Help maintain homeostasis by capturing stimuli from the external environment and relaying them to the brain for processing.

Ex. Eye structure

- protected by bony ridges and socket of the skull, plus eyelashes, eyelids and tears
- two directed forward for chasing prey in a 3D environment, binocular vision is the minimum needed for depth perception
Eye Parts :

Eyeball (globe) wall has 3 layers...

Sclera -
“white of the eye”, shapes eyeball, thick outermost layer, clear bulge in front is the cornea

Choroid layer -
absorbs light so it doesn’t reflect / bounce around inside the eyeball, forms the iris in front, ciliary body muscles control the shape of the lens (“accomodation”)

Conunctiva -
a clear membrane over the front of the eye keeping the front moist ( lacrimal glands produce tears (lacrimal fluid), carried by lacrimal ducts to your eyes, and drain into the sinuses )

Inner rear layer...the retina -
a light sensitive layer containing 2 kinds of photoreceptor cells...rod cells and cone cells.
Rods... concentrated around the retina’s periphery, for low light black / white / gray vision at night. 150 M

Cones... concentrated at the retina’s center, for color brighter light vision...red, green, blue. Daytime vision, neurons have a higher threshold. 6B

Both use a pigment (rhodopsin), which light breaks into retinol (from vitamin A) and opsin, which releases energy to stimulate the receptors. 3 slight changes in opsin gives us 3 types of receptors for red, blue, and green light. Neurons from these receptors bundle together to form the optic nerve leaving from the back of each eye.
Lens -
focusses light so that images land right on the surface of the retina...
To see at a distance... ciliary muscles relax, ligaments tighten, lens gets flatter
To see things up close...opposite happens

Iris -
The colored portion of the front of the eye, surrounding the pupil....controls the size of the pupil

Pupil -
A hole in the center of the iris that allows light rays to enter the back part of the eye

Fovea centralis and macula -
the central area of the retina (macula) directly behind the lens centre, where cones are concentrated in a small pit or dent...(fovea)...the best color vision possible.
Blind spot....
The area on the retina where the optic nerve attaches, no receptors there...no image can be seen if one were to land right on it.

The eyeball is divided into 2 compartments...

The front part....anterior chamber
between cornea and lens is the anterior chamber, filled with “aqueous humor” fluid...directs incoming light through the pupil and headed back to the retina.

The back part....posterior chamber
Between lens and retina is filled with “vitreous humor”, a clear gel that maintains the proper shape of the eye.

Path of Light Through the Eye....
http://www.youtube.com/watch?v=AsKeu4wm3XI&feature=related
http://www.youtube.com/watch?v=RE1MvRmWg7I

Cornea, pupil, lens, retina, receptors, impulse, optic nerve, and relayed on to the “visual cortex” at the rear
of your cerebrum.

Your ANS is responsible for the pupillary response to light, changing the diameter of the pupil using the iris.

Eye Disorders....(be able to describe each) (page 413)

Glaucoma
Cataracts
Astigmatism
Myopia (nearsightedness)
Hyperopia (farsightedness)

Their treatments:

Corneal transplants
Laser surgery (PRK and LASIK)
Corrective lenses
Lens replacement.
Ears and Hearing.....

Helps maintain homeostasis by detecting outside air movement, translating that movement into a neural impulse, to be interpreted by the temporal lobe of the cerebrum.

Parts:

pinna, auditory canal, tympanic membrane (eardrum), ossicles (incus, malleus, and stapes....or hammer, anvil and stirrup), cochlea (know its membranes, page 416), auditory nerve, eustachian tubes, and semicircular canals.
Disorders....

A. inner ear infections - treated with “tympanostomy” procedure, and antibiotics

B. Deafness (2 types)

1. **Neural deafness**... hair cell damage inside the cochlea. Common with aging, but also exposure to loud sound (dB scale). Usually not reversible.

   Sound frequencies are unevenly damaged...high and low ranges first.
2. Conduction deafness...
   Damage to the outer or middle ear that limits the amount of vibration passed (conducted) to the inner ear. Usually not complete, since skull bone still conducts SOME sound.

Treatments/coping with hearing disorders:
   hearing aids (HA) and sign language (ASL)

3 kinds of hearing aids...
   Conventional HA -
      mic, amp, and receiver, you adjust the volume

   Programmable HA -
      Electronics custom programmed to your frequency loss. Automatic volume control.

   Digital HA -
      Digitizes sound, and modifies the different pitches to custom fit to your needs.