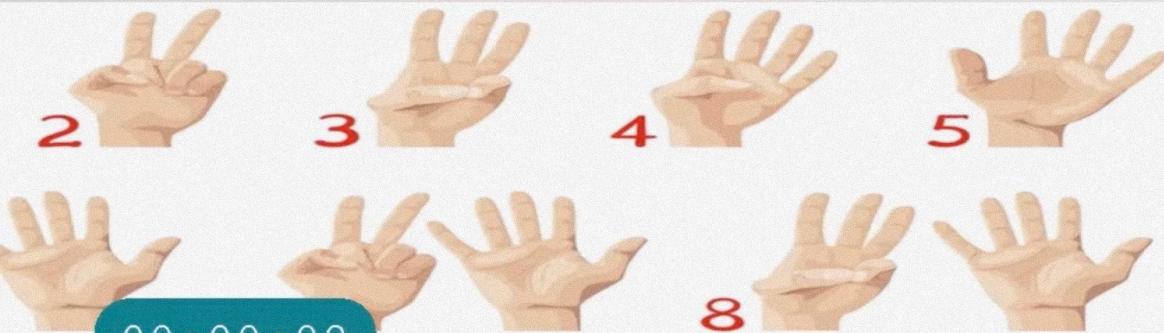


VISUAL ACUITY & SNELLEN'S CHART TESTING

DR AMRIT SAHIL PANJWANI (MBBS, MS)



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20/200

20/100

20/70

20/50

20/40

20/30

20/25

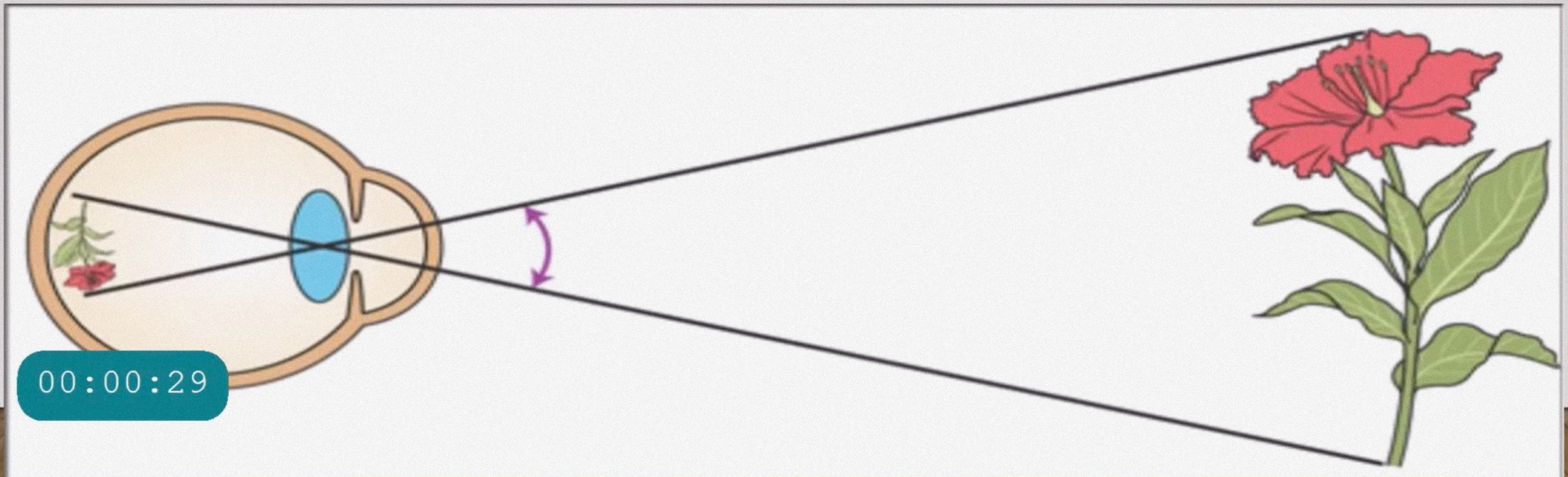
20/20

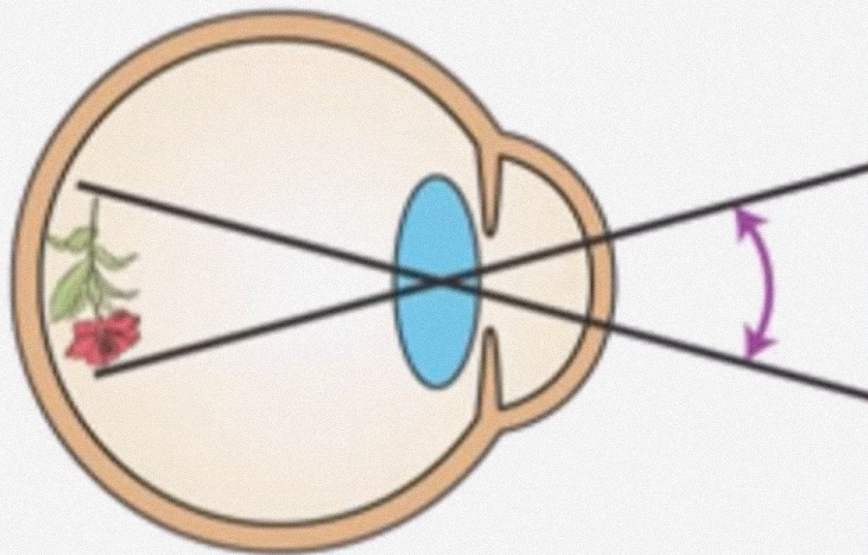
E	1
F P	2
T O Z	3
L P E D	4
P E C F D	5
E D F C Z P	6
F E L O P Z D	7
D E F P O T E C	8
L E F O D F C T	9
F D P L T C E O	10
F E E L E F T E	11



WHAT IS VISUAL ANGLE

- Angle subtended at the **nodal point** of the eye by the physical dimensions of an object in the visual field.





The nodal point is roughly located between the anterior $2/3^{\text{rd}}$ and the posterior $1/3^{\text{rd}}$ of the lens.

00:01:14



WHAT IS VISUAL ACUITY

- Measure of the ability of the eye to distinguish shapes and the details of objects at a given distance.
- **RESOLVING POWER of EYE**
- Reciprocal of the **minimum resolvable angle** measured *in minutes of arc* for a standard test pattern

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WHAT ARE THE COMPONENTS OF VISUAL ACUITY?

MINIMUM DETECTABLE

MINIMUM SEPERABLE

MINIMUM COGNIZABLE

MINIMUM DISCRIMINABLE

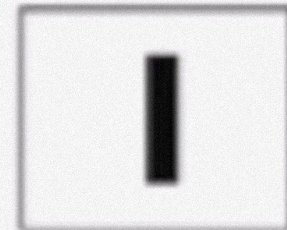
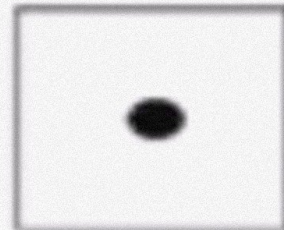
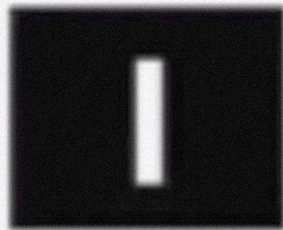
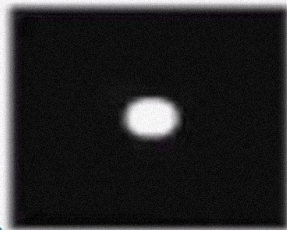
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MINIMUM DETECTABLE

Ability to determine whether or not an object is present in a visual field.

The limit for this kind of acuity is ~ 1 arc second.



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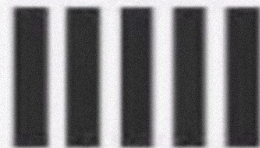


MINIMUM SEPERABLE (RESOLUTION)

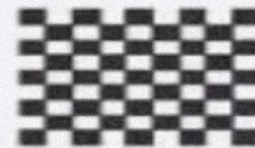
Discrimination of 2 spatially separated targets.
Normal angular threshold of discrimination for resolution 30-60 seconds of an arc. (minimum angle of resolution).



(a)



(b)



(c)

00:03:35



MINIMUM COGNIZABLE (RECOGNITION)

- MINIMUM COGNIZABLE: not only discrimination of the spatial characteristics of the test pattern but also the pattern with which he has previous experience

(Identification of faces, letters, symbols, pictures etc.)

F

C

E

o c

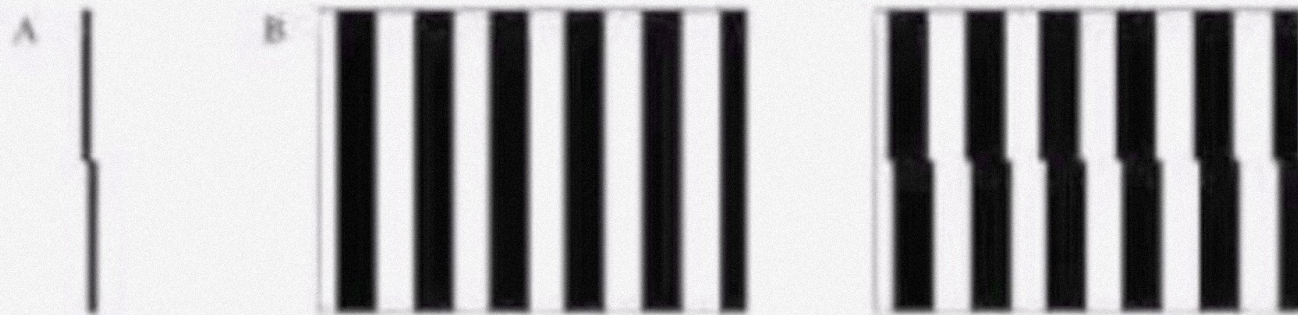
E M

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MINIMUM DISCRIMINABLE (HYPERACUITY)

Ability to determine whether or not two parallel and straight lines are aligned in the frontal plane.



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COMPONENTS OF MEASUREMENT OF VISION ?

- Visual acuity
- Visual field
- Contrast sensitivity
- Color vision
- Stereopsis(BSV)

00:06:14



20/200

E

1

E

E

E

20/100

SNELLEN'S CHART

20/70

20/50

L P E D 4

20/40

E C F D 5

20/30

E D F C Z P 6

L P E D

E C F D

E D F C Z P

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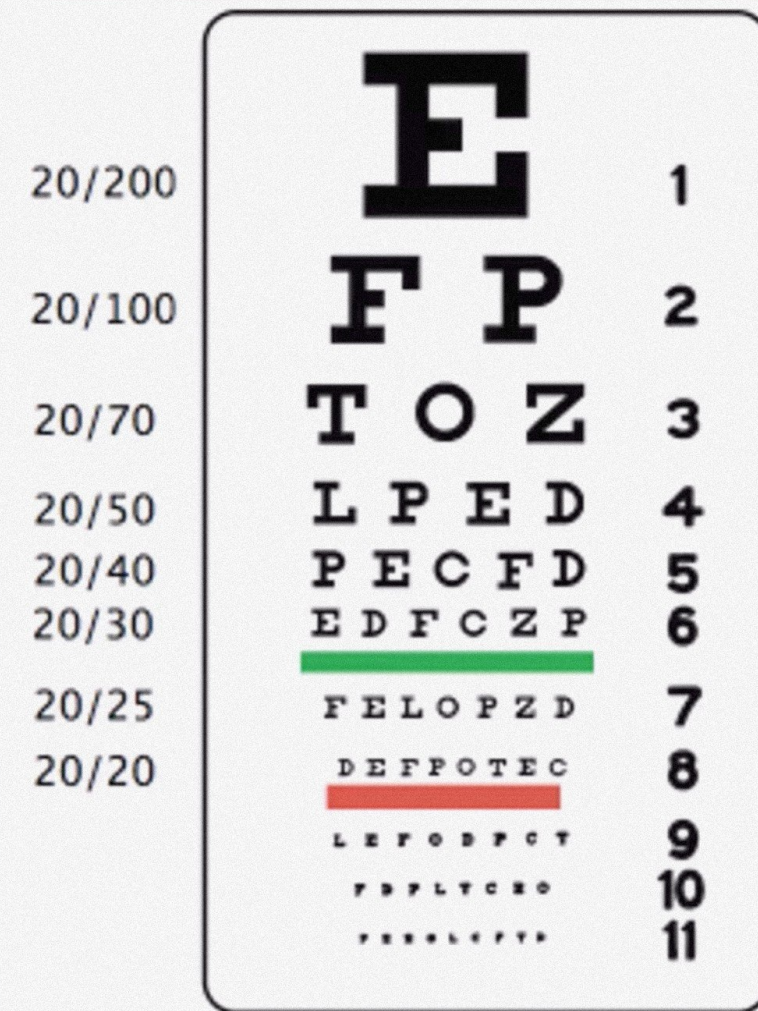
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Professor Hermann Snellen in 1863.

The letters are:

- i. It consists of series of black capital letters on a white board arranged in lines, each progressively diminishing in size.
- v. At given distance, each letter subtends at an angle of 5 minutes at the nodal point of the eye



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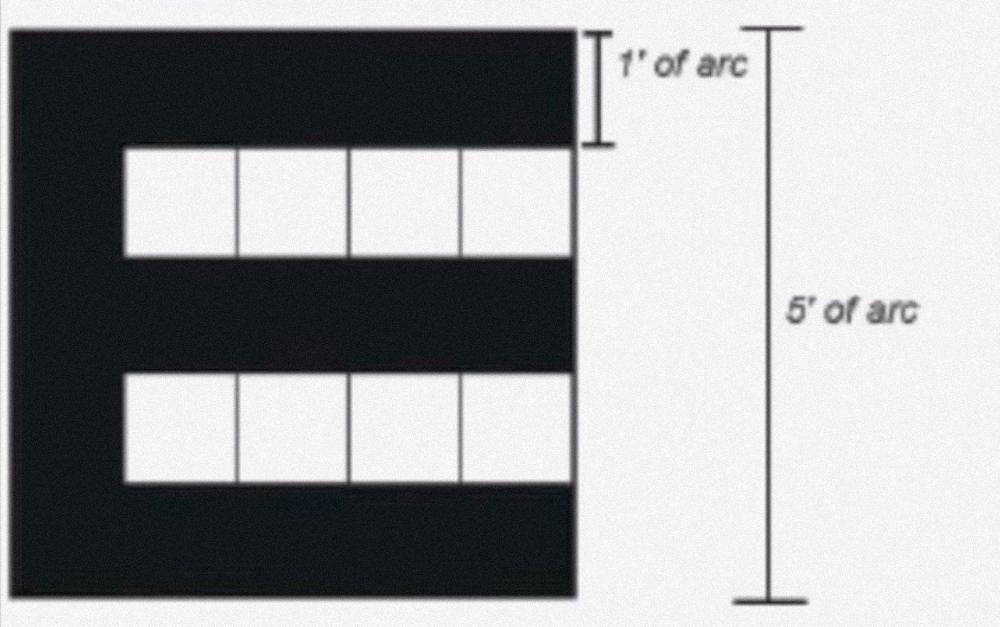


OPTOTYPE OF SNELLENS

- Each letter on the Snellen's chart is called an optotype and each optotype is made of a square-type font

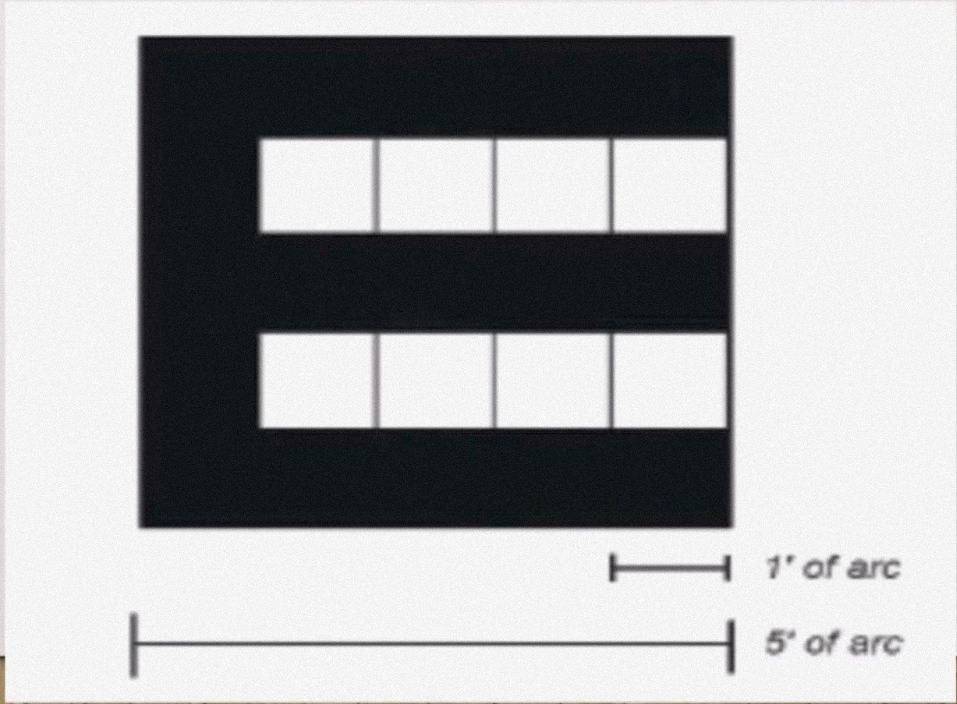
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Letters have such a breadth that they will subtend at an angle of 1 minute at the nodal point of the eye at a particular distance.

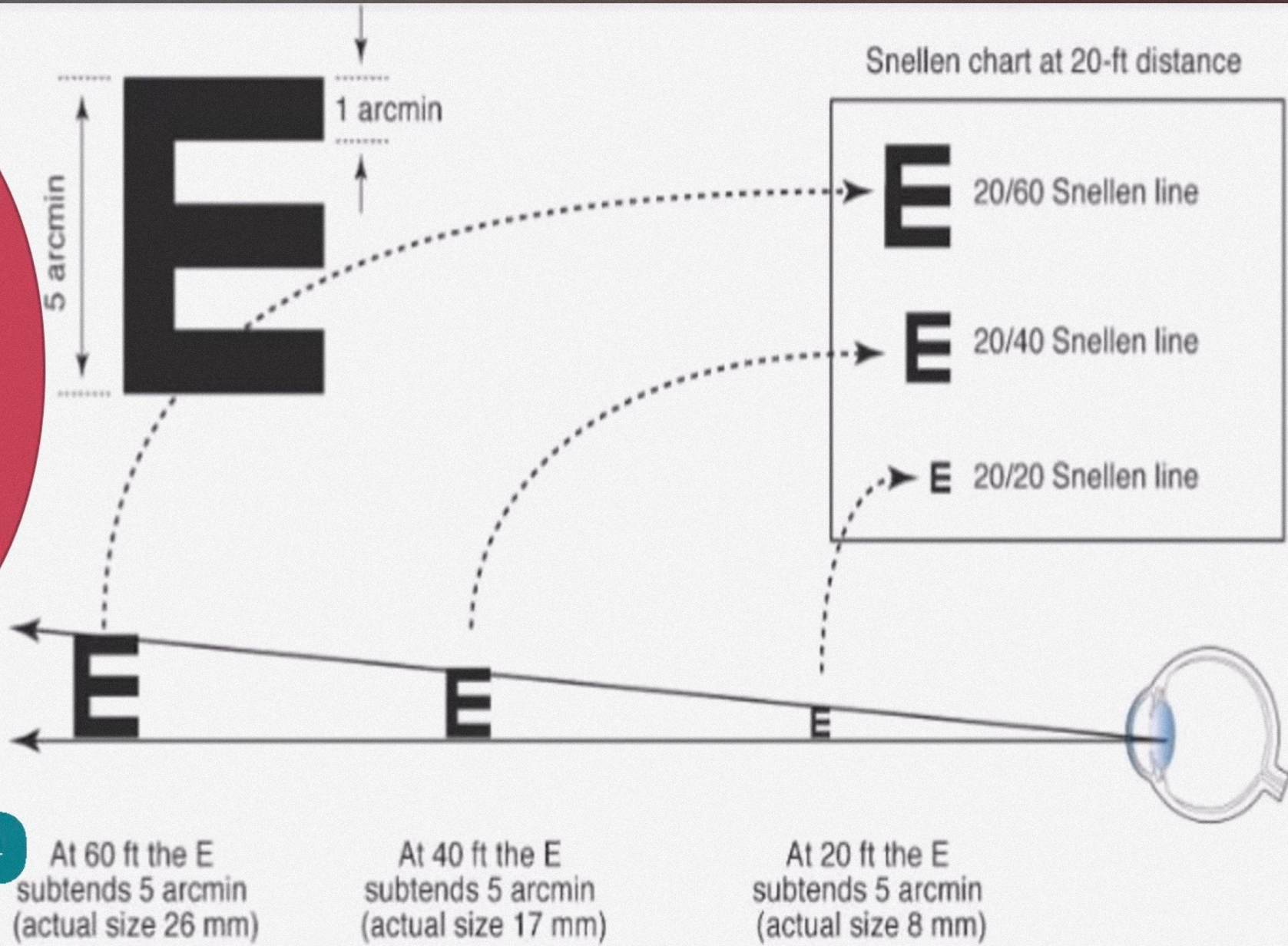
Each letter is designed such that it fits in a square. The sides of the letter are 5 times the breadth of constituent lines.



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At given distance, each letter subtends at an angle of **5 minutes** at the nodal point of the eye



00:08:51



60
H

36
A L

24
T N C

18
O L H A

12
E C T N O

9
C L O H N A

6
A E L O H C T

5
T N E L A C O

4
A E C O H N T L

00:09:55

FIGURE 10.1 Snellen distant test-types. The lines, from above downwards, should be read at 60, 36, 24, 18, 12, 9, 6, 5, 4 m, respectively. At these distances the letters subtend a visual angle of 5 minutes.

20/200

20/100

20/70

20/50

20/40

20/30

20/25

20/20

E

F P

T O Z

L P E D

P E C F D

E D F C Z P

F E L O P Z D

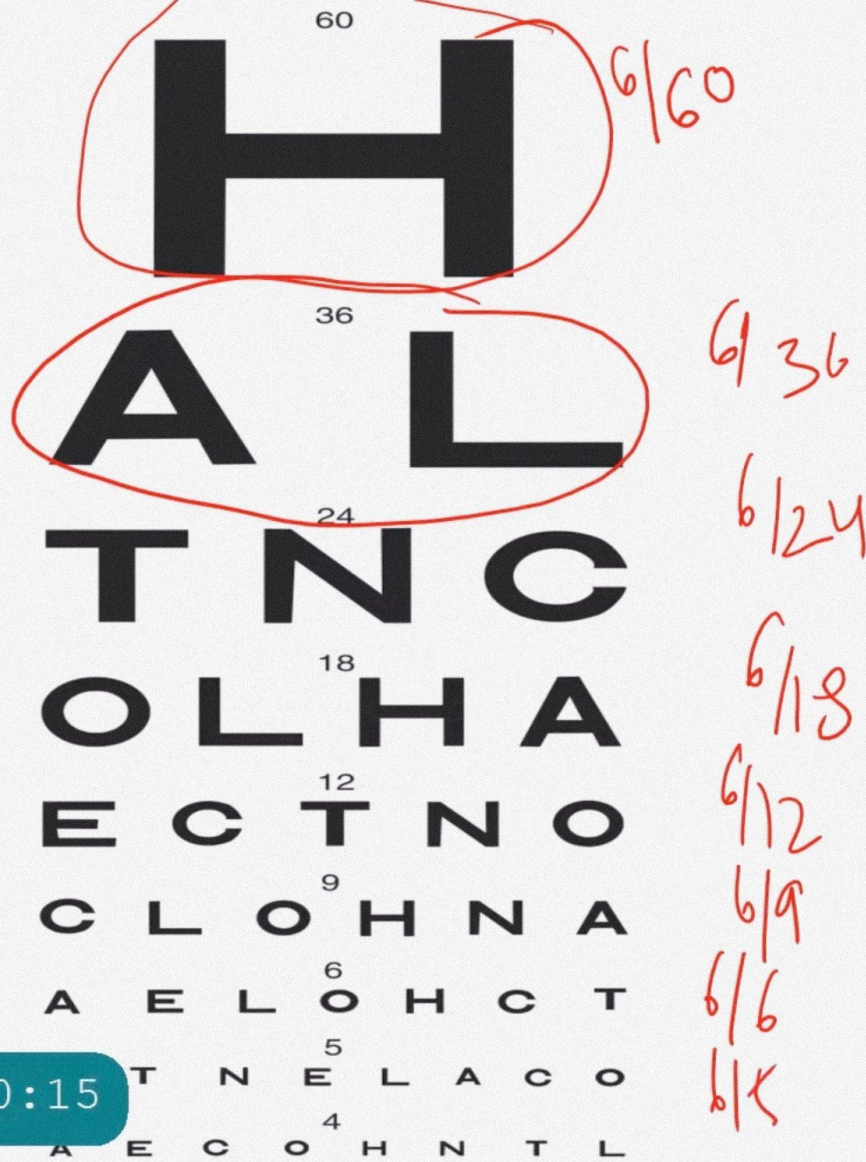
D E F P O T E C

L E F O D F C T

F D F L T C E O

F E E L O F T F





20/200

20/100

20/70

20/50

20/40

20/30

20/25

20/20

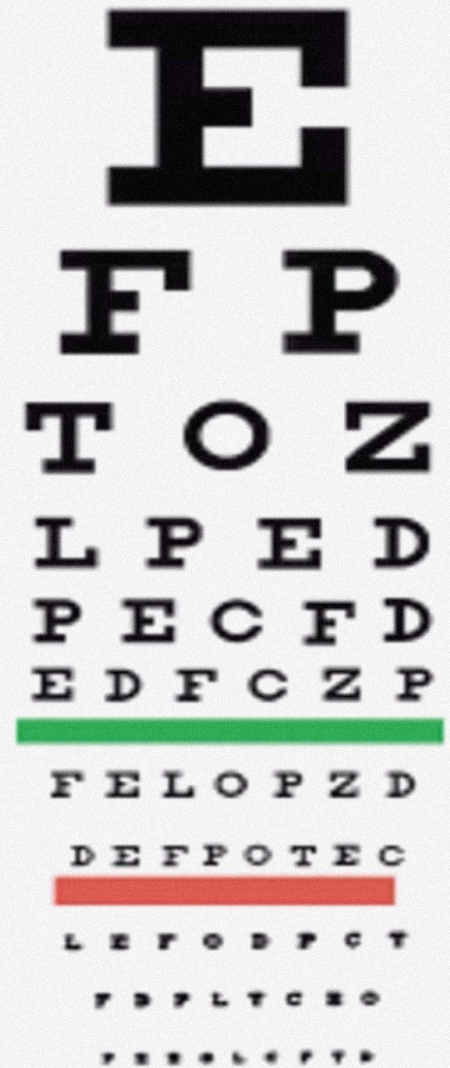


FIGURE 10.1 Snellen distant test-types. The lines, from above downwards, should be read at 60, 36, 24, 18, 12, 9, 6, 5, 4 m, respectively. At these distances the letters subtend a visual angle of 5 minutes.



Feet	Meters
20/20	6/6
20/30	6/9
20/40	6/12
20/60	6/18
20/80	6/24
20/120	6/36
20/200	6/60

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WHAT IS THE TESTING DISTANCE?

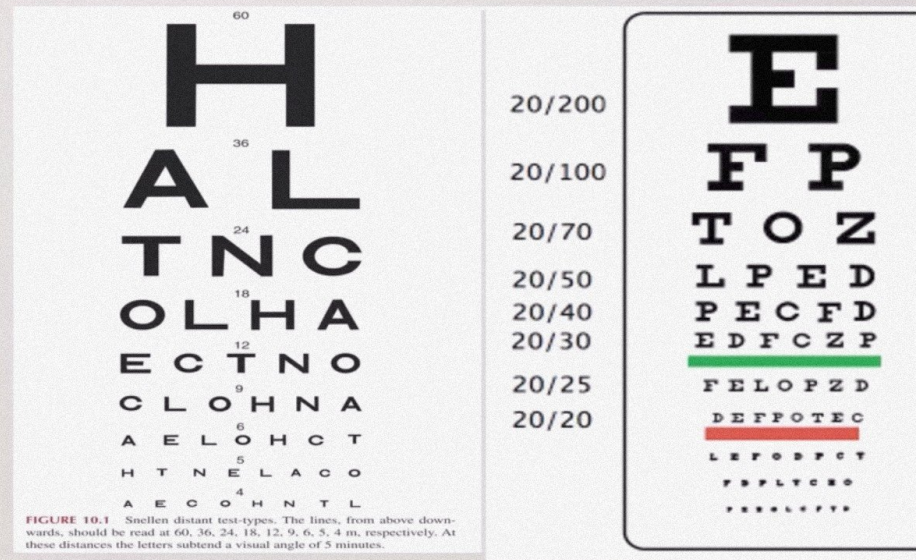
- Testing is done **6 m (20 ft)** away from the target
- At this distance ,divergence of rays that enters the pupil is so small that rays are considered parallel.
- Hence, accommodation is eliminated at this distance.

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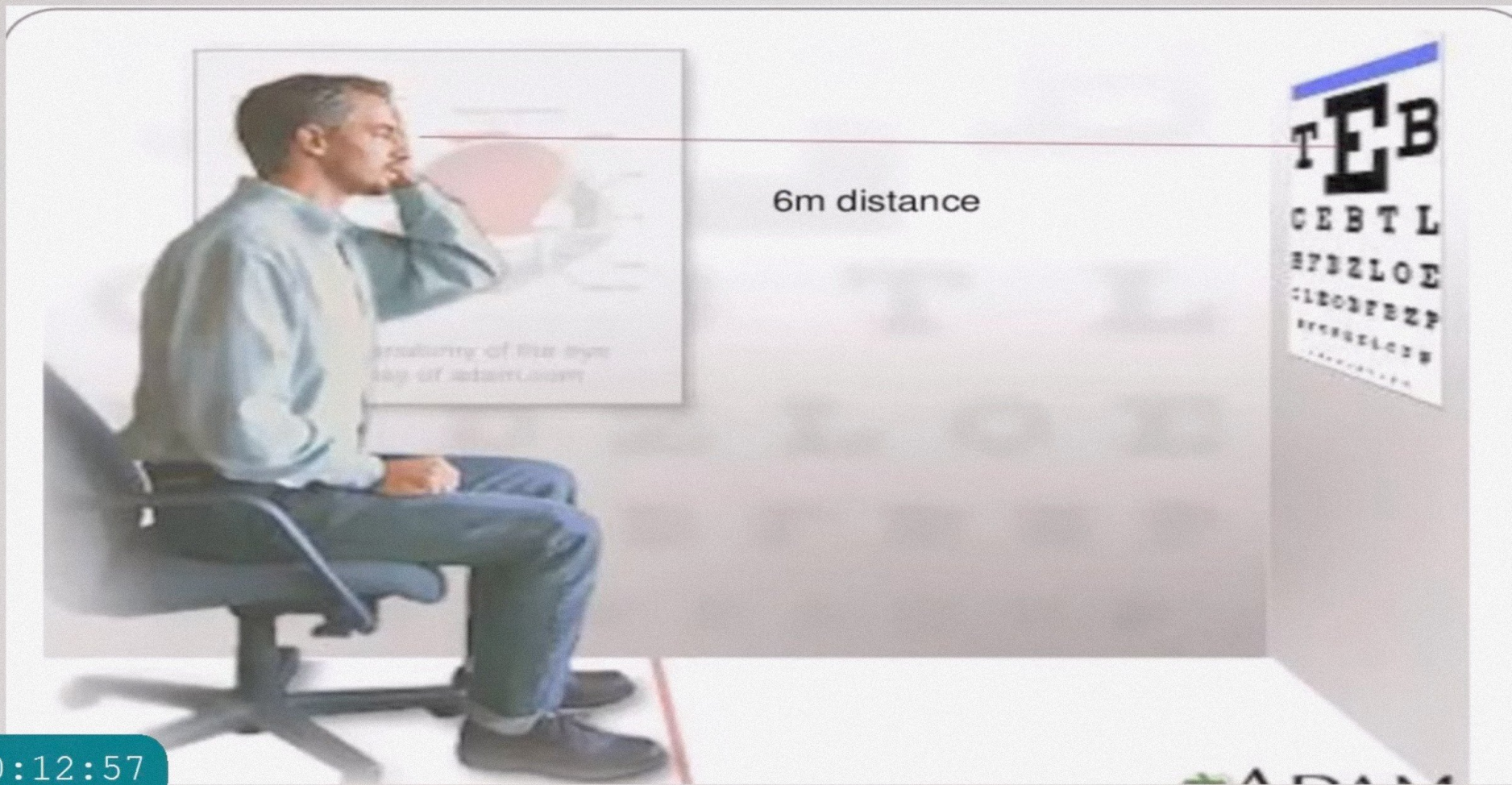
WHAT DOES 6/6 OR 20/20 MEANS?

- It represents the ability to see **1 min of arc** which is close to theoretical diffraction limits



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00:12:57



PROCEDURE FOR TESTING SNELLEN'S CHART

- Patient is seated at a distance of 6 m from the Snellen's chart
- Chart should be properly illuminated (not less than 20 foot candle).
- Patient is asked to read with each eye separately.
- Visual acuity is recorded as a fraction.

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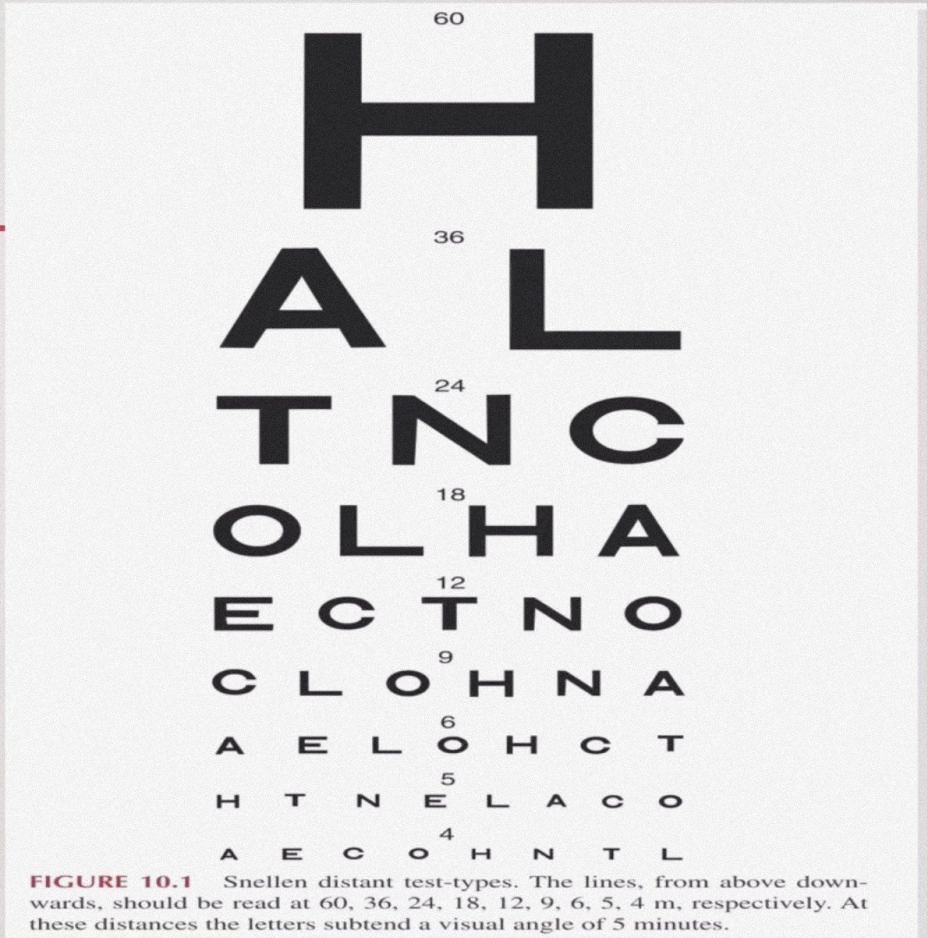
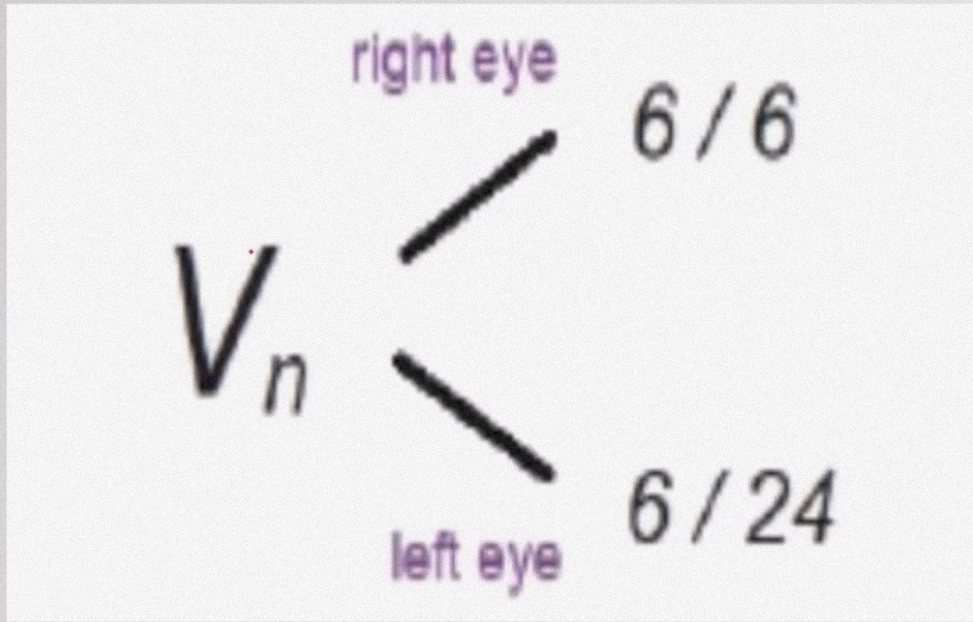


PROCEDURE FOR TESTING SNELLEN'S CHART

- Patient is seated at a distance of 6 m from the Snellen's chart
- Chart should be properly illuminated (not less than 20 foot candle).
- Patient is asked to read with each eye separately.
- Visual acuity is recorded as a fraction.
- **Numerator**: Distance of the patient from the chart.
- **Denominator**: Smallest letters read accurately.

00:13:41





00:13:47



If the patient cannot see the top line from 6 m, he/she is asked to walk towards the chart till one can read the top line.

Depending on the distance at which patient can read the topline, the VA is recorded as **5/60, 4/60, 3/60, 2/60 and 1/60.**



00:14:38



FINGER COUNTING

If patient is unable to read topline even from 1 m, he/she is asked to count fingers (CF) of the examiner, the VA is recorded as

- **CF-3metres**
- **CF-2 meters**
- **CF-1,meters**
- **CF close to face**

depending on the distance (in meters) at which the patient is
00:15:22 fingers.



HAND MOVEMENTS

- When the patient fails to count fingers, the examiner moves his/her hand close to patient's face. If the patient can appreciate the hand movements, the VA is recorded as **HM**

positive

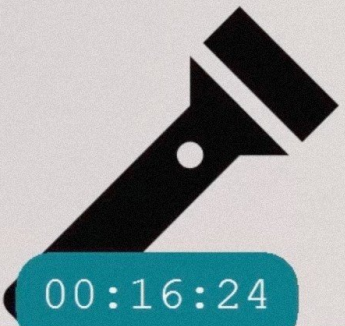


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PERCEPTION OF LIGHT

- When the patient cannot distinguish HM, examiner notes if the patient can perceive light or not. If the patient can perceive light, then it is recorded as **PL+**
- If the patient cannot perceive light, then it is recorded as **PL -ve**



PROJECTION OF RAYS

- If PL is +ve, then PR should be checked by shining light in all 4 directions and patient is asked whether he/she is able to recognize the direction of light rays that is shown and is recorded in all 4 quadrants

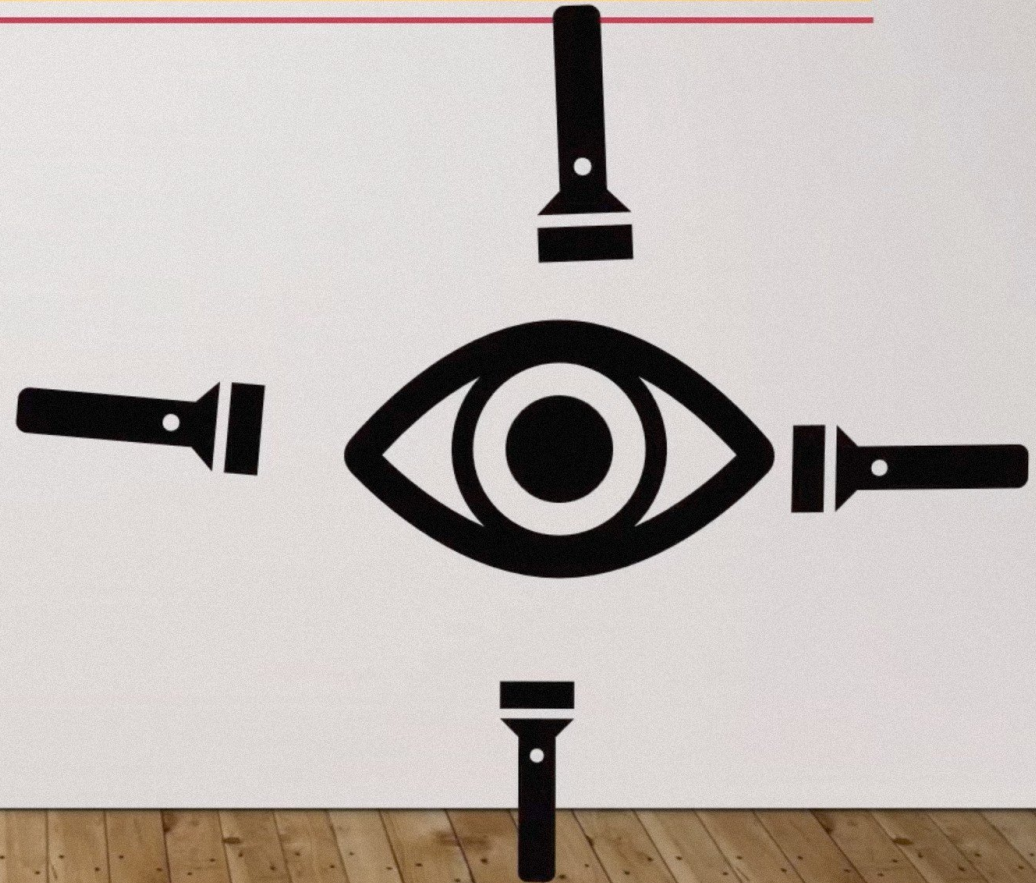


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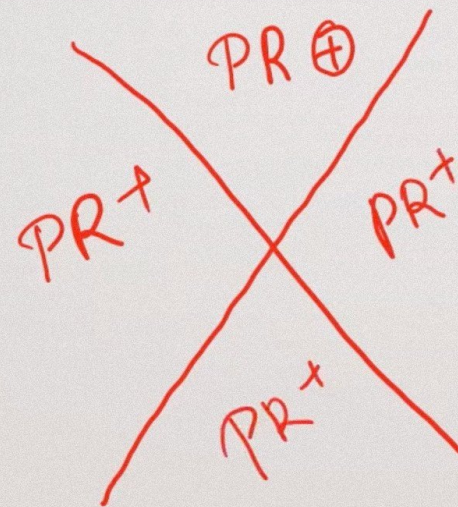
PROJECTION OF RAYS

- If PL is +ve, then PR should be checked by shining light in all 4 directions and patient is asked whether he/she is able to recognize the direction of light rays that is shown and is recorded in all 4 quadrants



00:17:56





00:18:18



DECIMAL NOTATIONS

- It converts Snellen fraction to a decimal.
- For example: Snellen 20/20—decimal 1.0
- Snellen 20/30—decimal 0.7
- Snellen 20/40—decimal 0.5

00:18:27



LOGMAR CHART

- Used for academic and research purposes.
- This is a modification of snellen's chart, where each subsequent line
- Differs by **0.1 log unit in the minimum angle of resolution (MAR)** required for that line.
- They have **equal number of letters** in each line.
- Used at a distance of **4 meters**.

00:18:42



Meters (Feet)
40 (130)

Line Size
1.2 60

H V Z D S

30 (100)

N C V K D

0.8 60

26 (85)

C Z S H N

0.8 60

20 (65)

O N V S R

0.7 60

16 (50)

K D N R O

0.6 70

12 (40)

==== Z K C S V ====

0.5 70

10 (30)

D V O H C

0.4 80

8 (25)

O H V C K

0.3 80

6 (20)

H Z C K O

0.2 80

4 (15)

N C K H D

0.2 80

3 (12)

Z H C S R

0.1 100

2 (9)

S Z R D N

0.1 100

1 (6)

V C C R D

0.1 100

V C C R D

00:19:29

LogMAR – ETDRS Chart



Feet	Meters	LogMAR
20/20	6/6	0.00
20/30	6/9	0.18
20/40	6/12	0.30
20/60	6/18	0.48
20/80	6/24	0.60
20/120	6/36	0.80
20/200	6/60	1.00

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