

Twinkle Twinkle?- Teacher Demonstrations

Stars are giant thermonuclear reactors that produce their own energy. Everything else in space is only visible because their surfaces reflect starlight. Our Sun is a star and we see the planets, asteroids, meteors and comets in our night sky because light from our Sun is reflected from their surfaces.



Stars appear to twinkle or scintillate when viewed from Earth because their light is bent or refracted as it moves down through layers of Earth's atmosphere. Each ray of light follows a zigzag path.

Fractured Pencil – Teacher Demonstration

A pencil placed in a glass half full of water and topped up with oil demonstrates refraction (bending) of light rays passing through two different liquids and a mixture of gases (air). The solid pencil appears fractured but is straight and entire when removed. Our atmosphere has various layers with different compositions.

Twinkle Torch – Teacher Demonstration

This explains why starlight appears to twinkle or scintillate whereas planets do not.



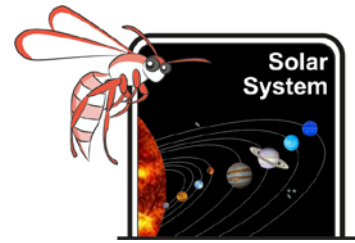
Materials

- A darkened room
- A torch
- A cardboard box (tissue boxes are excellent)
- A container of hot water
- A nail or pin to puncture a hole at the end of the box
- You may also need a board eraser or equivalent to raise the level of the torch inside the box

Method

1. Place the torch inside the box and make a small hole to allow the light beam to emerge.
2. Prepare hot water (or a nice cup of coffee for yourself)
3. View the round light source from the other side of the hole
4. Outside the box, place a container of very hot water under the hole to allow the steam to rise in front of the hole.
5. View the light again

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Observation

Initially the light is a round point source but when viewed through rising steam it radiates from the hole and scintillates.



Conclusion

Steam bent or refracted the light causing it to appear star like and twinkle. Stars twinkle because we view their light through the layers of our planet's atmosphere.

Repeat the activity using the nail to make a large hole in the box. You will find the increase in size of the disc of light reduces scintillation.

Planets do not twinkle as they are closer. Refracted light from one part of the planet cancels out refracted light from the other. They appear bigger so the twinkling is not as noticeable as it would be from an apparently tiny spot of light. In space both stars and planets would appear as round steady light sources as there is no atmosphere.