

Science Engagement Programs

Great science plays here

Cardboard Telescope

Introduction

The universe is a place full of shining stars, a variety of planets, several galaxies, and many other forms of energy. The Big Bang theory is the theory of how the universe began. We are able to see these celestial bodies at night with our own eyes, but the telescope makes this visualization even better.

The telescope is an instrument with various lenses that makes objects that are far away look closer, so more details can be observed.

Considerations

Some of the materials used in this at-home activity (scissors and magnifying glasses) may require the aid/supervision of an adult.

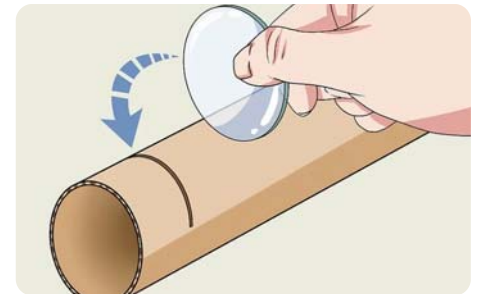
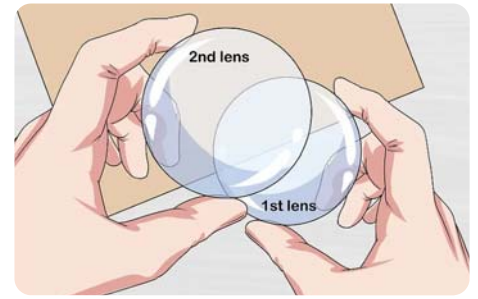


Materials Needed - Method 1

- **Two magnifying glasses** - different sizes
- **Cardboard paper** - paper towel roll or gift-wrapping paper roll (it helps if it is long)
- **Duct tape**
- **Scissors**
- **Ruler**
- **Sheet of printed paper** - newspaper or magazine will do
- **Assorted decoration items**

Procedure 1 — Building your telescope:

1. Get the two magnifying glasses and a sheet of printed paper.
2. Hold one magnifying glass (the bigger one) between you and the paper. The image of the print will look blurry. Then place the second magnifying glass between your eye and the first magnifying glass.
3. Move the second glass forward or backward until the print comes into sharp focus. You will notice that the print appears larger and upside down.
4. Have a sibling/parent measure the distance between the two magnifying glasses and write the distance down.
5. Cut a slot in the cardboard tube near the front opening about an inch (2.5 cm) away. Do not cut all the way through the tube. The slot should be able to hold the large magnifying glass.
6. Cut a second slot in the tube the same distance from the first slot as your sibling/parent wrote down. This is where the second magnifying glass will go.
7. Place the two magnifying glasses in their slots (big one at front, little one at back) and tape them in with the duct tape
8. Leave about 0.5 - 1 inch (1 - 2 cm) of tube behind the small magnifying glass and cut off any excess tube remaining.
9. Check to see that it works by looking at the printed page. You may have to play slightly to get the exact distances between the two glasses right so that the image comes to a focus.
10. Now, it's time to decorate. Use construction paper, printed pictures, stickers, etc... Be creative!
11. You have just built a simple refracting telescope! With your telescope, you should be able to see the moon and some star clusters as well as terrestrial objects (i.e. birds).



Materials Needed - Method 2

- Toilet roll (3 pieces)
- Paint (assorted colours)
- Masking tape
- Scissors
- Ribbon
- Paint brush
- Assorted decoration items

Procedure 2 — Building your telescope:



- 1) Take the 3 tubes and paint each one a different colour. Wait until the rolls are dry and number them from 1 to 3.

Procedure 2 — Building your telescope:



2) Take Tube 2 and make a cut lengthwise.



3) Roll Tube 2 and place it into Tube 1. Make sure it fits nicely into Tube 1.



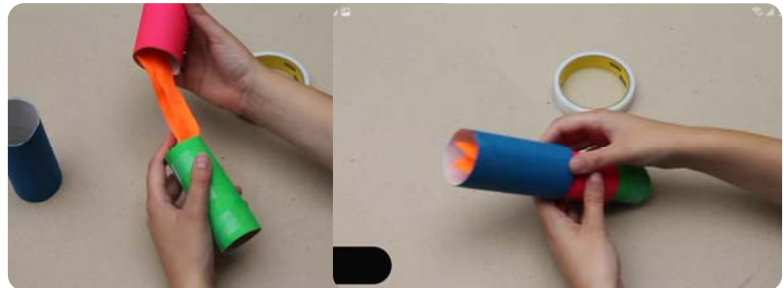
4) Remove Tube 2 from Tube 1 and place some tape on the top and bottom of the cut.



5) Now, take Tube 3 and repeat steps 2 to 4, but making sure that Tube 3 fits into Tube 2.



6) Take two pieces of ribbon (~18 cm/7" each) and tape them on opposite sides of each other in Tube 3.



7) Then, carefully place Tube 3 with the ribbons, inside Tube 2, and then Tube 2 inside Tube 1. Secure the end of the ribbons, using tape, inside Tube 1.



8) Decorate your telescope and have fun!

Observations

1. What can you use the telescope for? How does it work?
2. How many celestial bodies can you see with the naked eye? How many more can you observe with your new telescope?
3. What other things can you observe with your telescope?

Further Questions and Learning

1. What is astronomy?
2. What is the closest planet to the Sun?
3. What is the name of NASA's most famous space telescope?

Learn more about space from NASA's website: <https://www.nasa.gov/stem>

Sources

- <https://science.howstuffworks.com/question568.html>
- <https://www.wikihow.com/Make-a-Telescope>
- <https://www.scientificamerican.com/article/the-evolution-of-the-universe/>
- <https://www.youtube.com/watch?v=9QwwhTu5N-I>