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A lens is a homogeneous optical device having a transparent medium through which light is refracted they are used to converge and divert light. One or both covers collect light from one side and change its convergence to reflect the other. The word lens comes from the Latin word lentil because the shape of a bi-convex lens is like a pulse. The oldest lens is the Nimrud lens, which was made about 2700 years ago in ancient Assyria. Most lenses have a round cover with two axes. The first axis is the horizontal axis and the second axis is the vertical axis. Most lenses are made of glass, quartz, and plastic and their use is increasing day by day. There are usually two types of lenses convex and concave lens. Concave vs convex lens and their details are described below (2) & (3).Convex lensA lens that is thicker in the middle and narrower at the edges is called a convex lens. The incidental parallel rays on the convex lens emit convergence from the lens after refraction. That is why a convex lens is called a converging lens. The rays are incident on the convex surface of the convex lens. This lens converges a bunch of parallel rays at a point. This point is called the focal point of the lens and the distance of this point from the center of the lens is the focal length. The focal length of a convex lens is positive. The light converges at one point on the convex lens and then it spreads again (1) & (4).Example The lens used in the camera is a convex lens.Types of convex lensThere are three types of convex lenses depending on the shape of the surface (1).1. Double convex lensA lens that is convex on both sides is called a double convex lens. If the curvature radius of the two surfaces of this lens is equal, then it is called an equiconvex lens.2. Plano-convex lensA lens that has one side is flat and the other side is convex.3. Concave-convex lensA lens that has one surface concave and the other surface convex is called a concave-convex lens. The curvature radius of the concave surface of this lens is greater than the radius of curvature of the convex surface.Convergent action of a convex lensThe reflection of light through the prism causes the ray to bend towards the ground of the prism. The focusing action of convex lenses can be explained with the help of the properties of prisms. A convex lens is thought to be made up of a number of small cut prisms placed one on top of the other. However, the vertex angles of these prisms are not equal.The vertex angles at the very top and bottom of the main axis of the lens are the largest. If the top angle of the prism is large, the deviation of the refracted rays is greater. As a result, the incident rays on the two ends of the lens bend most towards the ground. But the vertex angle of the prism in the middle of the lens is very small so it is called a parallel plate.For this reason, if a bunch of parallel rays to the axis of the lens is incident in the middle of the lens, those rays will emit parallel to the axis after refraction. Thus the different parts of a convex lens act like a prism so that the incident rays on the lens bend towards the main axis after refraction. This results in the reflected rays passing through a point on the axis of the lens and the rays emit convergent (1) & (2).Formation of the image by convex lensIf the distance of an object from a convex lens is equal to the focal length of the lens or greater than the focal length, a real image of the object is formed. The size of the reflection depends on the distance of the object from the lens (1).On the other hand, if the object is placed less than the focal length of the lens, the reflection of the object is formed on the side where the object is on the lens. This image is virtual, straight, and larger in size than the object. This property of the convex lens is used to make microscopic instruments, magnifying glass (4)Uses of the convex lensConvex lenses are used in many cases likeA convex lens is used in a magnifying glass.Convex lenses are used as an aid in determining the focal length of a concave lens.Convex lenses are used as a burning glass.Eye diseases like hyperopia, presbyopia, etc. can be removed with the help of convex lenses.These lenses are used in cameras, microscopes, telescopes, and other lighting devices.It is used by jewelry makers and watches repairmen (1) &(4)Concave lensA lens that is narrow in the middle and thicker in both ends is called a concave lens. The middle of the concave lens is narrow and the edges are flattened. When parallel rays are incident on the concave surface of this lens, the rays are scattered. The incidental parallel rays on the concave lens emit divergence from the lens after refraction. For this reason, a concave lens is called a diverging lens. The focal length of a concave lens is negative (2).Example Lenses used in cars, motorbikes, etc. are concave lenses.Types of concave lensThere are three types of concave lenses (1) depending on the shape of the surface1. Double concave lensA lens that is concave on both sides is called a double concave lens. If the curvature radius of the two surfaces of this lens is equal, then it is called equi concave lens.2. Plano concave lensA lens that has one side is flat and the other side is concave, which is called a Plano concave lens.3. Convex-concave lensA convex-concave lens is a type of lens in which one surface is convex and the other is concave. The curvature radius of the concave surface of this lens is less than the radius of curvature of the convex surface.Divergent action of a concave lensA concave lens can be thought of as the sum of some prisms. The ground of the prisms above the main axis is upwards and the ground of the prisms below the main axis is at the bottom. As a result, the upper rays bend upwards and the lower rays bend downwards. This causes the refracted rays to turn into diverging rays. That is why the concave lenses are called diverging lenses (2).Uses of a concave lensLike a convex lens, concave lenses are used in many cases.A concave lens is used to see distant objects through binoculars. Convex lenses help to see a blurred image. Concave lenses are the most useful for binoculars.Myopia is a disease of the human eye. In this disease, no reflection is formed in the retina of the eye. Objects close to the eye appear clear and objects far from the eye become obscure. This disease of the eye can be removed by using concave lenses.Concave lenses are used in flashlights.Concave lenses are also used in the camera for better image quality.This lens is used in medical (especially dental treatment), various scanners, CDs, DVD players, etc. (3) & (4)Difference between the convex lens and the concave lensFrom the above discussion, there are some differences between convex and concave lenses observed. Some of the differences between convex and concave lenses are discussed below. Convex lenses and concave lenses are used simultaneously in some cases, but there are some differences between them (1) & (2).DefinitionA convex lens is a type of lens in which the middle part is thick and the sides are narrow.A transparent refractive medium bounded by two concaves is called a concave lens.Center typeThe center of the convex lens is thicker.The center of the concave lens is narrow.Edge typeBoth edges of this lens are narrow.Both edges of this lens are ticker.Focal lengthThe focal length of a convex lens is positive.The focal length of a concave lens is negative.Image typeThe convex lens forms the actual and inverted image.The concave lens forms the virtual and upright image.Position of focal lengthThe position of the focal length in a convex lens is towards the front of the lens.The position of the focal length in a concave lens is towards the back of the lens.Ray emission typeThe incidental parallel rays on the convex lens emit convergence from the lens after refraction.The incidental parallel rays on the concave lens emit divergence from the lens after refraction.Objects typeThe center of the convex lens is thicker, so the object looks closer and larger.The center of the concave lens is narrower, so the objects look smaller.Meeting point of lightAfter light passes through a convex lens, it is reflected and the reflected rays meet at a certain point.As it passes through the concave lens, light rays are refracted and the refracted rays are scattered around (1) & (4)Concave and convex lenses are both types of optical lenses that have different shapes and properties. A concave lens is thinner at the center and thicker at the edges, causing light rays passing through it to diverge. This type of lens is used to correct nearsightedness and to create virtual images. On the other hand, a convex lens is thicker at the center and thinner at the edges, causing light rays passing through it to converge. Convex lenses are commonly used in magnifying glasses, cameras, and eyeglasses to correct farsightedness and to create real images. Overall, concave and convex lenses have opposite effects on light rays and are used for different purposes in optics. When it comes to lenses, there are two main types that are commonly used in various optical devices - concave lenses and convex lenses. These lenses have different shapes and properties that make them suitable for different applications. In this article, we will compare the attributes of concave lenses and convex lenses to understand their differences and similarities.ShapeOne of the most obvious differences between concave lenses and convex lenses is their shape. Concave lenses are thinner at the center and thicker at the edges, giving them a curved-in appearance. On the other hand, convex lenses are thicker at the center and thinner at the edges, giving them a curved-out appearance. This difference in shape affects how light rays are refracted when passing through the lenses.Focal LengthAnother important attribute to consider when comparing concave lenses and convex lenses is their focal length. The focal length of a lens is the distance from the lens to the point where light rays converge or diverge. Concave lenses have a negative focal length, which means that light rays diverge after passing through the lens. In contrast, convex lenses have a positive focal length, causing light rays to converge after passing through the lens.Image FormationConcave lenses and convex lenses also differ in how they form images. When an object is placed in front of a concave lens, the image formed is virtual, upright, and smaller in size. This is because the light rays diverge after passing through the lens. On the other hand, when an object is placed in front of a convex lens, the image formed is real, inverted, and either larger or smaller in size, depending on the object's distance from the lens.ApplicationsDue to their unique properties, concave lenses and convex lenses are used in different applications. Concave lenses are commonly used in devices such as cameras, telescopes, and binoculars to correct nearsightedness and to produce virtual images. Convex lenses, on the other hand, are used in devices like magnifying glasses, microscopes, and projectors to magnify objects and produce real images. The choice of lens depends on the specific requirements of the application.Light RefractionOne of the key differences between concave lenses and convex lenses is how they refract light. When light rays pass through a concave lens, they are refracted in such a way that they diverge. This is because the lens is thinner at the center, causing the light rays to spread out. In contrast, when light rays pass through a convex lens, they are refracted in such a way that they converge. This is because the lens is thicker at the center, causing the light rays to come together.PowerThe power of a lens is a measure of its ability to bend light rays. Concave lenses have a negative power, indicating that they diverge light rays. This property makes concave lenses useful for correcting vision problems such as nearsightedness. On the other hand, convex lenses have a positive power, indicating that they converge light rays. This property makes convex lenses useful for magnifying objects and producing real images.ConclusionIn conclusion, concave lenses and convex lenses have distinct attributes that make them suitable for different applications. Concave lenses are thinner at the center, have a negative focal length, and produce virtual images. Convex lenses are thicker at the center, have a positive focal length, and produce real images. Understanding the differences between these two types of lenses is essential for choosing the right lens for a particular optical device or application. Comparisons may contain inaccurate information about people, places, or facts. Please report any issues. Your life wouldn't be the same without lenses. Whether you need to wear corrective eyeglasses or not, you can't see a clear image of anything without some kind of lenses to bend the rays of light that pass through them into a single focal point.Scientists depend on microscopes and telescopes to allow them to see very small or distant objects, except magnified to the point where they can extract useful data or observations from the images. And exactly the same principles are used to make sure you have a camera that can help you take the perfect selfie.From the magnifying glass to the human eye, all lenses operate on the same basic principles. While there are important differences between converging lenses (convex lenses) and diverging lenses (concave lenses), as soon as you learn some of the basic details, you'll notice many similarities too. Before embarking on this journey to understand convex and concave lenses, it's important to have a primer on some of the key concepts in optics. The focal point is the point at which parallel rays converge (i.e. meet) after passing through a lens, and where a clear image is formed.The focal length of the lens is the distance from the center of the lens to the focal point, with a smaller focal length indicating a lens that bends rays of light more strongly.The optical axis of a lens is the line of symmetry running through the center of the lens, which runs horizontally if you imagine a lens stood vertically upright.A light ray is a useful way to represent the path of a beam of light, used in ray diagrams to give a visual interpretation of how the presence of a lens affects the path of the light beam.In practice, any object will have light rays leaving it in every direction, but not all of these offer useful information when it comes to analyzing what the lens actually does. When you draw ray diagrams, choosing a few key light rays is usually enough to explain the propagation of light waves and the process of image formation. Ray diagrams and ray tracing allow you to determine the location of image formation based on the object's location and the lens' location.The process of drawing the light rays and their deflection as they pass through the lens can be completed using Snell's law of refraction, which relates the angle of the ray before reaching the lens to the angle on the other side of the lens, based on the indices of refraction for air (or another medium through which the ray travels) and the piece of glass or other material used for the lens.However, this can be time-consuming, and there are a few tricks that can help you produce ray diagrams more easily. In particular, remember that light rays passing through the center of the lens aren't refracted to a noticeable degree, and that parallel rays are deflected toward the focal point.There are two main types of image formation that can occur with lenses and that you can use ray diagrams to establish. The first of these is a "real image," which refers to a point at which light rays converge to produce an image. If you placed a screen at this location, the light rays would create an in-focus image on the screen. A real image is produced by a converging lens, which is otherwise known as a convex lens.A virtual image is completely different and is created by a diverging lens. Because these lenses bend light rays away from each other (i.e. make them diverge), the "image" is actually formed on the side of the lens where the incident light rays came from.The funneling out of the rays on the opposite side makes it look as if the rays were produced by an object on the same side of the lens as the incident rays, as if you traced the rays back on a straight-line path to the point where they would converge. This isn't literally true, though, and if you placed a screen at this location there would be no image. The thin lens equation is one of the most important equations in optics, and it relates the distance to the object do, the distance to the image di and the focal length of the lens f. The equation is pretty simple, but it's a little more difficult to use than some other equations in physics because the key terms are in the denominators of fractions, as follows:\(\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}\)The convention is that a virtual image has a negative distance and that real images have a positive image distance. The focal length of the lens also follows this same convention, so positive focal lengths represent converging lenses, and negative focal lengths represent diverging lenses.Convex and concave lenses are the two main types of lenses discussed in introductory physics classes, so as long as you understand how these behave, you'll be able to answer any question.It's important to note that this equation is for a "thin" lens. This means that the lens can be treated as deflecting the path of a light ray from one location only, the center of the lens.In practice, there is a deflection on both sides of the lens one at the interface between the air and the lens material, and the other at the interface between the lens material and the air on the other side but this assumption makes the calculation much simpler. A concave lens is also referred to as a diverging lens, and these are curved so that the "bowl" of the lens is facing the object in question. As mentioned above, the convention is that lenses like this are assigned a negative focal length, and the virtual image they produce is on the same side as the original object.To complete the ray tracing process for a concave lens, note that any light ray from the object that travels parallel to the optical axis of the lens will be deflected, so it appears to have originated from near the focal point of the lens, on the same side of the lens as the object itself.As mentioned above, any ray that passes through the center of the lens will continue without being deflected. Finally, any ray moving toward the focal point on the opposite side of the lens will be deflected, so it emerges parallel to the optical axis.Drawing a few such rays based on a single point on the object will usually be enough to find the location of the image produced. A convex lens is also known as a converging lens and essentially works in the opposite way to a concave lens. It's curved so that the outer bend of the "bowl" shape is closest to the object, and the focal length is assigned a positive value.The process of ray tracing for a converging lens is very similar as for a diverging lens, with a couple of important differences. As always, rays of light passing through the center of the lens are not deflected.If an incident ray is travelling parallel to the optical axis, it will deflect through the focal point on the opposite side of the lens. Conversely, any light ray coming from the object and passing through the near focal point on its journey toward the lens will be deflected, so it emerges parallel to the optical axis.Again, by drawing two or three rays for a point on the object based on these simple principles, you'll be able to find the location of the image. This is the point where all of the light rays converge on the opposite side of the lens to the object itself. Magnification is an important concept in optics, and it refers to the ratio of the size of the image produced by a lens and the size of the original object. This is pretty much how you'd understand magnification as a concept from everyday life if the image is twice as big as the object, it's been magnified by a factor of two. But the precise definition is:\(M= -\frac{i}{o}\)Where M is the magnification, i refers to the size of the image and o refers to the size of the object. A negative magnification indicates an inverted image, with positive magnification being upright. There are similarities between convex and concave lenses in basic terms, but there are more differences than similarities when you look at them in more detail.The major similarity is that they both work on the same basic principle, where the difference in refractive index between the lens and the surrounding medium allows them to bend light rays and create a focal point. However, diverging lenses always create virtual images, while converging lenses can create real or virtual images.As the curvature of the lens decreases, converging and diverging lenses become increasingly similar to each other, because the geometry of the surfaces becomes more similar too. Since they both work based on the same principle, as the geometry becomes more similar, the effect they have on a light ray becomes more similar too. Concave and convex lenses have many practical applications, but the most common in day to day life is the use of corrective lenses (eyeglasses) for myopia or nearsightedness, or indeed hyperopia or farsightedness.In both of these conditions, the focal point for the lens of the eye doesn't quite match up with the position of the light-sensitive retina at the back of the eye, with it being in front for myopia and behind it for hyperopia. Eyeglasses for myopia are diverging, so the focal point is moved backward, while for hyperopia converging lenses are used.Magnifying glasses and microscopes work in the same basic way, using biconvex lenses (lenses with two convex sides) to produce a magnified version of the images. A magnifying glass is the simpler optical device, with a single lens that serves to produce a bigger image size than you could obtain otherwise. Microscopes are a little more complicated (because they usually have multiple lenses), but they produce magnified images in basically the same way.Refractor telescopes work just like microscopes and magnifying glasses, with a biconvex lens producing a focal point inside the body of the telescope, but the light continuing on to reach the eyepiece.As on microscopes, these have another lens in the eyepiece to make sure the captured light is in focus when it reaches your eye. The other major type of telescope is a reflector telescope, which uses mirrors instead of lenses to gather the light and send it to your eye. The mirror is concave, so it focuses the light to a real image on the same side of the mirror as the object. Johnson, Lee. "Concave & Convex Lenses: Similarities & Differences" sciencing.com, . 28 December 2020. APA Johnson, Lee. (2020, December 28). Concave & Convex Lenses: Similarities & Differences. sciencing.com. Retrieved from Chicago Johnson, Lee. Concave & Convex Lenses: Similarities & Differences last modified August 30, 2022. Light is a fascinating chapter included in the science syllabus. Students learn a lot of new concepts in this chapter. As they proceed to the new classes, they delve deeper into the basic and advanced concepts of light. First, they learn the features of light rays and then proceed to learn what reflection of light rays is. On proceeding further, they come to know how refraction of light rays occurs in a transparent medium. We will study the features of a concave and convex lens in this section.One of the most significant parts of this chapter is the lens. It is a transparent medium made of glass but has one or two curved surfaces. Lenses are of two types, concave and convex lenses. The nature of the curved surface determines what kind of lens it is. Studying the behaviour of the lenses will help distinguish between a concave and convex lens. Let us learn what a concave and convex lens is first.What is a Convex Lens?A curved transparent medium made of glass that looks like a part of a compact sphere is called a convex lens. The surface of this lens has an external curve that looks like the surface of a glass ball. When light rays fall on the convex surface of this lens, they tend to converge from their paths.When both the surfaces are convex, they are called a biconvex lens. When one surface is a plane and the other is convex, it is called a plano-convex lens. The behaviour of the lenses depends on the degree of curvature of a convex lens. When parallel rays fall on the convex surface of this lens, they tend to converge and meet at a single point. This point is called the focus of the lens. The focal length is the measurement of the focal point and the centre of the lens. The focal point is also called the principal focus of a lens.In this section, you will learn how the position of an object on the principal axis and its distance from the focus determine the size and type of the images formed. The thumb rule of the convex lens regarding image formation dictates the dimension and nature of images. This lens is used in different ways.Uses of a Convex LensConvex lenses are used in microscopes, magnifying glasses and eyeglasses. They are also used in the cameras to create real images of objects present at a distance. The nature of the images depends on the way these lenses are used. The prime reason for learning the uses of convex lenses is to find how light refraction is used to see things properly.The above example of a convex lens signifies how these lenses are used to create real images to serve a purpose. In eyeglasses, the convex lenses remain closer to the eyes creating a virtual image. You will also learn why the images formed are either real or virtual and how they are used for various purposes.Check the convex lens used and find how a lens is used to serve a purpose. Every use will define how the lenses are used in different ways. It will help you remember the features of this lens.What is a Concave Lens?A concave lens is a type of transparent medium made of glass that has one or two concave surfaces. The best way to recognize a concave lens is by checking the curved surface. It resembles the inner surface of a hollow sphere, almost like the mouth of a cave. These lenses are also called divergent lenses as the parallel beams incident on their surface tends to diverge from their paths.Concave lenses can never produce a real image as their property is to diverge light rays away from their path. It means that the light rays will not converge and meet at a point physically. When the rays are produced backwards in a virtual way, they meet at a point. This is the prime difference between concave and convex lens. If you follow the equation of the focal length and object distance, you will find that the image distance always comes negative. It means that the image will form on the opposite side of the refracted rays.Uses of a Concave LensA concave lens is used to diverge incident rays. This helps to create a virtual image on the opposite side of the refracting surface. Hence, these lenses are used in binoculars, telescopes, cameras, flashlights and eyeglasses. The images are erect and upright, unlike the real images. This is how you can distinguish between concave and convex lens by learning the features of light rays refracting inside the lenses.When you follow the structure and traits of a concave and convex lens, you will clearly understand the difference in the formulas. The same formula of focal length, image distance and object distance can be adjusted using the traits of each lens.Why should You differentiate between Concave and Convex Lens?The difference between a concave and convex lens will help you understand the traits of each lens. It will also help you figure out the adjustments in the formula used to calculate image distance, object distance and focal length of a lens.Difference between Convex Lens and Concave LensThe appearance of convex lenses is thicker in the middle and thinner at the edges whereas the appearance of concave lenses is thinner in the middle and thicker at the edges.A convex lens is also known as a converging lens whereas a concave lens is also known as a diverging lens.Convex can be used in a lot of things like overhead projector, camera, focus sunlight, simple telescope, projector microscope, magnifying glasses etc whereas concave lens can also be used in a lot of things like spy holes in the doors, glasses, some telescopes etc.A convex lens is being used for the correction of the long sight problem whereas a concave lens is being used for the correction of the short sight problem.Convex lenses always have a positive focal length whereas concave lenses have a negative focal length.Convex lens converges the incident rays towards the principal axis whereas concave lens diverges the incident rays away from the principal axis.The image which is being formed through the concave lens is upright, smaller in size than the object and is virtual. The position of the image which is being formed is between the lens and the objects and is regardless of the position of the object. Whereas the image which is being formed through a convex lens is real, inverted and smaller in size than the object when the object is being placed at focus. When the object is being placed at 2F, the image which is going to be formed is inverted, of the same size as that of the object and is real. When the object is placed between 2F and F, the image which is going to be formed is inverted, larger than the object and is real. If and when the object is being placed at F (focus), there will be no image going to form. When the object is going to be placed on the same side of the lens, the image will be formed virtual, upright and larger than the object. A convex lens or converging lens focuses the light rays to a specific point, whereas a concave lens or diverging lens diverges the light rays. A lens is a transparent material (either curved or flat surface) based on the principles of refraction. Concave lenses and convex lenses are often used together which is known as the Concave Convex lens. When these lenses are combined, they produce sharper images. Most eyeglass lenses use combinations of convex and concave lenses. Cameras, telescopes and microscopes use different lenses, helping us to see the world in a better way.Read More: Concave lenses and Convex lensesConcave Vs ConvexAppearanceA concave lens is thinner in the middle and thicker at the edges.A convex lens is thicker in the middle and thinner at the edges.Also known asIt is also known as Diverging LensIt is also known as Converging LensApplicationUsed in glasses, some telescopes, spy holes in the doors, etc. It is also used for the correction of the problem in short sightUsed in the camera, overhead projector, projector microscope, simple telescope, magnifying glasses, etc. It is also used for the correction of the problem in long sight.Focal LengthNegative Focal LengthPositive Focal LengthIncident RaysIt diverges the incident rays away from the principal axis.It converges the incident rays towards the principal axis.Type of Image FormedThe image formed is an upright, virtual, and smaller size than the object. The position of the image formed is in between the lens and the object regardless of the objects positionThe image formed is inverted, real and smaller than the object when the object is placed at focus. The image formed is the inverted, real, and the same size as the object when the object is placed at 2F. The image formed is inverted, real and larger than the object when the object is placed between 2F and F. Image is formed at infinity when the object is placed at the focus.. The image formed is upright, virtual, and larger than the object when the object is placed on the same side of the lens.Recommended Videos Stay tuned with BYJUS to learn more Physics concepts with the help of interactive video lessons. Put your understanding of this concept to test by answering a few MCQs. Click Start Quiz to begin! Select the correct answer and click on the Finish buttonCheck your score and answers at the end of the quiz Visit BYJUS for all Physics related queries and study materials 0 out of 0 arewrong 0 out of 0 are correct 0 out of 0 are Unattempted View Quiz Answers and Analysis Convex Lenses and Concave Lenses are the types of spherical lenses, which are optical devices that are transparent in nature. There are several differences between Convex and Concave Lenses which we will cover in this article in detail such as their distinct characteristics and uses. Knowing the difference between Convex and Concave Lenses is critical in grasping their function in different optical systems such as binoculars, optical microscopes, telescopes, etc.This article explores the difference between convex and concave lens in detail including their definition with diagrams and key characteristics as well.Convex Lenses and Concave LensConvex lens- Thicker in the middle and thinner on the edges, a convex lens is able to form real images by converging light rays when the object is outside the focal point and virtual images when it's closer than the focal length.Concave lens: Forming only virtual images, a concave lens is thinner at the center and thicker at the edges, diverging light rays. It has a virtual focal point instead of a real one and rays appear to originate from it.What is Convex Lens?With a curved shape that bulges from the centre and tapers towards the edges, a convex lens - also referred to as a converging lens, is an optical device that is transparent. The lens is able to converge parallel rays of light that pass through it due to the fact that it's thicker at the centre than it is at the edges.Types of Convex LensBiconvex Lens: The lens has a shape, on both sides bulging towards the center. It is commonly used in magnifying glasses and simple camera lenses.Plano Convex Lens: This lens has one side (plano). The other side is curved outward. It is designed to focus rays to a specific point and is often found in optical instruments and projectors.Concavo Convex: This lens has convex face and concave face. In this lens convex face has smaller curvature.What is Concave Lens?A transparent optical device with a curved shape that curves inward, creating thinner centres and thicker edges is known as a concave lens or diverging lens. When passing through this type of lens, parallel rays of light spread apart or diverge, unlike convex lenses that converge light rays.Types of Concave LensBiconcave Lens: The lens curves inward on both sides causing it to become thinner towards the center. This design disperses rays. Creates virtual images. It is commonly used in eyeglasses for nearsightedness.Plano Concave Lens: Similar to the lens this one also has one side (plano) but curves inward on the other side. It diverges light. Finds application in specific optical systems, like beam expansion setups.Difference Between Convex and Concave LensConvex lensA convex lens is thicker at its center and thinner at its edges, bulging outward like the exterior of a sphere.It is also known as a converging lens because it focuses parallel rays of light that pass through it.A convex lens converges parallel rays of light to a focal point on the opposite side of the lens from the light source.It can form real and inverted images when objects are placed beyond its focal point, and it can create virtual and upright images when objects are placed between the lens and its focal point.Convex lenses are commonly used in magnifying glasses, cameras, telescopes, and binoculars to focus and magnify distant objects.They are also used in eyeglasses to correct farsightedness (hyperopia) and presbyopia.Concave lensA concave lens is thinner at its center and thicker at its edges, curving inward to create a hollow or dented appearance.It is known as a diverging lens because it spreads out parallel rays of light that pass through it.A concave lens causes parallel rays of light to diverge as if they originated from a virtual focal point on the same side as the light source.It can only produce virtual and diminished images when objects are placed on the same side as the virtual focal point.Concave lenses are used in eyeglasses to correct nearsightedness (myopia) and in certain scientific instruments and devices to spread out light or correct optical aberrations.Check: Differences Between Myopia and HypermetropiaConcave vs Convex Lens - Tabular Difference There are various key differences between the Convex Lens and Concave Lens, which are listed in the following table:CharacteristicConvex LensConcave LensLens ShapeThicker at the center, bulging outwardThinner at the center, curving inwardFocusingConverging lens, brings parallel rays to a focusDiverging lens, causes parallel rays to spread outPrincipal FocusReal, located on the side of incoming lightVirtual, located on the same side as incoming lightImage FormationCan form real or virtual imagesAlways forms virtual, upright, and diminished images.MagnificationCan have positive or negative magnificationAlways has a negative magnification.Lens ThicknessThicker at the centerThicker at the edges.Lens CurvatureCurves OutwardCurves inward.Focal LengthPositive focal lengthNegative focal lengthLens Equation1/f = 1/v + 1/u1/f = 1/v - 1/uImage SizeCan be larger, smaller, or same size as objectAlways smaller than object.ApplicationsCameras, projectors, magnifying glassesCorrective eyeglasses, optical experimentsLens AberrationsMore prone to chromatic aberrationLess prone to chromatic aberration.Field of ViewWidens field of view for magnificationNarrows field of view for correction.Lens TypesBiconvex, Plano ConvexBiconcave, Plano ConcaveApplication of Convex and Concave LensThere are various use cases where convex and concave lenses are used in our daily lives. Some of these use cases are discussed for each lens in the following headings.Check: Image Formation by LensesApplication of Convex LensSome common used cases of Convex Lens are:Camera Lenses: In cameras, convex lenses are utilized to concentrate light onto the image sensor or film. This process ensures that the resulting images are clear and well-defined.Magnifying Glasses: When magnifying small objects, magnifying glasses employ the use of virtual, enlarged images created by convex lenses.Eyeglasses: Additionally, these same convex lenses can rectify hyperopia (commonly known as farsightedness) by causing incoming light rays to converge before reaching the eye's lens.Projectors: By focusing beams of light onto a single point, projectors aid in projecting amplified images onto screens for visual representation.Telescopes: These optical devices have the capability to gather and concentrate distant light from celestial bodies and remote landscapes using convex lenses. Consequently, they allow us to observe such entities with accuracy.Check: Lens Sign ConventionApplication of Concave LensSome commonly used cases of Concave Lens are:Eyeglasses: Concave lenses serve the purpose of rectifying myopia by redirecting incoming light in a way that prevents it from focusing directly on the eye's lens.Laser Systems: These lenses find their application in various optical devices where the spread or divergence of light is required, such as beam expanders and laser systems.Galilean Telescopes: Within Galilean telescopes, concave lenses play a crucial role by producing a virtual image for amplification purposes.When it comes to viewing aids, these types of lenses can be seen incorporated into devices like peepholes or door viewers. Their function within such tools is to offer an extended field of view to the viewer.In ophthalmology, certain diagnostic and testing equipment relies on concave lenses to achieve accurate results.Additionally, they contribute significantly to projectors and display technology. By manipulating how light disperses, these lenses enable the creation of distinct optical effects while also improving visibility within projection systems.Related Resources, If a piece of glass or other transparent material takes onthe appropriate shape, it is possible that parallel incident rays would eitherconverge to a point or appear to be diverging from a point. Therefore, a transmissive optical device thatfocuses or disperses a beam of light by means of refraction is referred to as alens.A convex Lens also known as a converging lens is a lens that converge raysof light that are travelling parallel to its principal axis. The edges of aconvex lens are curved outward rather than inward. A convex lens bends lightrays inward, which results in the object being perceived as larger or closer.More importantly, they are thick across the middle and thin at the upper andlower edges. Given that convex lens have a curved surface, light rays fallingon the surface will refract to different direction. Convex lens are lens which merges the light rays at a particular point that travels through. A convex lens is thicker at the middle and thinner at the edges. Convex lens forms a real image, but it can also create a virtual image when the object is in the middle and optical center. In the convex lens, the curve is facing outward. In convex lens, the focal length is positive Convex lens due to thickness of the centre, the object will appear closer and larger. The position of focal point in convex lens is in front of the lens. When light rays passes through the convex lens, it converges the light rays and focuses on one point. In convex lens, both the image and the object are on the same side of the lens unlike concave lens. Convex lenses are used to rectify the problem of farsightedness (hyperopia).Binoculars and telescopesCamerasEye glassesFlashlightsLasers (CD, DVD players)Concave lens ordiverging lens is a lens that diverge rays of light that are travellingparallel to its principal axis. Diverging lens can also be identified by theirshape; they are relatively thin across their middle and thick at their upperand lower edges.Concave lens, are lens which disperses or diverges the light rays passing through it.Concave lenses are thinner at the middle and thicker at the edges.The image formed by the concave lens is upright, virtual and smaller than the object.In the concave lens, the curve faces inward.In concave lens the focal length is negative.Concave lens due to thinness of the centre, the object will appear smaller and beyond.Position of the focal point is on the back side of the lens.When light rays go through the concave lens, it disperses, making them to spread out to different direction. The object is on one side of the lens while the image is on the other side.The concave lenses are used to rectify the problem of shortsightedness (myopia).Used as a side-view mirror on the passenger anddrivers side of a car.Used for security purposes in supermarkets andbuilding apartments.Used to make lenses of sunglasses.Also Read: Difference Convex And Concave Mirrors Elements of Comparison Convex Lens Concave Lens DescriptionConvex lens are lens which merges the light rays at a particularpoint that travels through.Concave lens, are lens which disperses or diverges the light rayspassing through it. Structure A convex lens is thicker at the middle and thinner at the edges.Concave lenses are thinner at the middle and thicker at the edges. Image FormationForms a real image, but it can also create a virtual image when theobject is in the middle and optical center.The image formed by the concave lens is upright, virtual and smallerthan the object. The Curve The curve is facing outward.The curve faces inward. The Focal Length The focal length is positiveThe focal length is negative. Object Convex lens due to thickness of the centre, the object will appearcloser and larger.Concave lens due to thinness of the centre, the object will appearsmaller and beyond. Position of the focal pointThe position of focal point in convex lens is in front of the lens.The position of the focal point is on the back side of the lens. Light Rays When light rays passes through the convex lens, it converges thelight rays and focuses on one point.When light rays go through the concave lens, it disperses, makingthem to spread out to different direction. Position of Image Both the image and the object are on the same side of the lens.The object is on one side of the lens while the image is on the otherside. Real Life ApplicationsConvex lenses are used to rectify the problem of farsightedness(hyperopia).The concave lenses are used to rectify the problem ofshortsightedness (myopia). Example of Objects that uses the Lens Some examples of objects with convex lenses in include: Binoculars and telescopesCameras Eye glasses FlashlightsLasers (CD, DVD players) Examples of where concave lens are used: Used as a side-view mirror on the passenger and drivers side of a car.Used for security purposes in supermarkets and building apartments.Used to make lenses of sunglasses. Convex lens are lens which merges the light rays at aparticular point that travels through while concave lens, are lens whichdisperses or diverges the light rays passing through it.The lens is understood as a curved and transparent piece of glass or plastic, which focuses and refracts light rays in a certain manner. The curvature of the object ascertains the extent to which light is bent and in which direction. They are used in spectacles, microscope and telescopes. Based on the shape, the lens can be grouped as a convex lens or concave lens. The former brings together the parallel beam of light, while the latter disperses it. So, the point of focus in case of the convex lens is the point where all the light rays meet, i.e. point of convergence, but if we talk about the concave lens, the focal point is the point from where the light rays seem to diverge, i.e. point of divergence.Lets understand the difference between convex and concave lens, with the help of the diagram below.Content: Convex Lens Vs Concave LensComparison ChartDefinitionKey DifferencesConclusion Comparison Chart Basis for ComparisonConvex LensConcave Lens MeaningConvex lens refers to the lens which merges the light rays at a particular point, that travels through it.Concave lens can be identified as the lens which disperses the light rays around, that hits the lenses. Figure CurveOutwardInward LightConvergesDiverges Centre and edgesThicker at the center, as compared to its edges.Thinner at the center as compared to its edges. Focal lengthPositiveNegative ImageReal and inverted image.Virtual, erect and diminished image. ObjectsAppear closer and larger.Appear smaller and farther. Used toCorrect hyperopia.Correct myopia. Definition of Convex LensConvex Lenses are the lenses that feel massive at the centre than at the edges. The curve of the lens is outward, and as the light beams pass through the lens, it refracts them and brings them together, resulting in the convergence of light, due to which it is also named as a converging lens. Look at the figure given below:So, the point where the light rays meet is known as a focal point, or principal focus and space amidst the centre of the lens and the principal focus is the focal length. Further, it generates a real and inverted image, but it can also form a virtual image when the object is placed too close to the lens. Such lenses are used to focus a beam of light on making the object look clearer and larger.Example: The lenses of a camera are a convex lens, as the light rays focus on person or object being captured.Definition of Concave LensConcave lenses represent the type of lenses which are slender at the centre than at the borders. The shape of a concave lense is round inward that bends the beams outward, causing divergence of the rays of light falling on it, so it is known as a diverging lens. This also makes theobject look smaller and farther than they really are and the image formed is virtual, diminished and upright.As you can see in the given figure, the light rays appear to be diverging from a virtual point, which is known as principal focus or focal point. Further, the length between the focal point and the centre of the lens is called focal length.Example: Concave lenses are used in the side mirrors of cars and motorbikes. They can also be used in movie projectors to spread the image. The following points are noteworthy, so far as the difference between convex and concave lens is concerned:The lens which merges the light rays at a particular point, that travels through it, are a convex lens. The lens which disperses the light rays around, that hits the lenses, are called a concave lens.In the convex lens, the curve is outward facing, whereas, in the concave lens, the curve faces inward.When the light rays pass through the convex lens, it converges the light rays and focuses on one point. On the other hand, when the light rays go through the concave lens, it diverges the beams, i.e. they spread out.The structure of convex lens is like, thicker at the centre and thinner at the edges. Conversely, the concave lenses are thinner at the centre and thicker at its edges, in structure.The focal length of a convex lens is positive, while that of a concave lens is negative.Generally, a convex lens forms a real image, but it can also create a virtual image when the object is in the middle of the focus and optical centre. On the contrary, the image formed by the concave lens is erect, virtual and smaller, than the object.Due to the thicker centre of convex lenses, the objects are seen larger and closer. Unlike, concave lens, whose thin centre causes the object to look farther and smaller.A convex lens is used to treat hyperopia or farsightedness. In contrast, the concave lens proves helpful in the treatment of myopia or shortsightedness. ConclusionSo, with the above examples and figures, you might have got a clear understanding of the difference between the two types of lenses. Many times, convex and concave lenses are used along to produce sharper, clear and better images. Concave and convex describe the shape of a curve. Remember that concave resembles a cave!The terms concave and convex describe the curvature of objects or mathematical functions. Theyre ubiquitous in a range of disciplines, including optics, mathematics, engineering, and everyday life. Here are the definitions of concave and convex, everyday examples, and how to remember which is which.Definition: An object or a function is concave if it curves inward. In simple terms, its hollow or bowed in, much like a cave.Everyday Examples:A bowl.A satellite dish.A spoons interior.Skateboard ramps.A pie with a slice taken out of it.Definition: An object or function is convex if it curves outward, or in other words, bulges out.Everyday Examples:An eyeA speed bump.A magnifying glass.A globe.A triangle.Concave: Think Con-cave; it has a cave or an inward dip.Convex: Think of Con-vex as convicts trying to escape, bulging outwards.Concave lenses focus light inside the curve of the lens, while convex lenses focus light using the outer curve. A lens that curves like a C (no flat side) is both concave or convex, depending on which side of the lens you view from.Examples: Eyeglasses for nearsighted people, cameras, telescopic sights.Properties:Diverge light rays.Produce a virtual, diminished image.Ways to Remember: A concave lens is caving in, so it spreads light away or diverges it.Examples: Magnifying glasses, eyeglasses for farsighted people, microscopes.Properties:Converge light rays.Produce both real and virtual images.Ways to Remember: Convex lenses converge light, making things appear larger or closer.Examples: Shaving mirrors, car headlights, astronomical telescopes.Properties:Converge light rays.Can produce both real and virtual images.Ways to Remember: Concave mirrors converge light, much like theyre collecting it into a focus.Examples: Security mirrors in stores, car side mirrors, rear-view mirrors.Properties:Diverge light rays.Produce only virtual, diminished images.Ways to Remember: Convex mirrors diverge light, spreading it out to give a wider field of view.Examples: Star-shaped figures, snowflakes, some irregular polygons.Properties:Have at least one interior angle greater than 180.Have vertices that cave inward.Ways to Remember: Concave has a cave or an inward dip; you can imagine it as a polygon thats been pinched inward.Examples: Squares, rectangles, triangles, regular hexagons.Properties:All interior angles are less than 180.No vertices cave inward.Ways to Remember: Convex polygons bulge outward, with no indents or caves.Examples: Exponential functions, quadratic functions with a positive leading coefficient.Properties:Slope increases as you move along the function.Holds the property f(tx+(1t)y) tf(x) + (1t)f(y) for 0 t 1.Ways to Remember: The shape of a concave function resembles the entrance to a cave or a hill.Examples: Logarithmic functions, negative exponential functions.Properties:Slope decreases as you move along the function.Holds the property f(tx + (1t)y) tf(x) + (1t)f(y) for 0 t 1.Ways to Remember: A convex function looks like a valley.By understanding the basic differences and applications of concave and convex lenses, mirrors, polygons, and functions, you gain a deeper insight into how these concepts shape our world, from the glasses we wear to the roads we drive on.Hass, Joel; Heil, C.; Weir, M. (2017). Thomas Calculus (14th ed.). Pearson. ISBN 978-0-13-443898-6.Hecht, Eugene (2002). Optics (4th ed.). Addison Wesley. ISBN 978-0-321-18878-6.Nayak, Sanjay K.; Bhuvana, K.P. (2012). Engineering Physics. New Delhi: Tata McGraw-Hill Education. ISBN 9781259006449.Sines, George; Sakellarakis, Yannis A. (1987). Lenses in antiquity. American Journal of Archaeology. 91 (2): 191196. doi:10.2307/505216Related Posts Learn the key differences between convex and concave lenses in physics. Explore their properties, image formation, and applications in eyeglasses, cameras, and microscopes. Convex vs. Concave Lens: Key Differences and Applications Introduction Lenses play a crucial role in optics, helping us see better and understand the behavior of light. The two main types of lensesconvex lenses and concave lenseshave different shapes, properties, and applications. In this hall, well study their differences, characteristics, and uses. READ ALSO The law of reflection: definition, principles and applications Definition of Convex and Concave Lenses What is a Convex Lens? A convex lens is a lens that is thicker in the middle and thinner at the edges. It converges (focuses) light rays that pass through it, bringing them to a point. Also known as a converging lens, it can form real or virtual images, depending on the objects position. Example: A magnifying glass uses a convex lens to focus light and enlarge objects. What is a Concave Lens? A concave lens is thinner in the middle and thicker at the edges. It diverges (spreads out) light rays, making them appear to come from a virtual focal point. Also called a diverging lens, it always forms a virtual, upright, and smaller image. Example: Eyeglasses for nearsightedness use concave lenses to correct vision. FeatureConvex LensConcave LensShapeThicker in the middle, thinner at edgesThinner in the middle, thicker at edgesOther NameConverging lensDiverging lensEffect on Light RaysConverges (focuses) light to a pointDiverges (spreads out) lightImage FormationCan be real or virtualAlways virtualImage CharacteristicsCan be inverted or upright, depending on object positionAlways upright and smallerUsed InMagnifying glasses, cameras, microscopes, human eye (natural lens)Eyeglasses for nearsightedness, peepholes, laser devices Applications of Convex and Concave Lenses Convex Lens Applications Convex lenses are widely used in optical devices. Magnifying glasses use them to enlarge objects by focusing light. In cameras, convex lenses help focus light and produce clear images. They are also found in eyeglasses for farsightedness, helping people with hyperopia by focusing light onto the retina. Microscopes and telescopes rely on convex lenses for magnifying distant or tiny objects. Concave Lens Applications Concave lenses are essential in vision correction and optical technology. Eyeglasses for nearsightedness use them to spread out light before it reaches the eye, helping those with myopia see clearly. Peepholes in doors use concave lenses to provide a wider field of view. In laser devices, concave lenses help control and shape laser beams for medical and scientific applications. Conclusion Both convex and concave lenses are essential in optics, but they function differently. Convex lenses focus light and can form real images, while concave lenses spread out light and always form virtual images. Understanding these differences helps us appreciate their roles in vision correction, photography, and scientific instruments. 1. What is the main difference between a convex lens and a concave lens? Answer: A convex lens is thicker in the middle and converges light rays to a point, while a concave lens is thinner in the middle and diverges light rays, spreading them out. 2. What type of images do convex and concave lenses form? Answer: A convex lens can form both real and virtual images depending on the objects position. A concave lens always forms a virtual, upright, and smaller image. 3. Which lens is used in eyeglasses for nearsightedness and why? Answer: A concave lens is used for nearsightedness because it diverges light rays, allowing them to focus correctly on the retina. 4. How does a convex lens help in a magnifying glass? Answer: A convex lens converges light rays, making the object appear larger when placed within the focal length of the lens. 5. Why is a concave lens used in peepholes? Answer: A concave lens spreads out light rays, allowing a wider field of view, which helps people see a larger area through a small hole.

What is the sign of power of convex and concave lens. What is the focal length of concave and convex lens. What is the difference between concave mirror and convex lens. What is concave lens and convex lens class 10. What is the use of concave and convex lens. What is concave mirror and convex lens. What is the sign convention for concave and convex lens. What is the difference between concave and convex lens. What is lens distinguish between convex and concave lens. What is concave and convex lens with diagram. What is the power of concave and convex lens. What is convex and concave lens class 7. What is convex and concave lenses. What is the difference of concave and convex lens. What is the magnification of convex lens and concave lens.

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