Lenses some of these very important aspects of

Lenses (optics) are devices which serve in the transmission or refraction of light as well as diverging and converging of a beam (Harris, 2002). They are illustrated by the curvature of the two optical surfaces (Harris, 2002). There are two main types of lenses, that is, concave lenses and convex lenses. Geometrical optics is also known as ray optics is used in the depiction of how light travels and this is described in terms of rays which explain the refraction and reflection of light rays (Glassner, 1992). These two ideas share the common concept of convergence and divergence, but on the larger field, they are part of the wider field of natural sciences. The force of nature takes an upper hand in the study of optics.

The forces of nature more especially light and rays help in understanding of patterns in nature. Some of these very important aspects of lenses and geometrical optics are discussed below and bring in to light how they relate and link with each other to bring out a clearer understanding of their roles (Winston et al 2005). To begin with, in regard to lenses, there are of two types, that is, the convex lenses and the concave lenses.

In the case of convex lenses, they are converging lenses that are thinner towards the edge but thicker in the middle (Harris, 2002) and they are mostly used to closely examine small objects. The distance between the object and the radius of curvature is changed in relation to the focal length when convex lens are used (Glassner, 1992). However, it is noted that images produced by the convex lenses are real. This type of lens aids in examining small objects closely, among children it is common because they use it while playing with the rays of the sun to burn small pinholes on pieces of paper and even dry leaves and chips of wood. Winston et al (2005), acknowledges that, concave lenses are thicker towards to the edges and are thinner in the middle. Convex lenses produce virtual images which are always erect and reduced (Winston et al, 2005). According to Winston et al (2005), these images also look like they are far away than they actually are. The concave lens is diverging and therefore spreads light rays that pass through it.

Its main use has been seen in spectacles and contact lenses that help correct short sightedness (Glassner, 1992). Harris (2002) proposes that the focal length relates to the concave and convex lenses because it is part of that system, when it is looked at in relation to the focal point, thus defined as the distance that exists between the place where parallel light rays converge which usually happens at infinity also called the focal point and the center of the convex lens or concave mirror (Harris, 2002) in the case of convex lens, it comes after the rays have hit the optical center of the lens, but in the case of the concave lens, the focal point lies before the rays reach the optical center (Winston et al, 2005). It is understood that a lens that has got a short focal length can see a wider view of the subject in question but with a lesser level of magnification than that that has got a longer focal length which will have a higher level of magnification (Glassner, 1992). The focal length therefore plays a major role in determining the type of lens to use. When using the lenses, there is the converging and diverging of the rays (Jahns & Brenner, 2004). Diverging of rays happens when the light rays are seen to be spreading apart as they move far away into infinity when viewing an object. An object is seen by viewing the light that emanates from the object or reflected on the object and sometimes both happens.

For instance in regard to the pupil of the eye, whenever an object that is close to the eye is viewed, the light rays from the object diverge as they move through the pupil into the eye (Harris, 2002). When the object is far away, for instance the sun, its rays still diverge to make it possible to see it (Winston et al, 2005). If rays are spread out then they are called divergent rays. Converging of rays happens when the rays of light emanating from different sources tend to come together and meet at a single point (Jahns &Brenner, 2004). According to Glassner (1992), divergent rays occurs when the ray moves further from the optical axis, therefore, a ray is regarded as divergent or convergent depending on its relation to the optic axis. A ray that passes through the lens without any change represents the legitimate ray path (Harris, 2002).

Real versus virtual image

In the study of optics (Jahns & Brenner, 2004), when an image is considered to be real, then light converges on that image. For real images to occur, objects have to be put on the outside area of the focal length of converging mirror or lenses, and then the resultant image is usually inverted. A real image can only be formed when the distance from the lens is greater than the focal length in the case of a converging lens (Harris, 2002). Images formed by cameras (the negative) together with overhead projectors are some of the examples of real images (Jahns & Brenner, 2004).

According to Harris, (2002), one of the striking characteristic of a virtual image is that the image is the diverging outgoings rays are from a point on the object. This means that in the mirror or lens, the image or a point on an image (Harris, 2002) will seen to be on the inside of the focal length of a converging lens. This will make the virtual image appear erect and shrunken.

According to Glassner (1992), virtual images are produced by converging lenses when the object is placed inside the focal length. Therefore, the virtual image is erect and enlarged, as it is further from the lens than the object (Glassner, 1992). The image therefore can be formed even if the rays do not meet. For example, the image of one in a mirror is an example of a virtual image because the image is just captured and copied directly as it is when one moves the mirror; no image will be in place.

Concave mirrors produce real or virtual images, depending on the nearness of the objects to the concave mirror. On the contrary, convex mirrors produce virtual images of ordinary objects (Jahns &Brenner 2004). There are also have concave and convex mirrors, they both reflect light and images also.

The difference between both is that one curve inwards and the other outwards (Jahns &Brenner, 2004) and convex mirrors have got their surfaces bulging to the source of light or object. Ideally they are also called diverging mirrors. Convex mirrors have a wider field in terms of view and they bulge outward in the middle. On the other hand, concave mirrors curve inwardly in the middle (Jahns &Brenner, 2004). These two mirrors are useful in fields of safety and sciences, the concave mirror specifically in the car headlights and also make-up mirrors.

The convex mirrors are mostly used for surveillance purposes in places like hallways and supermarket stalls. Glassner (1992) acknowledges that, tracing a ray of light is also possible because it helps in locating an image. For ray tracing, the illumination consequences are achieved by calculating the effects of a surface. This is done through the tracing or the tracking of the path followed by a light of ray. However, the tracing and tracking of the path of ray of light is usually done when the ray of light is bouncing off or when it is being refracted (Glassner, 1992).

It also helps solve the problem caused by bending wave fronts, rays that may have changed direction or reflected off surfaces. Ray tracing is used in tracing radio signal through the ionosphere where the radio signals are refracted or reflected back to the earth (Glassner, 1992). The importance of this aspect is that it helps in shaping the behavior of radio signal behavior as the radio signal goes through the ionosphere. Fresnel lenses have greatly taken the place of other conventional lenses (Jahns & Brenner, 2004). These lenses are characterized by a large aperture and a very short focal length. The lenses are very much thinner than the conventional lenses; they are also large and flatter. These lenses are capable of capturing light from sources and making it possible over great distances (Glassner, 1992).

The lenses are in a form of many small pieces of glass put together though it seems like a single glass and characteristically very light in weight. Much of the material is removed but the surface curvature remains (Jahns &Brenner, 2004). Much of the material is removed but the refractive power of the Fresnel lens is effectively maintained making it cost effective. All clearly stated, that the patterns in nature that encompass the lenses and the geographical optics surround the reflection and or refraction of rays, how lenses and mirrors work as well as how nature itself works this out. This helps in the understanding of the role of light in viewing objects.

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