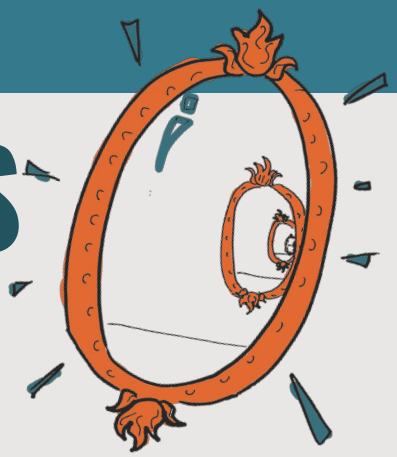
INFINITY IMAGES

ELEMENTARY SCHOOL LEVEL 3



Infinity mirrors are two parallel mirrors that create smaller and smaller images that appear to recede into infinity. The reflections appear to recede into the distance because the light travels the distance it appears to be traveling. Try placing different objects between your infinity mirrors to see the way they recede into the distance. Try objects with vastly different colors or patterns on either side.

EDUCATIONAL STANDARDS:

NGSS CONNECTION:
4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.

5-ESS1-1. Support an argument that the apparent brightness of the sun and stars is due to their relative distances from the Earth.

COMMON CORE CONNECTION:
ELA/Literacy
RI.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

RI.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.

SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.

4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

Mathematics
MP.2 Reason abstractly and quantitatively.

MP.4 Model with mathematics.

5.G.A.2 Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

DOK:
Level 1: Recall
Level 2: Concept
Level 3: Strategic Thinking
Level 4: Extended Thinking

MATERIALS NEEDED:

- ❏ Two pieces of square acrylic plastic mirror.
- ❏ Tape

DIRECTIONS:

1. Tape one of the mirrors to the wall against the floor.
2. Sit on the floor opposite the mirror and hold the other mirror up facing it. You will see the regression of images immediately.
3. Place an object between the mirrors and record the way that it looks as it falls into infinity.

OBJECTIVE:

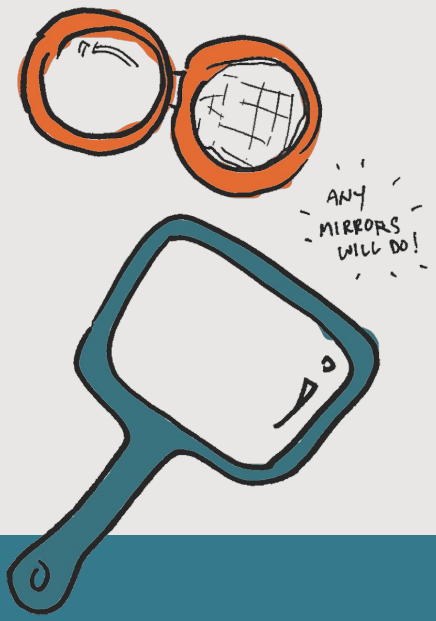
Students will be able to pose an argument about the apparent brightness of stars including our sun by using observations from an infinity mirror.

ESSENTIAL QUESTIONS:

- Why does our sun appear brighter than other stars in the sky?
- What does one observe in an infinity mirror? Why are the lights “further” away smaller and dimmer?
- How might the infinity mirror support a scientific explanation of the apparent brightness of stars in the sky?

ENGAGE / EXPLORE:

1. Teacher places the infinity mirror in front of the class
    a. Allow students to observe and look in the mirror
2. Ask students to make observations about the mirror
    a. Students should see a repeated pattern
    b. The pattern should get smaller as it fades into infinity
3. Ask students
    a. Does the pattern end?
        i. If so, why does it end?
        ii. If not, why does it not end?
    b. The pattern continues, however, the light source is so far away it can no longer be seen (DO NOT TELL STUDENTS THIS)
4. Evaluate
    a. Identify student misconceptions through their observations and answers to questions



EXPLAIN:

1. Have the students conduct research on stars
    a. They produce light
    b. Locations in the universe
    c. Our sun being a star
2. Provide opportunities for students to explore a light source from varying distances
    a. This may include
        i. A flashlight from different distances in the room
        ii. Video of a train approaching at night
        iii. Video of a plane taking off
    b. Have students identify and discuss what they notice about the light and object as they move closer and further away
    a. Support the discussion with reflective questioning

ELABORATE:

1. Ask the question:
    a. Is the apparent brightness of our sun and stars due to their relative distance from earth?
    b. Ask students to provide evidence to support their answers
2. Students should provide a method of explanation of their choice and use the infinity mirror, classroom discussion, and research to support the claim
    a. Methods of explanation can include a presentation, poster, experimental observation/lab findings, drawings, 3Dd structure, etc.
3. Evaluate
    a. Identifying their claim
    b. Students use observations and experience in their support
    c. Reasoning and synthesis of information