

Grade 6 Science

Unit 1: Light and Matter

Driving question: Why do we sometimes see different things when looking at the same object?

13 lessons (investigations and weekly readings) and a words quiz. Use this pack with the unit's **Teacher Guide**, **Student Procedure Guide**, **Student Work Pages** and **Science Literacy Student Reader** (download them once from the course) to teach the whole unit without the internet.

What is in this pack

- A plan for each lesson: the lesson question, how many class days it takes, the Teacher Guide pages to follow, and the student pages to print.
- For each weekly reading: the Student Reader pages, words to know and the exercise page.
- The words quiz, ready to print, with its key at the back.

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Lesson schedule

Each investigation lesson takes the number of class days shown (about 45 minutes a day). Do each reading over a week alongside the lessons. Tick each one off as you go.

	Lesson	Days	Student pages
☐	Reading: Science Literacy Preface: Put Yourself in This Scene	1 week	—
☐	Lesson 1: How can something act like a mirror and a window at the same time?	4	2 to print
☐	Lesson 2: What happens if we change the light?	3	3 to print
☐	Reading: Science Literacy Collection 1: Light and Color	1 week	1 to print
☐	Lesson 3: What happens when light shines on the one-way mirror?	3	4 to print
☐	Reading: Science Literacy Collection 2: Reflection and Absorption	1 week	1 to print
☐	Lesson 4: How do similar amounts of light transmit through and reflect off the one-way mirror?	1	2 to print
☐	Lesson 5: How do light and the one-way mirror interact to cause the one-way mirror phenomenon?	1	2 to print
☐	Lesson 6: Why does the music student not see the adults?	2	2 to print
☐	Lesson 7: Why do the music student and the adults see the music student but the music student can't see the adults?	1	4 to print
☐	Reading: Science Literacy Collection 3: Human Vision	1 week	1 to print
☐	Lesson 8: Why do we sometimes see different things when looking at the same object?	3	5 to print
☐	Reading: Science Literacy Collection 4: A Closer Look at Light	1 week	1 to print
☐	Words quiz	—	—

Page numbers are PDF page numbers of each file, so they match what your PDF reader shows.

Reading: Science Literacy Preface: Put Yourself in This Scene

Words to know

- **light** — visible electromagnetic radiation

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 27–30: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Preface: “Put Yourself in This Scene”: PDF pages 6–7. Look at the pictures and maps together.

Check for understanding

- Use one of today's words in a sentence of your own.

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

LESSON QUESTION

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

Plan about **4 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 31–56: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 6–11
- Initial Diagram to Explain the Phenomenon — Student Work Pages, PDF pages 9–10

For the teacher

- Teacher Reference 1 — Teacher Guide, PDF pages 219–226
- Teacher Reference 2 — Teacher Guide, PDF page 227

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
How can something act like a mirror and a window at the same time?

Lesson 2: What happens if we change the light?

LESSON QUESTION

What happens if we change the light?

Plan about **3 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 57–79: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 12–16
- Representing the Path of Light in Different Scenarios — Student Work Pages, PDF pages 11–12
- Testing Light Scenarios — Student Work Pages, PDF pages 13–14

For the teacher

- Teacher Reference 1 — Teacher Guide, PDF pages 228–229
- Teacher Reference 2 — Teacher Guide, PDF pages 230–233

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation: What happens if we change the light?

Reading: Science Literacy Collection 1: Light and Color

Words to know

- **amplitude** — the height of a wave’s crest or depth of its trough from the baseline
- **electromagnetic radiation** — the flow of energy at the speed of light through empty space or through a material medium in the form of waves through electric and magnetic fields
- **frequency** — the number of waves that pass a fixed point in a unit of time
- **intensity** — the quality of strength or magnitude, as in the brightness of light or the loudness of sound
- **light** — visible electromagnetic radiation
- **light source** — something that emits visible light, typically through some kind of reaction occurring within it
- **radiation** — the transmission of energy that can travel both through space and through physical media
- **reflect** — to throw back without absorbing
- **system** — a set of interconnected things working together
- **transmit** — to cause or allow something, such as light or force, to pass or be conveyed through space or a medium
- **visible light** — the range of wavelengths of electromagnetic energy that can be detected by human vision
- **wave** — a propagating disturbance that transfers energy outward from a source

Teacher’s lesson plan

Follow the Teacher Guide, PDF pages 80–86: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Collection 1: “Light and Color”: PDF pages 8–17. Look at the pictures and maps together.

Student pages to print

- Exercise Page 1 — Student Work Pages, PDF pages 37–38

Check for understanding

- Use one of today’s words in a sentence of your own.

Lesson 3: What happens when light shines on the one-way mirror?

LESSON QUESTION

What happens when light shines on the one-way mirror?

Plan about **3 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 87–114: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 17–22
- Asking Questions Tool - Experimental Questions — Student Work Pages, PDF pages 15–16
- Measuring Light Investigation Procedures — Student Work Pages, PDF pages 17–20
- Light Sensor Position Template — Student Work Pages, PDF pages 21–22

For the teacher

- Teacher Reference — Teacher Guide, PDF pages 234–239

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
What happens when light shines on the one-way mirror?

Reading: Science Literacy Collection 2: Reflection and Absorption

Words to know

- **absorb** — to take in or soak up by chemical or physical action
- **aerosol** — a liquid or solid that is dispersed in a gas
- **correlation** — a perceived connection or relationship between two things
- **dependent variable** — a factor that is studied for how it is effected by the independent variable in an investigation
- **independent variable** — a factor that is deliberately adjusted, or varied, in an experiment or investigation
- **light** — visible electromagnetic radiation
- **opaque** — blocks lights; not able to be seen through
- **radiation** — the transmission of energy that can travel both through space and through physical media
- **reflect** — to throw back without absorbing
- **transmit** — to cause or allow something, such as light or force, to pass or be conveyed through space or a medium
- **turbidity** — a measure of the clarity of water
- **variable** — a factor that can change or be changed from one occurrence to another

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 115–121: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Collection 2: “Reflection and Absorption”: PDF pages 18–27. Look at the pictures and maps together.

Student pages to print

- Exercise Page 2 — Student Work Pages, PDF pages 39–40

Check for understanding

- Use one of today's words in a sentence of your own.

Lesson 4: How do similar amounts of light transmit through and reflect off the one-way mirror?

LESSON QUESTION

How do similar amounts of light transmit through and reflect off the one-way mirror?

Plan about **1 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 122–131: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 23–24
- Reading: How is a one-way mirror made? — Student Work Pages, PDF pages 23–24

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
How do similar amounts of light transmit through and reflect off the one-way mirror?

Lesson 5: How do light and the one-way mirror interact to cause the one-way mirror phenomenon?

LESSON QUESTION

How do light and the one-way mirror interact to cause the one-way mirror phenomenon?

Plan about **1 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 132–144: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 25–26
- Develop a Model — Student Work Pages, PDF pages 25–26

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
How do light and the one-way mirror interact to cause the one-way mirror phenomenon?

Lesson 6: Why does the music student not see the adults?

LESSON QUESTION

Why does the music student not see the adults?

Plan about **2 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 145–163: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 27–32
- Why does the student see themselves and not the adults? (Model Template) — Student Work Pages, PDF pages 27–28

For the teacher

- Teacher Reference — Teacher Guide, PDF pages 240–248

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
Why does the music student not see the adults?

Lesson 7: Why do the music student and the adults see the music student but the music student can't see the adults?

LESSON QUESTION

Why do the music student and the adults see the music student but the music student can't see the adults?

Plan about **1 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 164-176: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 33-34
- Explaining the One-Way Mirror Phenomenon — Student Work Pages, PDF pages 29-30
- Self Assessment and Peer Feedback — Student Work Pages, PDF pages 31-32
- Reference: Peer Feedback Guidelines — Student Procedure Guide, PDF pages 39-40

For the teacher

- Rubric — Teacher Guide, PDF page 249

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
Why do the music student and the adults see the music student but the music student can't see the adults?

Reading: Science Literacy Collection 3: Human Vision

Words to know

- **context** — all the words and ideas that surround an individual word, passage, event, or situation and can shed light on its meaning
- **electromagnetic radiation** — the flow of energy at the speed of light through empty space or through a material medium in the form of waves through electric and magnetic fields
- **intensity** — the quality of strength or magnitude, as in the brightness of light or the loudness of sound
- **light** — visible electromagnetic radiation
- **mirage** — an optical illusion in which light bends through one or more layers of air, altering a subject's apparent position or orientation
- **opaque** — blocks lights; not able to be seen through
- **radiation** — the transmission of energy that can travel both through space and through physical media
- **refraction** — deflection of waves as they pass from one medium to another
- **translucent** — semitransparent; allowing some light to pass through, but not detailed shapes
- **transmit** — to cause or allow something, such as light or force, to pass or be conveyed through space or a medium
- **transparent** — allowing light to pass through
- **variable** — a factor that can change or be changed from one occurrence to another

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 177–183: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Collection 3: “Human Vision”: PDF pages 28–37. Look at the pictures and maps together.

Student pages to print

- Exercise Page 3 — Student Work Pages, PDF pages 41–42

Check for understanding

- Use one of today's words in a sentence of your own.

Lesson 8: Why do we sometimes see different things when looking at the same object?

LESSON QUESTION

Why do we sometimes see different things when looking at the same object?

Plan about **3 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 184–202: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 35–38
- Explaining New Phenomena — Student Work Pages, PDF pages 33–34
- Let's Answer Questions from Our Driving Question Board! — Student Work Pages, PDF pages 35–36
- Reading: How do eyeglasses help people see better? — Student Procedure Guide, PDF pages 41–42
- Reading: Walt Disney Concert Hall Case Study — Student Procedure Guide, PDF pages 43–48

For the teacher

- Teacher Reference 1 — Teacher Guide, PDF pages 250–253
- Teacher Reference 2 — Teacher Guide, PDF pages 254–255
- Teacher Reference 3 — Teacher Guide, PDF pages 256–257
- Teacher Reference 4 — Teacher Guide, PDF pages 258–262
- Answer Key — Teacher Guide, PDF pages 263–271

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation: Why do we sometimes see different things when looking at the same object?

Reading: Science Literacy Collection 4: A Closer Look at Light

Words to know

- **absorb** — to take in or soak up by chemical or physical action
- **context** — all the words and ideas that surround an individual word, passage, event, or situation and can shed light on its meaning
- **intensity** — the quality of strength or magnitude, as in the brightness of light or the loudness of sound
- **LED light** — a light source that emits light when current flows through a light-emitting diode
- **light** — visible electromagnetic radiation
- **light source** — something that emits visible light, typically through some kind of reaction occurring within it
- **reflect** — to throw back without absorbing
- **scatter** — to cause something, such as light, to reflect or travel in multiple, often random, directions
- **visible light** — the range of wavelengths of electromagnetic energy that can be detected by human vision
- **wavelength** — the distance from one crest of a wave to the next crest (or from one trough to the next trough)

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 203–208: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Collection 4: “A Closer Look at Light”: PDF pages 38–47. Look at the pictures and maps together.

Student pages to print

- Exercise Page 4 — Student Work Pages, PDF pages 43–47

Check for understanding

- Use one of today's words in a sentence of your own.

WORDS QUIZ

Light and Matter

Name: _____ Date: _____

Circle the letter of the best answer.

1. Which word means “to cause something, such as light, to reflect or travel in multiple, often random, directions”?

- a) scatter
- b) aerosol
- c) independent variable
- d) reflect

2. Which word means “to cause or allow something, such as light or force, to pass or be conveyed through space or a medium”?

- a) electromagnetic radiation
- b) LED light
- c) transmit
- d) intensity

3. Which word means “deflection of waves as they pass from one medium to another”?

- a) mirage
- b) scatter
- c) system
- d) refraction

4. Which word means “a factor that is studied for how it is effected by the independent variable in an investigation”?

- a) light source
- b) dependent variable
- c) radiation
- d) translucent

5. Which word means “a measure of the clarity of water”?

- a) refraction
- b) mirage
- c) turbidity
- d) variable

6. Which word means “visible electromagnetic radiation”?

- a) photon
- b) polarize
- c) light
- d) visible light

- 7.** Which word means “blocks lights; not able to be seen through”?
- a) visible light
 - b) aerosol
 - c) opaque
 - d) reflect
- 8.** Which word means “something that emits visible light, typically through some kind of reaction occurring within it”?
- a) turbidity
 - b) dependent variable
 - c) light source
 - d) translucent
- 9.** Which word means “a set of interconnected things working together”?
- a) scatter
 - b) system
 - c) absorb
 - d) frequency
- 10.** Which word means “the height of a wave’s crest or depth of its trough from the baseline”?
- a) refraction
 - b) amplitude
 - c) scatter
 - d) radiation
- 11.** Which word means “the distance from one crest of a wave to the next crest (or from one trough to the next trough)”?
- a) wavelength
 - b) electromagnetic radiation
 - c) aerosol
 - d) translucent
- 12.** Which word means “semitransparent; allowing some light to pass through, but not detailed shapes”?
- a) translucent
 - b) correlation
 - c) turbidity
 - d) amplitude

FOR THE TEACHER

Answers

Unit quiz key

1. a 2. c 3. d 4. b 5. c 6. c 7. c 8. c 9. b 10. b 11. a 12. a