

Visual Acuity & Methods of Assessment

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117

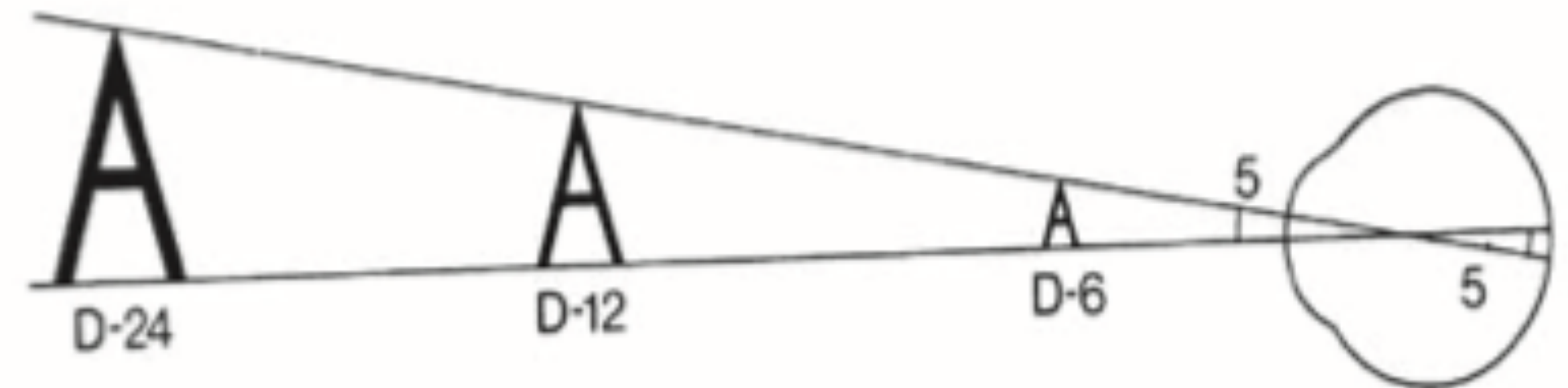
Visual Acuity

- Measure of spatial resolution of the eye
- Retinal function (macular)-appreciation of form sense
- 2 objects → Stimulate 2 adjacent cones → single target
- Unstimulated cone between the stimulated ones → 2 targets

Measurement of visual acuity

■ Distant Visual Acuity

- Visual acuity test types
- Series of letters arranged in lines, each diminishing in size
- Breadth of the lines of which the letters are composed
 - Edges- angle of 1 minute at the nodal point
- Each letter placed in a square, sides of which = 5 times the breadth of the constituent lines
- Whole letter-angle of 5 minutes at the nodal point of the eye.



Snellen's Test Types

- Basis- 2 distant points are visible as separate only when they subtend an angle of 1' at the nodal point
- Series of black capital letters on a white board -in lines- progressively diminishing in size
- Largest letter will subtend an angle of 5' at the nodal point if it is at 60 m front the eye
- Person with average acuity will read the top letter at 60 m, 2nd at 36m,...



Procedure of testing

- Patient seated at a distance of 6m from the chart
 - Rays of light are practically parallel
 - Patient exerts minimal accommodation
- Chart should be properly illuminated
 - Considerable influence on visual acuity
 - Should not fall below 20 ft cs
- Read from largest letter downwards, with each eye separately

- Recorded as a fraction
 - Numerator- distance of patient from the letters
 - Denominator- distance at which a person with normal vision would be able to read the last line which the patient succeeds in reading
- If patient is able to read upto 6m line, $VA=6/6$
- Depending upon the smallest line the patient reads from 6m, $VA=6/9, 6/12, \dots$

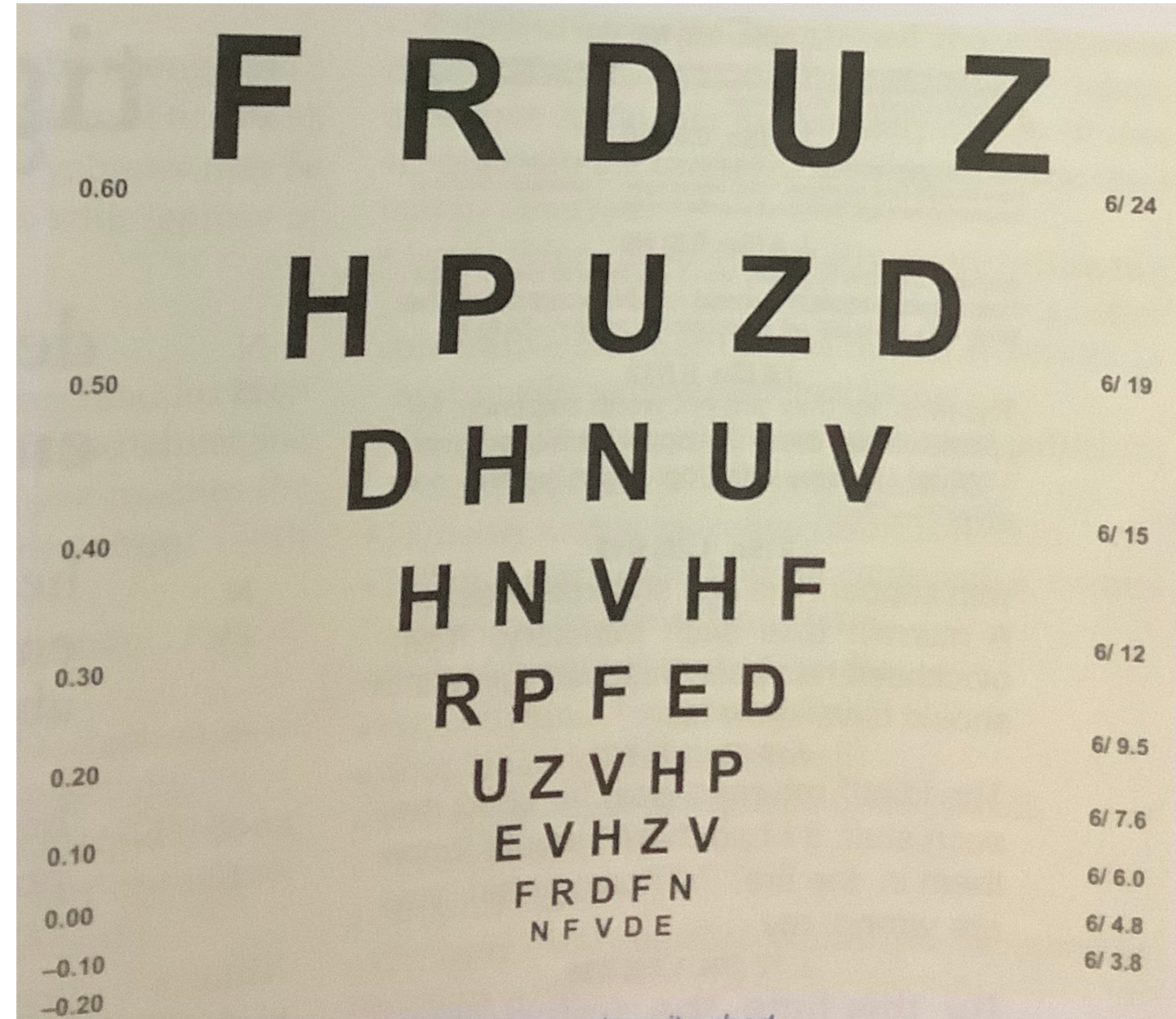
- If he cannot read the top line from 6m -slowly walk towards the chart
- Depending on the distance at which he can read the top line, vision is recorded as $5/60, 4/60, \dots, 1/60$.
- If unable to read top line from 1m → Count fingers of examiner at 1m, V=ability to count fingers at 1m
- V= counting fingers close to face
- If he cannot count fingers, examiner moves his hand close to face- HM +ve
- If unable to see this also, light is focused on his eyes - PL +ve/ PL -ve
- If he can perceive light - may be able to indicate direction from which light is projected
 - Projection of light accurate/inaccurate in each quadrant

Refining of visual acuity measure

- Initial measurement-visual acuity of eye unaided by lenses
- If vision subnormal-read through pinhole
 - If it improves- refractive error
- Necessary in all cases to determine the function of macula
- Refraction of eye must be determined & visual acuity assessed again with correcting glasses

Log MAR Visual Acuity Charts

- **L**ogarithm of **M**inimum **A**ngle of **R**esolution
- LogMAR chart
 - Rows of letters
 - Equal number of letters in each line
- Progression of difficulty from 1 line to the next is uniform
- Lines progress in 0.1 logMAR steps
- Every letter read count as 0.02 of each line



- More accurate estimate of visual acuity
- Used in - Bailey-Lovie chart
 - chart used in Early Treatment of Diabetic Retinopathy Study(ETDRS)

Visual Acuity Equivalents

- In USA, values are converted to feet (6m=20ft)
- Snellens fraction reduced to decimal number

- **decimal acuity**

- LogMAR acuity

<i>Decimal resolution system</i>	<i>Snellen 6-m table</i>	<i>Snellen 20-foot table</i>	<i>Angle table</i>	<i>Log MAR acuity</i>
1.0	6/6	20/20	1.0	0
0.7	6/9	20/30	1.4	-0.18
0.5	6/12	20/40	2.0	-0.3
0.3	6/18	20/60	3.3	-0.5
0.25	6/24	20/80	-	-0.6
0.17	6/36	20/120	-	-0.78
0.1	6/60	20/200	10.0	-1

LogMAR acuity

- Find MAR(minimum angle of resolution)
 - Divide the denominator in snellens fraction by the distance at which the letters were read
 - i.e., snellens fraction is inverted & reduced
 - Snellen acuity of $6/12 = \text{MAR of } 2 \text{ minutes of arc}$
- Find $\log_{10} 2 = 0.3$
- Snellen fraction of $6/12 = \text{logMAR acuity } 0.3$

Visual Acuity measurement in special cases

Cataract

- In patients with dense cataract-cannot test using the methods discussed
- Laser interferometer
 - Forms diffraction pattern of parallel lines in retina even through moderate cataract
 - To establish visual acuity likely to be regained after surgery
- Potential acuity meter-projects a tiny snellens chart onto the retina

Children

- Visual evoked potential & preferential looking behaviour
- Very young preverbal children- Teller acuity test
 - Preferential looking test
 - Child would rather look at objects with a patterned stimulus than at homogenous field
 - Smallest pattern that the child seems to prefer- indicator of best visual acuity



- Children greater than 2 years -simple picture charts
- E test -illiterate patients,children
- Landolt's C chart- illiterate patients

- Objective measure of visual acuity- phenomenon of **optokinetic nystagmus**
- White drum with vertical black stripes- rotated before the eyes - patient follows a stripe with a slow motion -as it disappears -switch suddenly back to pick up a new stripe
- Automatic reflex-persists as long as individual stripes are seen
- By varying breadth of stripes/ distance of patient from drum, acuity can be assessed
- Uncooperative & malingering patients

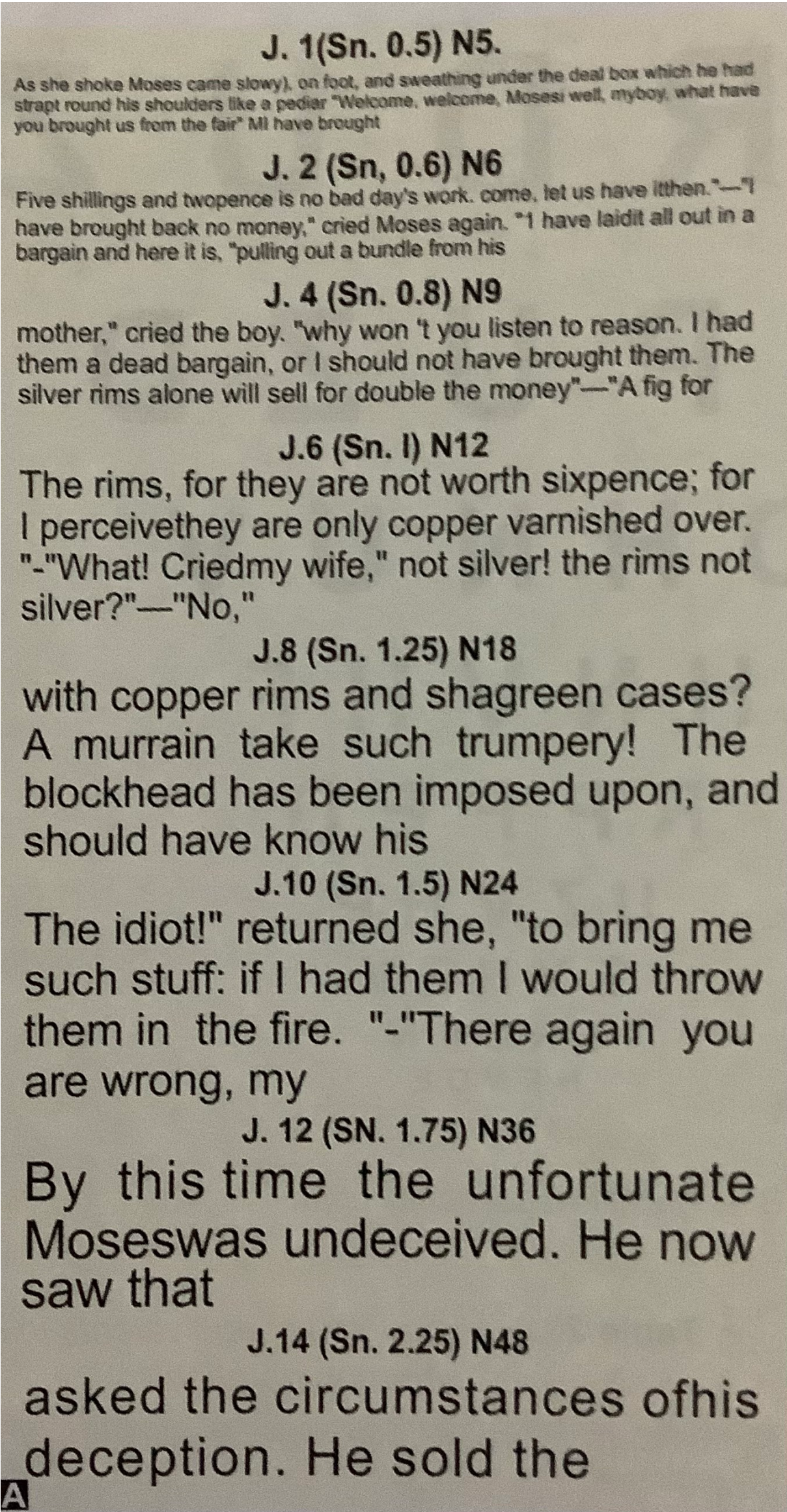
Photostress Test

- Cover 1 eye-ask to read the smallest possible line on near test
- Bright light shone into the eye for 15 min
- Ask to read the same line of print& recovery time is noted
- In normal people & those with optic nerve disease -no significant difference in time taken for the 2 eyes to recover
- In macular disease - recovery time prolonged
- Early macular disease

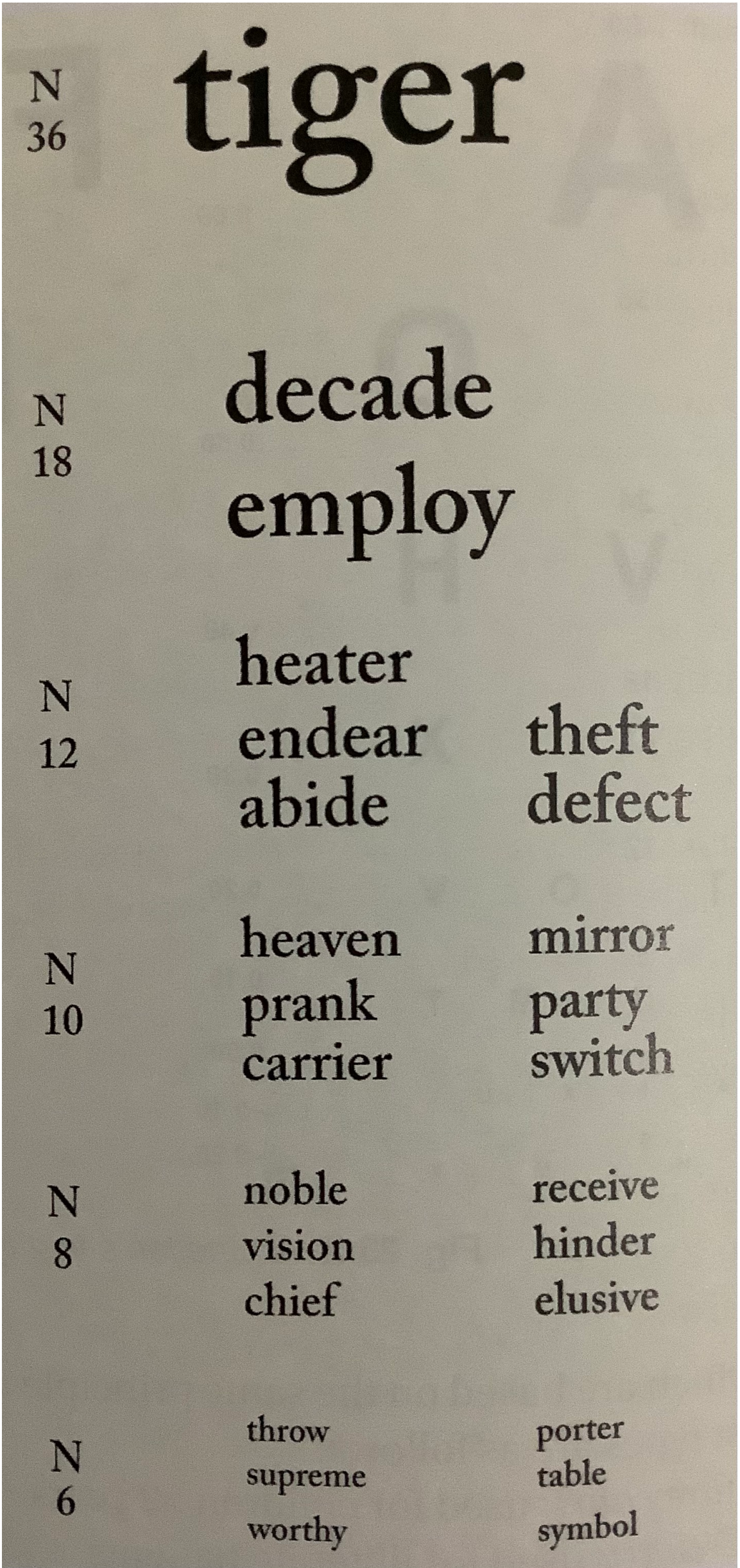
Visual Acuity for Near

- Ask the patient to read the near vision chart
 - 35 cm
 - good illumination
 - each eye separately
- Series of different sizes of printer type arranged in increasing order & marked accordingly

- **Jaeger's chart**
 - Prints marked from 1-7
 - According acuity labelled as J1 to J7
- **Roman test types**
 - N5, N8, N10, N12, N18
- **Snellen's near vision test types-** prepared by reducing the thickness of snellen's distance vision chart



JAEGER'S



ROMAN TEST
TYPES

Thank you