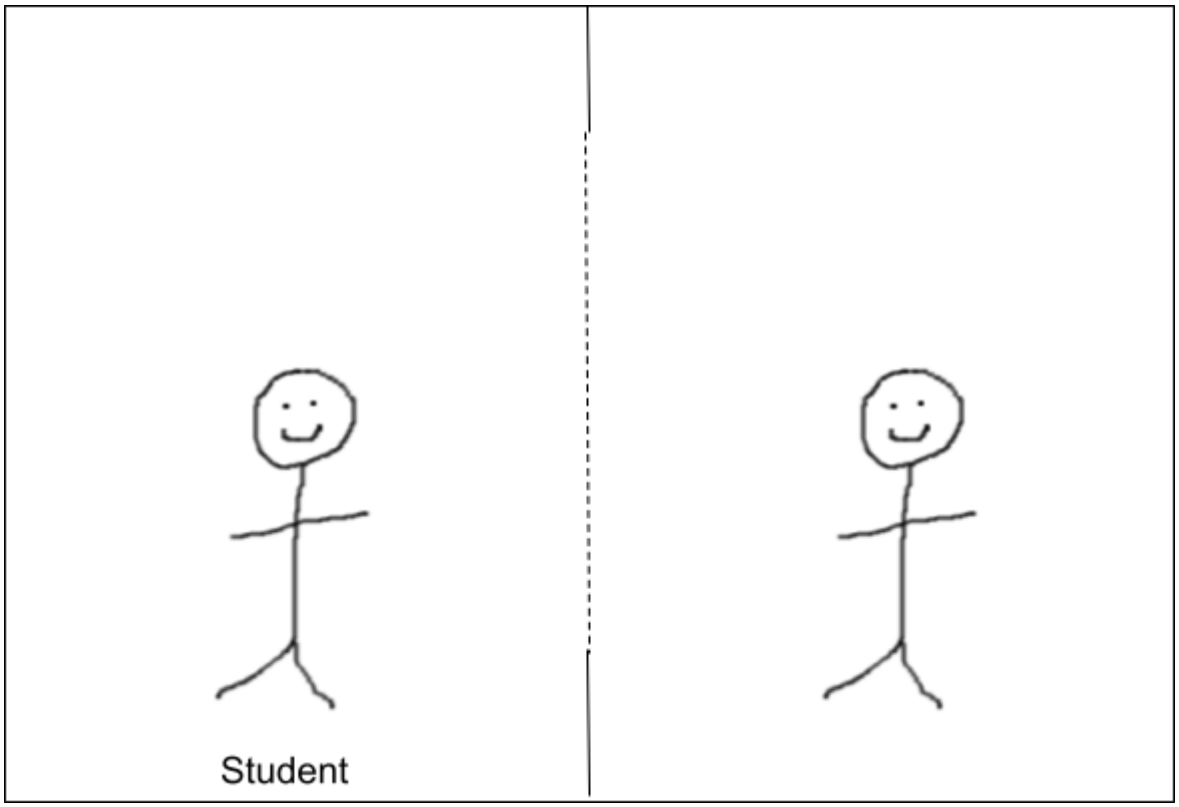
Name: _____ Date: _____

Initial diagram to explain the phenomenon

Create a diagram to explain as much as you know about the following two questions:

- Why does the teacher see the music student?
- Why does the music student see themself and not the teacher?

- Include all the important parts we agreed on and label them.
- Use pictures, symbols, and words to explain **how the parts interact** to cause the phenomenon.
- Record questions that you have if you become stuck.



Lesson 1: How can something act like a mirror and a window at the same time?

Explore an Interesting Phenomenon

Science Notebook

1. Make a chart on a blank left-side page in your science notebook to record what you notice and wonder about.

Notice	Wonder

2. Watch the video closely and record what you notice and wonder.

Share Noticings and Wonderings

With Your Class

3. Share what you noticed and wondered with your class.
   - What did you notice happening in the video?
   - What did you wonder about?

What do we think is happening?

Turn and Talk

4. Discuss these questions:
   - Why did the teacher see the music student?
   - Why does the music student see themself and not the teacher?

Initial Explanations

5. Discuss the "parts" or "components" of the scene in the video:
    - What parts are important for explaining the phenomenon?
    - What parts are not important?
    - What parts are we not certain about?

Develop a Diagram

6. Write these two questions in your notebook:
    - Why did the teacher see the music student?
    - Why does the music student see themself and not the teacher?

7. Create a diagram to explain as much as you know about the two questions.
    - Include all the important parts and label them.
    - Use pictures, symbols, and words to explain **how the parts interact** to cause the phenomenon.
    - Record questions that you have if you become stuck.

Compare Diagrams

8. Each partner shares their diagram. When it is your turn, turn your science notebook around so your diagram faces your partner.
9. As you notice things about each diagram, record the following:
    - Place a ✓ by parts of your diagrams that are similar.
    - Place a **?** by parts of your diagrams that are different or where you are less certain.

Navigation

10. If we want to investigate the phenomenon using a scale model, what important parts do we need to include in the scale model?

Navigation

A scale model is a physical representation of something in the world. It can help us explain phenomena or solve problems.

11. Discuss: Where have you seen or used scale models in your life?

Mapping the Model to the _____

Physical models are useful for studying the real world and testing our ideas about phenomena. The physical model is one way to represent the important parts and interactions from the real world.

12. Work with your class to map parts of the box model to the parts they represent from the video.
    - How are the parts alike?
    - How are the parts not alike?

Investigate Using the Box Model

Science Notebook

13. Locate your Notice and Wonder chart.
14. Draw a line below your last noticing from the video. Below this line you will add noticings from the *Box Model Investigation*.

With a Group

15. Turn on the flashlight for Room A.
16. Peek through the viewing hole for Room A. Record noticings to your Notice and Wonder chart.
17. Peek through the viewing hole for Room B. Record noticings.
18. Turn off the flashlight.
19. Add wonderings to your chart.

Noticings from the Box Model Investigation

Science Notebook

20. Review the *Communicating in Scientific Ways* sentence starters. Which ones may be helpful for sharing observations?
21. Tape the sentence starters into your notebook as directed by your teacher.

With Your Class

22. Discuss with your class:
    - What was similar between what you saw in the video and what you saw in the box model?
    - What was different?
    - What new things did you notice in the box model?
23. Record additional noticings and wonderings to our class chart.

Limitations of the Box Model

Models are useful for representing the real world to explain phenomena. But models are not a perfect representation.

With Your Class

24. Discuss: If we use this box model to test ideas about the one-way mirror phenomenon, what *differences* between the box model and the real world shown in the video could be important to keep in mind?

Exit Ticket

Exit Ticket

25. Look at your Notice and Wonder chart and your diagram. Complete the following exit ticket.
    - What is one idea you want to bring to our whole-class discussion next time to help us explain the phenomenon?
26. Give your exit ticket to your teacher before you leave class.

Classroom Norms

Norms are best practices that we all agree to try to work on so we have a productive and respectful learning environment. Norms are similar to rules but are more about how we communicate and work together as a learning community.

Scientists Circle

27. Work with the class to discuss norms that will be useful for our work together.

Purpose of Our Consensus Discussion

The goal of this discussion is to figure out areas of agreement and disagreement in our diagrams.

We also want to practice our norms.

Scientists Circle

28. Our discussion is guided by these questions:
    - What do we all seem to agree on?
    - What do we disagree on?
    - What are some new ideas that we may want to consider?

Initial Class Consensus Model to Explain the Phenomenon

A diagrammatic model is another way to represent and explain a phenomenon in the real world. This kind of model should capture your thinking using pictures, symbols, words, and colors to explain the phenomenon. Your goal is not to draw the real world, but rather to explain how the phenomenon works.

Scientists Circle

29. Develop a model with your class to answer the following questions:
    - Why did the teacher see the music student?
    - Why does the music student see themself and not the teacher?

Brainstorm Related Phenomena

Turn and Talk

30. Discuss: What other experiences have you had, or objects have you seen, that the video and the box model remind you of?

Scientists Circle

31. Work with your class to create a list of Related Phenomena that you believe are similar to the one-way mirror phenomenon.

Home Learning: Self-Documentation

Our phenomenon is an object that looks different in different conditions. Where do you see a similar thing in your life? Your home? Your neighborhood or community?

Home Learning Opportunity

32. Take a photo or hand-draw one example of a related phenomenon from your life.
33. Bring your example to class to build a set of related phenomena.

Types of Questions to Ask

Assessment Opportunity/On Your Own

34. All questions are welcomed! As you write your question(s), ask yourself:
    - If we answer this question, will it help us explain the phenomenon?
    - Can we investigate this question to learn more?
    - Can it be answered with a yes or no? If so, can I write it in a different way?

What questions do you have now?

Assessment Opportunity/On Your Own

35. Review these items to find questions that you have about the phenomena:
    - your Notice and Wonder chart and initial models,
    - our Initial Class Consensus Model, and
    - our list of Related Phenomena.
36. Then, write one question per sticky note in big, bold, and clearly readable handwriting.
37. Put your initials on the back of the sticky note in pencil.

Driving Question Board (DQB)

38. How to build a Driving Question Board:

1. The first student reads their question, then posts it to the DQB.
2. Students should raise their hand if one of their questions relates to the question that was just read aloud.
3. The first student selects the next student whose hand is raised.
4. The second student reads their question, says why or how it relates, and posts it near the question it most relates to.
5. The student selects the next student, who may have a related question or a new question.
6. We will continue until everyone has at least one question on the DQB.

Systems Thinking

When scientists try to develop an explanation for something that happens in the world, they often start by

- identifying the important parts,
- investigating the ways the parts may be interacting, and
- setting a boundary on what's important (carving out the part of the world they want to investigate and explain).

This type of thinking is called **systems thinking.**

39. Discuss: When have we done this kind of thinking already?

Ideas for Investigations

Turn and Talk

40. Your teacher will assign one group of similar questions for your group to work on.
41. What kinds of investigations could we do to answer this set of questions? What additional sources of data or information might we need?

Scientists Circle

42. Share your ideas for investigations with your class to develop a class list.

Communicating in Scientific Ways

How we figure things out	Symbol	How we communicate
1. Agree or disagreewith others' ideas		I agree with_because… I agree with you, but I also think... I disagree with_____because… I know where you are coming from, but I have a different idea... I am thinking about it differently...
2. Add onto someoneelse's idea		I want to piggyback on April's idea. I want to add to what Jeremiah said.
3. Search for new ideas from other sources		We could get some new ideas from….
4. Consider if new ideas make sense		That idea makes sense to me because … That idea doesn't make sense because … What's their evidence?
5. Suggest an experiment or activity to get more evidence or to answer a new question		What if we …? We could get better evidence if we …?
6. Let your ideaschange and grow		I think I'm changing my idea. I have something to add to my idea.

Communicating in Scientific Ways

How we figure things out	Symbol	How we communicate
7. Ask why and how questions		How come …? I wonder …. Why …? How do they know that …?
8. Observe		I see …. I noticed …. I recorded …. I measured ….
9. Organize data and observations		I see a pattern …. I think we could make a graph …. Let's make a chart ….
10. Think of an idea, claim, prediction, or model to explain your data and observations		My idea is …. I think that …. We could draw a picture to show …. I think it looks like this ….
11. Give evidence for your idea or claim		My evidence is …. The reason I think that is …. I think it's true because ….
12. Reason from evidence or models to explain your data and observations		The reason I think my evidence supports my claim is because …. The model shows that ….
13. Listen to others' ideas and ask clarifying questions		Are you saying that …? What do you mean when you say…? What is your evidence? Can you say more about …?

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Science Classroom Norms

Classroom Norms	
Respectful Our classroom is a safe space to share.	● We provide each other with support and encouragement. ● We share our time to talk. We do this by giving others time to think and share. ● We critique the *ideas* we are working with but not the *people* we are working with.
Equitable Everyone's participation and ideas are valuable.	● We monitor our own time spent talking. ● We encourage others' voices who we have not heard from yet. ● We recognize and value that people think, share, and represent their ideas in different ways.
Committed to our community We learn together.	● We come prepared to work toward a common goal. ● We share our own thinking to help us all learn. ● We listen carefully and ask questions to help us understand everyone's ideas. ● We speak clearly and loud enough so everyone can hear.
Moving our science thinking forward We work together to figure things out.	● We use and build on others' ideas. ● We use evidence to support our ideas, ask for evidence from others, and suggest ways to get additional evidence. ● We are open to changing our minds. ● We challenge ourselves to think in new ways.