Drawing Ray Diagram for Convex lens

Learning Objective

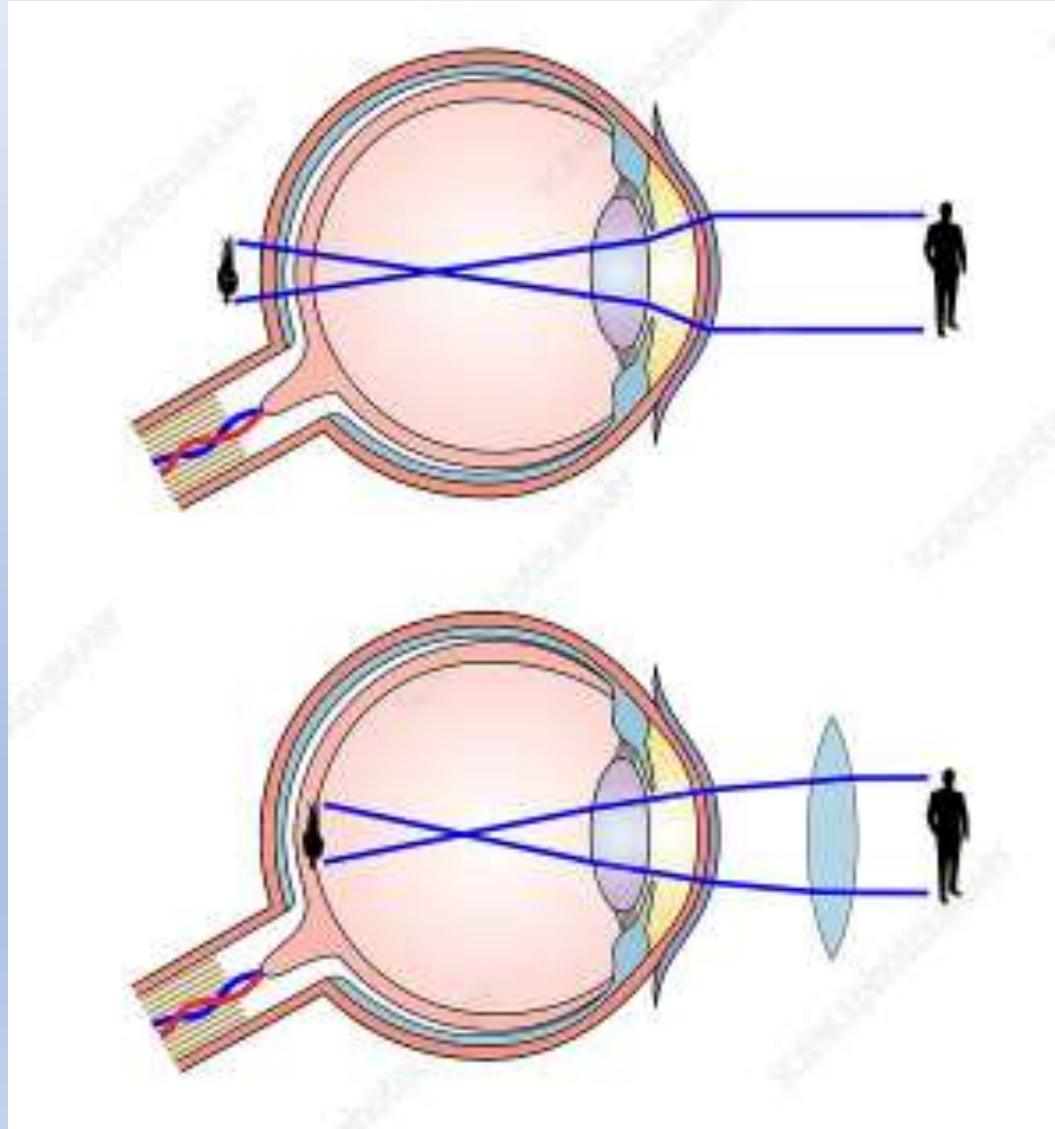
1. Draw and use ray diagrams for the formation of a image by a converging or Convex lens.

2. Describe the use of converging and diverging lenses to correct long-sightedness and short-sightedness

Lenses to correct eyesight problems

Key words

1. Magnifying Glass
2. Short sight
3. Long sight
4. Convex lens
5. Optic center
6. Principal axis
7. Principal focus
8. Focal length



Starter Activity

1.What is image?

2.State the difference between Real and Virtual image

https://www.bbc.co.uk/bitesize/guides/z7ftnrd/revision/2

HPL ACP: Linking
HPL VAA : CONFIDENT

Starter Activity

1.What is image?

An image may be defined as that point, where the light rays coming from an object meet or appears to meet after reflection or refraction.

2.State any 2 difference between Real and Virtual image

A

Real image is formed when the rays of light after reflection or refraction actually meet at some point whereas a

Virtual image is formed when the rays of light after reflection or refraction appear to meet at a point.

A

Real image can be formed in in a screen

Virtual image can be only seen in the mirror.

HPL ACP: Linking

HPL VAA : CONFIDENT

Key words - Definition

1. Enlarged

Used to describe an image which is bigger than the object.

2. diminished

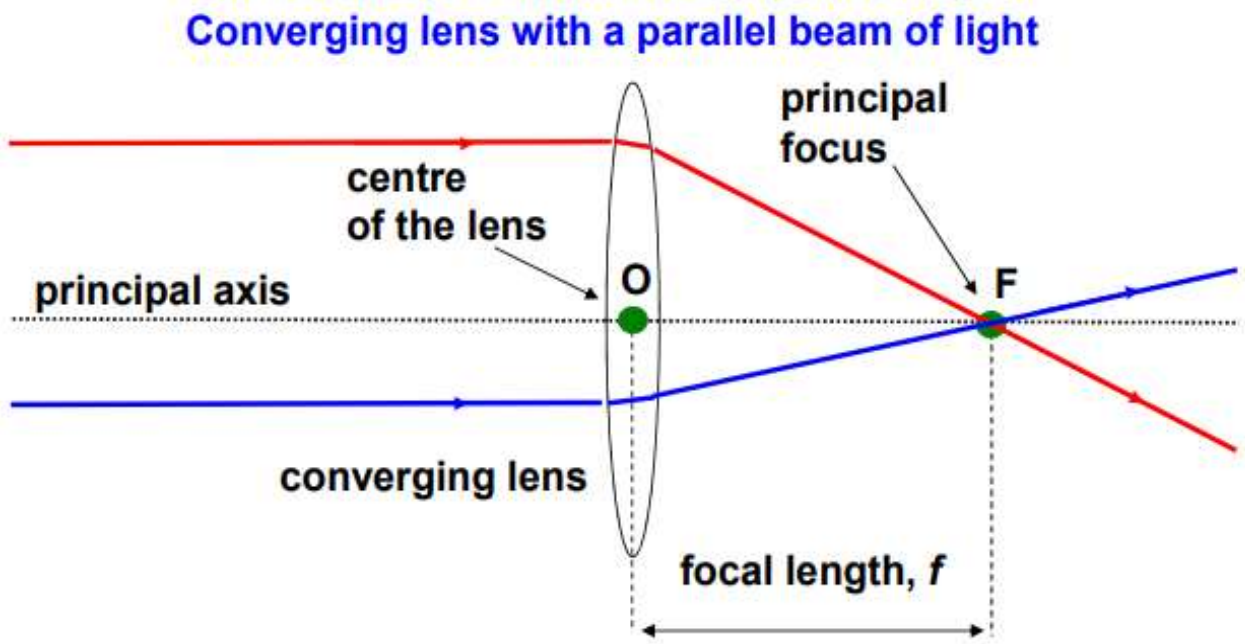
Used to describe an image which is smaller than the object.

3. inverted

Used to describe an image which is upside down compared to the object.

4. upright

Used to describe an image which is the same way up as the object.



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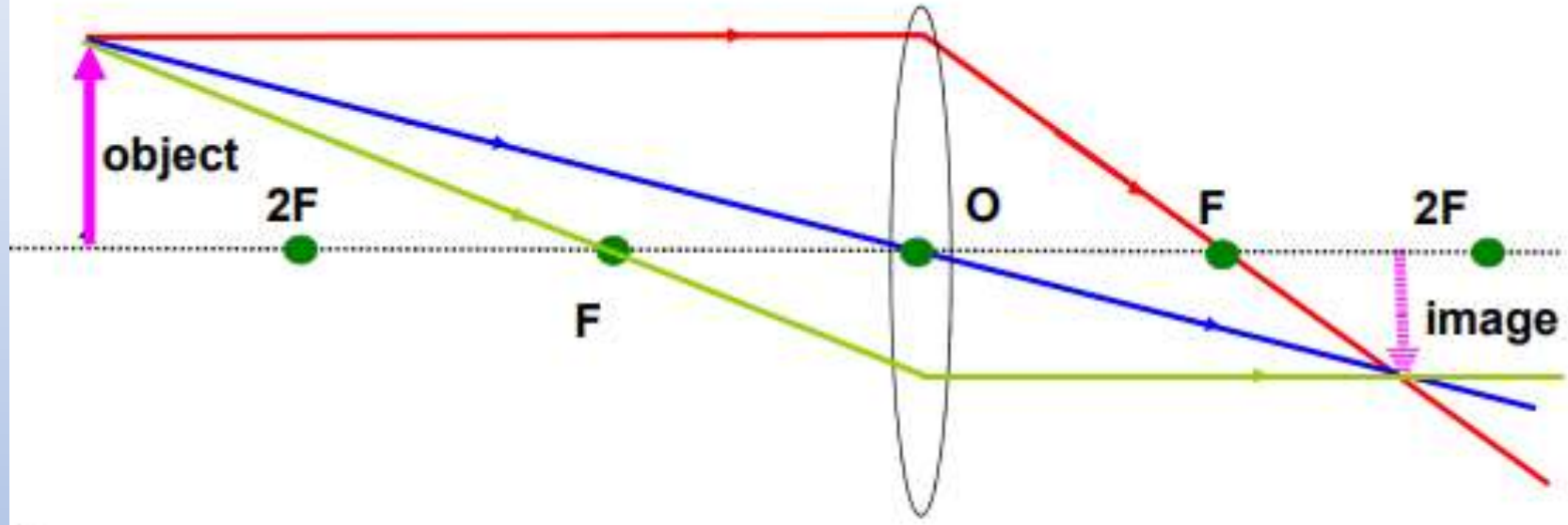
Convex or Converging lens is used in projector, camera, microscope and magnifying glass

Converging lens images

1. Object more than twice the focal length distant from a converging lens

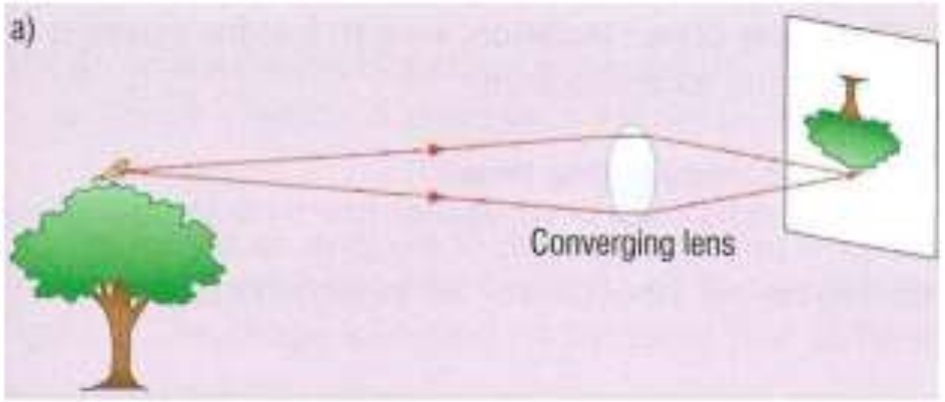


Uses:

- Camera
- Eye

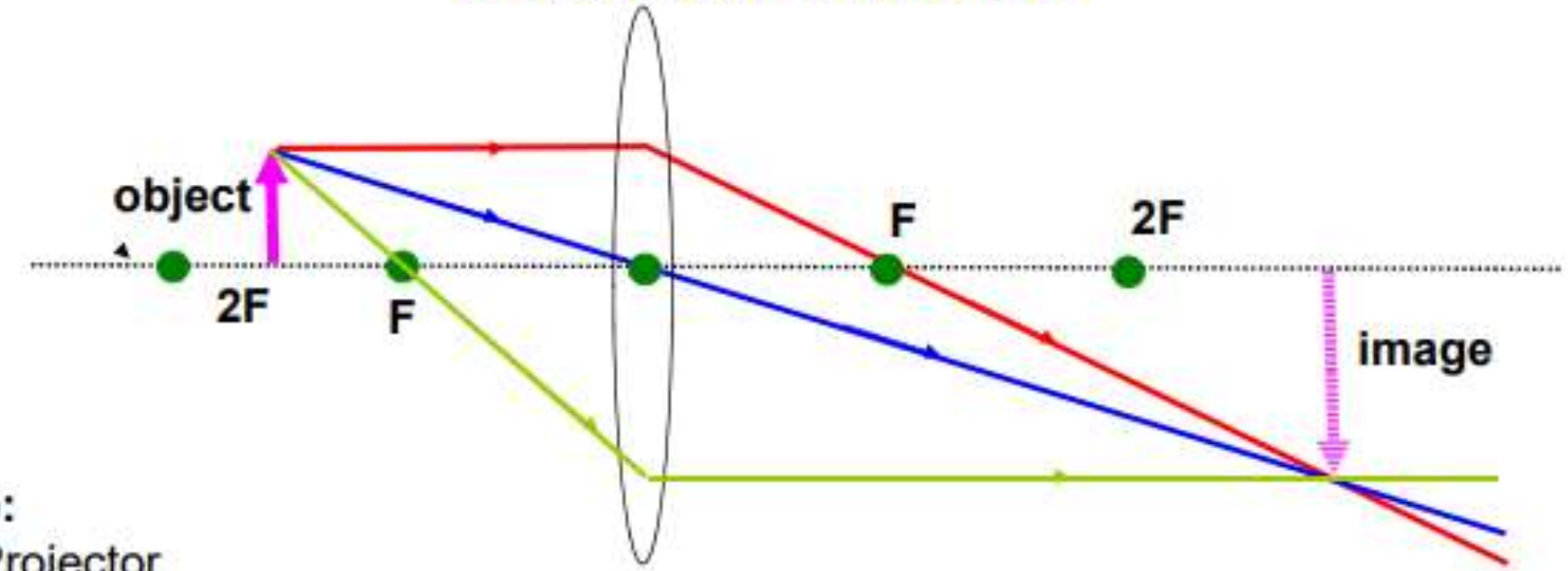
The image formed is:

- Smaller than the object (diminished)
- Inverted
- Real



Converging lens images

2. Object between F and 2F

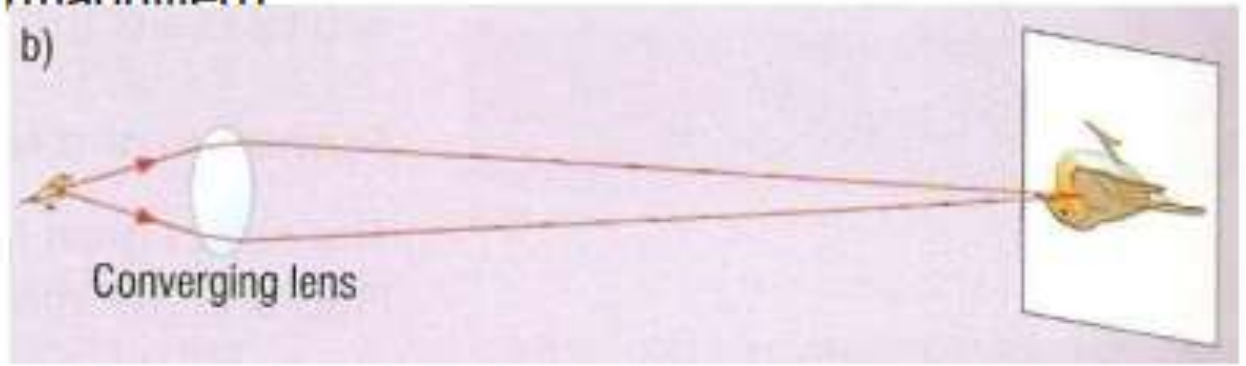


Use:

- Projector

The image formed is:

- Larger than the object (magnified)
- Inverted
- Real

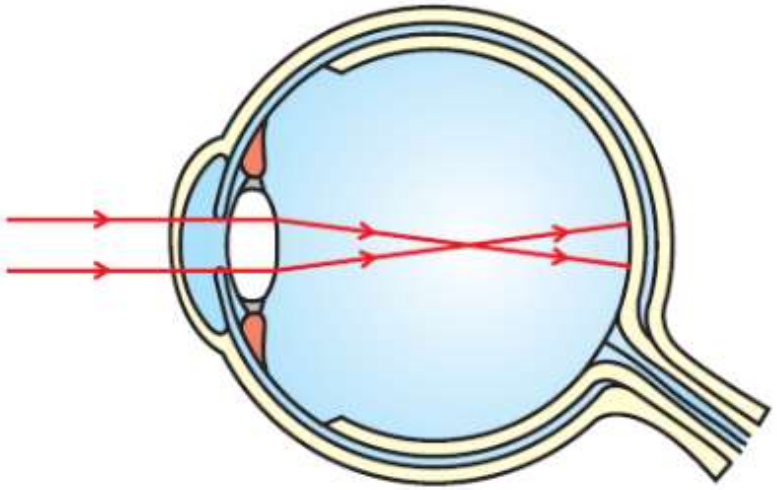


Lenses to correct eyesight problems –short sight Myopia

Short sight

A person with short sight can see close up objects clearly, but cannot form a clear image of distant objects. The image is formed in front of the retina. This is usually because the eyeball is slightly too long so that the rays meet in front of the retina. To correct this, a diverging lens is used to make the rays from the distant object diverge. The eye lens is then able to form a focused image. Figure 13.42 shows the problem and how it is corrected.

a



b

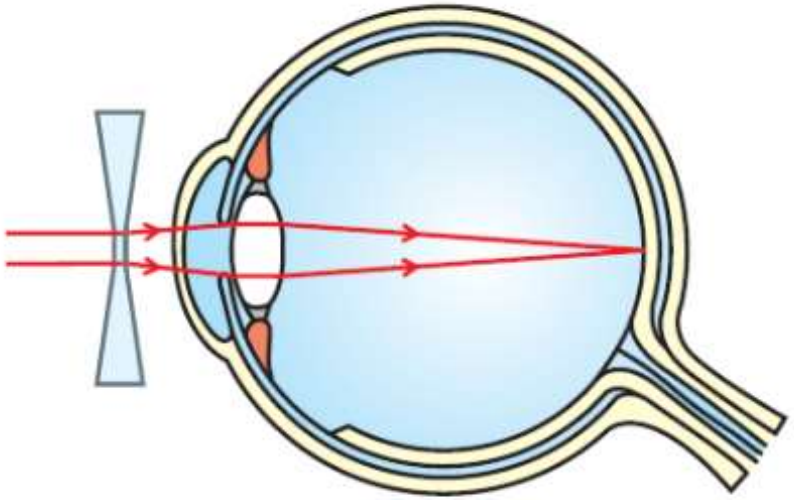


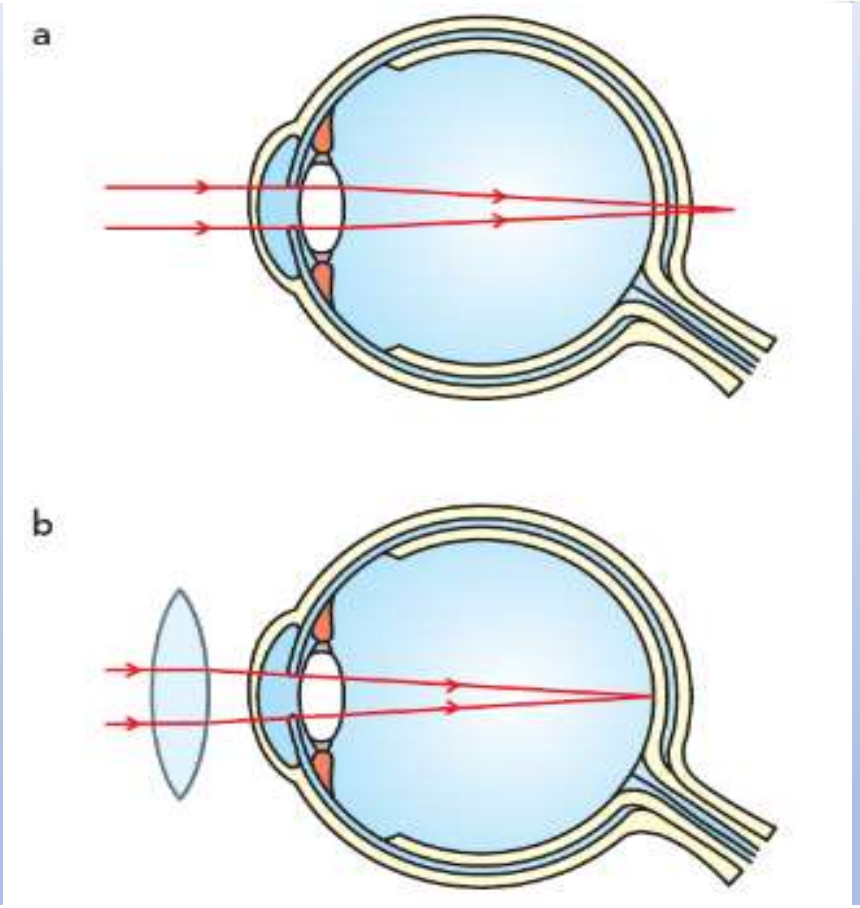
Figure 13.42a: With short sight, the image is formed before the retina. **b:** Using a diverging lens to help the lens in the eye to form an image on the retina.

1. Can see close up objects clearly, but cannot form a clear image of distant objects.
2. The image is formed in front of the retina.
3. Eyeball is too long so that the rays meet in front of the retina.
4. Diverging lens is used to make the rays from the distant object diverge.
5. Then the eye lens is able to form a focused image

Lenses to correct long eyesight problems - Hyperopia

Long sight

A long-sighted person has the opposite problem. A long-sighted eye can focus on distant objects but not close objects. This can be because the eyeball is too short, or the lens cannot become strong enough so the rays from a close object cannot be converged enough to a form an image on the retina. A converging lens causes the rays to converge, allowing the eye lens to form a focused image of close objects, as shown in Figure 13.44.



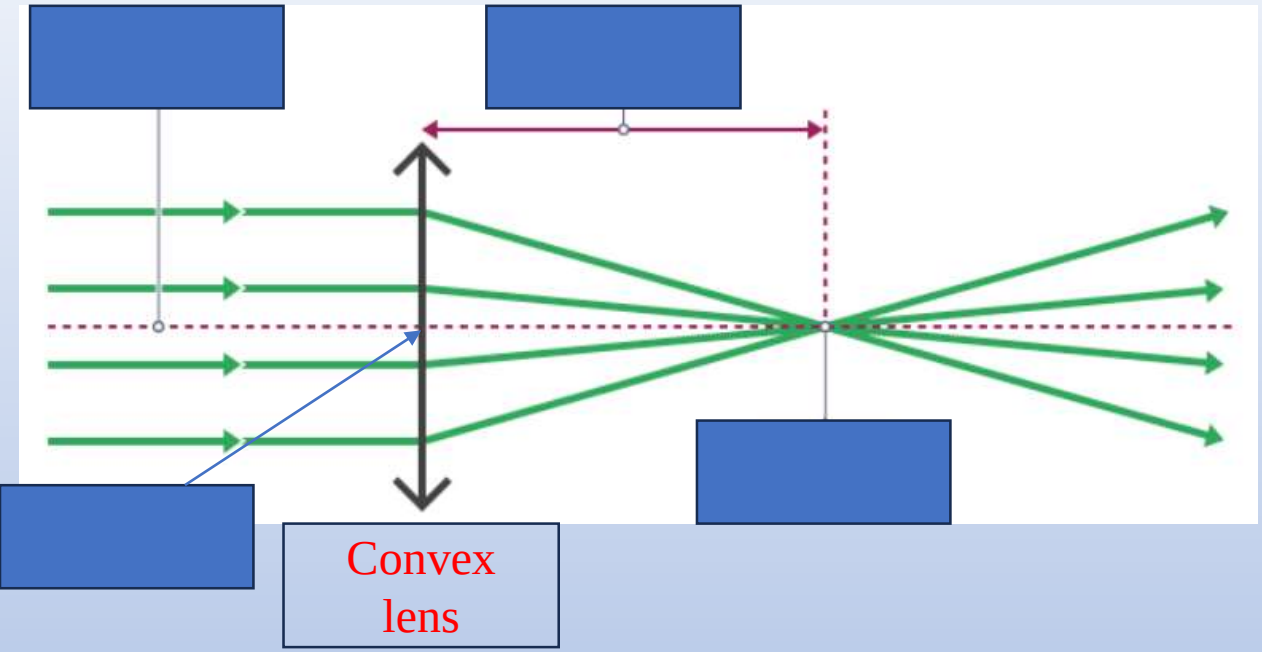
1. Can see distant objects clearly, but cannot form a clear image of close objects.

2. Eyeball is too short or the lens cannot become strong enough

3. The rays from a close objects cannot be converged enough to form an image on the retina.

4. Converging lens is used to converge, allowing the eye lens to form a focused image of close objects

Figure 13.44a: With long sight, the image is formed behind the retina. **b:** A converging lens works with the lens in the eye to form an image on the retina.



Activity 1: Identify & Label (Concrete learning)

Task:

•Label parts of a convex lens diagram

WORD BANK:

Optic center, Focal length, Principal focus and Principal axis

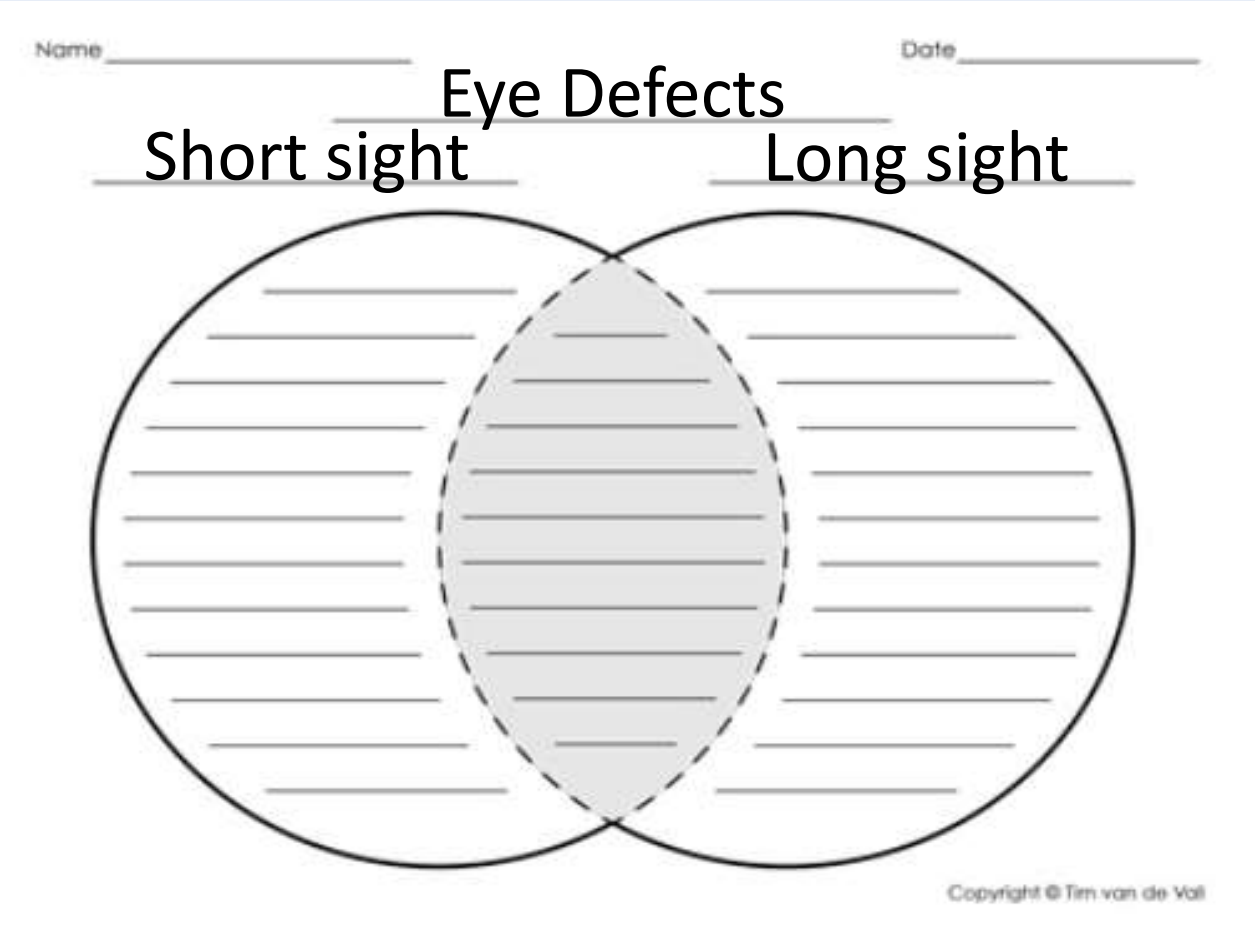
Tick correct statements yes or No

1.A convex lens is thicker in the middle
2.Convex lenses spread light
3.Convex lens is used in human eye

HPL

•**ACP:** Meta-thinking (basic recall)
•**VAA:** Confidence, Perseverance

Activity – 2 – Compare and Contrast the eye defects short sight and long sight – Draw Venn diagram



HPL ACP Analysing:

identify similarities and differences between short sight (myopia) and long sight (hyperopia).

•They break information into parts and organize it logically in a Venn diagram.

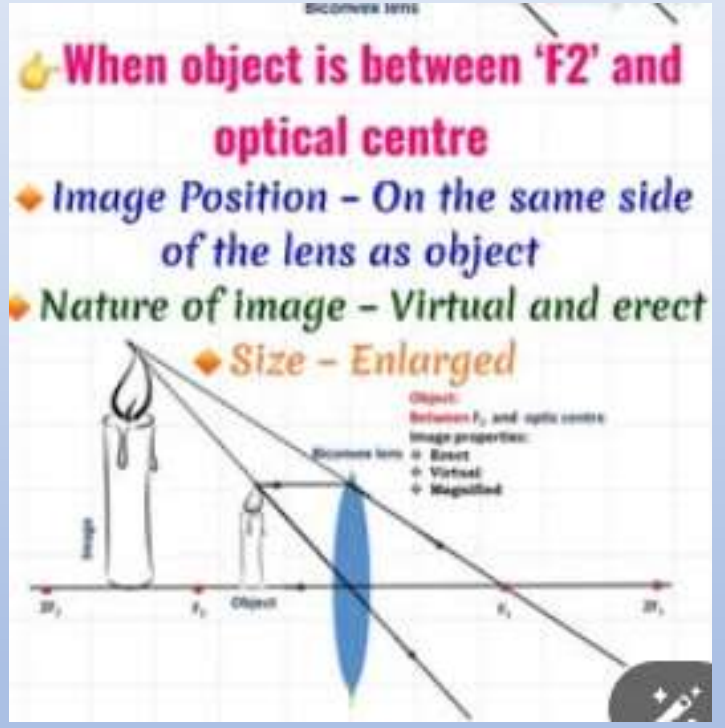
HPL VAA Accuracy & Precision

- Correct scientific terms are used:
  - Retina
  - Convex lens
  - Concave lens
- Correct placement of facts in the Venn diagram.

Activity – 3 – Apply & Explain (Challenge)

Task:

- Explain how a convex lens forms images at **different distances**
- Draw a simple ray diagram when the object is placed between F and optic center



Challenge Question:

Why do cameras and microscopes use convex lenses instead of concave lenses?

HPL

- **ACP:** Reasoning, Creating, Critical thinking
- **VAA:** Open-mindedness, Risk-taking

UAE Identity

How do Optometrist in Burjeel hospital, Abu Dhabi confirm the patient is suffering from short sight after examining their eyes?

PLENARY – Reflect & Assess

Exit Ticket Questions

1.One thing I learned about convex lenses
2.One real-life use of a convex lens
3.One question I still have

Mini Quiz

1.Is a convex lens thicker in the middle or edges?
2.Does it converge or diverge light?
3.Name one device that uses a convex lens

HPL

- **ACP:** Meta-thinking, Reflecting
- **VAA:** Confidence, Independence

The diagram shows 2 different vision problems.
Identify and describe which diagram is myopia (short sight) and hyperopia (long sight)