

البصريات

اخطاء الانكسار

المرحلة الثانية

المحاضرة الثانية

**Department of Optics Techniques**

**Lecture2**

**Visual acuity**

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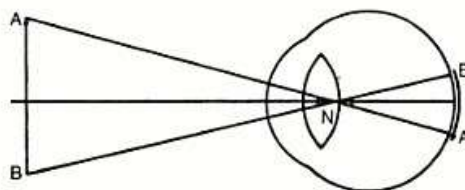
## Visual acuity

Assessment of the eyes ability to distinguish object details and shape, using the **smallest identifiable object** that can be a specified distance (usually 6 m). VA is the quantities measure of the ability to identify black symbols on a white background at a standardized distance as the size of the symbols is varied. The VA represents the smallest size that can be reliably identified. VA is the most common clinical measurement of visual function.

Visual field: Full extent of the area visible to an eye that is fixating straight ahead.

Visual angle: Is the angle subtended at the nodal point of the eye by the physical dimensions of an object in the visual field. Visual angle is a useful and convenient mode of specifying the spatial extend of objects or elements in the visual field.

It has been observed that the two adjacent **points** can be seen **clearly and discretely** only when these two points (A and B) produce a visual angle not less than 1 minute. The dimensions of the visual angle depended upon **the size of the object** as well as **its distance from the eye.**



**Figure (8): Visual angle (ANB) subtended at the nodal point by the physical dimensions (AB) of the object**

## Procedure of measurement Visual Acuity by chart

For testing **distant** visual acuity, the patient is seated at a distance of 6 m from the Snellen chart, so that the rays of light are practically parallel and the patient exerts **minimal accommodation**. The chart should be **properly illuminated**. The patient is asked to read the chart with each eye separately and the visual acuity is recorded as a fraction, the numerator being the distance of the patient from the letters and the denominator being the smallest letters accurately read.

When the patient is able to read up to 6 m line, the visual acuity is recorded as 6/6, which **is normal**. Similarly depending upon the smallest line that the patient can read from the distance of 6 m, his or her vision is recorded as 6/9, 6/12, 6/18, 6/24, 6/36 and 6/60. If one cannot see the top line from 6 m, he or she is asked to slowly walk toward the chart till one that can read the top line. Depending upon the distance at which one can read the top line, the vision is recorded as 5/60, 4/60, 3/60, 2/60 and 1/60.

The patient is unable to read the top line even from 1 m, he or she is asked to

count fingers (CF) of the examiner. His or her vision is recorded as CF-3', CF2', CF1' CF close to face, depending upon the distance at which the patient is able to count fingers. When the patient fails to count fingers, the examiner moves his or her hand close to the patient's face. If one can appreciate the hand movements (HM), visual acuity is recorded as HM positive. When the patient cannot distinguish the hand movements, the examiner notes whether the patient can perceive light (PL) positive and if not it is recorded as PL negative.

## The most commonly used tests to measure distance visual acuity

There are many types of visual acuity tests. These tests are designed for different ages and levels. For example, a small child who cannot speak yet will need a different visual acuity test than a college student.

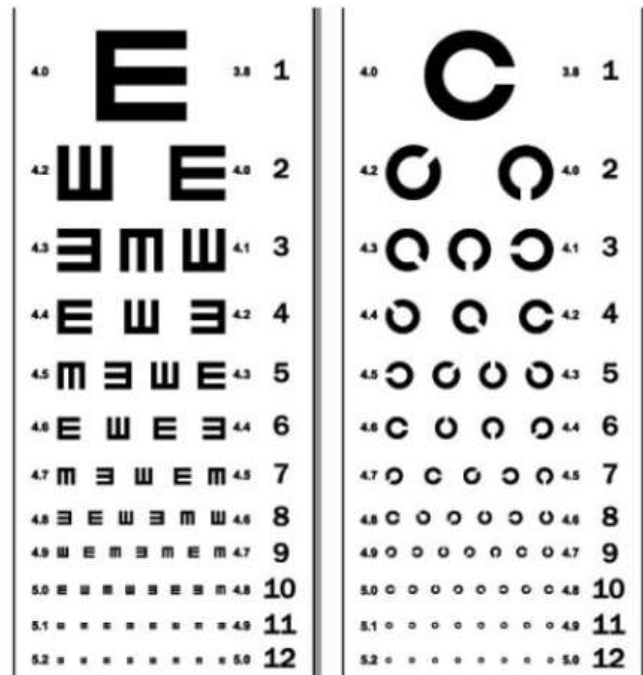
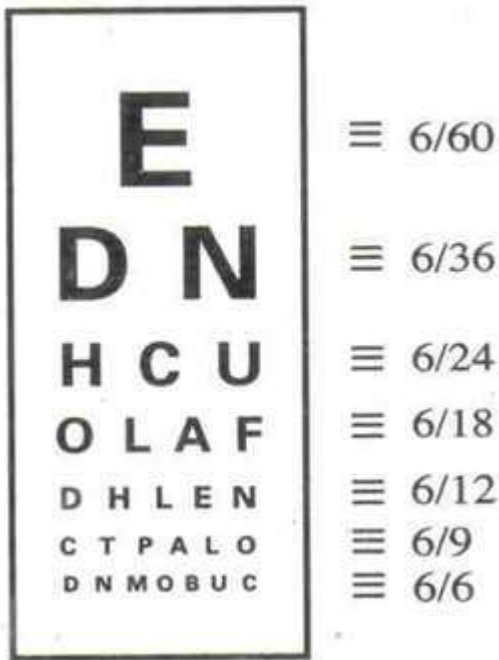
Distance visual acuity tests are usually done at 20 feet or 6 meters. "Perfect vision" is considered to be 20/20 vision.

How a Snellen chart and a "tumbling E" chart might look at your eye doctor's office.

The most commonly used tests to measure distance visual acuity are:

- **Snellen Chart** – A chart with rows of capital letters, with each row decreasing in size. Usually used for older children and adults.
- **Random E Chart** – A chart with rows of a "tumbling" E facing different directions. Each row decreases in size, similar to the Snellen chart. Usually used for young children who can point in the direction that the E is facing

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Snellens test

Random E Chart

### How is visual acuity measured in infants?

Infant visual acuity is measured by a technique called “preferential looking.” The most common type of preferential looking test is with the use of Teller Acuity Cards.

Preferential looking tests do not need a person to respond. They are performed using the following technique:



1. The tester holds up a blank, gray card with no pattern and a card with a pattern that is “more interesting” to look at.
2. The person being tested turns their head to look at the “more interesting” card with a pattern.
3. As the test progresses, sharper visual acuity is needed to see the markings on the patterned card.
4. When the patterns on the card become too difficult to see, both cards look alike. There is no head turn due to “preferential looking

## Why are visual acuity tests useful?

Doctors use visual acuity tests to determine the correct prescription for glasses or contact lenses.

Visual acuity tests can also determine whether:

- An infant or child has proper visual development.
- A person has the required visual acuity to get a drivers license.
- A person qualifies for special services due to decreased visual acuity.
- A disease has progressed and caused changes in vision.
- A medication is effective in stabilizing vision or preventing vision loss.

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