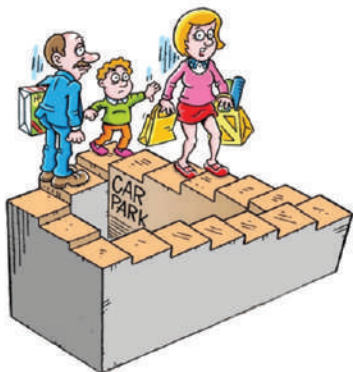


**TOPIC: PROPERTIES OF LIGHT: THAUMATROPE**

**Think a Ton!!**



*"We're not there yet, because your daddy still can't remember which level he parked it on!"*

1. How do we see things?
2. How do 3D videos work?
3. Why do virtual reality instruments give us such an amazing experience?
4. How are videos made?
5. What are optical illusions?
6. Can eyes store images like the camera does?

-----Know what's inside-----

Activity	Description
<b>Engage</b>	Vision is a wonderful gift that helps us to see things around us. Let's learn about the properties of light and its applications.
<b>Explore</b>	Let's explore the different materials that are used to make a thaumatrope.
<b>Elaborate</b>	Learn to make your very own thaumatrope and to understand the persistence of vision.
<b>Explain</b>	What is an optical illusion? How are videos made? What is the persistence of vision?
<b>Evaluate</b>	Explore what you learnt!!

## ENGAGE

### Know to Question; Question to know!!

1. How does the human eye work?
2. Sometimes why do we see things which are not actually present?
3. How does animation work? How are your favourite cartoons made?
4. When we watch a 3D film, why do we feel that we can touch the objects in front of us?

## EXPLORE

### 1. Read it aloud!

"Accodrning to a rscheearch, it deosn't mtttaer in waht oredr the ltteers in a wrod are, the olny iprmoatnt tihng is taht the frist and lsat ltteers be at the rghit pclae. The rset can be a toatl mses and you can sitll raed it wouthit porbelm. Tihs is bcuseae the huamn mnid deos not raed ervey lteter by istlef, but the wrod as a wlohe."

Yes, if all the fsirt and lsat lertets are ucnhnaged, tehn any wrod wth 3 lertets is esay and wrods with 4 lertets are olny stighly off. But cidsoner scantlifingy lightener lacixel citanibonms wth recuded particletibidy and tuloerbe cloud pilfertoraer!

(But consider significantly lengthier lexical combinations with reduced predictability and trouble could proliferate.)

### 2. What is persistence of vision?

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2. A few optical illusions are given below. Write what you see in each image in the space provided below.



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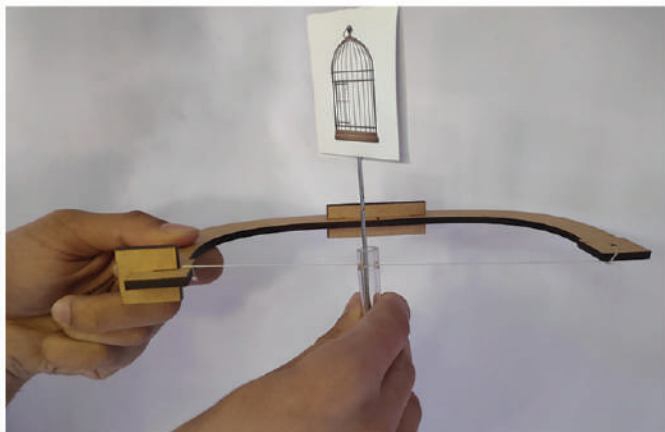
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## ELABORATE

### Activity: Thaumatrope

#### A. About the project:

Persistence of vision is the eye's ability to keep seeing an image of an object for a fraction of second after the object has disappeared. The image of an object stays on your retina even after you've stopped looking at it. Your eye and brain actually retain a visual impression for about 1/30th of a second. The principle of persistence of vision is used in making motion pictures and animated cartoons.



#### B. Observation:

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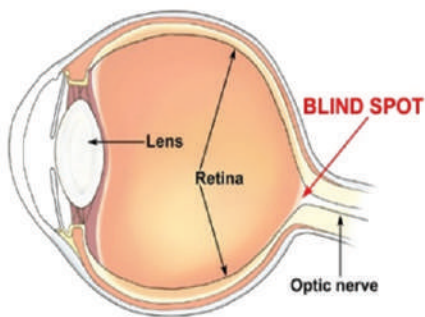
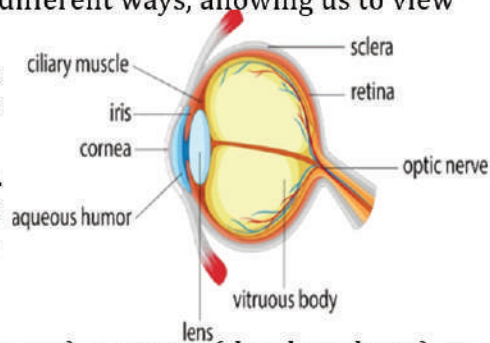
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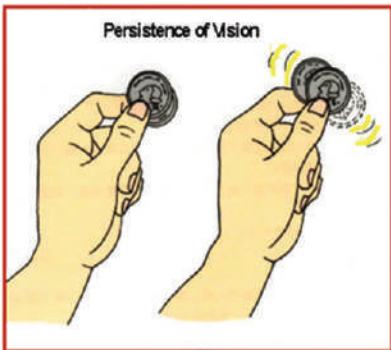
## EXPLAIN

1. Light is a form of energy with the ability to make objects visible to the human eye.
2. Darkness is defined as the lack of illumination or absence of light.
3. Light travels through the air in a straight line.
4. It interacts with objects in different ways, allowing us to view those objects.
5. The way our eyes have been designed to work is simply amazing.
6. The eyes work as a camera.
7. To see an object, the light should reflect off the object, reaching the eye.
8. The front part of the eye includes sclera (white of the eye), a cornea (the clear dome), iris (coloured part) and pupil (the black circular opening in the iris that lets light in).
9. Behind the iris and pupil lies the lens, which helps focus light on the back of your eye.
10. The inside lining of the eye is the retina, a light-sensitive layer.
11. This layer consists of millions of nerve cells that convert light to electrical impulses which are transmitted by the optic nerve.
12. Each eye has an optic nerve.
13. Both these optic nerves are connected to the brain.
14. When we see an image, our brain combines the information obtained by both the eyes and forms it into one image.
15. A blind spot is a place where our nerves are not present.
16. This is just on the entry of the optic nerve into the retina.



17. We cannot see whatever object lies in the blind spot. For example, you cannot see what is happening right behind your shoulder without tilting your head. That is a blind spot.
18. When we see something, we perceive it.

19. Persistence of vision is when our brain keeps an image in its memory for a split second.



20. To simplify, when you see an image for a second, you keep it in your memory. But when you see a series of images very quickly your brain cannot separate the images and you see it as a film.

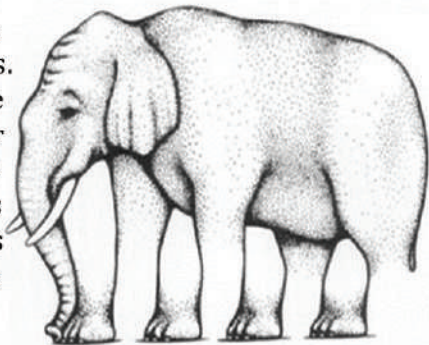
21. All the animations (including your favourite cartoons) work on the same principle.

22. They use the persistence of vision so that you see each drawing of the cartoon as a whole video.

23. A video is nothing but a collection of images played one after another so quickly that we do not see it as separate images but as one video as a whole.

24. We see optical illusions because those pictures make use of blind spots in our eyes.

25. Another reason why we see optical illusions is that our eyes do not scan the whole image. Once our brain gets to know what the image is all about, it signals the eyes to send information only that is needed by the brain.



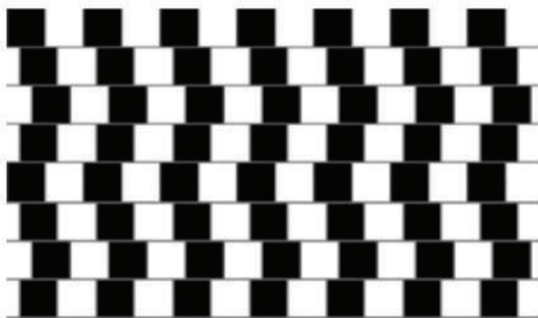
26. Optical illusions make use of this feature of our eyes.

27. So optical illusions are nothing but images trying to play with our brain.

**EVALUATE**

**1. Observe the illusions given below and answer the questions.**

i. Are the lines straight?



ii. Which circle is bigger?



iii. Explain in your own words the working of a Thaumatrope.

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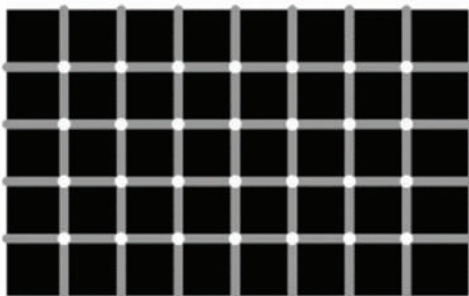
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2. Given below are a few optical illusions, observe them and answer the questions given below.

i. Can you count the number of black dots?



ii. Observe both the images carefully. Are the lines straight or bent?

