DELHI PUBLIC SCHOOL

PHYSICS PROJECT

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CLASS: 12TH 'A'

TOPIC: TELESCOPE

SUMITTED TO: MRS CHITRA CHATERJEE

CERTIFICATE

This is to certify that Maruvapalli Manoj of Class XII-A has successfully completed the project on the Terrestrial Telescope during the session 2019-20.

This has been done under the supervision off Mrs Chitra Chaterjee along with lab assistant Prakash Raut.

Sign of Teacher Signature of Student

ACKNOWLEDGEMENT

I place my sincere thanks to my physics teacher Mrs Chitra Chaterjee for her guidance and advices to complete my work succesfully. I thank lab assistant Prakash Raut for helping me during project. I also thanks our principal Mrs Ritu Sharma for providing me all the facilities to finish the project on time.

Last but not least I thank my parents for their encouragement and support in my humble venture.

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INTRODUCTION

A **telescope** is an optical instrument that makes distant objects appear magnified by using an arrangement of lenses or curved mirrors and lenses, or various devices used to observe distant objects by their emission, absorption, or reflection of electromagnetic radiation.

The first known practical telescopes were refracting telescopes invented in the Netherlands at the beginning of the 17th century, by using glass lenses. They were used for both terrestrial applications and astronomy.

HISTORY

The earliest existing record of a telescope was a 1608 patent submitted to the government in the Netherlands by Middelburg spectacle maker Hans Lippershey for a refracting telescope. The actual inventor is unknown but word of it spread through Europe. Galileo heard about it and, in 1609, built his own version, and made his telescopic observations of celestial objects.

The idea that the objective, or light-gathering element, could be a mirror instead of a lens was being investigated soon after the invention of the refracting telescope. Shortly following the release of Galileo's original telescope model, critics and academic minds across the European continent attempted to provide innovative solutions for correcting the telescope's

color aberration design flaw. In 1613, a French philosopher named Descartes wrote to Galileo, suggesting for replacement of the telescope's simple lens in favor of hyperbolic lenses.In 1632, one of Galileo's pupils, and the University of Bologna's professor of mathematics, Bonaventura Cavalieri published *Specchio ustorio*. Within the work, Cavalieri proclaimed his desire for constructing a reflecting telescope for testing the possibility of igniting a fleet of wooden ships using only a telescope. Following his fantasy proclamation, Cavalieri discussed the data he obtained through his observation of beams of white light reflecting off of glass prisms. Cavalieri found that according to the law of reflection, a beam of light directed upon the conical section of a prism, the reflected beam will radiate from the opposite end in

a pattern reminiscent of Euclidian geometry. The potential advantages of using parabolic mirrors—reduction of spherical aberration and no chromatic aberration—led to many proposed designs and several attempts to build reflecting telescopes.

The 20th century also saw the development of telescopes that worked in a wide range of wavelengths from radio to gamma-rays. The first purpose built radio telescope went into operation in 1937. Since then, a large variety of complex astronomical instruments have been developed.

THEORY:

Terrestrial telescope is an astronomical telescope is used to see the distant bodies on earth .But they looked inverted and causes inconvenient to observe.

In order to see distant bodies on earth in correct manner or erect form terrestrial telescope is used.

In this telescope, there are three lenses. First lens Lens1 acts as an objective and the lens Lens3 acts as eye piece and between Lens1 and Lens3, lenses third length of shorter focal length Lens2 is paced permanently. This lens can be called as erecting lens. In telescope, the image formation is reversed even it is virtual. By compound process, in terrestrial telescope, these three telescopes are processed to form a correct image of an object.

Length of tube is: f1 + f3 + 4 f2.

Magnification of the telescope when image is formed at infinity is: f1/f3

Magnification of the telescope when image is formed at near point (D) is: f1/f3 (1+f3/D)

Where f1 is Focal length of Lens1, f3 is Focal length of Lens3, f2 is the focal length of Lens2 and D is the near point of the eye i.e. 25cm.

MATERIALS REQUIRED:

A biconvex lens of diameter 3 inches(7.62 cm) and focal length 50 cm,2 biconvex lenses of 1 inch(2.54 cm) and focal length 45mm,pipe cutter, measuring tape, glue gun, PVC pipes of diameter 1 inch,3 inch and 3.5 inches, PVC fitter of smaller diameter of 1 inch and 3 inch.

PROCEDURE:

1. First use the pipe cutter to smooth the uneven areas at the two ends of the pipe so that pipes and lenses can fit perfectly.
2. Now there are three pipes of three different diameter: 1, 3 and 3.5 inches. Insert lens of 3 inch on the one side of pipe of 3.5 inch and then insert each lens of 1 inch in one end of pipe each of 3 inch(with the help of pipe fitter) and 1 inch.
3. Use the glue gun to stick the lenses from the edge of the pipes of 3.5 inch and 1 inch each.
4. Use the pipe fitter of 1 inch to stick the lens of 1 inch to the pipe of 3 inch.
5. Now keep the pipe I respective order 3.5 inch first then 3 inch second and then last 1 inch.
6. Now insert the 1 inch pipe inside the 3 inch pipe and insert this whole section inside the 3.5 inch pipe.to make it a foldable telescope.
7. Use the pipe fitter of 3 inch to fit the pipe of 1 inch to 3 inch pipe.

8. Making of telescope is complete.

CALCULATIONS:

- Focal length of Lens1 = 50cm.
- Focal length of Lens2 = 4.5cm.
- Focal length of Lens3 = 4.5cm.
- Near point (d) for the eye = 25cm

Length of the tube = 50cm + 4.5cm + 4*4.5cm.

= 72.5cm.

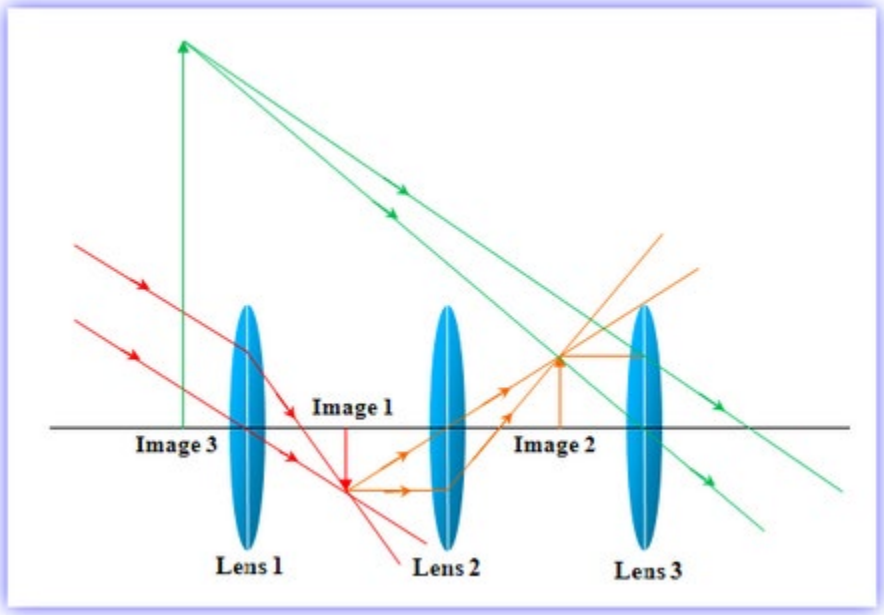
Magnification of the telescope when image is formed at infinity = 50cm / 4.5cm.

= 11.111.

Magnification of the telescope when image is formed at near point (D) = (50 / 4.5 (1 + 4.5 / 25)) cm.

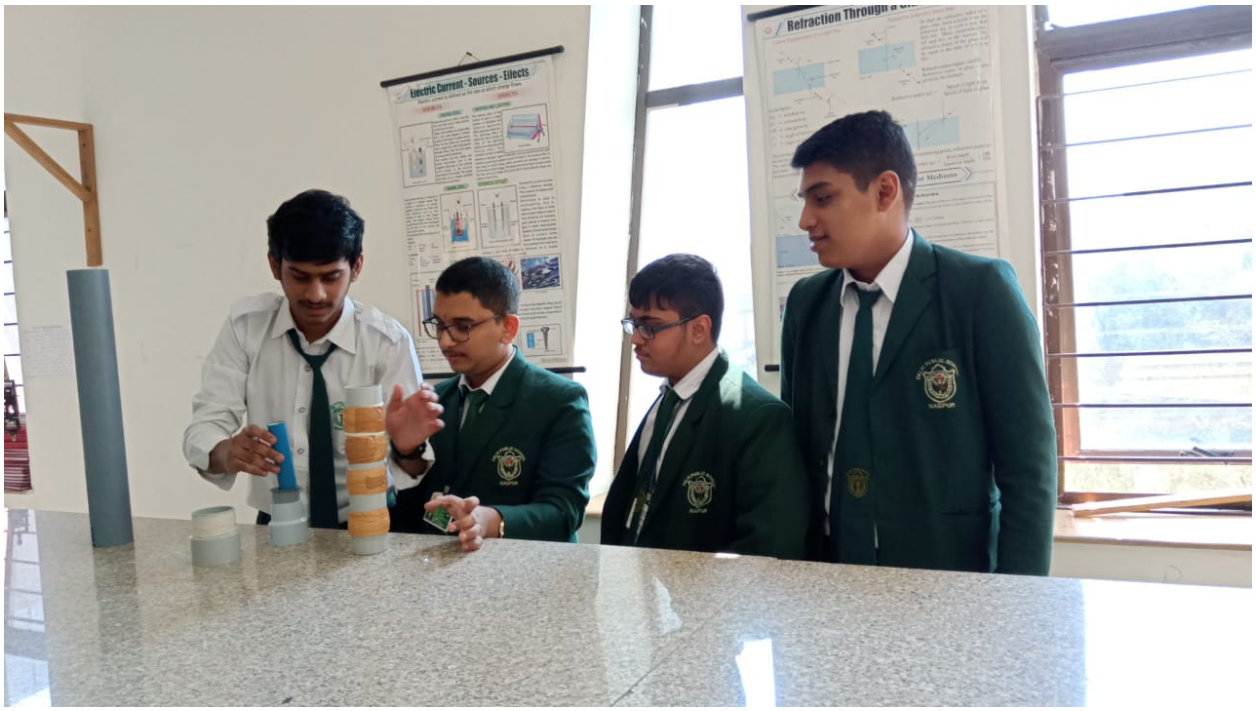
= 13.111.

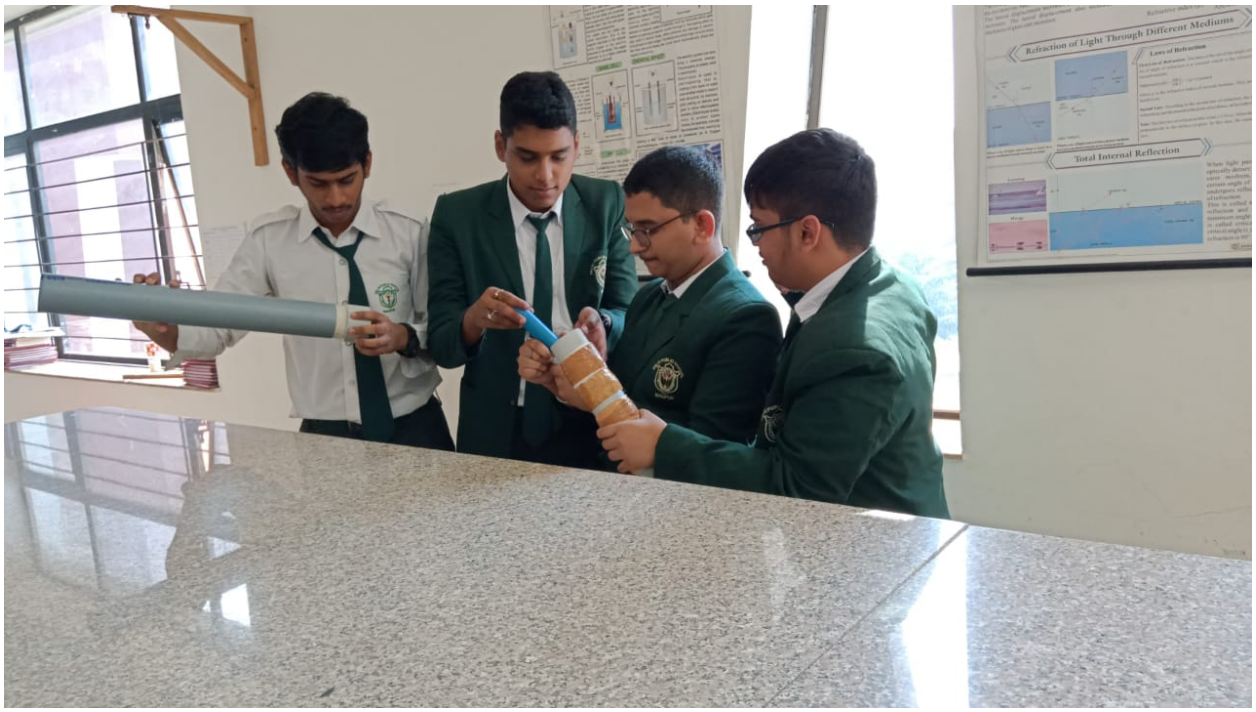
REPRESENTATIVE DIAGRAM:

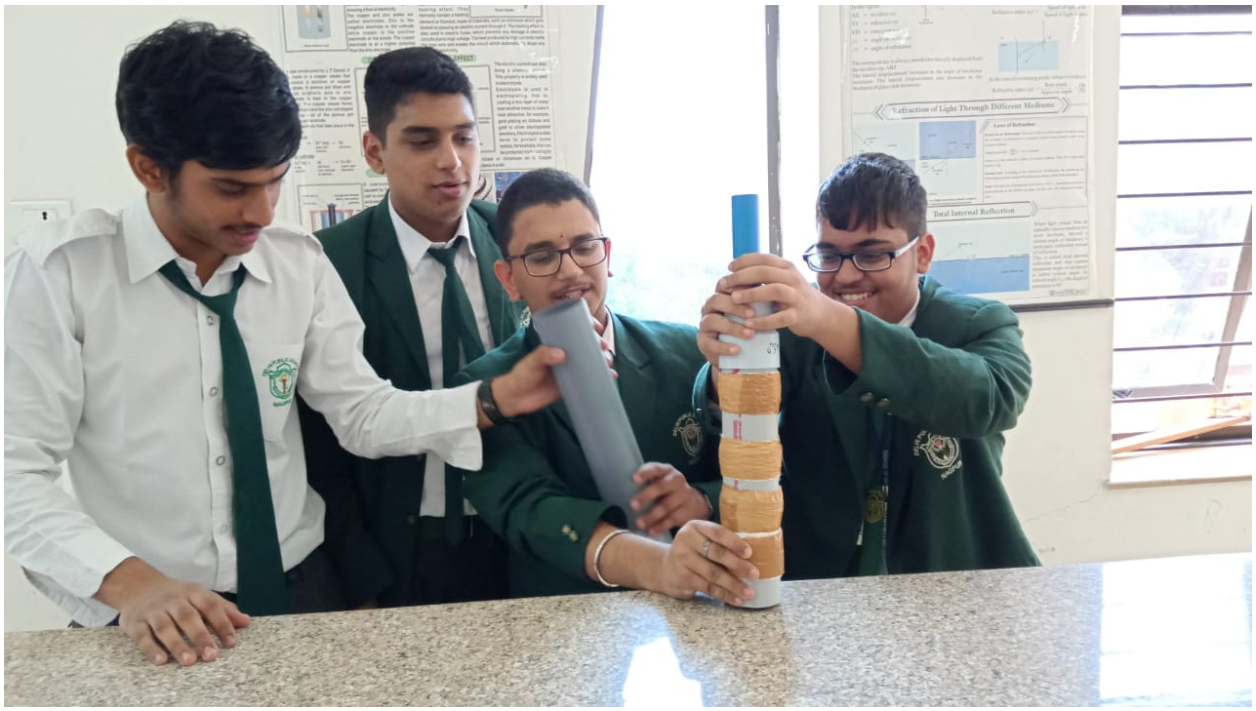


USES:

1. Can use to watch a small image from large distance.
2. Can be used to watch stars from large distance.


Electric Current - Sources - Effects
Refraction Through a


Refraction of Light Through Different Mediums
Total Internal Reflection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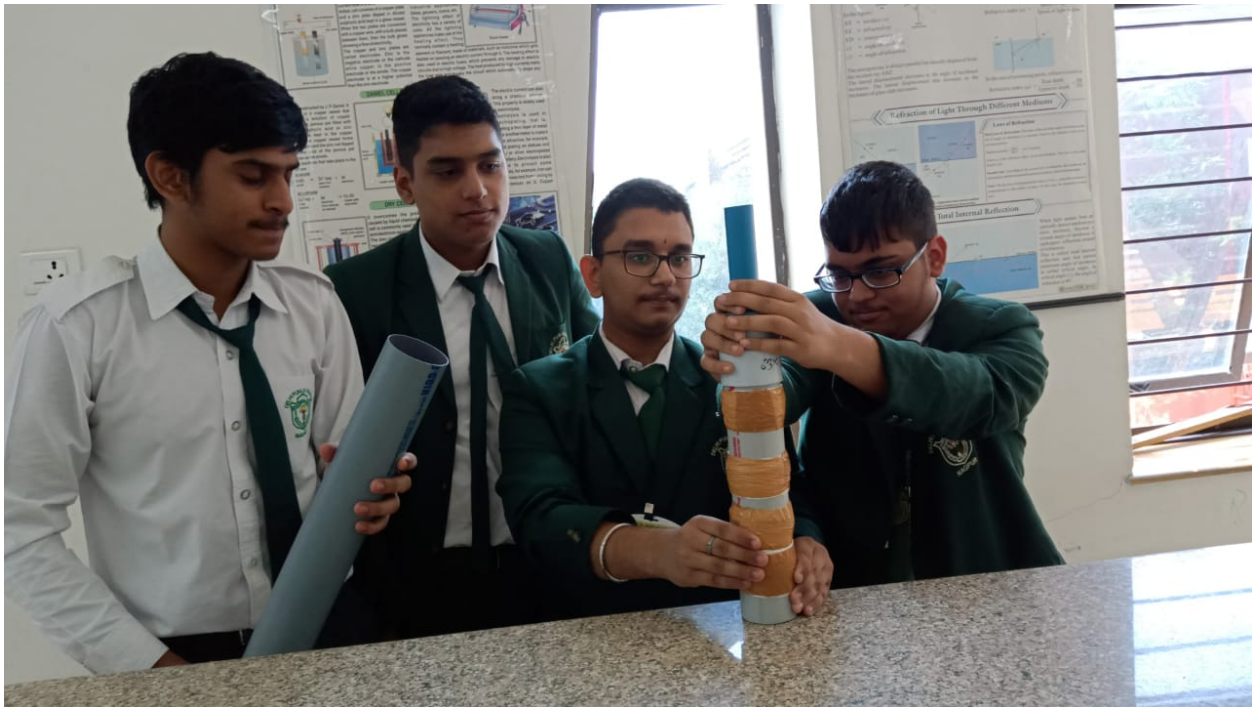
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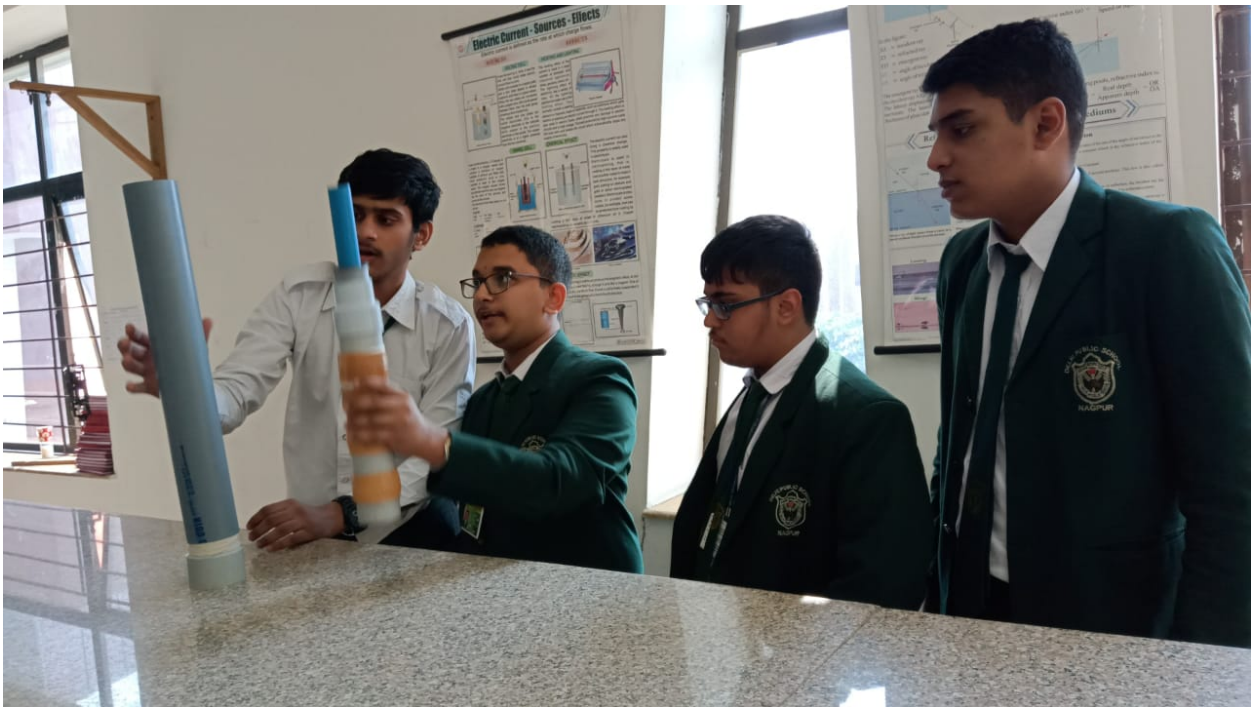
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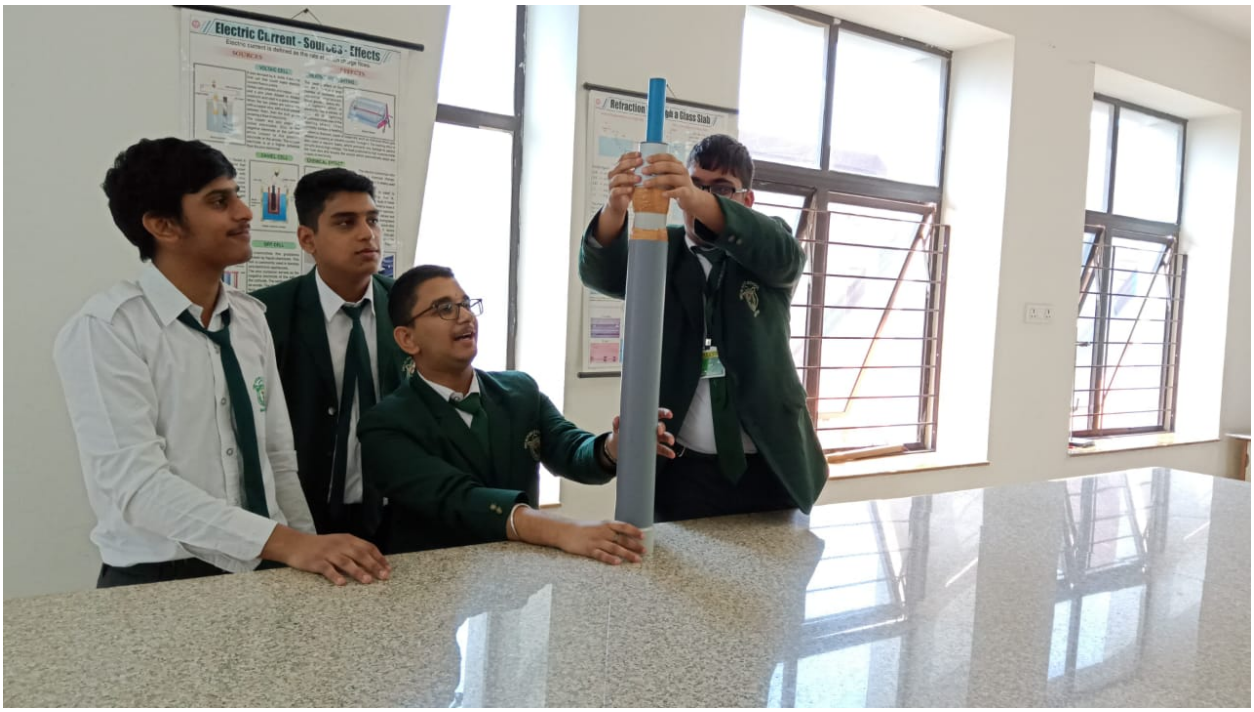
Electric Current - Sources - Effects