VISUAL EXPERIMENTS

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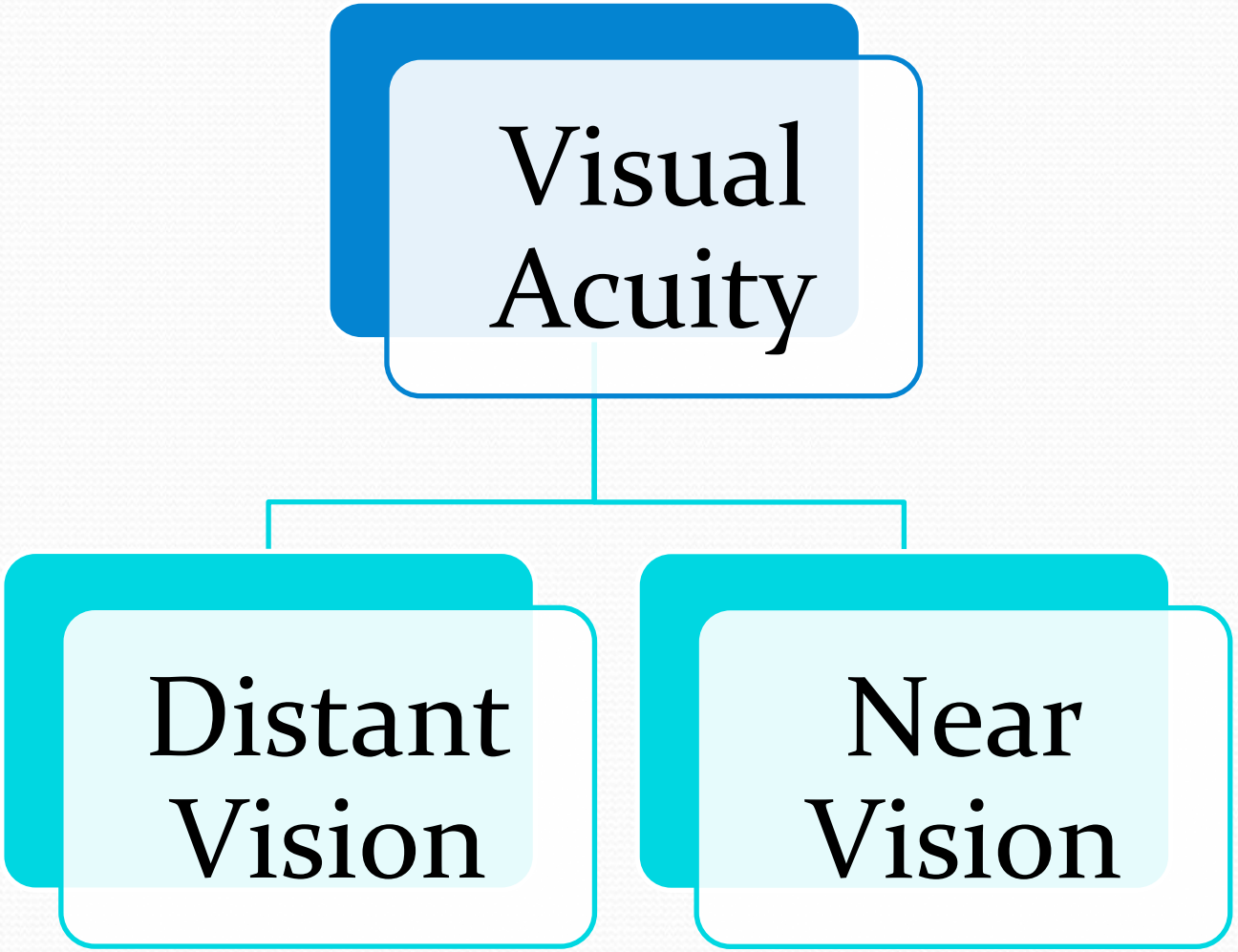
- TEST FOR VISUAL ACUITY
  - Distant vision
  - Near vision
- TEST FOR ASTIGMATISM
- TEST FOR ACCOMODATION
  - Determination of near point
  - SANSON-PURKINJE IMAGES
- TEST FOR COLOUR VISION
- DEMONSTRATION OF BLIND SPOT

Requirements

1. Snellen’s chart
2. Jaeger’s chart
3. Astigmatism chart
4. Pins and rulers
5. Candles and dark room.
6. Ishihara's coloured plates.
7. Blind spot tester


Visual Acuity
Distant Vision
Near Vision

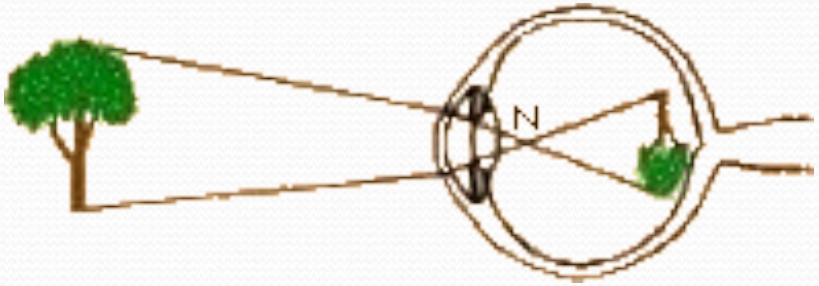
Visual Acuity

- It is the power to discriminate details or the shortest distance by which 2 lines can be separated and still perceived as 2 lines.

- It depends on:
  - The refractive ability of the refractive media.
  - The density of the photoreceptors.
  - The visual angle

Visual angle

- It is the angle subtended at the nodal point by the light rays converging on the nodal point of the eye.



- The average person can resolve 2 points & recognise their separation when the angle they subtend is 1 minute (1/60 of a degree). The space on the retina is 4.5µm or there is at least one unstimulated receptor between the 2 lines.

Visual acuity test is indicative of the function of the fovea which is used for central vision.

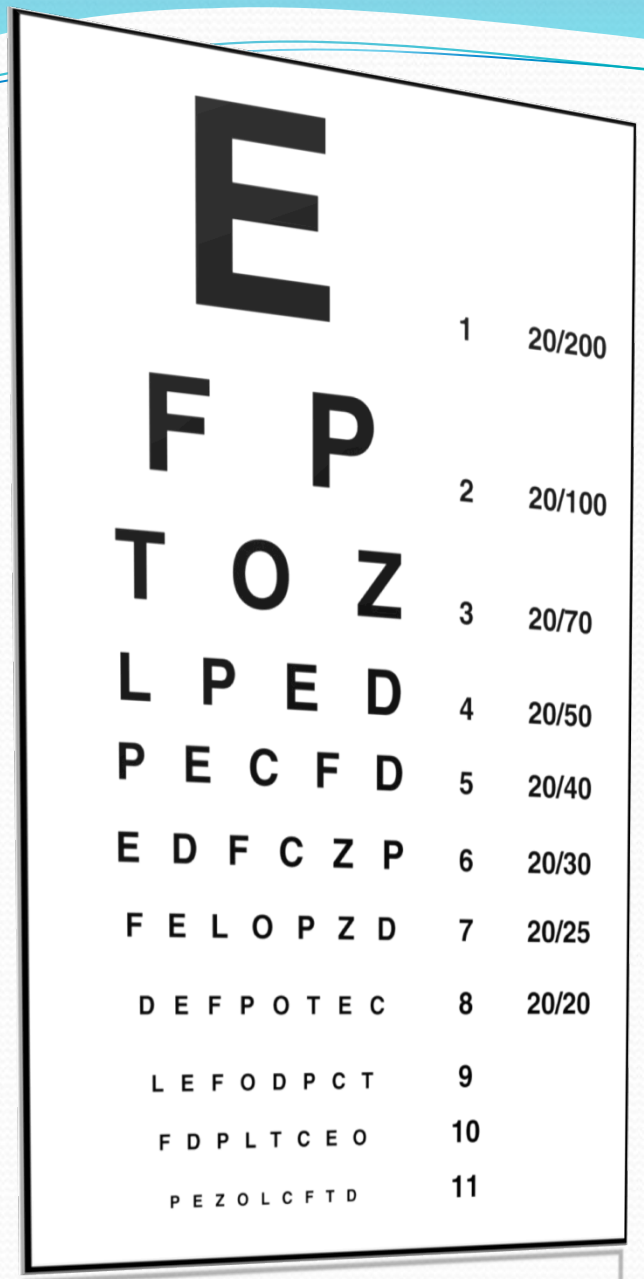
How visual acuity is measured?

There are 2 types: 

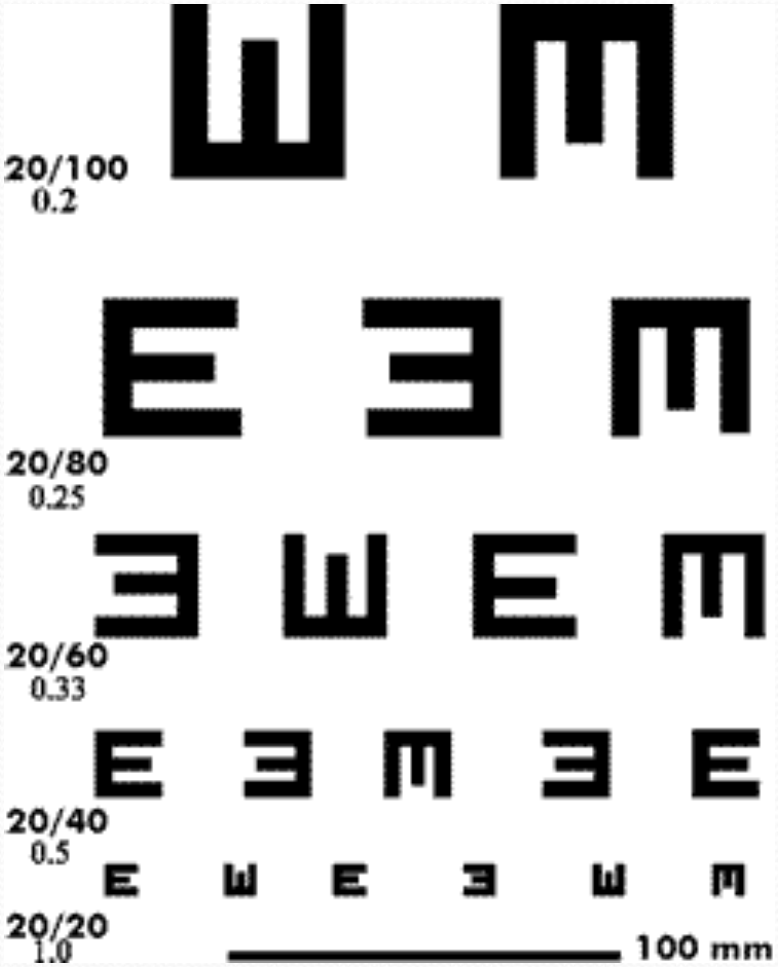
1. **Distant vision** : Snellen chart test
2. **Near vision** : Jaeger's chart test

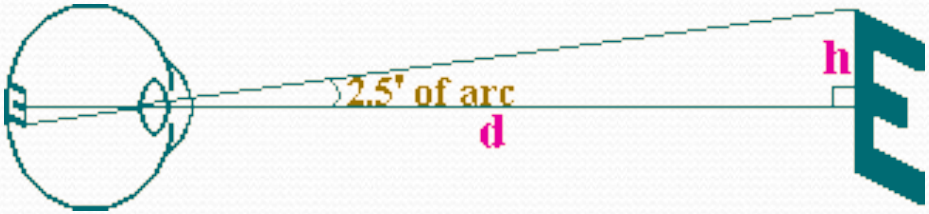
Snellen Chart Test

- Snellen Alphabet Chart
- Snellen E chart


E
1 20/200
F P
2 20/100
T O Z
3 20/70
L P E D
4 20/50
P E C F D
5 20/40
E D F C Z P
6 20/30
F E L O P Z D
7 20/25
D E F P O T E C
8 20/20
L E F O D P C T
9
F D P L T C E O
10
P E Z O L C F T D
11


A
20/200
D F
20/100
H Z P
20/70
T X U D
20/50
Z A D N H
20/40
P N T U H X
20/30
U A Z N F D T
20/25
N P H T A F X U
20/20
X D F H P T Z A N
20/15
20/10


20/100
0.2
20/80
0.25
20/60
0.33
20/40
0.5
20/20
1.0
100 mm


h
2.5' of arc
d

Procedure

- Snellen chart is placed at a distance d = 20 feet (6m).
- Cover on eye.
- Ask him to read aloud the letters of each row (begin at top).
- Find out the smallest letter he could see.
- Note the distance D of this line.
- Repeat the test covering the other eye.
- Perform the test without glasses.

Recording Results

Visual Acuity = d / D

d = distance between patient & chart

D = distance from where a normal subject can read.

Exple: V A of 20/80 :The patient can recognise at 20 feet a symbol that can be recognised by a person with Nl VA at 80 feet.

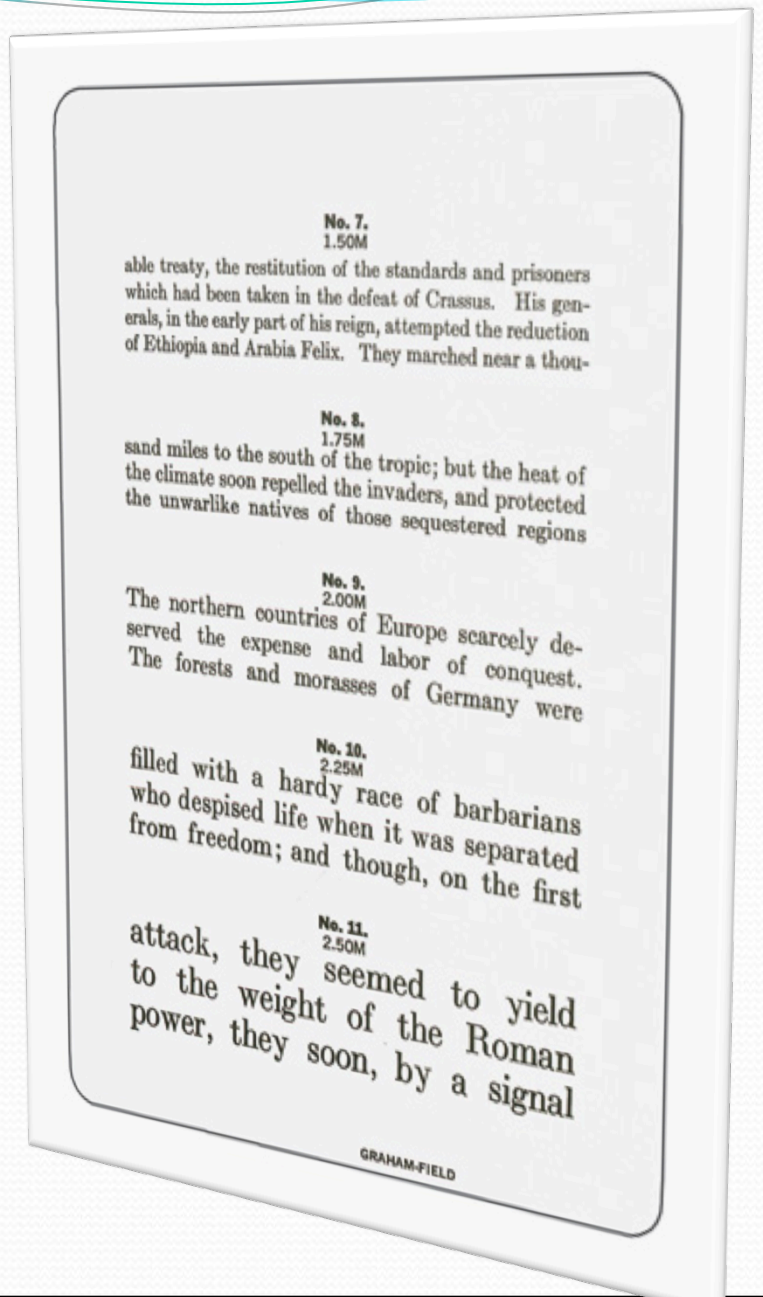
- VA : 20/20 is a reference standard
- The larger the bottom nbr the poorer the vision. (eg:20/30).
- The less the bottom nbr the better the acuity. (eg:20/15).

Test For Near Vision

Procedure:

- Ask the subject to hold the Jaeger card at a distance of 30 cm
- Select the test eye & cover the other eye
- Ask him to read the smallest line or recognise the smallest picture
- Repeat the test with the other eye.

ource: Fauci AS, Kasper DL, Braunwald E, Hauser SL, Longo DL, Jameson JL, Loscalzo
arrison's Principles of Internal Medicine, 17th Edition: http://www.accessmedicine.com



Interpretation

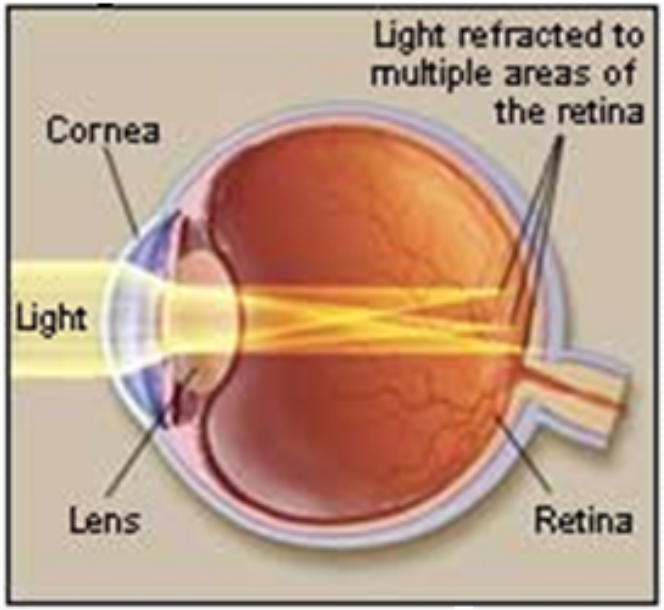
- If he can read the line JO.6: He can read at 30cm the letters or pictures that can be read by a normal subject at 60cm.

- He is normal if he can identify line JO.3 : 30cm

- ✓ A myopic (nearsighted) person will have better Vac at near than at far.
- ✓ A hypertropic (farsighted) person will have better Vac at far than at near.
- ✓ Snellen chart detects myopia.
- ✓ Jaeger chart detects hypermetropia

Test For Astigmatism

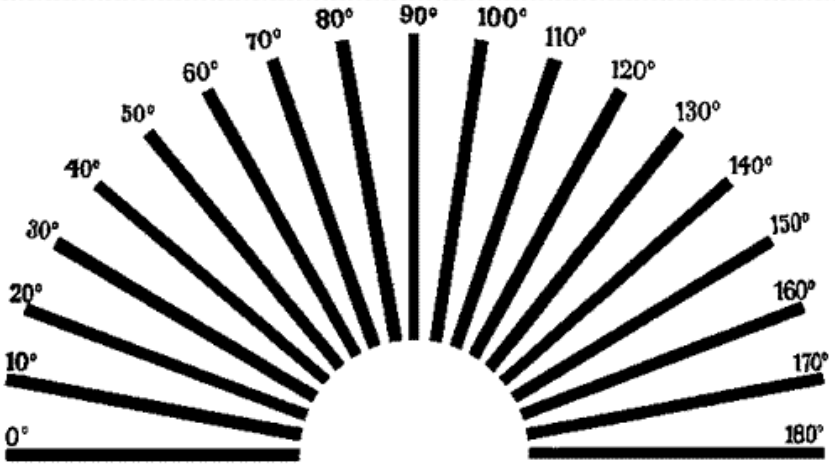
Astigmatism: irregular curvature of one or more surfaces of the cornea or lens; So there is no distinct point of focus inside the eye, but rather smeared or spread out focus.



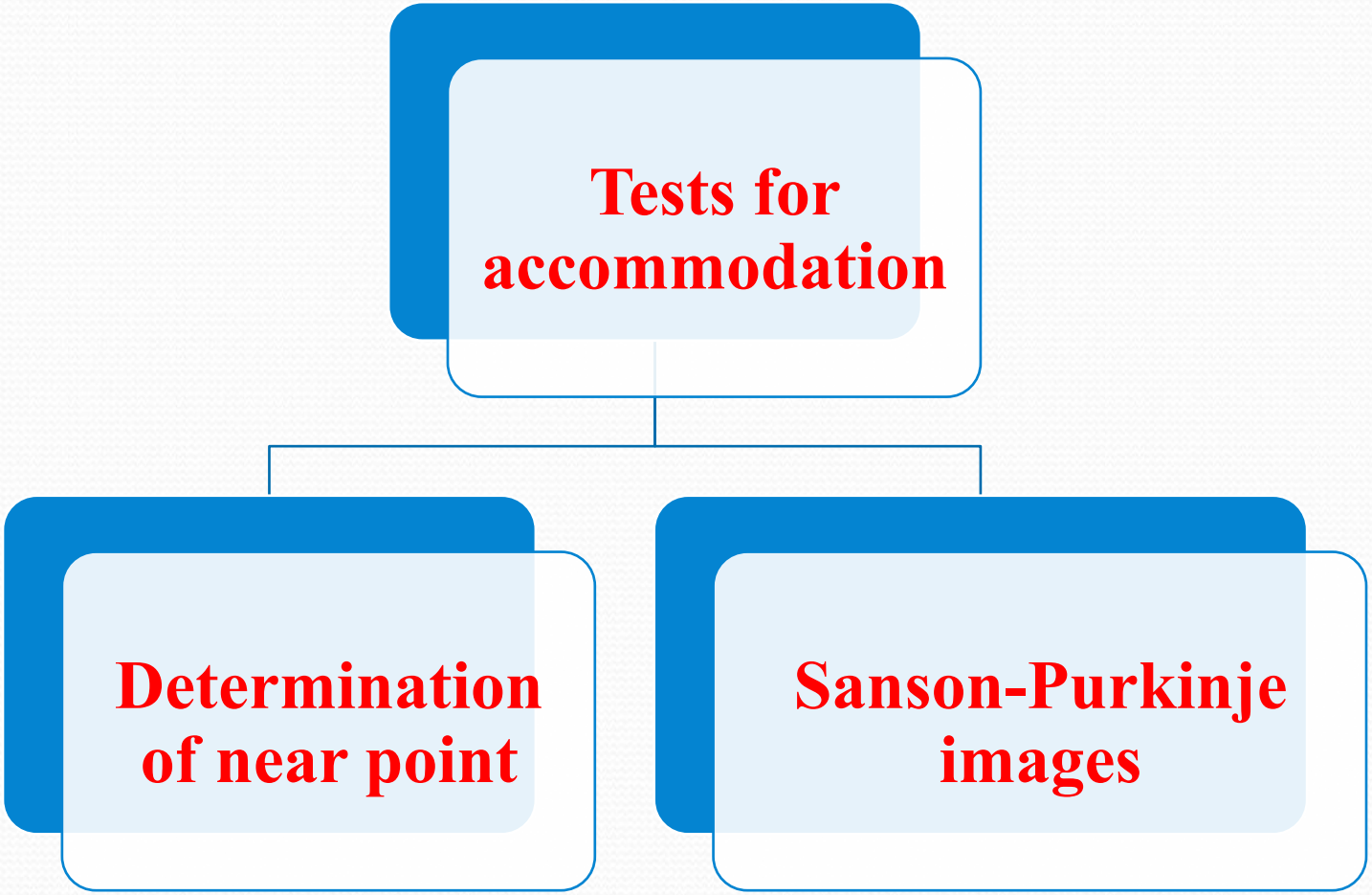
- Objects at any distance appear blurry & distorted.

Procedure

- Subject stands at 6m (20 ft) from an astigmatism chart
- Covers one eye.
- This chart consists of a nbr of dark lines radiating from a central point.



- If astigmatism is present, some of the spokes appear sharp & dark ;others appear blurred & lighter.


Tests for accommodation
Determination of near point
Sanson-Purkinje images

Accommodation

Is the process by which the refractive power of the lens is increased by increasing the curvature of the anterior surface of the lens for viewing near objects.

Determination of Near Point

- Def: The distance from the eye to the nearest object that can be focused clearly .

- The N P of vision increases with age : loss of elasticity of lens & weakening of cilliary muscles which control lens focusing: (presbyopia).

- At age 10: NP= 8cm .
- At age 70: NP= 100cm.

Procedure

- Place one hand over one eye.
- Focus on a pin held at arm length
- Gradually bring the pin closer focusing continually until the pin begins to blur.
- Measure the distance from the eye to the pen at the point of blurring; this is the near point of vision
- Repeat with the other eye.

SANSON-PURKINJE IMAGES

1. The subject looks at a distant object in a dark room.

2. Place a candle light in front of and a little to the side of the subject's eye.

3. Look into the subject's eye from the side opposite to the candle.

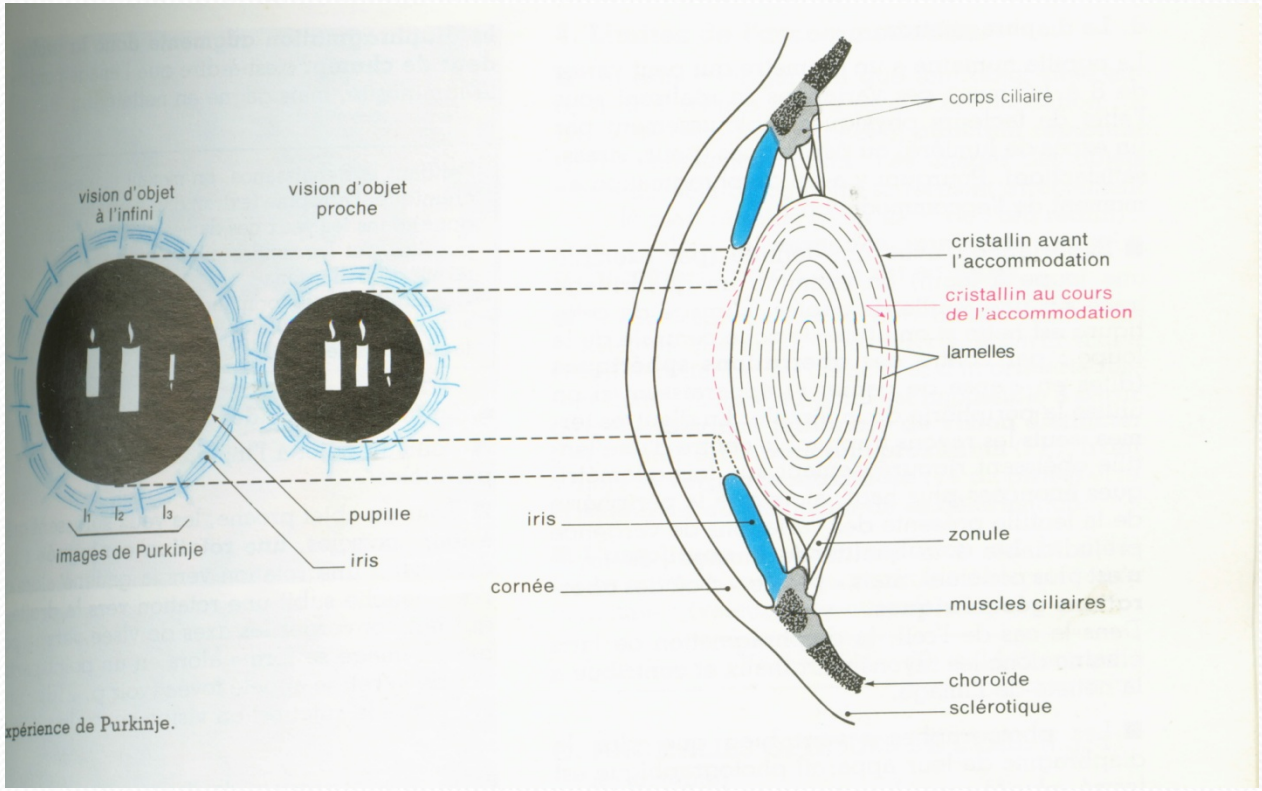
4. Before accommodation, when the eye is in relaxed state observe how many clear images of the candle light are reflected in the subject's pupillary area. Take note of the relative size and position of the images.

Images	BEFORE ACCOMODATION	AFTER ACCOMODATION
First	Bright, small and upright from cornea	
Second	Dim, large and upright from anterior surface of lens	
Third	Small and inverted from posterior surface of lens	

5. Now ask the subject to focus on an object nearby.

6. Observe the changes that are produced in the size and position and brightness of the three images.

SANSON-PURKINJE IMAGES



xpérience de Purkinje.

Images	BEFORE ACCOMODATION	AFTER ACCOMODATION
First	Bright, small and upright from cornea	image does not change (corneal curvature unchanged)
Second	Dim, large and upright from anterior surface of lens	image becomes smaller and moves toward the upright image (due to the ↑in curvature of anterior surface of lens)
Third	Small and inverted from posterior surface of lens	changes very little (the curvature of the posterior lens surface changes very little)

Conclusion

The increased convexity occurs mainly in the anterior surface of the lens.

- ***Myopia***: corrected by **concave lenses**
- ***Hypermetropia***: corrected by **convex lenses**
- ***Astigmatism***: corrected by **cylindrical lenses**
- ***Presbyopia***: corrected by **bifocal lenses**

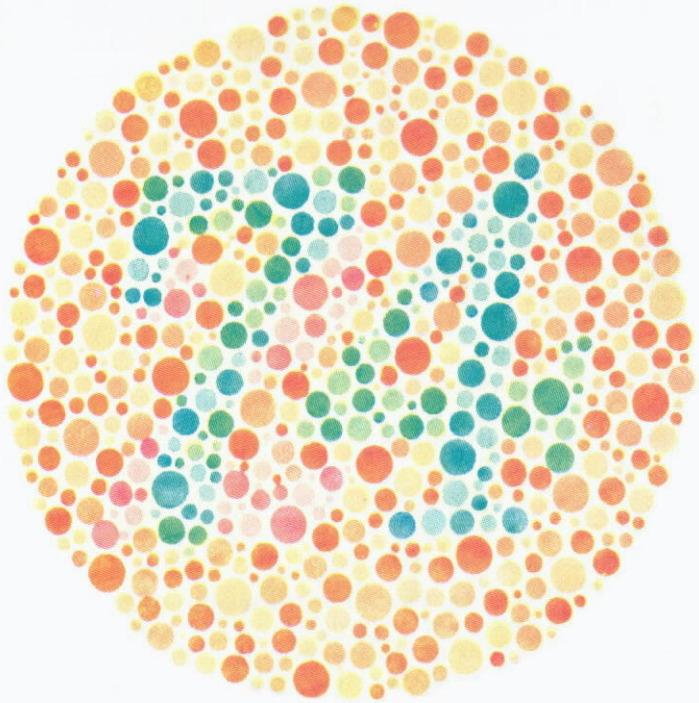
TEST FOR COLOR VISION

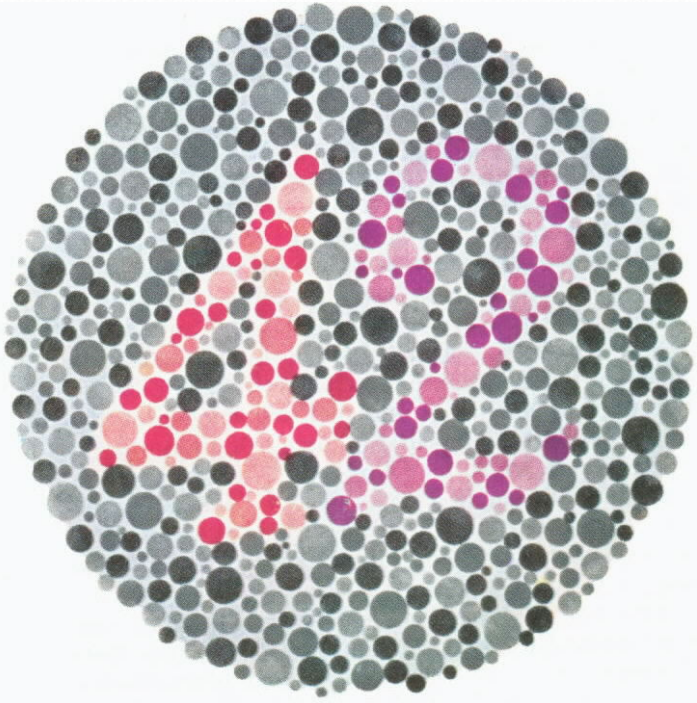
Ishihara's coloured plates

are made up of coloured numbers or spots on a background of identical shaped colored spots.

- The figures or numbers are intentionally made up of colors that are likely to look the same as the background to an individual who is color blind.

Ishihara's colored plates





Procedure:

1. Select the eye to be tested and close the other eye.
2. Ask the subject to read the number in several plates or ask him to trace the zigzag pathway with his index finger.
3. Note if the subject has difficulty or fails to read the number or trace the path in the plates.
4. Survey all members of your group for color blindness.
5. Record the data in the table provided.

Demonstration Of blind spot

- Hold the card 20 inch from your face
- Cover the R eye ; focus the L eye on the +
- Slowly bring the card closer until the dot disappears
- Continue to move the image closer until the dot reappears
- Cover the L eye; focus on the dot with the R eye
- Move the image slowly closer to you and the plus should disappear

Thank You