

# VISUAL EXPERIMENTS

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# VISUAL ACUITY

## TEST FOR FAR VISION

Equipment: 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.

Suppose the smallest letter that can be read by the subject is in the line along which the distance is mentioned "9 meter", then the Visual Acuity of that eye is:

$$\text{Visual Acuity (VA)} = \frac{6}{9}$$

It means that the subject is able to read from 6 meters only, which a normal person can read from 9 meters, so his visual acuity for the far vision is disturbed. Normal Visual Acuity for far vision is 6/6 (in meters) or 20/20 (in feet).

FEET

METERS

$\frac{20}{200}$

E

$\frac{6}{60}$

$\frac{20}{100}$

C B

$\frac{6}{36}$

$\frac{20}{70}$

D L N

$\frac{6}{24}$

$\frac{20}{50}$

P T E R

$\frac{6}{18}$

$\frac{20}{40}$

F Z B D E

$\frac{6}{12}$

$\frac{20}{30}$

O F L C T G

$\frac{6}{9}$

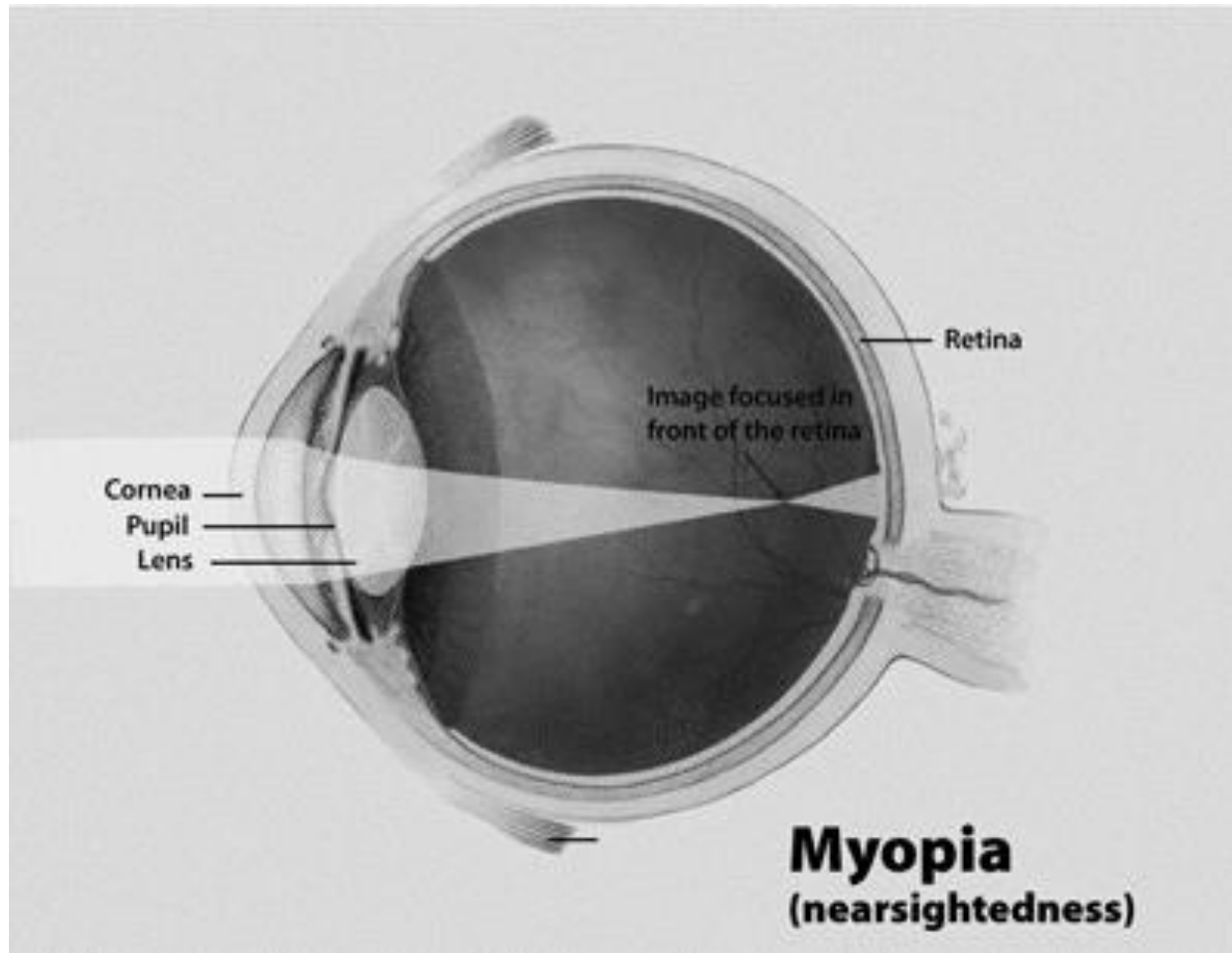
$\frac{20}{20}$

A P E O R F D Z

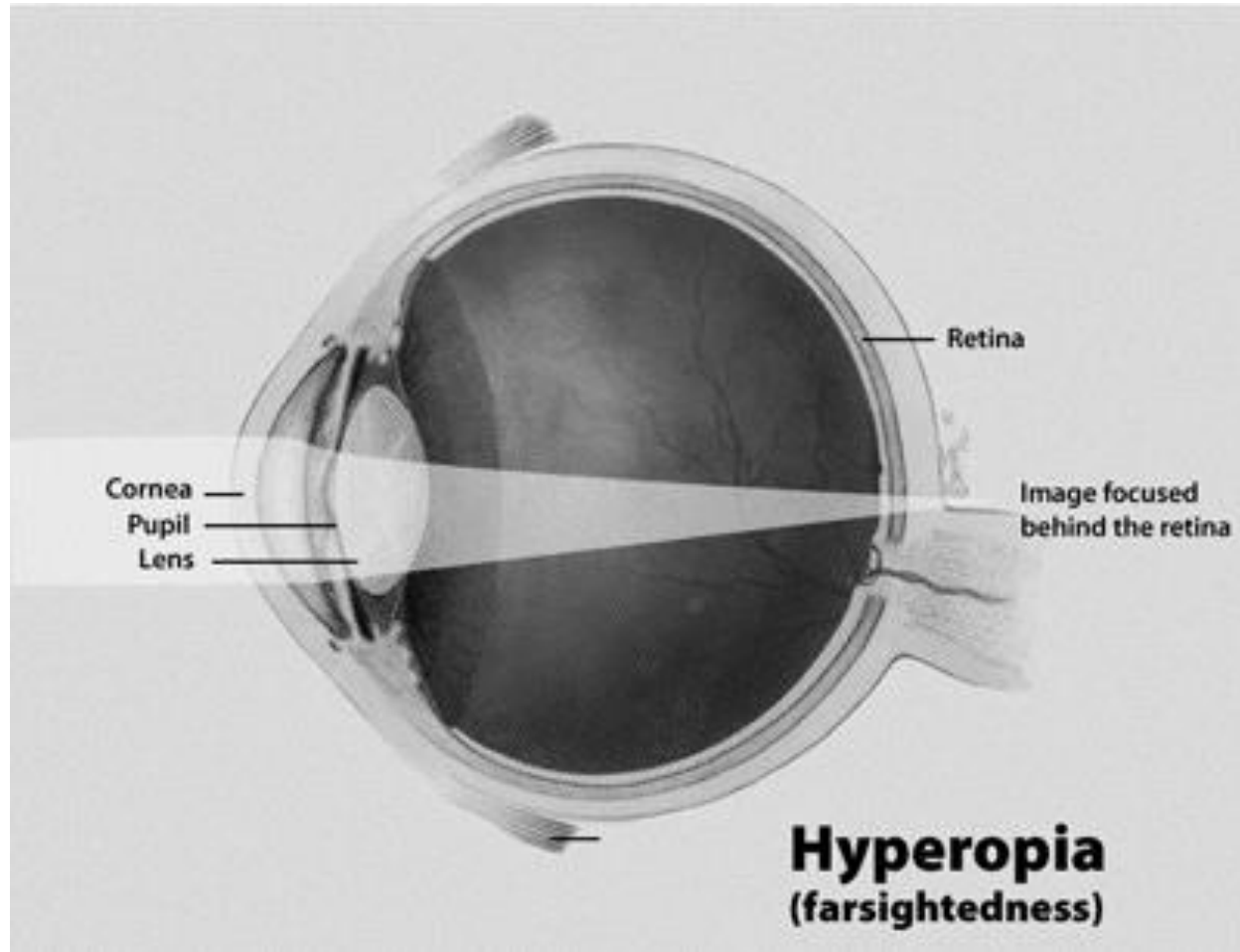
$\frac{6}{6}$

N P R T V Z B D F H K O

# REFRACTIVE ERRORS: MYOPIA



# HYPERMETROPIA / HYPEROPIA



## **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.

**Equipment:** Jaeger's Chart



**No. 1.**  
**.37M**

In the second century of the Christian era, the empire of Rome comprehended the fairest part of the earth, and the most civilized portion of mankind. The frontiers of that extensive monarchy were guarded by ancient renown and disciplined valor. The gentle but powerful influence of laws and manners had gradually cemented the union of the provinces. Their peaceful inhabitants enjoyed and abused the advantages of wealth.

**No. 2.**  
**.50M**

fourscore years, the public administration was conducted by the virtue and abilities of Nerva, Trajan, Hadrian, and the two Antonines. It is the design of this and of the two succeeding chapters, to describe the prosperous condition of their empire; and afterwards, from the death of Marcus Antoninus, to deduce the most important circumstances of its decline and fall; a revolution which will ever be remembered, and is still felt by

**No. 3.**  
**.62M**

the nations of the earth. The principal conquests of the Romans were achieved under the republic; and the emperors, for the most part, were satisfied with preserving those dominions which had been acquired by the policy of the senate, the active emulations of the consuls, and the martial enthusiasm of the people. The seven first centuries were filled with a rapid succession of triumphs; but it was

**No. 4.**  
**.75M**

reserved for Augustus to relinquish the ambitious design of subduing the whole earth, and to introduce a spirit of moderation into the public councils. Inclined to peace by his temper and situation, it was very easy for him to discover that Rome, in her present exalted situation, had much less to hope than to fear from the chance of arms; and that, in the prosecution of

**No. 5.**  
**1.00M**

the undertaking became every day more difficult, the event more doubtful, and the possession more precarious, and less beneficial. The experience of Augustus added weight to these salutary reflections, and effectually convinced him that, by the prudent vigor of

**No. 6.**  
**1.25M**

his counsels, it would be easy to secure every concession which the safety or the dignity of Rome might require from the most formidable barbarians. Instead of exposing his person or his legions to the arrows of the Parthians, he obtained, by an honor-

No. 7.  
1.50M

able treaty, the restitution of the standards and prisoners which had been taken in the defeat of Crassus. His generals, in the early part of his reign, attempted the reduction of Ethiopia and Arabia Felix. They marched near a thou-

No. 8.  
1.75M

sand miles to the south of the tropic; but the heat of the climate soon repelled the invaders, and protected the unwarlike natives of those sequestered regions.

No. 9.  
2.00M

The northern countries of Europe scarcely deserved the expense and labor of conquest. The forests and morasses of Germany were

No. 10.  
2.25M

filled with a hardy race of barbarians who despised life when it was separated from freedom; and though, on the first

No. 11.  
2.50M

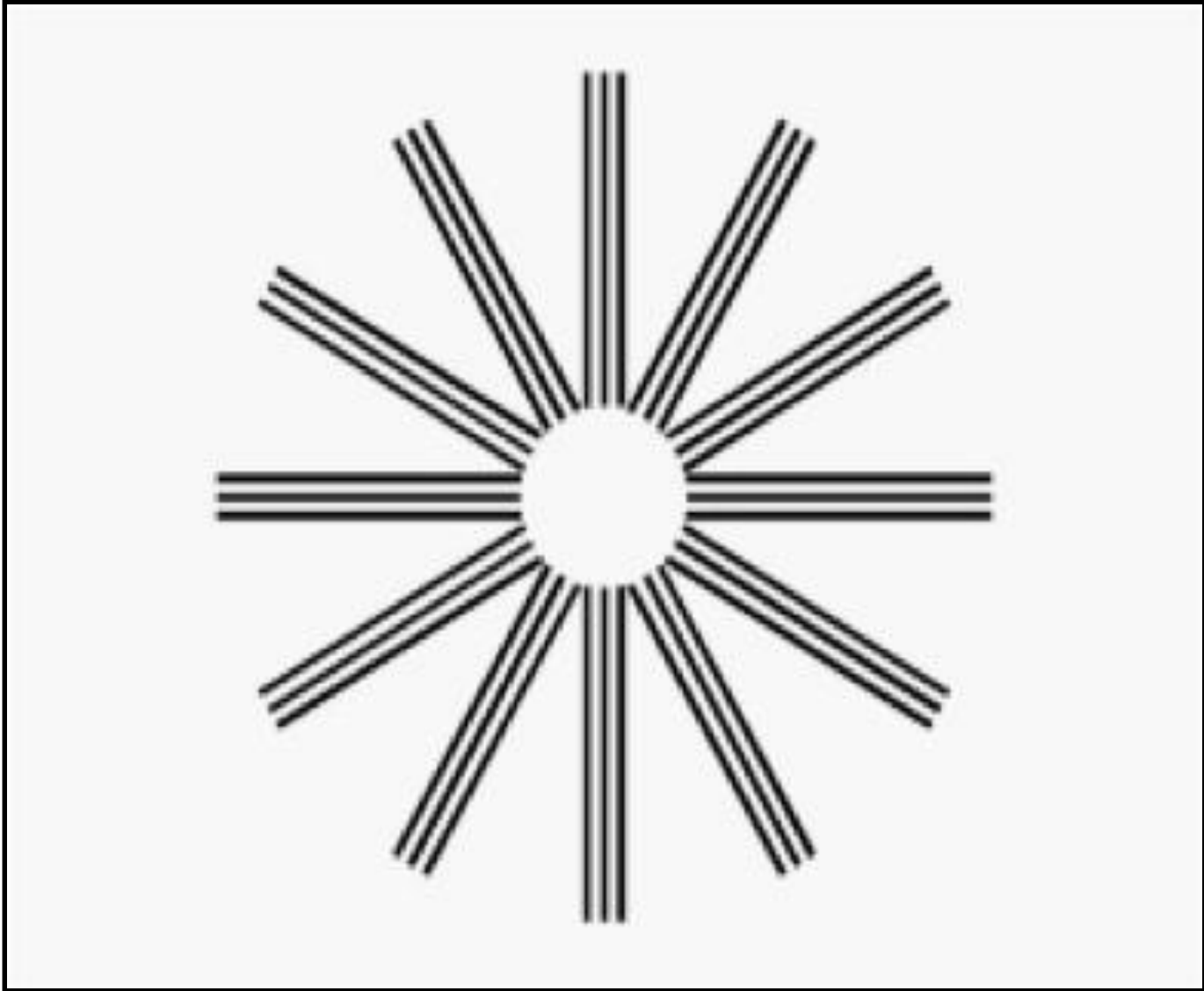
attack, they seemed to yield to the weight of the Roman power, they soon, by a signal



# 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. 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 and need to be treated by adding *cylindrical lenses* in eyeglasses that will correct the astigmatism by altering the way light enters your eyes.

**Equipment:** Astigmatism Chart



# DEMONSTRATION OF BLIND SPOT

**Equipment:** Blind Spot Card



# **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.

**Equipment:** Common Pin

| 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     |

# TEST FOR ACCOMMODATION

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

## ***PURKINJE-SANSON IMAGES:***

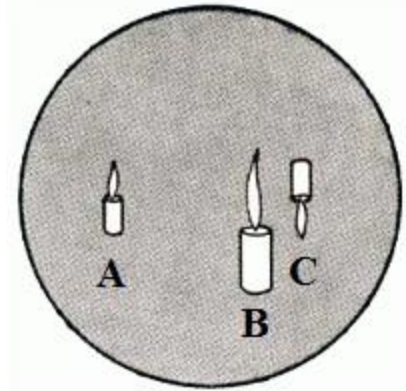
If a small bright light, usually a candle, is held in front of and a little to one side of the eye in a very dark room, three images are seen:

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.

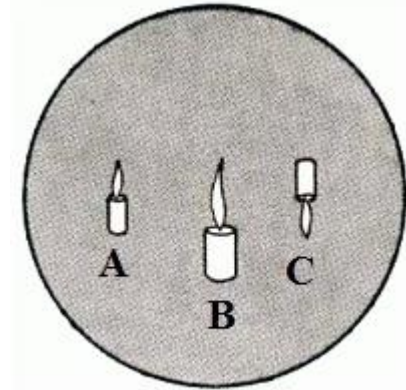
**Equipment:**

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.

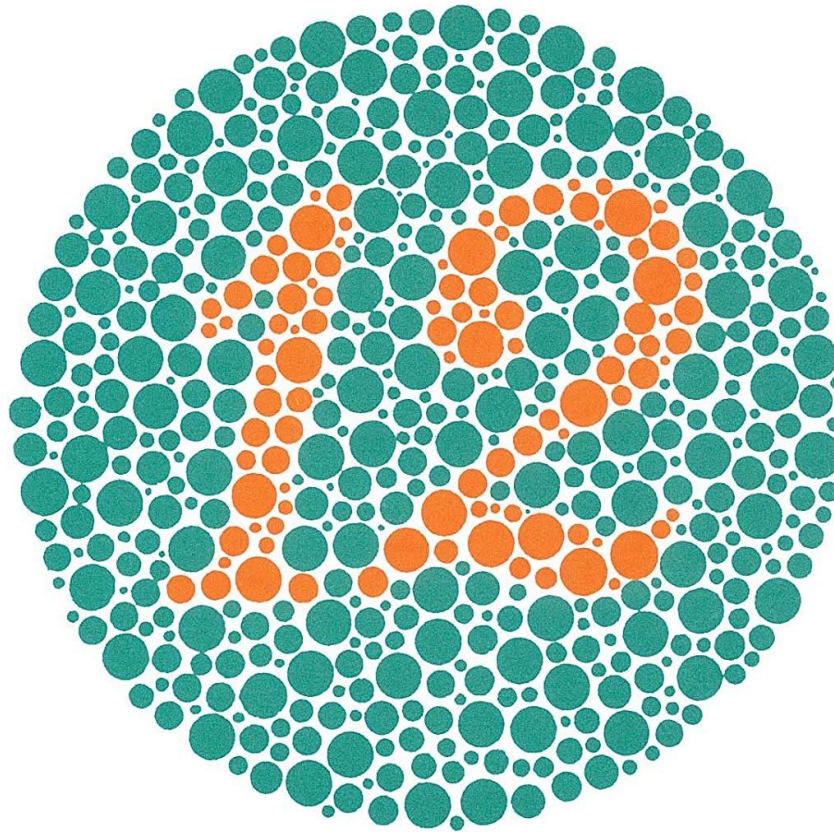
There are three types of cones in our eyes; red, green and blue.

Relative lack or deficiency of one, two or all of them will lead to a defect in color vision.

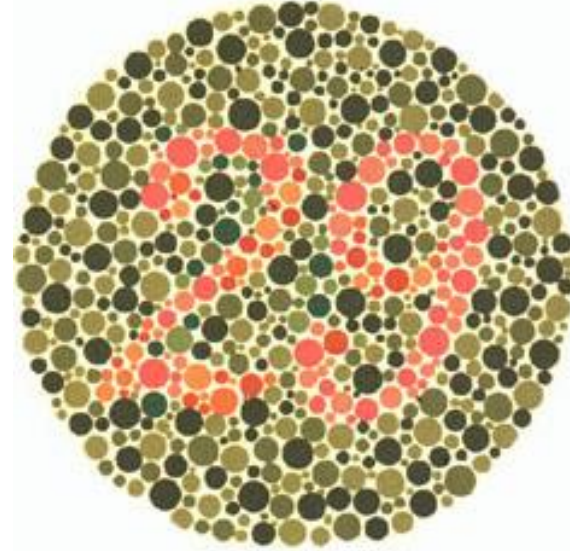
*Equipment:* Ishihara's Colored Plates

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

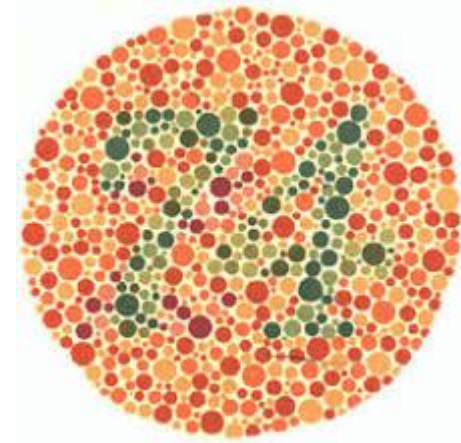
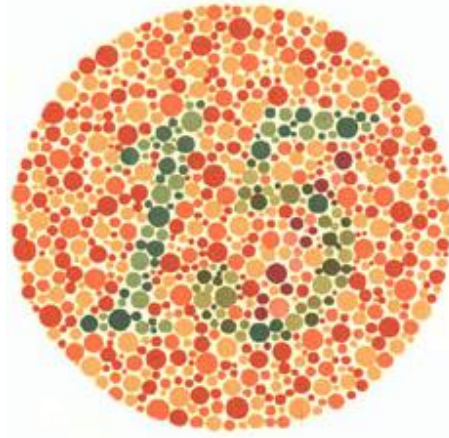
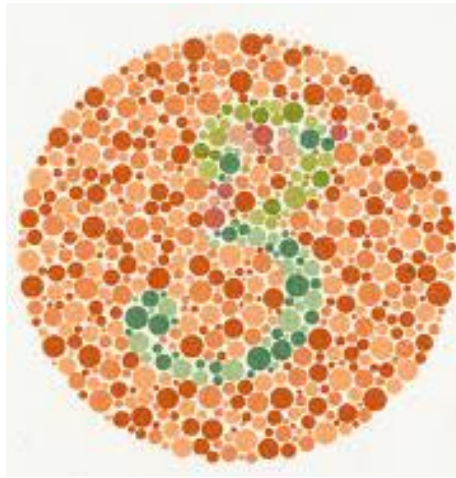
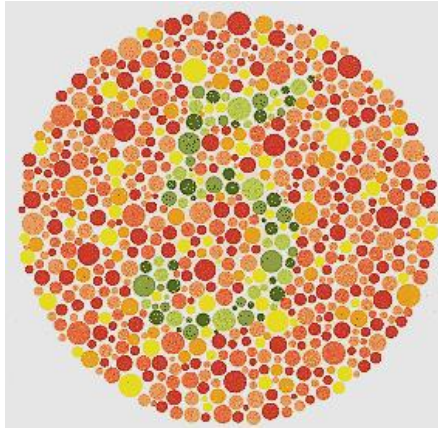




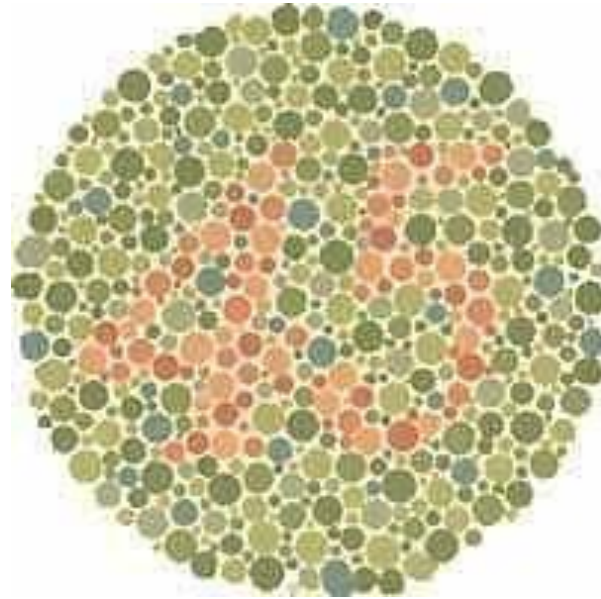
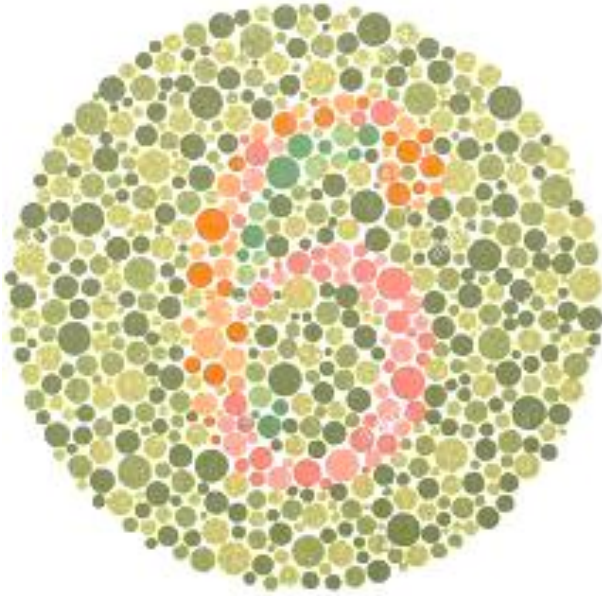
**Both the normal and with all color deficiencies, read it as 12**



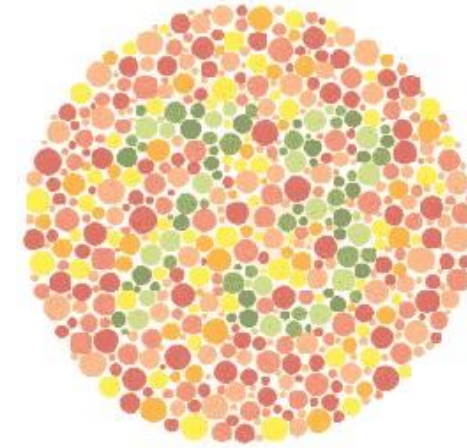
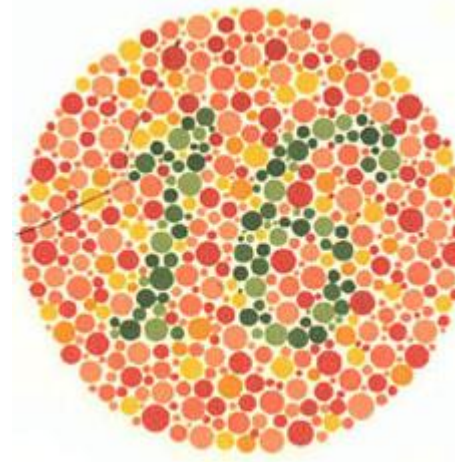
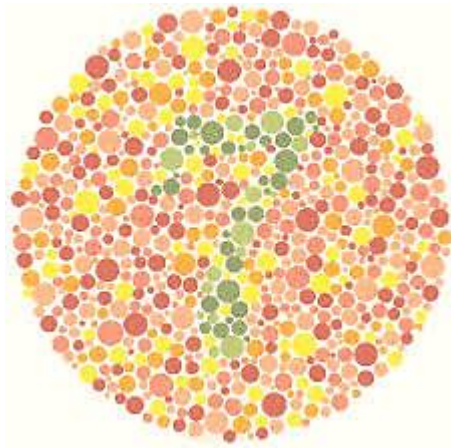
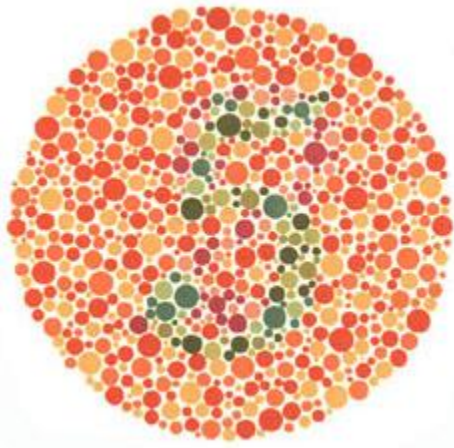
**Normal People read them as 8 and 29**  
**Those with red-green deficiencies read them as 3 and 70**



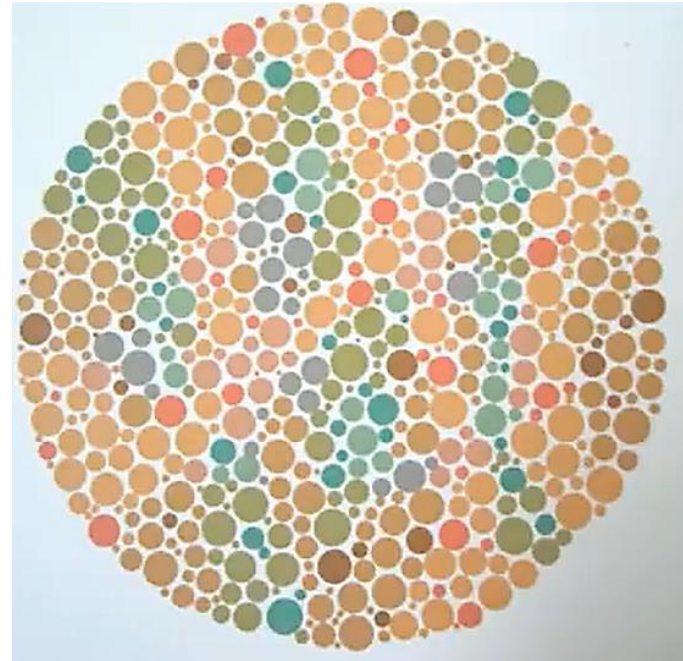
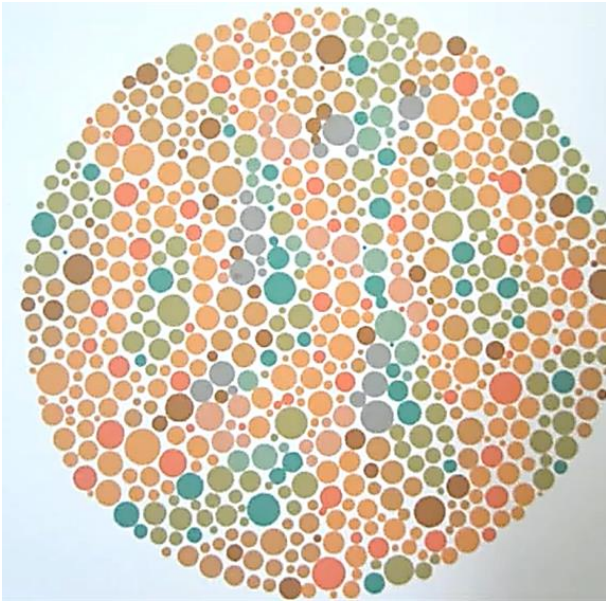
**Normal People read them as 5, 3, 15 and 74**  
**Those with red-green deficiencies read them as 2, 5, 17 and 21**  
**Those with total color blindness cannot read any numerical.**



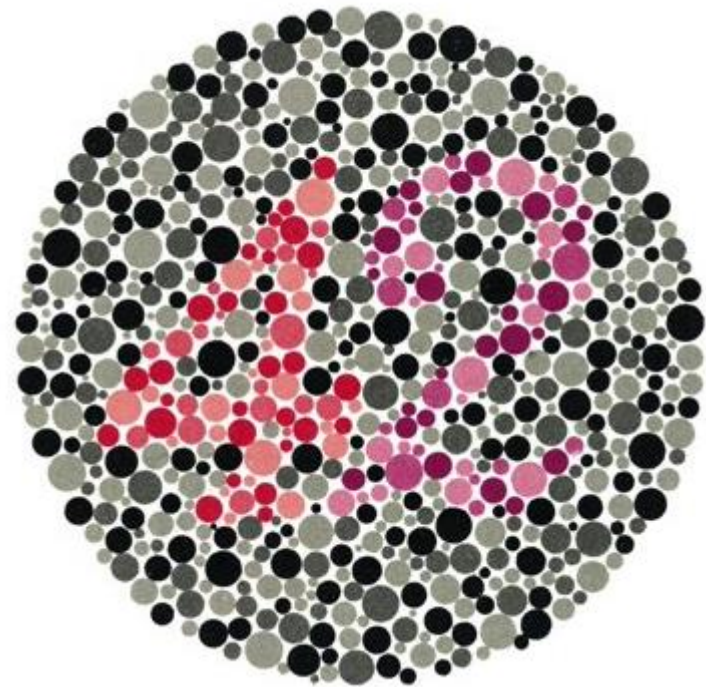
**Normal People read them as 6 and 45**  
**Majority of those with color vision deficiencies cannot read them at all**  
**or read them incorrectly.**



**Normal People read them as 5, 7, 16 and 73**  
**Majority of those with color vision deficiencies cannot read them at all**  
**or read them incorrectly.**



**Majority of those with red-green deficiencies read them as 5 and 45.**



**Normal People read them as 26 and 42**

**Those with protanopia and strong protanomalia read them as 6 and 2**

**Those with deuteranopia and strong deuteranomalia read them as 2 and 4**