

CNS Block



Visual Experiments

**Done By;*

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☆Visual acuity☆

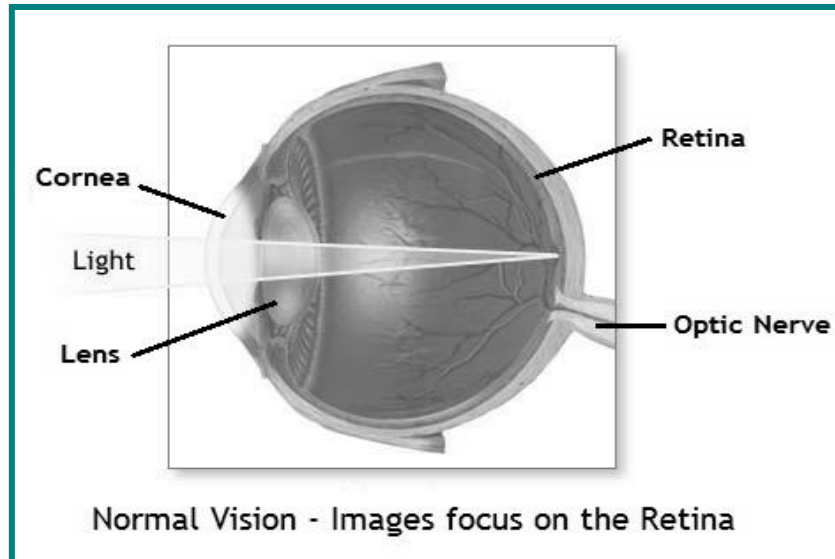
- Visual Acuity is defined as the shortest distance by which two lines can be separated and still perceived as two lines.

it depends on;.

1- Refractive ability of the refractive media (Cornea and lens) of the eye.

- **Refractive ability;** refers to the ability of the eyes to bend parallel rays of light coming from infinity to focus on the retina

2- The density of the photoreceptors.



-The **fovea centralis** is the place of greatest visual acuity during the daylight (Full of Cons).

-the **mid-peripheral portion** of the retina is the place of greatest visual acuity in the dim light (Full of Rods).

* Test For Far Vision*

- Equipment:

Snellen's Chart

		Metric Feet	
A		6/60	20/200
D F		6/36	20/120
H Z P		6/24	20/80
T X U D		6/18	20/60
Z A D N H		6/12	20/40
P N T U H X		6/9	20/30
U A Z N F D T		6/6	20/20
N P H T A F X U		6/5	20/16

DIAGRAM OF SNELLEN'S CHART

* Interpretation:

$$\text{Visual Acuity (VA)} = \frac{d}{D}$$

-Where,

d = the distance from where the subject is reading the chart.

D = the distance from which a normal subject can read that line.

- Normal Visual Acuity for far vision is 6/6 (in meters) or 20/20 (in feet).

* Refractive Errors *

- MYOPIA -

Myopia is a refractive error in which close objects are seen clearly, but the far objects appear blurred.

- This condition is also called *Nearsightedness*.

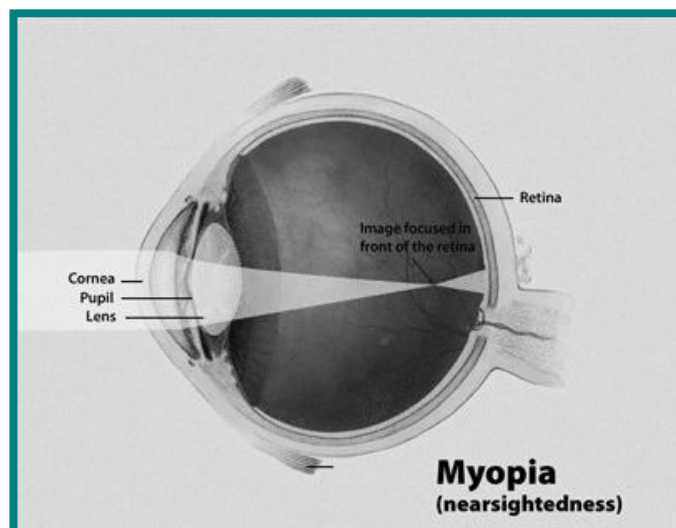
-Causes;.

It occurs if the eyeball is too long or the cornea has too much curvature. As a result, the light entering the eye from a distant object isn't focused exactly on the retina but focuses **in front of it**, so that distant object looks blurred.

-Treated By:

1- Applying *concave (minus) lenses* in front of the eyes.

2- Performing surgery to flatten cornea that will decrease the refractive ability of the cornea and the light rays from a far object will focus on the retina.



- Hypermetropia / Hyperopia-

Hypermetropia is a refractive error in which far objects are seen clearly, but the near objects appear blurred.

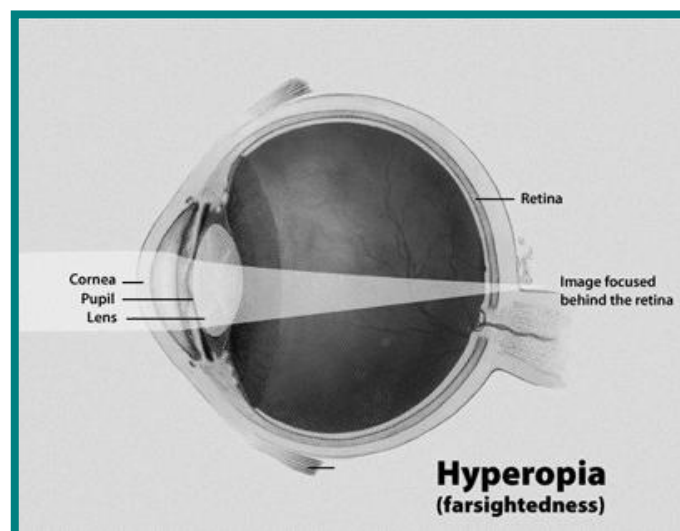
- This refractive error is known as *farsightedness*.

-Causes;.

The eyeball is smaller or the lens is weak, the image from a near object is focused **behind the retina**, making the object look blurred.

-Treated By;

applying **convex (plus) lenses** in front of eye so that the light rays entering the eyes from any near object will focus exactly on the retina and the near objects can be seen clearly then.

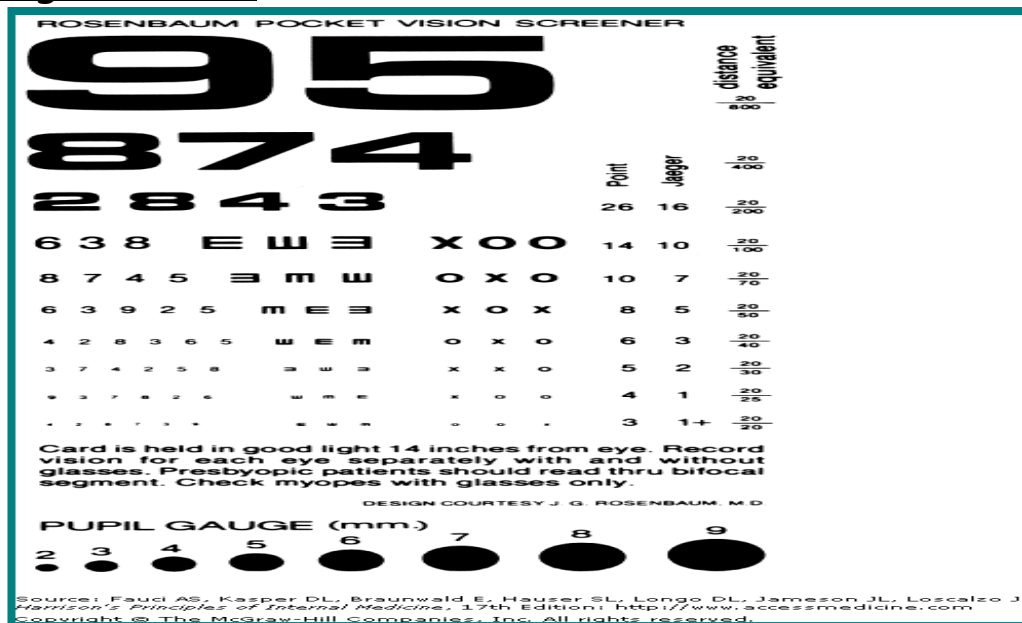


* Test For Near Vision *

- The near vision test is measuring your ability to read and see objects within an arm's distance from the body.
- This test is important if you have **hypermetropia** or **presbyopia**.
- Most clinics record the near vision as a **Snellen fraction (distance equivalent)** or as a **Jaeger notation**.

*Equipment:

Jaeger's Chart.



★ Test For Astigmatism★

- Astigmatism is a type of refractive error that causes blurred vision mainly due to the irregular shape of the cornea and sometimes uneven curvature of the lens inside the eye can also cause Astigmatism.

-Causes:-

An irregular shaped cornea or lens prevents light from focusing properly on the retina.

- Astigmatism frequently occurs with other vision conditions like nearsightedness (Myopia) and farsightedness (Hypermetropia).

- Slight amounts of astigmatism usually don't affect vision and don't require treatment. However, larger amounts of astigmatism cause distorted or blurred vision, eye discomfort and headaches.

-Treated By:

Adding *cylindrical lenses* in eyeglasses that will correct the astigmatism by altering the way light enters your eyes.

**Equipment:*

Astigmatism Chart

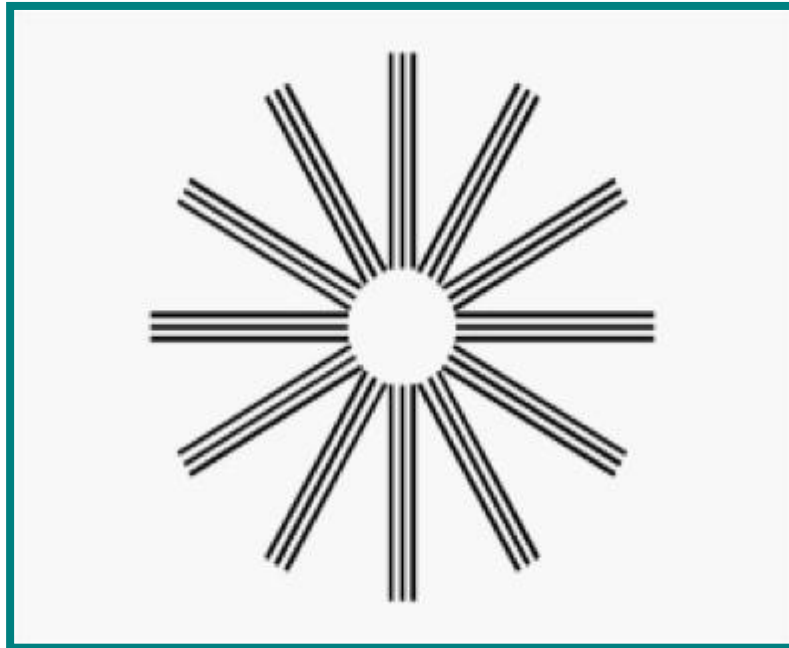


DIAGRAM OF ASTIGMATISM CHART

- If astigmatism is present, some of the spokes will appear sharp and dark, whereas the others will appear blurred and lighter because they come to focus either in front of or behind the retina when they pass through uneven curvature of the cornea.

* Demonstration Of Blind Spot*

A **blind spot**, also known as a **scotoma**, is the place in the visual field where an object cannot be seen keeping one eye closed.

- This is due to the light rays from that part of the visual field focus on the optic disc of the retina which lacks the light-detecting **photoreceptor cells**.
- The **optic disc** of the retina is located medial to fovea centralis and is the part of retina through which the **optic nerve** leaves and **blood vessels** enter.

*Equipment:

Blind Spot Card.



*** DIAGRAM OF A BLIND SPOT CARD***

- Keeping your right eye focused on the "plus" sign, gradually bring the blind spot card closer to your face until the "circle" drawn on the blind spot card disappears. This is the blind spot of your right eye.

* Determination Of Near Point*

Near point is the nearest possible distance at which the near object can be clearly seen.

- The near point of vision changes dramatically with age.
- Averaging about 8cm at the age of 10 and about 100 cm at the age of 70.

AGE	NEAR POINT
10 YEARS	8 cm
20 YEARS	10 cm
30 YEARS	12.5 cm
40 YEARS	18 cm
50 YEARS	40 cm
60 YEARS	83 cm
70 YEARS	100 cm

-With the age, people will suffer from:

- 1- Loss of accommodation
- 2- Loss of lens elasticity
- 3- Near point recession

And this is known as **Presbyopia**.

-Treated By: Bifocal lens.

*Equipment:

Common Pin

☆ Test For Accommodation☆

The process of accommodation can be tested by observing Purkinje-Sanson images in a dark room.

(you should know the accommodation reflex)

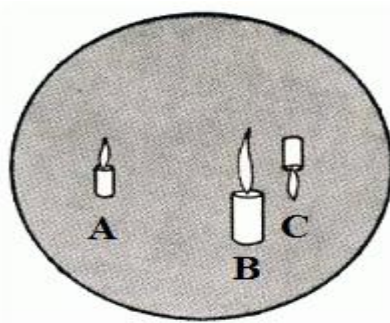
- Purkinje-Sanson images:

If a small bright light, usually a candle, is held in front of and a little to one side of the eye in a very dark room, **three images are seen**:

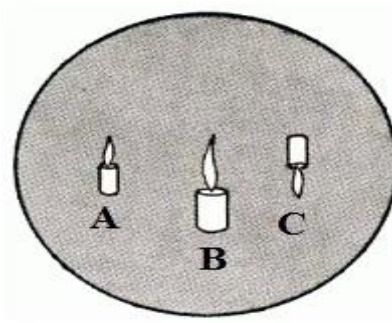
1. The first image comes from the cornea and it is small, bright and upright.
2. The second image comes from anterior surface of the lens. It is large, upright but less bright.
3. The third or last image comes from posterior surface of the lens and it is small, bright and inverted.

☆Equipment:

A candle and a dark room



Before Accommodation



After Accommodation

A = First image from Cornea

B = Second image from anterior surface of lens

C = Third image from posterior surface of lens

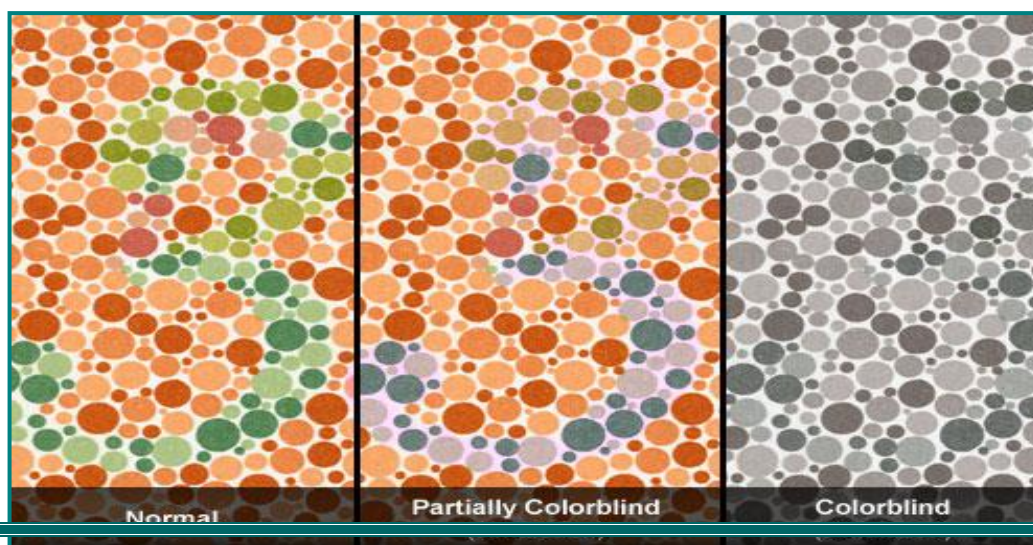
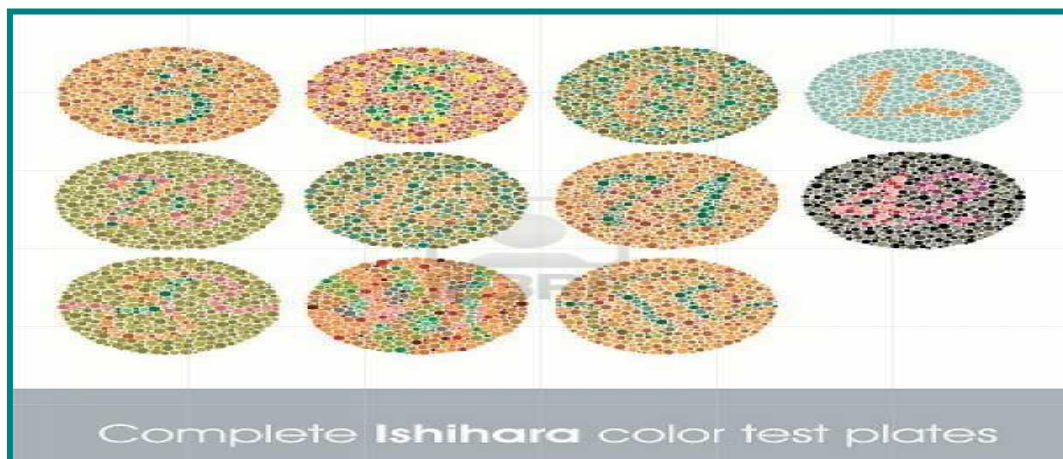
* Test for Color Vision*

Color vision is the function of the cones.

- There are three types of cones in our eyes; red, green and blue.
- The gene that causes defect in color vision is carried on the **X chromosome**, making the handicap more common among **men** (who have just one X chromosome) than among **women** (who have two).

*Equipment:

Ishihara's Colored Plates.



-Nopia=Blindness.

-Nomaly=Weakness.

TYPE OF COLOR BLINDNESS	DEFINITION & PATHOLOGY
PROTANOPIA (RED BLINDNESS)	A form of colorblindness characterized by defective perception of red and confusion of red with green or bluish green due to the complete absence of red cones.
DEUTERANOPIA (GREEN BLINDNESS)	A form of colorblindness characterized by insensitivity to green, moderately affecting red-green hue discrimination due to the complete absence of green cones.
TRITANOPIA (BLUE BLINDNESS)	A very rare visual defect characterized by the inability to differentiate between blue and yellow due to the complete absence of blue cones.
PROTANOMALY	A type of anomalous trichromatic vision with defective perception of red due to less sensitivity of red cones.
DEUTERANOMALY	A type of anomalous trichromatic vision in which the green cones have decreased sensitivity, mildly affecting red-green hue discrimination.
TRITANOMALY	A rare type of anomalous trichromatic vision in which the blue cones have decreased sensitivity, affecting blue–yellow hue discrimination.

★*Good Luck*★

