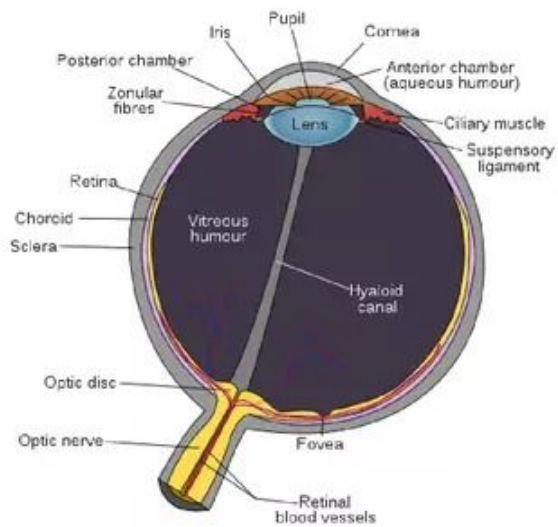


# IGCSE Coordinated Science: Nervous Control in Humans

1. Describe the human nervous system in terms of the central nervous system (brain and spinal cord as areas of coordination) and the peripheral nervous system which together serve to coordinate and regulate body functions.

- Nervous System
  - The point of the nervous system is to “detect” and “respond” to stimuli. Stimuli is basically a detectable change in ones internal or external environment. The Nervous System is split into two essential systems, the Central nervous System and the Peripheral Nervous System.
- Central Nervous System
  - We commonly abbreviate this as the CNS. The CNS consists mainly of the brain and spinal cord. The Spinal cord is a long, thin , tubular bundle of nervous tissue and support tissue that runs through a tunnel in the backbone, essentially protecting it. The skull protects the brain. The CNS gives out instructions to the other parts of the body to perform certain jobs. If your central nervous system is impaired, you might be paralyzed!
- Peripheral Nervous System
  - Key job of PNS is to detect stimuli and send impulses to the brain regarding the detected stimuli
  - PNS is made out of receptors and nerves which help carry the impulses
- Receptor Cells: Cells that detect something about its environment.
  - There are many receptors in the body which are able to detect a wide variety of things such as Temperature, Light, Touch, Sound and Chemicals.
    - Effectors are opposite of receptors.
      - Effectors respond to stimuli, whilst receptors detect it. Effectors are usually muscle and glands.

2. Describe the structure and function of the eye, including accommodation and pupil reflex.



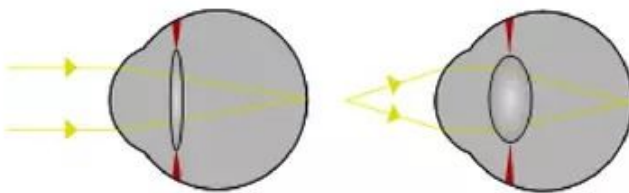
## Human eye is a Sensory Organ

### Features of Eye

<b><u>Section</u></b>	<b><u>Feature</u></b>
Retina	This is the most inner-most layer of the eye. It is very sensitive to light. Fovea is located here along with Rods and Cons.
Iris	The Iris widens and narrows to control the amount of light that enters the eye depending on the light intensity.
Suspensory Ligaments	Loosens and tightens. This is to adjust the thickness of the lens.
Choroid	Middle layer that surrounds the eye that contains many blood vessels.

Iris	This widens and narrows to control amount of light that enters the eye. This amount is dependent on light intensity
Scelera	Outer most, protective layer of the eye.
Retina	This is the inner most section of the eye. It is very sensitive to light and is where the fovea is located. It also contains rods and cones.
Fovea	A light sensitive section.

### Accomodation



- The angle the light hits the eye depends on the distance of the object from the light
- All light rays that hit the eye needs some amount of refraction to be directed to the fovea.
- This why the lens can widen and narrow according to the distance of the object being looked at.
- This widening and narrowing is to ensure that the light ray can hit the retina at the right spot.
- We call this accomodation
- This is the process that involves focusing light to achieve a sharp image
- 70% of light rays are refracted as they pass through cornea:
- The lens then makes final adjustments by changing its shape so light coming from near or far objects can be focused on.

When lens focuses on near objects:

- Ciliary muscle contracts
- This is why if you force your eyes on close objects for a long period of time, your eyes begin to feel sore.
- This causes suspensory ligaments to relax.
- Lens are allowed to be thickened and become more convex.
- Lens become more elastic and will thicken if allowed.
- Give's lens more refractory power.

On far objects:

- Ciliary muscles relax
- Suspensory Ligaments tense up
- Stretches the lens so makes it less thinner and convex.
- Decreases lens refractory power.

### Pupil Reflex

- Pupil increases in size in dim light and vice-versa:
- The increase in size (dilation) is to increase the amount of light collected and to boost vision.
- The decrease in size (contraction) is to decrease the amount of light collected and hence protect ones retina's.
- This is an automatic reflex rather than a conscious action and one does not need to consciously devote effort to allow this process to occur.

### 3 Identify motor (effector), relay (connector) and sensory neurones from diagrams

Just focus on the three neurons you need to know.

### 4 Describe a simple reflex arc in terms of sensory, relay and motor neurones, and a reflex action as a means of automatically and rapidly integrating and coordinating stimuli with responses. Reflex Actions

- Reflex are fast, automatic, and cannot be learned.
- These exist to ensure that animals have a good chance of survival

Reflex Actions include:

- Blinking (stimulated by bright light)
- Knee jerk (stimulated by the force applied to the knee)
- Yawning (stimulated by high Carbon Dioxide levels)

Reflex Arc: Process which controls the reflex actions.

The path taken for a reflex arc: Sensory Cell → Sensory Neurone → Relay neurone → Motor neurone → Effector