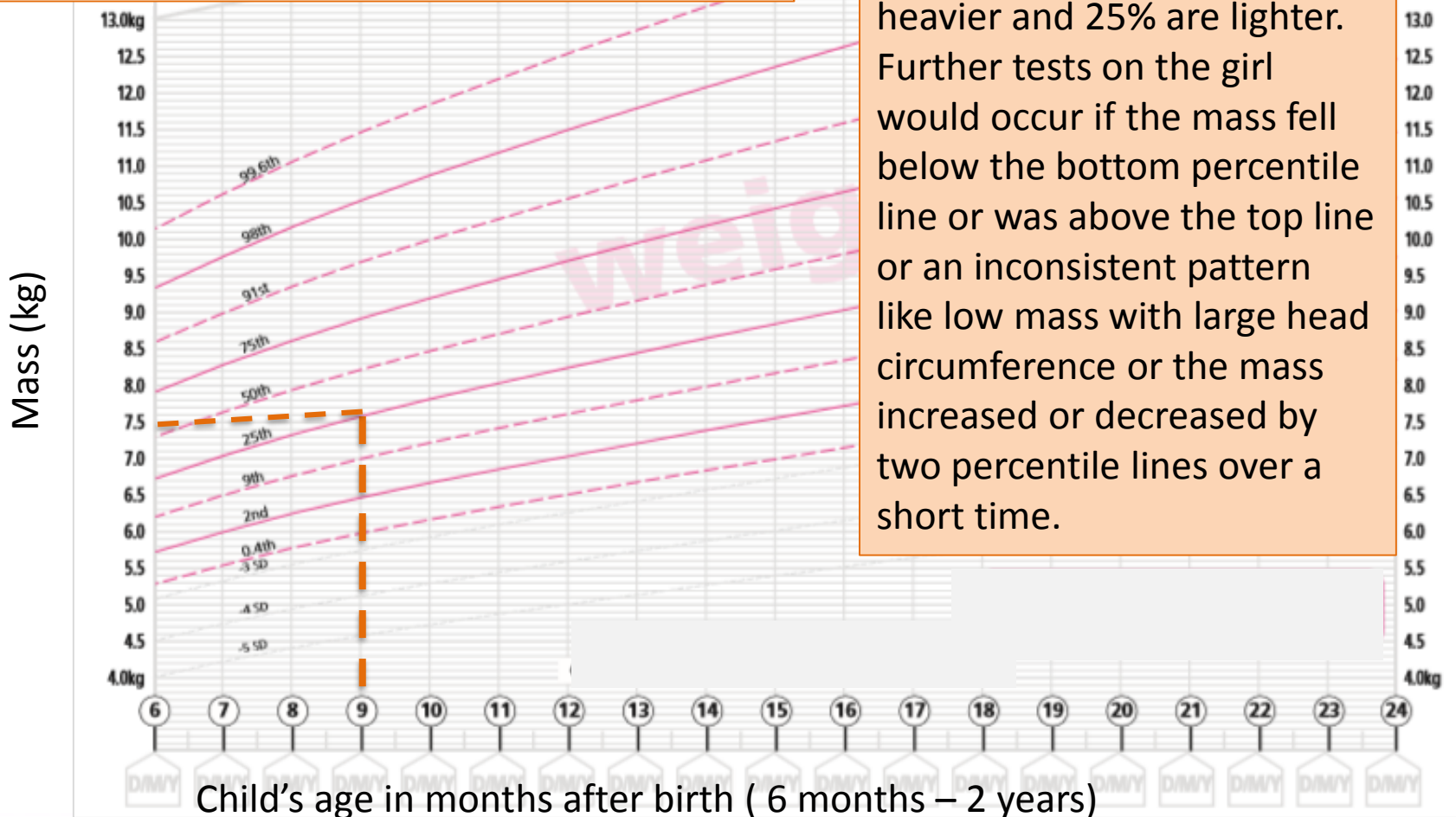
Growth in **plants** occurs by cell division at the **root and shoot** tips. Cells increase in size or height by **cell elongation**.

This happens **throughout the plants life**.

# growth

This is an example of a NHS percentile chart used to monitor growth of a baby girl from 6 months to 2 years. There are separate charts for length, mass and head circumference.

A 9 month old girl who weighs 7.5kg is on the 25<sup>th</sup> percentile. This means 75% of 9 month old girls are heavier and 25% are lighter. Further tests on the girl would occur if the mass fell below the bottom percentile line or was above the top line or an inconsistent pattern like low mass with large head circumference or the mass increased or decreased by two percentile lines over a short time.



# Cell differentiation

Cell **differentiation** occurs as organisms develop and the cell changes to become **specialised**. As the cell **differentiates**, it forms different sub-cellular structures, e.g. the tail on a sperm cell or the hairs on a root hair cell.



Most types of **ANIMAL** cells **differentiate** in the early stage of development.



Most types of **PLANT** cells can **differentiate** **throughout their life** cycle.

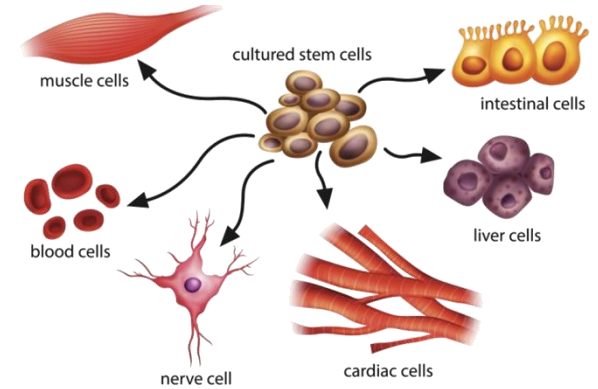
# Stem cells

**Stem cells** are **undifferentiated cells** within an organism. They can produce other stem cells that can then differentiate into many different types of cells.

**Human embryo stem cells** can be cloned and made to **differentiate** into **most** different types of human cells.

**Human adult stem cells** can form **many** (but not all) types of cells including blood cells.

Human stem cells can be used to **help treat diseases** like **diabetes** and **paralysis**.



**Embryos** produced by **therapeutic cloning** have the **same genes as the patient**. This means stem cells from the embryo are **not rejected by the patient's body**. This is why they can be used for medical treatments.

The **risks** of using stem cells risks such as the **transfer** of **viral infections**.

Some people have objections to stem cell use for **ethical** and **religious** reasons.

During fertility treatment doctors usually fertilise many more eggs than are going to be used. The **embryos** formed are used to **obtain** stem cells.

In the UK, **scientists** can use these embryos for **research** but only under **very strict guidelines**.

# Stem Cells (plants)

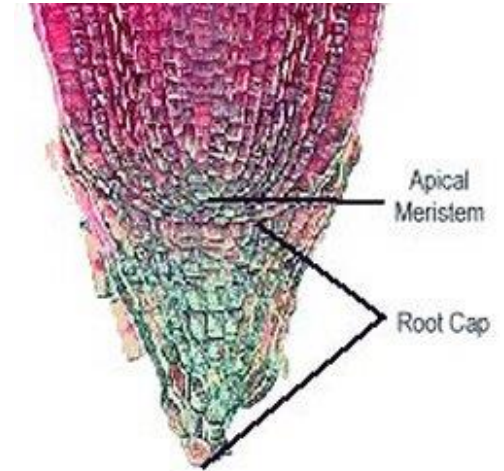
Most types of **PLANT** cells can **differentiate throughout their life** cycle.

**Undifferentiated** stem cells in **plants** are grouped together in **structures called meristems**.

The undifferentiated cells can then specialise e.g. root hair cell, xylem or phloem cells.

**Stem cells** from **meristems in plants** can be used to produce **clones of plants** quickly and economically.

- **Rare species** can be cloned to protect from extinction.
- **Crop plants** with special features, such as disease resistance, can be cloned to produce large numbers of identical plants for farmers e.g. potatoes, strawberries and dates.



# QuestionIT!

## Cell division

- Mitosis and the cell cycle
- Cancer
- Stem cells
- Growth and differentiation



## Cells and control part 1 - Question IT

1. What is mitosis?
2. What are the three main stages of the cell cycle?
3. List the 4 stages involved in mitosis, starting with prophase.
4. Why is mitosis important to the organism?
5. How many daughter cells are formed as a result of mitosis?
6. How many chromosomes are present in a human diploid cell?
7. What is cancer?
8. What is the definition of growth?
9. Does cell elongation occur in animal or plant growth?
10. What is cell differentiation?
11. If a baby was described as being on the 50<sup>th</sup> percentile for head circumference— what does that mean?
12. What is a stem cell?
13. How is a human embryonic stem cell different to an adult stem cell?
14. Where is a meristem found?
15. What is a meristem?
16. Name a benefit and a risk to using stem cells in medicine.

## Cells and control part 1 - Question IT

17. In what stage of an animal's life cycle do most cells differentiate?
18. In mature animals when do cells still need to differentiate?
19. In what stage of their life cycle do plant cells differentiate?

# AnswerIT!

## Cell division

- Mitosis and the cell cycle
- Cancer
- Stem cells
- Growth and differentiation



1. What is mitosis? **A type of cell division**
2. What are the three stages of the cell cycle? **Growth, DNA synthesis and mitosis.**
3. List the stages involved in mitosis, starting with prophase. **Prophase, metaphase, anaphase, telophase**
4. Why is mitosis important to the organism?  
**For growth**  
**Repair or replacement of damaged cells**  
**Asexual reproduction in some animals**
5. How many daughter cells are formed as a result of mitosis? **2**
6. How many chromosomes are present in a human diploid cell? **46**
7. What is cancer? **Uncontrolled cell division as a result of changes in cells.**
8. What is the definition of growth? **Increase in size or number of cells.**

# Cells and control part 1 – AnswerIT

9. Does cell elongation occur in animal or plant growth? **Plant**

10. What is cell differentiation? **The process by which a cell changes to become specialised for a specific role.**

11 If a baby was described as being on the 50<sup>th</sup> percentile for head circumference—what does that mean? **50% of children have a bigger head and 50% have a smaller head.**

12. What is a stem cell? **An undifferentiated cell.**

13. How is a human embryonic stem cell different to an adult stem cell?  
**Embryonic stem cells have the potential to divide and produce any type of body cell. Adult stem cells can only differentiate to form a few types of cells e.g. red blood cells**

14. Where is a meristem found? **In a plant shoot or root tip**

15. What is a meristem? **This is where the plant produces undifferentiated cells .**

16. Name a benefit and a risk to using stem cells in medicine.

**Benefits: Already in use to cure some diseases by bone marrow transplant.**

**Can be used to create specialised cells to replace damaged ones.**

**Potential for being able to find new cures to life changing conditions such as spinal injuries or CNS diseases.**

**Risks: Diseases can be passed on as viruses are found inside cells and may go undetected in the stem cells used.**

**Tumour development- stem cells divide very quickly and if this is not controlled then a tumour may develop.**

**Rejection – stem cells which are not from the patient are likely to trigger an immune response.**

**A patient undergoing stem cell treatment will have to take immunosuppressive drugs which makes them more susceptible to disease.**

## Cells and control part 1 – AnswerIT

17. In what stage of an animal's life cycle do most cells differentiate?

**In the early stages.**

18. In mature animals when do cells still need to differentiate?

**For repair and replacement of cells.**

19. In what stage of their life cycle do plant cells differentiate?

**They differentiate throughout their lifecycle.**

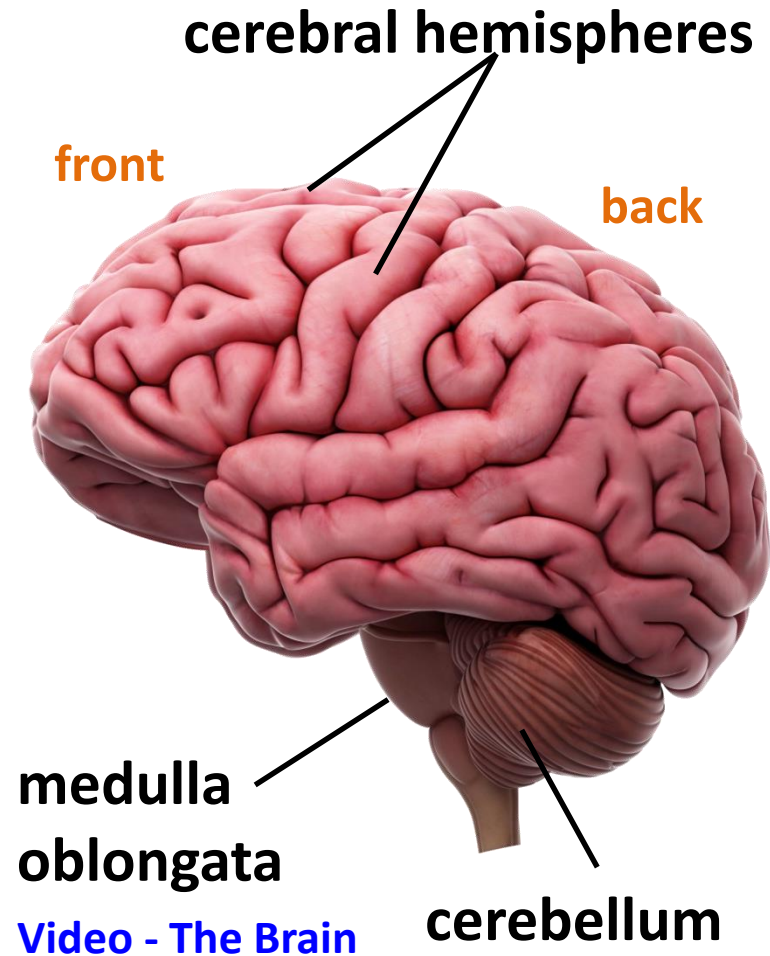


## The central nervous system Part 2 - The brain (biology only)

The **brain** controls **complex behaviour**. It is made of **billions** of interconnected neurones and has **different regions** that carry out **different functions**.

**Three** of the **main structures** in the brain are:

- **Cerebral hemispheres** – the **outer** ‘wrinkled’ layers of the brain. It is **responsible** for **intelligence, language, memory** and **consciousness**.
- **Cerebellum** – is located at the lower part of the back of the brain. It is **responsible** for **voluntary coordination** of the **muscles and balance**.
- **Medulla oblongata** – is located in the lower part of the brain stem. It is **responsible** for **involuntary** (unconscious) **coordination** such as **breathing, swallowing** and **heart rate**.



## The central nervous system Part 2 - The brain (HT biology only)

A **neuroscientist** is a scientist that studies the structure and function of the brain. The complexity and delicacy of the brain makes investigating the brain and treating brain disorders very difficult.

**Accessing the brain tissue** inside the hard, protective **skull** can be **difficult**.

Neuroscientists use **CT** or **PET scanning** to investigate brain function.



### Studying brain damage

**Damage** to different brain areas produces different behavioural and psychological effects. For example, damage in the **front** end of the brain **disturbs the ability to make decisions** whereas **damage to the back of the brain disturbs vision**.



# The central nervous system Part 2 - The brain (HT biology only)

A CT (computerised tomography) scan **uses X-rays** to produce detailed **2-d images** of the brain.

A **CT scan** results in the body being subjected to a dose of ionising radiation that is much greater than for a simple X-ray as it takes hundreds of images.

CT scans are commonly performed and generally safe. Any increased risk of cancer usually outweighs the benefits of having the scan.

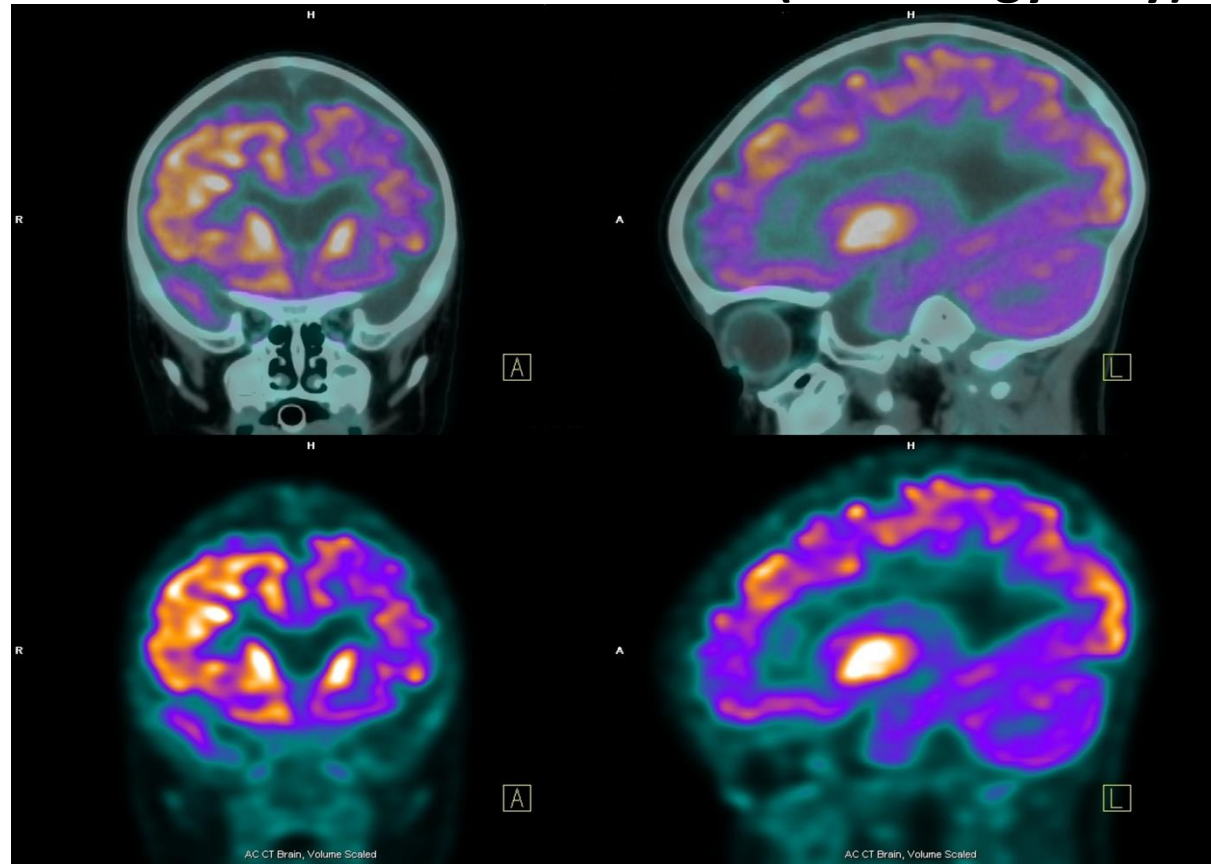


A CT scan shows the **main structures** of the brain. The function of the brain cannot be tested using this equipment. A CT scan will show diseased or damaged areas and this can then give a good idea of why the brain is not functioning effectively.

# The central nervous system Part 2 - The brain (HT biology only)

A PET (positron emission tomography) scan uses radioactive tracer chemicals to show which parts of the brain are functioning whilst in the scanner.

It measures oxygen use and blood flow. More active parts of the brain show in red or orange colours. Green shows low activity.



A PET scan shows both the **main structures** of the brain **and** the **function** of the brain in real time. PET scans are useful for studying disorders like Alzheimer's disease where activity in parts of the brain are reduced compared to a healthy brain.

## The central nervous system Part 2 - The brain (biology only)

**Treatment** of brain or spinal cord injuries, tumours or CNS diseases can be **difficult**.

**Drugs** do **not always pass** through **the protective membrane** which surrounds the brain and spinal cord.

The skull and bony vertebrae means it is **difficult to access** the brain and spinal cord tissue without **risky surgery** which can itself lead to **permanent damage** being caused. Not all areas of the brain are fully understood yet.

**Neurones** do not automatically repair themselves unlike some other cells in the body. **Stem cells** are currently being pioneered as one method of treating **spinal cord injuries**.

# QuestionIT!

## The Central Nervous system

### Part 2

- Brain structures and functions
- CT and PET Scanning (Biology HT ONLY)
- Limitations of treating problems in the CNS (Biology HT ONLY)



## The central nervous system Part 2 - Question IT

1. Name the three main parts of the brain and state the role of each.
2. What is a CT scan?
3. What is a PET scan?
4. What does a PET scan do?
5. What are the limitations in treating damage and disease in the brain and nervous system?

# AnswerIT!

## The Central Nervous system

### Part 2

- Brain structures and functions
- CT and PET Scanning (Biology HT ONLY)
- Limitations of treating problems in the CNS (Biology HT ONLY)



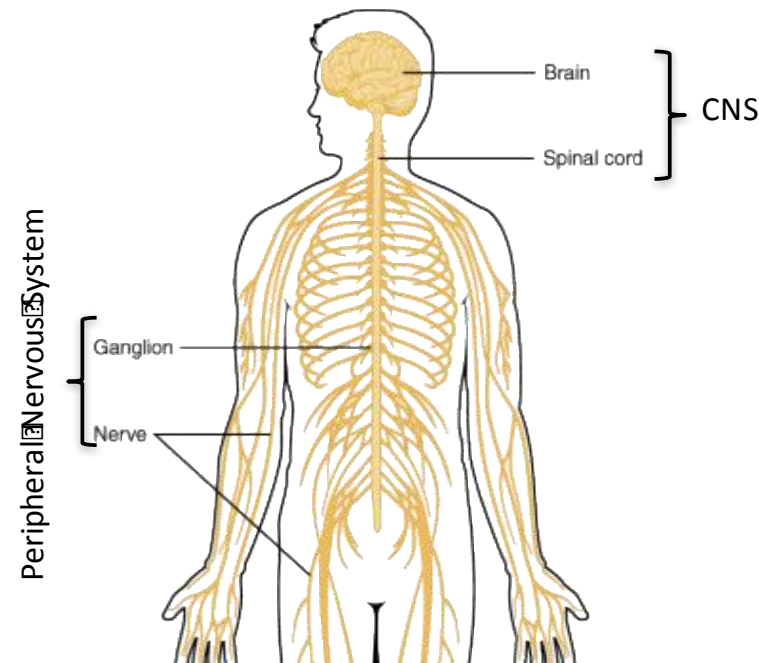
## The central nervous system Part 2 - AnswerIT

1. Name the three main parts of the brain and state the role of each.  
**cerebral hemispheres**– the outer ‘wrinkled’ layer of the brain. It is responsible for intelligence, language, memory and consciousness;  
**cerebellum** – is located at the lower part of the back of the brain and is responsible for voluntary coordination of the muscles; **medulla oblongata** – is located in the lower part of the brain stem. It is responsible for involuntary coordination such as breathing, swallowing and heart rate.
2. What is a CT scan? **A scanner which uses X-rays to produce images of the brain**
3. What is a PET scan? **A scanner which uses radioactive chemicals to produce images of the brain**
4. What does a PET scan do? **The scanner can show both structure and function of the brain which can show if parts of the brain are abnormally active or inactive compared to a healthy brain.**
5. What are the limitations in treating damage and disease in the brain and nervous system?  
**Drugs do not always pass through the protective membrane which surrounds the brain and spinal cord. The skull and bony vertebrae means it is difficult to access the brain and spinal cord tissue without risky surgery which can itself lead to permanent damage being caused.**



# The central nervous system Part 3 - Structure and function

The nervous system enables humans to react to their surroundings and to coordinate their behaviour.



A **stimulus** is any change in the surroundings. These are detected by **receptors** (cells that detect a change) and information passes along cells (neurons) as **electrical impulses** to the **central nervous system (CNS)**.

The **CNS** is the **brain** and **spinal cord**.

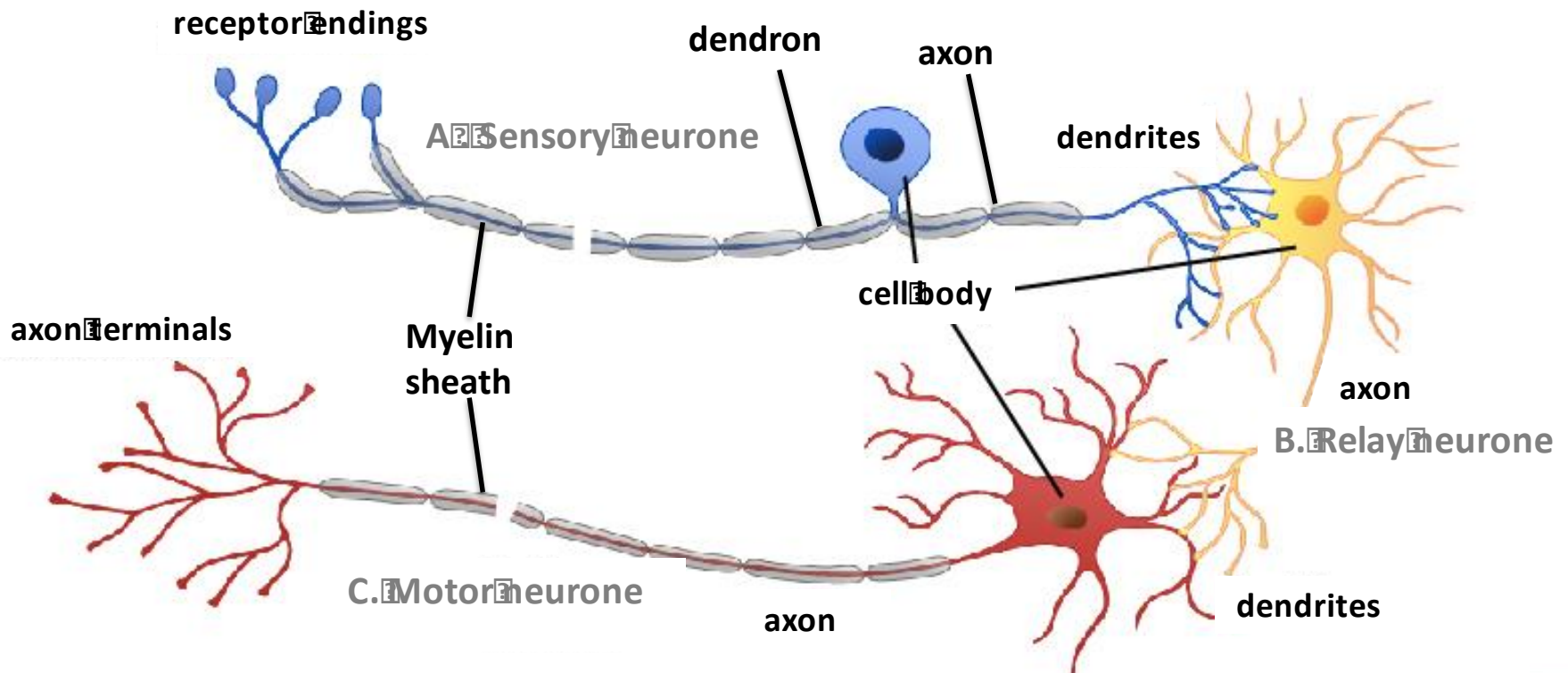
The **CNS coordinates** the **response of effectors** which may be muscles contracting or glands secreting hormones.

**stimulus → receptor → coordinator → effector → response**

# The central nervous system Part 3 - Structure and function

There are **three main types** of neurones:

- A. Sensory neurones** – these carry impulses from the receptors to the central nervous system (CNS).
- B. Relay neurones** – these connect the sensory neurones to the motor neurones in the CNS.
- C. Motor neurones** – these carry impulses from the CNS to an effector.

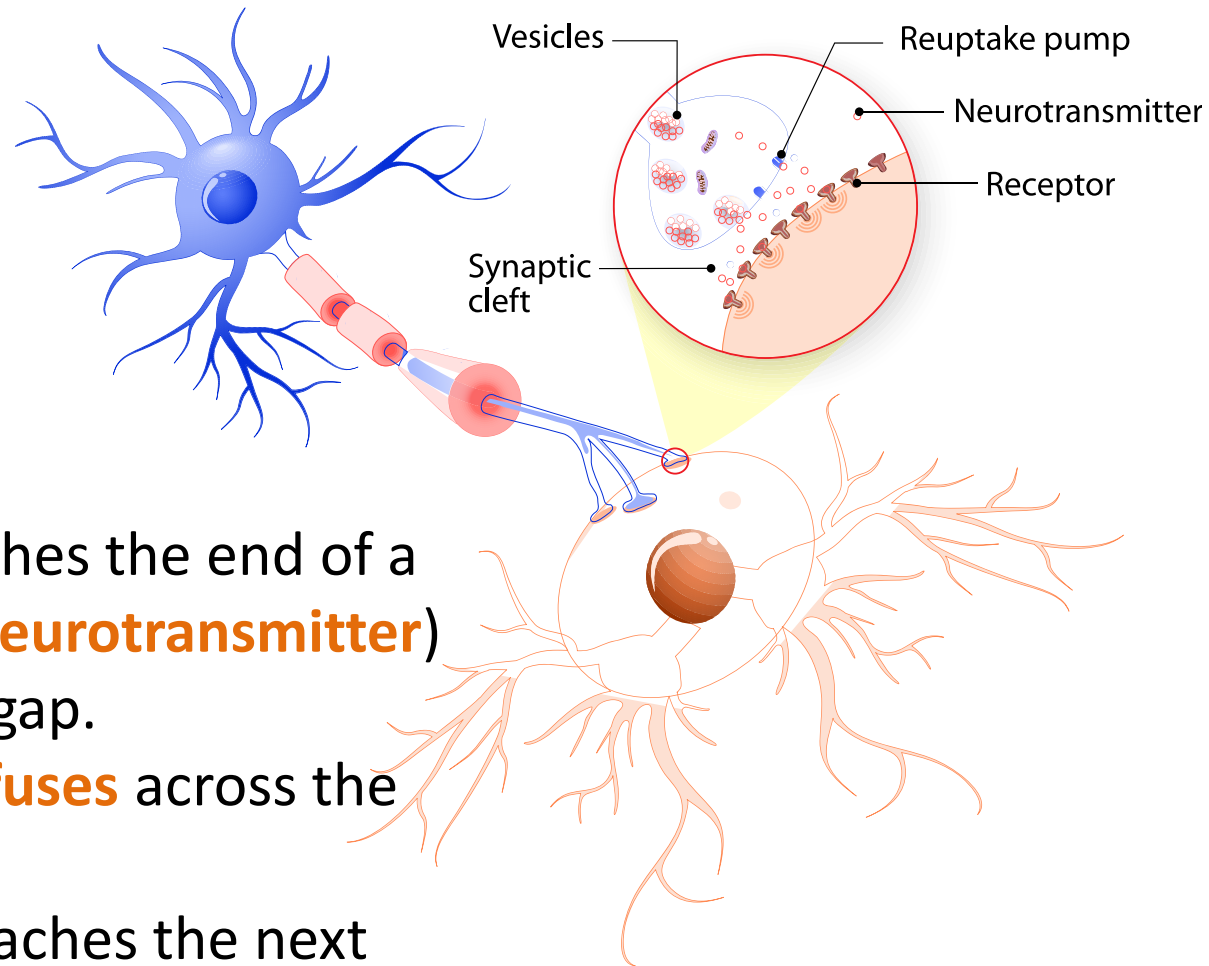


# The central nervous system Part 3 - Structure and function

Neurons are not joined together. They have small gap between them.

The gap is called  
a synapse

- When an impulse reaches the end of a neurone a chemical (**neurotransmitter**) is released across the gap.
- The chemical then **diffuses** across the synapse.
- When the chemical reaches the next neurone in sufficient quantities this starts **another impulse**.



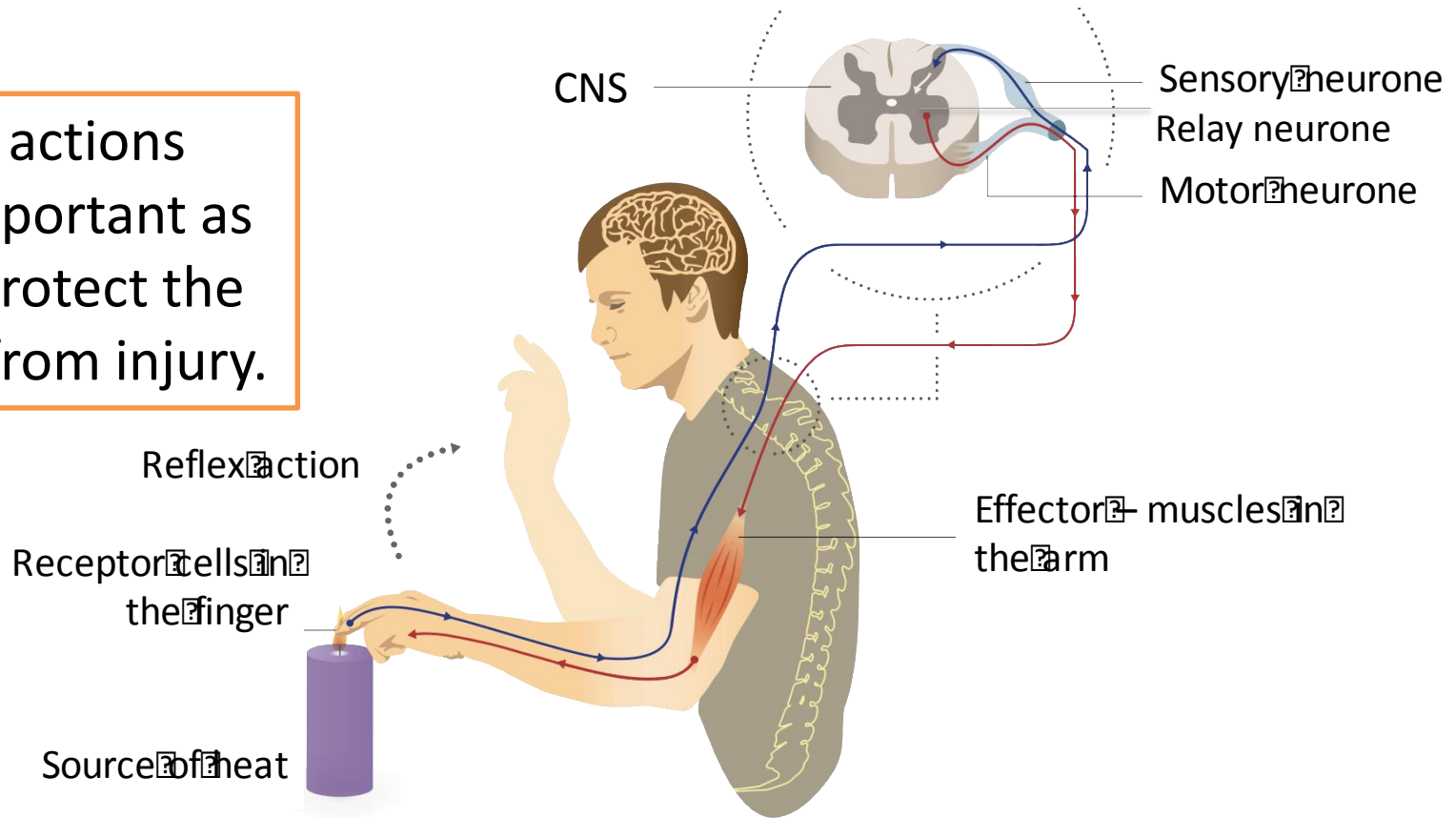
# The central nervous system Part 3 - Structure and function

Structure	Function
Receptor	Specialised cells which detect stimuli and turn them into electrical impulses
Axon	Carries electrical impulses <u>away</u> from the cell body
Dendron	Carries electrical impulses from receptor <u>towards</u> cell body
Dendrite	Branched ends which receive electrical impulses
Myelin sheath	Layer of fatty insulating material around motor and sensory neurones which speeds up transmission of the impulse
Synapse	Gap between neurones which ensures impulses travel in one direction
Neurotransmitter	Chemical involved in passing impulses from one nerve cell to another across a synapse
Effector	Organ, tissue or cell which produces a response

# The central nervous system Part 3 - Structure and function

Reflex actions are **automatic** and **rapid**; they do not involve the conscious part of the brain. The path that a reflex action takes is called a **REFLEX ARC**.

Reflex actions are important as they protect the body from injury.

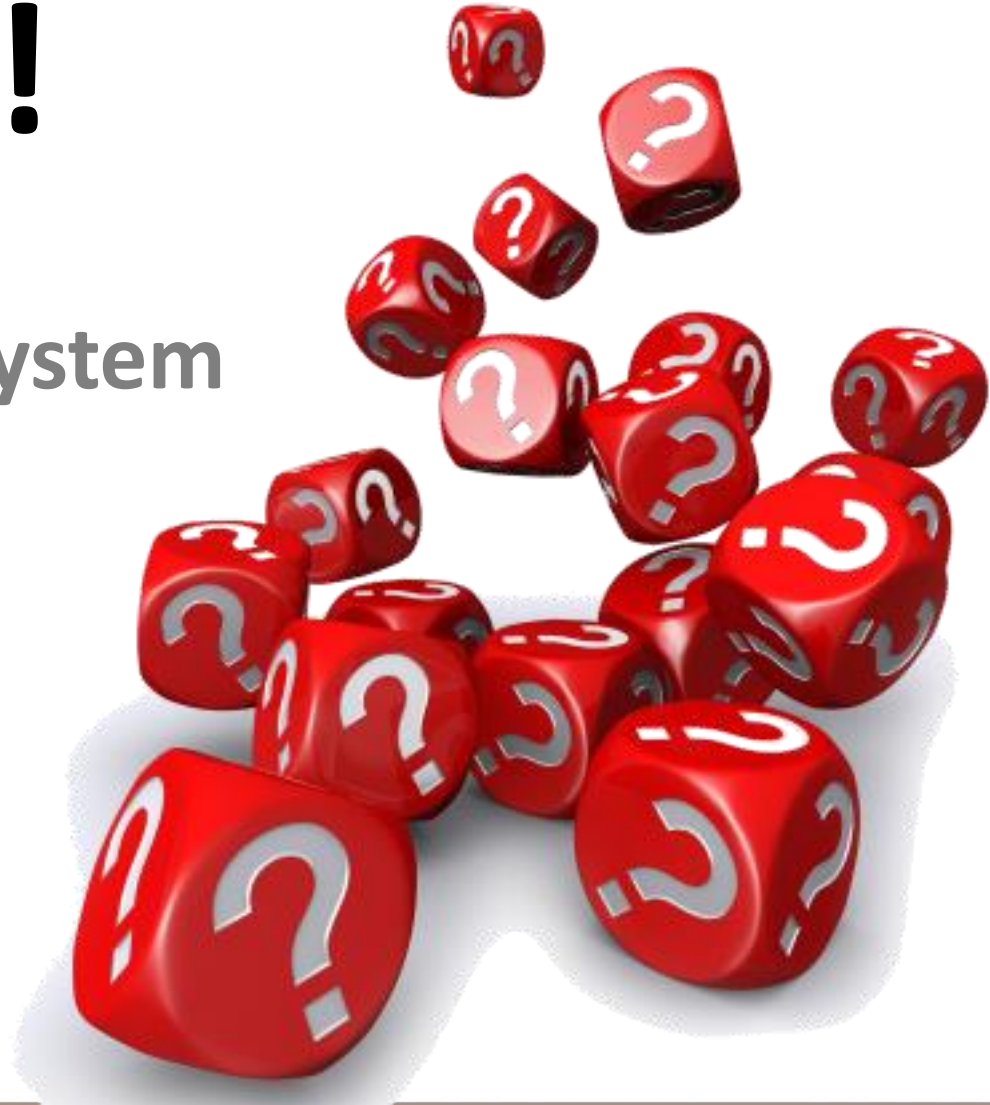


stimulus → receptor → sensory neurone → relay neurone → motor neurone → effector

# QuestionIT!

## The Central Nervous system Part 3

- Structure and function of neurons
- Reflex arc



## The central nervous system Part 3 - Question IT

1. What is a stimulus?
2. What is a receptor?
3. Name the two parts of the central nervous system.
4. What is an effector?
5. What does the CNS coordinate?
6. Put these in the correct order: receptor, stimulus, response, coordinator, effector.
7. What is the role of the sensory neurone?
8. What is the role of the relay neurone?
9. What is the role of the motor neurone?
10. What is a synapse?
11. Describe what happens at the synapse.
12. Why are reflex actions important?
13. Recall the pathway of the reflex arc.

# The central nervous system Part 3 - Structure and function

14. Complete the missing parts of the table below:

Structure	Function
Receptor	
	Carries electrical impulses <u>away</u> from the cell body
	Carries electrical impulses from receptor <u>towards</u> cell body
Dendrite	Branched ends which receive electrical impulses
Myelin sheath	
	Gap between neurones which ensures impulses travel in one direction.
Neurotransmitter	
	Organ, tissue or cell which produces a response

# AnswerIT!

## The Central Nervous system

### Part 3

- Structure and function of neurons
- Reflex arc



## The central nervous system Part 3 - AnswerIT

1. What is a stimulus? **Any change in the surroundings**
2. What is a receptor? **Cells that detect a change**
3. Name the two parts of the central nervous system. **Brain and spinal cord**
4. What is an effector? **A muscle or gland**
5. What does the CNS coordinate? **The response of effectors**
6. Put these in the correct order: receptor, stimulus, response, coordinator, effector.  
**stimulus → receptor → coordinator → effector → response**
7. What is the role of the sensory neurone? **Carry impulses from the receptors to the Central nervous system (CNS)**

## The central nervous system Part 3 - AnswerIT

8. What is the role of the relay neurone? **Connect the sensory neurones to the motor neurones in the CNS.**
9. What is the role of the motor neurone? **These carry impulses from the CNS to an effector.**
10. What is a synapse? **A gap between two neurones**
11. Describe what happens at the synapse **An impulse reaches the end of a neurone; neurotransmitter is released across the gap. It then diffuses across the synapse and when it reaches the next neurone this starts another impulse.**
12. Why are reflex actions important? **They protect the body from injury**
13. Recall the pathway of the reflex arc. **receptor → sensory neurone → relay neurone (CNS) → motor neurone → effector**

# The central nervous system Part 3 - Structure and function

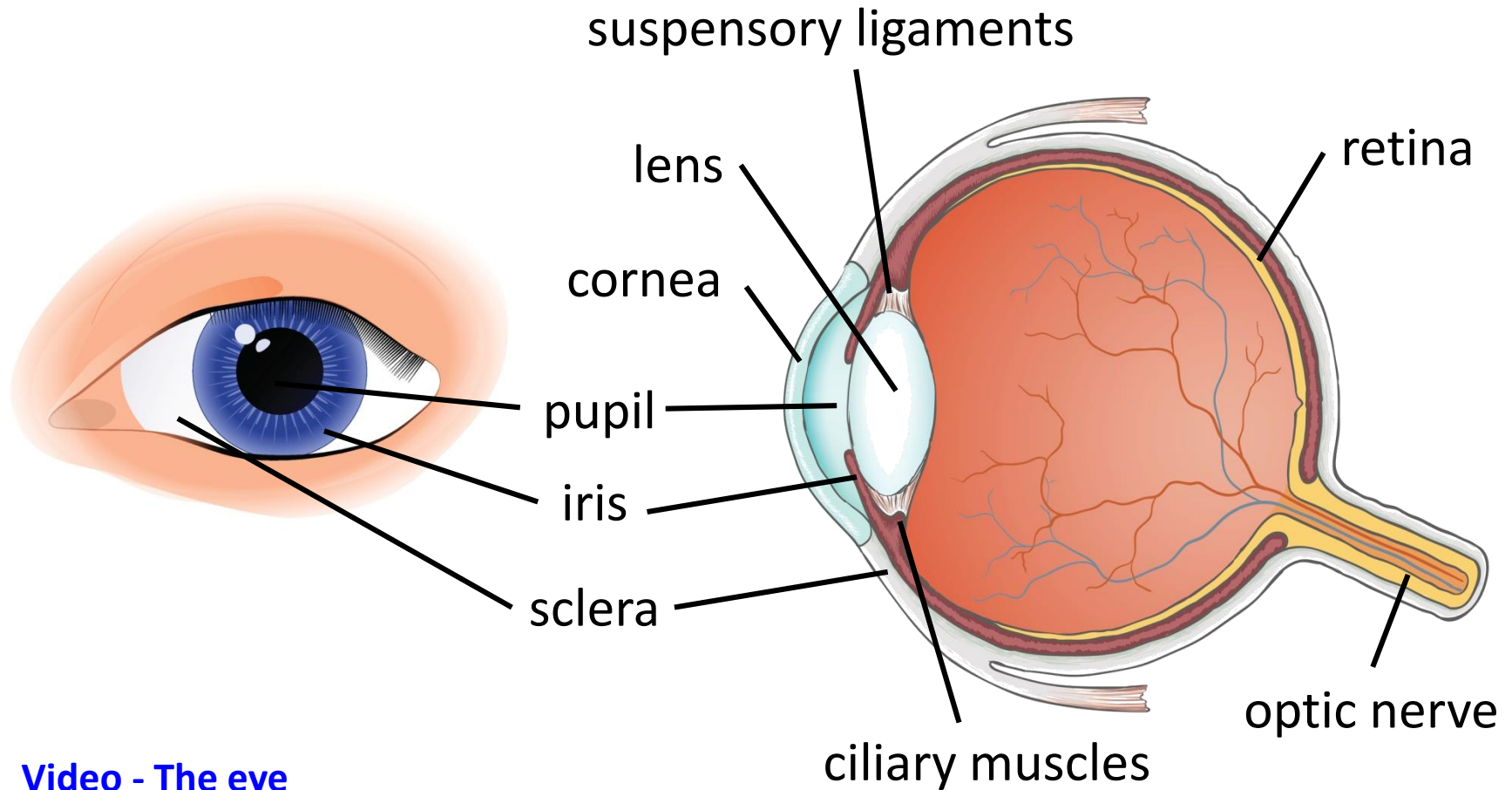
14. Complete the missing parts of the table below:

Structure	Function
Receptor	<b>Specialised cells which detect stimuli and turn them into electrical impulses</b>
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<b>Synapse</b>	Gap between neurones which ensures impulses travel in one direction.
<b>Neurotransmitter</b>	<b>Chemical involved in passing impulses from one nerve cell to another across a synapse</b>
<b>Effector</b>	Organ, tissue or cell which produces a response



## The central nervous system Part 4 - The eye (biology only)

The **eye** is a **sense organ** containing **receptors** sensitive to **light intensity** and **colour**.



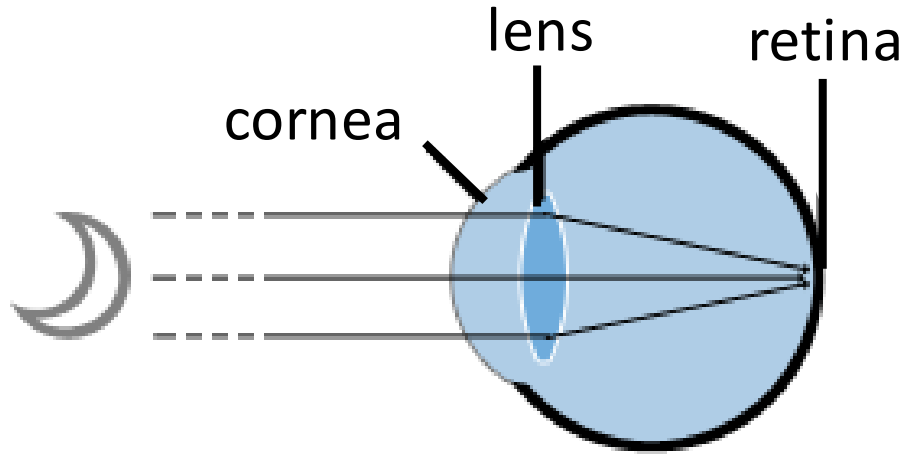
[Video - The eye](#)

## The central nervous system Part 4 - The eye (biology only)

Part of the eye	Description and function
cornea	Transparent layer at the front of the eye. It refracts light into the eye.
iris	The coloured part of the eye that contains muscles that control the amount of light entering the eye.
pupil	The hole in the middle of the iris that lets light in. Its diameter is controlled by the iris.
lens	A transparent, biconvex structure in the eye that refracts light onto the retina.
retina	Thin layer of tissue at the back of the eye that contains receptor cells called rods and cones for light and colour.
sclera	Tough white supporting wall of the eye.
ciliary muscles	Muscles that are connected to the lens by the suspensory ligaments; they change the shape of the lens.
suspensory ligaments	These connect the lens to the ciliary muscles.
optic nerve	Carries impulses from the retina to the brain.

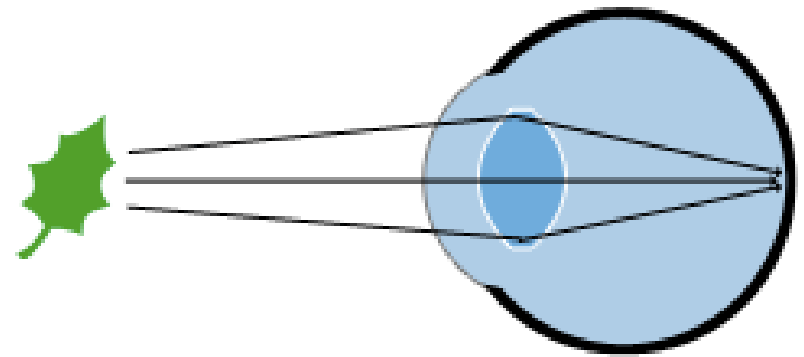
## The central nervous system Part 4 - The eye (biology only)

**Accommodation** is the process of **changing the shape of the lens** to **focus** on **near** or **distant objects**.



To **focus** on a **distant object**:

- the ciliary muscles relax
- the suspensory ligaments are pulled tight
- the lens is then pulled thin and only slightly refracts light rays.



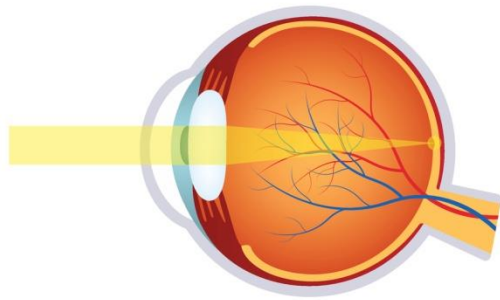
To **focus** on a **near object**:

- the ciliary muscles contract
- the suspensory ligaments loosen
- the lens is then thicker and refracts light rays strongly.

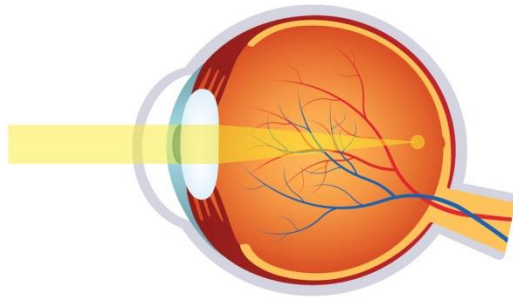
[Video - accommodation](#)

# The central nervous system Part 4 - The eye (biology only)

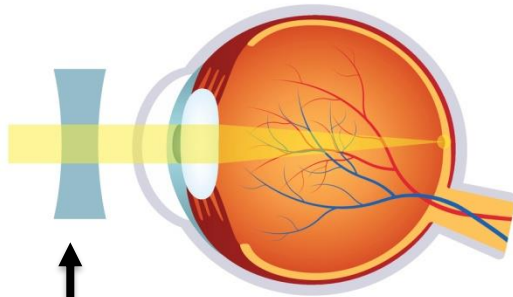
Two common defects of the eyes are **myopia** (short sightedness) and **hyperopia** (long sightedness) in which rays of light do not focus on the retina.



Normal vision



Myopia



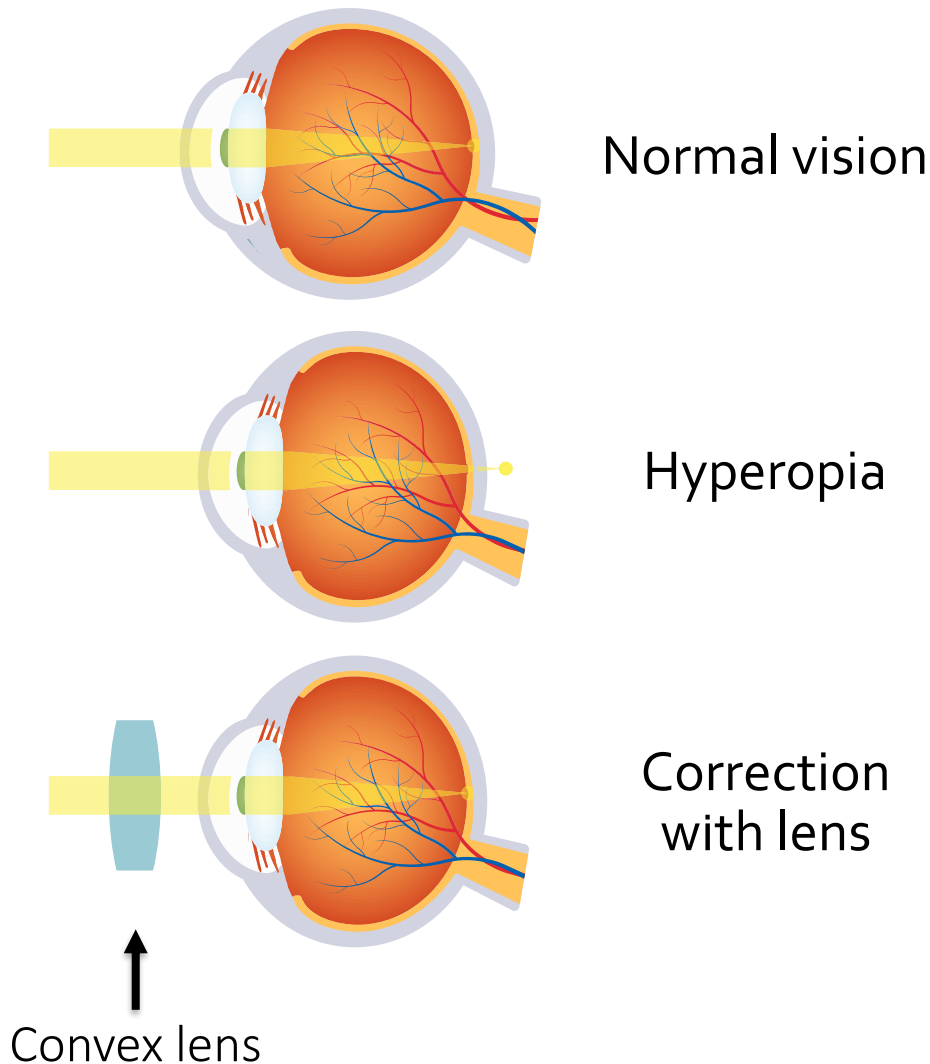
Correction with lens

Concave lens

## **Myopia** (short sightedness)

- People who are short sighted **cannot focus** on objects that are **far away**.
- It usually occurs when the **eyeball** is **too long**.
- The light rays from distant objects **focus** in the eyeball **in front** of the **retina**.
- Myopia can be **corrected** with **concave lenses** so that the light rays focus on the retina.

# The central nervous system Part 4 - The eye (biology only)

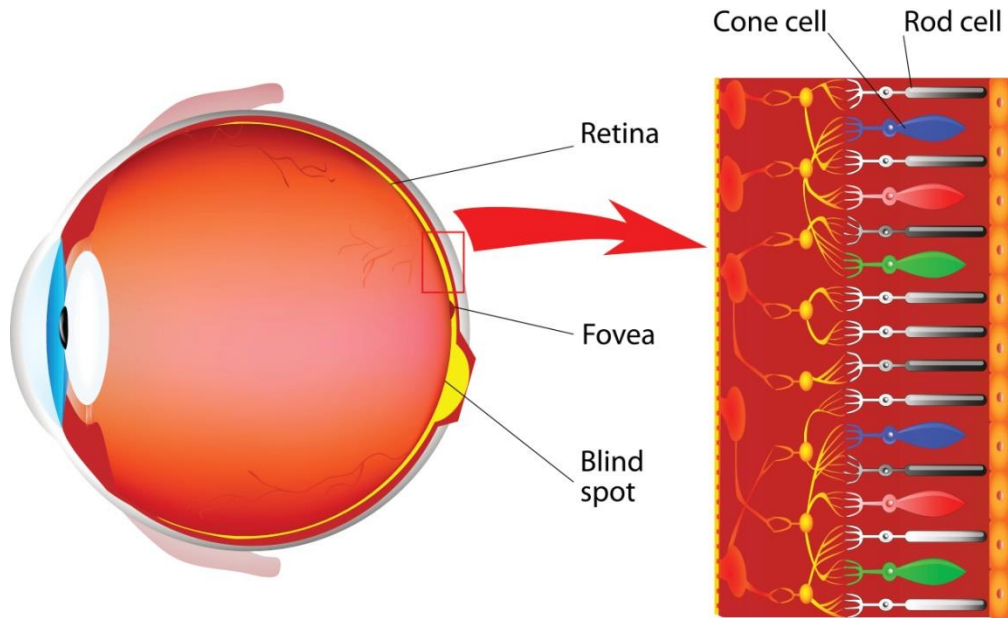


## Hyperopia (long sightedness)

- People who are long sighted **cannot focus** on objects that are **near**.
- It usually occurs when the **eyeball** is **too short**.
- The light rays from distant objects **focus** in the eyeball **behind** the **retina**.
- Hyperopia can be **corrected** with **convex lenses** so that the light rays focus on the retina.

# The central nervous system Part 4 - The eye (biology only)

## Photoreceptor cell

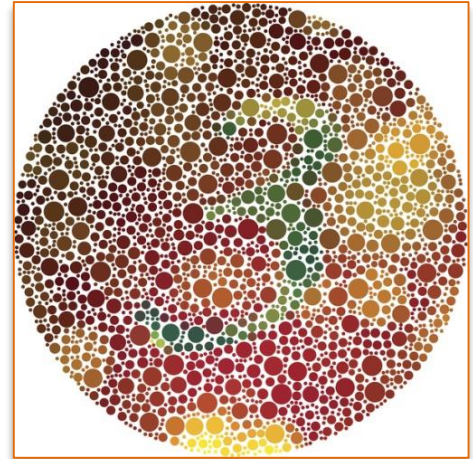


**Rod** cells enable us to see objects in **dim light**. They do not detect colour.

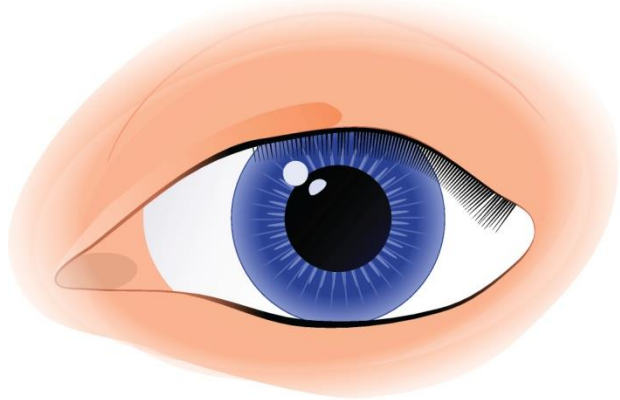
**Cone** cells enable us to see objects clearly in **bright light** and in **colour**. There are three types of cone – red, green and blue. They do not function well in dim light.

**Colour blindness** is a condition that a person is **born with** and is inherited from their parents. More men are colour blind because the gene is carried on the **X chromosome**.

A colour blind person is unable to tell the difference between certain colours. The most common condition is **red green** colour blindness. The **red and green cones** in the retina are **not functioning** normally. There is **no cure** for this condition.



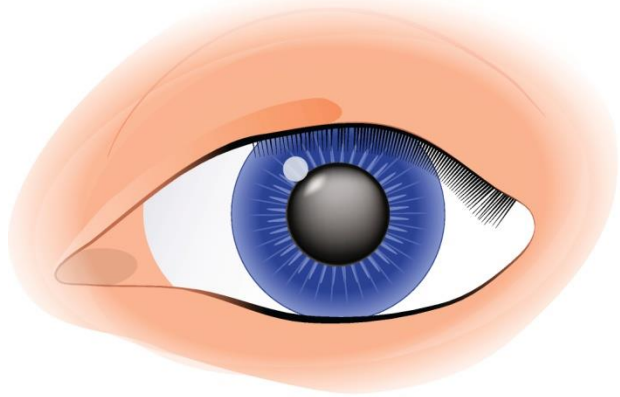
## Cataract



Healthy eye



Clear lens



Eye with cataract



Lens clouded by cataract

Due to a **cloudy patch** on the **lens**, light is unable to enter the eye normally.

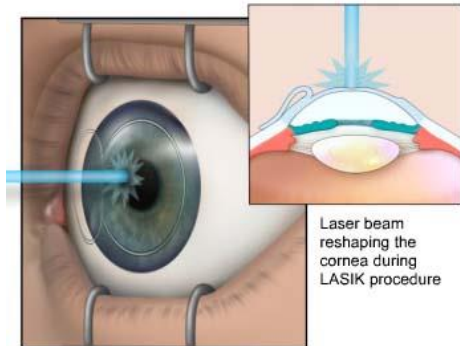
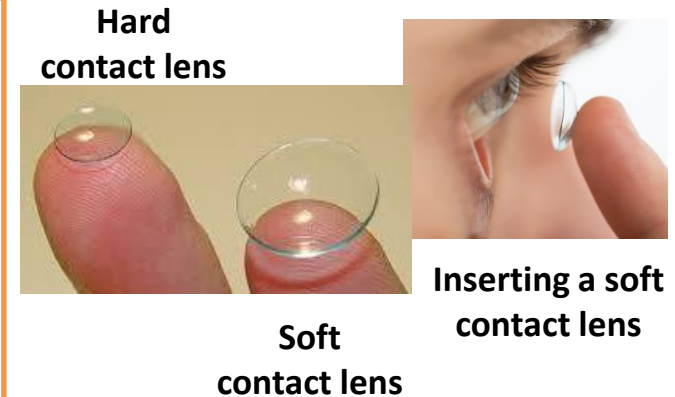
People who have cataracts often have **blurred vision** and find it difficult to see in bright light or in accurate colour.

Cataracts can be **cured** by replacing the lens with an **artificial** one.

# The central nervous system Part 4 - The eye (biology only)

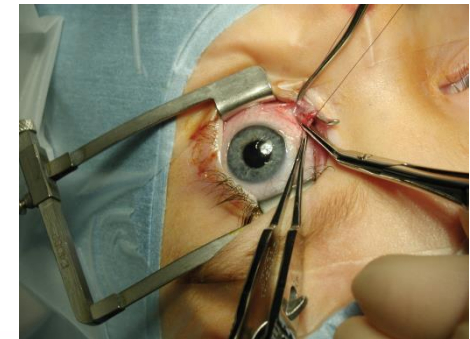
There are new technologies available to correct vision including:

**Contact lenses** – these can be **hard** or **soft** and are inserted directly into the eye and sit on the cornea. This then refracts the light rays. **Advantages** - lightweight, almost invisible, good for people playing sports. **Disadvantages** – not a permanent solution and they can cause irritation and infections.



**Laser surgery** – the other layer of the cornea is peeled back and lasers are used to change the shape of the cornea so that the light rays will refract and form an image on the retina. **Advantages** – permanent solution to correct vision. **Disadvantages** – a surgical procedure, can cause infections.

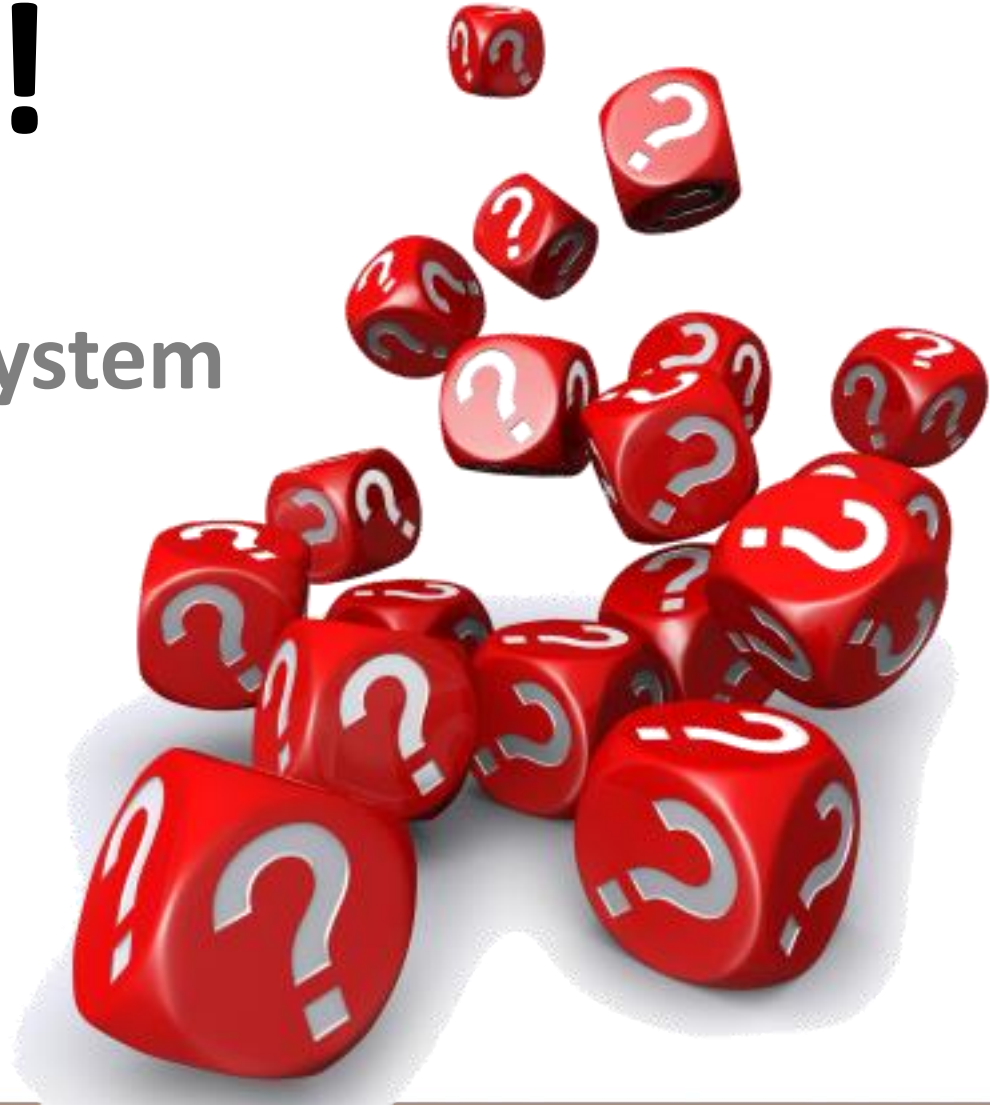
**Lens replacement** – surgery refers to a medical procedure where an artificial acrylic or silicone lens is implanted into the eye to correct problems with vision. **Advantages** – permanent solution to correct vision. **Disadvantages** – a surgical procedure, can cause infections.



# QuestionIT!

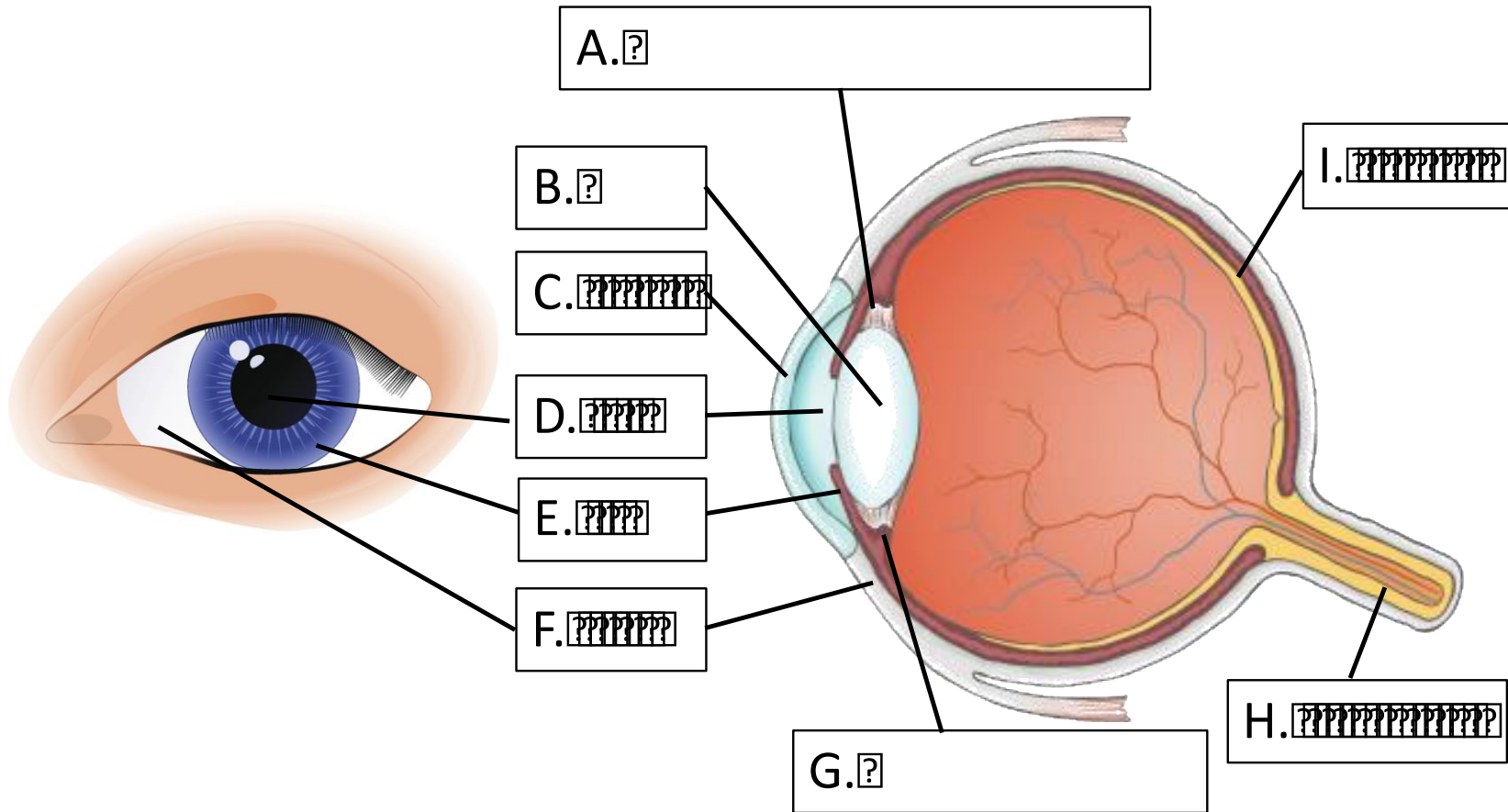
## The Central Nervous system Part 4

- Eye – structure, functions and defects (Biology ONLY)



# The central nervous system Part 4 - Question IT

1. Label parts A – I on the diagram below:



## The central nervous system Part 4 - Question IT

2. Write the name of each part of the eye in the table below:

Part of the eye	Description and function
	Transparent layer at the front of the eye. It refracts light into the eye.
	The coloured part of the eye; contains muscles that control the amount of light entering the eye.
	The hole in the middle of the iris that lets light in. Its diameter is controlled by the iris.
	A transparent, biconvex structure in the eye that refracts light onto the retina.
	Thin layer of tissue at the back of the eye that contains receptor cells for light and colour.
	Tough white supporting wall of the eye.
	Muscles that are connected to the lens by the suspensory ligaments; they change the shape of the lens.
	These connect the lens to the ciliary muscles.
	Carries impulses from the retina to the brain.

## The central nervous system Part 4 - Question IT

3. What is accommodation?
4. How does the eye focus on distant objects?
5. How does the eye focus on near objects?
6. What is myopia? How can it be corrected?
7. What is hyperopia? How can it be corrected?
8. What is a cataract? How can it be treated?
9. What is the most common form of colour blindness?
10. What causes colour blindness?

# AnswerIT!

## The Central Nervous system

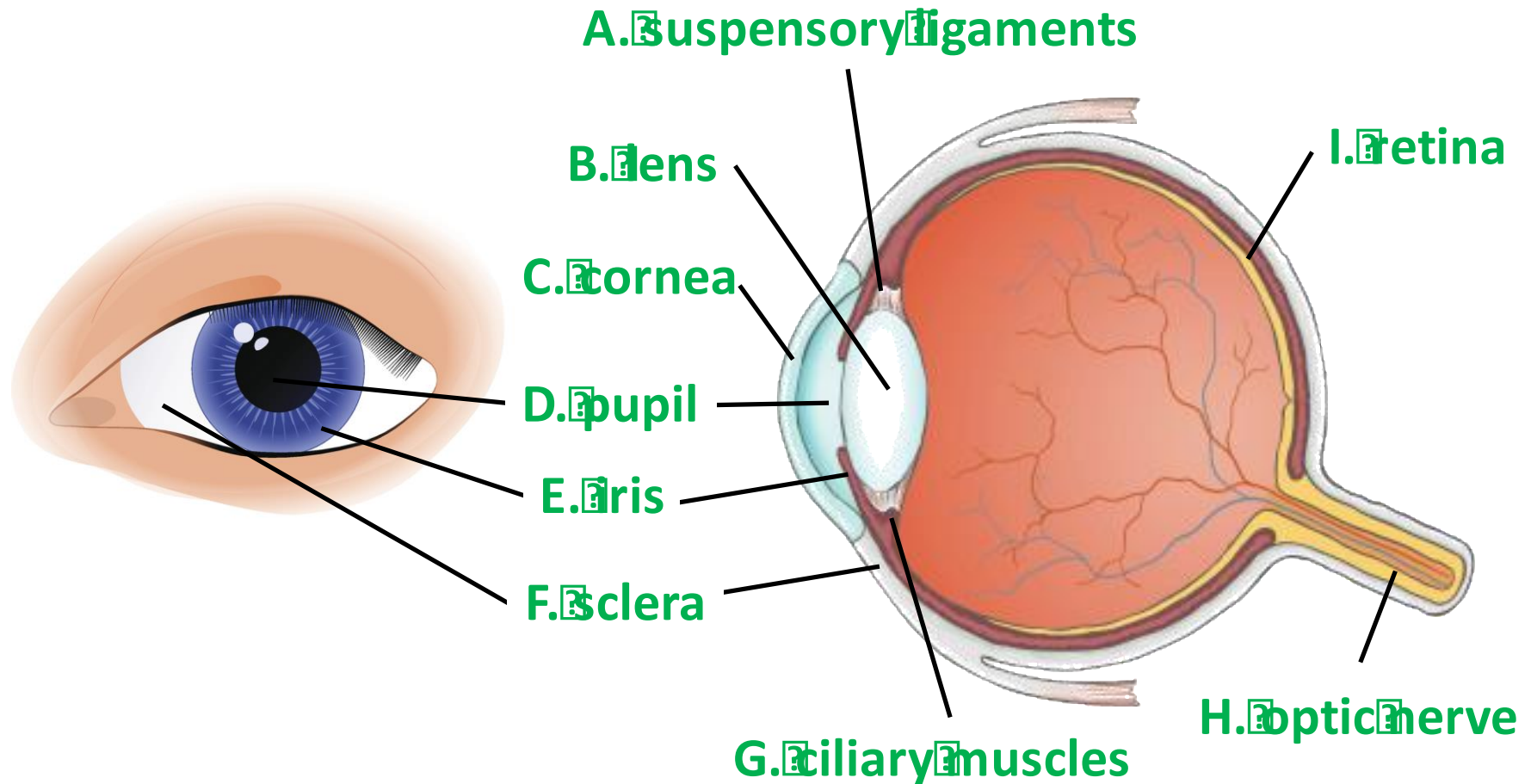
### Part 4

- Eye – structure, functions and defects (Biology ONLY)



# The central nervous system Part 4 - AnswerIT

1. Label parts A – I on the diagram below:



## The central nervous system Part 4 - AnswerIT

2. Write the name of each part of the eye in the table below:

Part of the eye	Description and function
<b>cornea</b>	Transparent layer at the front of the eye. It refracts light into the eye.
<b>iris</b>	The coloured part of the eye; contains muscles that control the amount of light entering the eye.
<b>pupil</b>	The hole in the middle of the iris that lets light in. Its diameter is controlled by the iris.
<b>lens</b>	A transparent, biconvex structure in the eye that refracts light onto the retina.
<b>retina</b>	Thin layer of tissue at the back of the eye that contains receptor cells for light and colour.
<b>sclera</b>	Tough white supporting wall of the eye.
<b>ciliary muscles</b>	Muscles that are connected to the lens by the suspensory ligaments; they change the shape of the lens.
<b>suspensory ligaments</b>	These connect the lens to the ciliary muscles.
<b>optic nerve</b>	Carries impulses from the retina to the brain.

## The central nervous system Part 4 - AnswerIT

3. What is accommodation? **The process of changing the shape of the lens to focus on near or distant objects**
4. How does the eye focus on distant objects? **The ciliary muscles relax, the suspensory ligaments are pulled tight, the lens is then pulled thin and only slightly refracts light rays.**
5. How does the eye focus on near objects? **The ciliary muscles contract, the suspensory ligaments loosen, the lens is then thicker and refracts light rays strongly**
6. What is myopia? How can it be corrected? **Short-sightedness, it can be corrected with concave lenses.**
7. What is hyperopia? How can it be corrected? **Long-sightedness, it can be corrected with convex lenses.**
8. What is a cataract? How can it be treated? **A cloudy patch on the lens. Treated by replacement with an artificial lens.**
9. What is the most common form of colour blindness? **Red green**
10. What causes colour blindness? **Cones not functioning normally- it is an inherited condition which cannot be cured.**