The Laws of Reflection (Key)

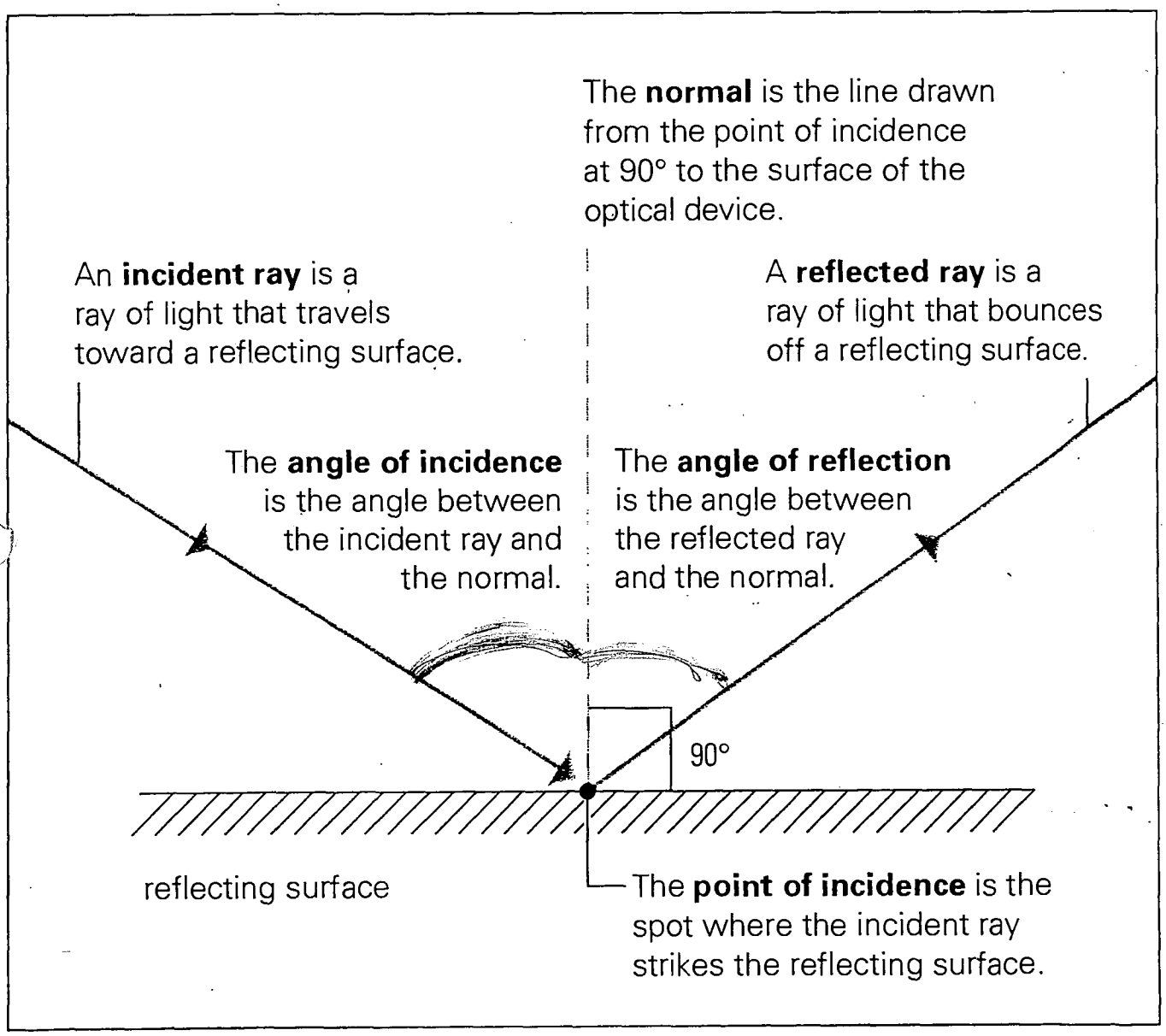
- *The First Law of Reflection*: The incident beam (ray), the normal and the reflected beam are all on the same plane (all occur on the same flat surface).

- *The Second Law of Reflection*: The angle of incidence is equal to the angle of reflection.

Vocabulary

NORMAL an imaginary line of reference drawn perpendicular (90°) to the reflecting/refracting surface at the point where incident/refracted ray strikes the surface.

5.5 Terms Related to the Reflection of Light



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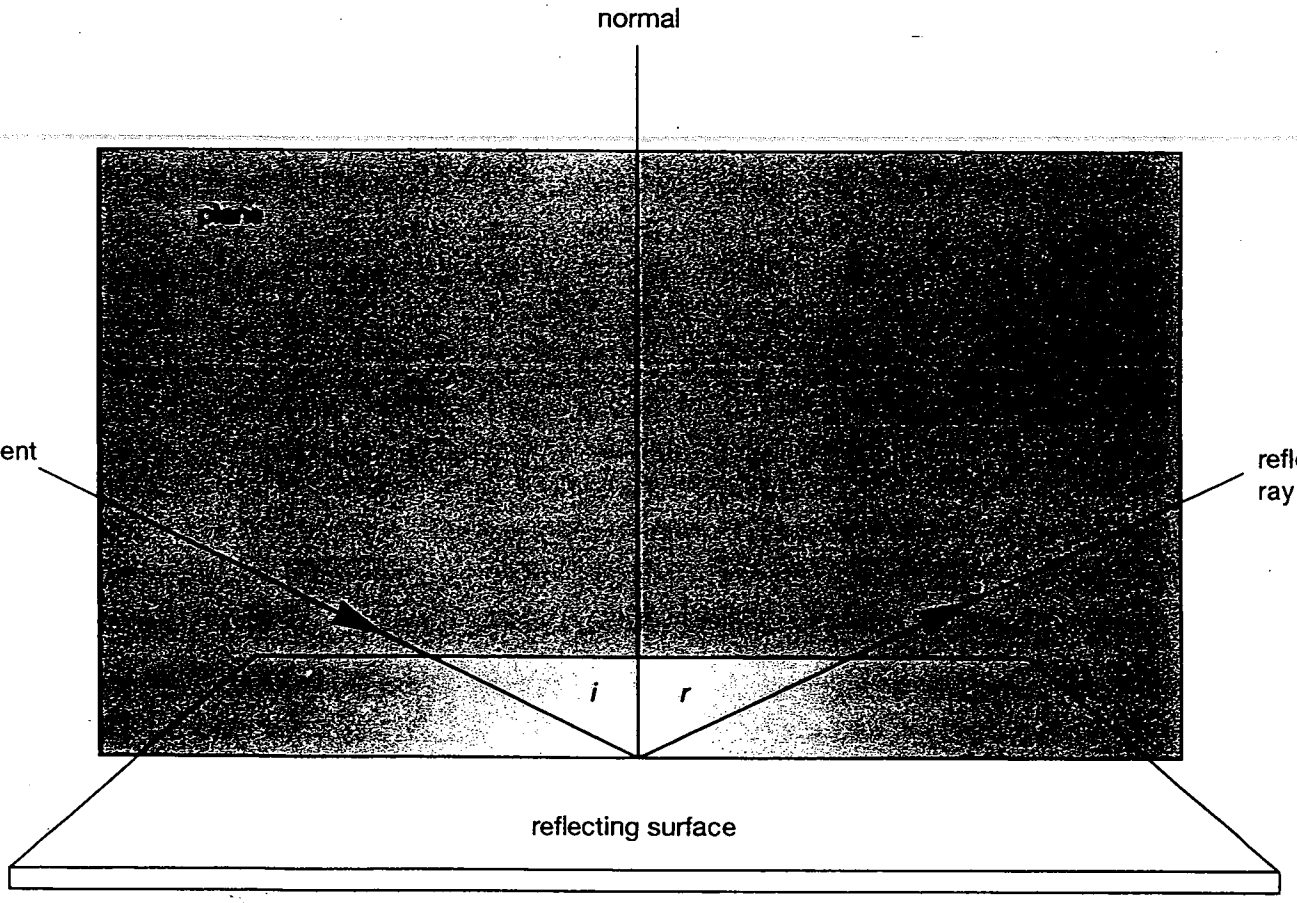

Figure 7.15 The two laws of reflection: 1. The angle of reflection, *r*, is always equal to the angle of incidence, *i*. 2. The incident ray, the normal, and the reflected ray are always in the same plane.

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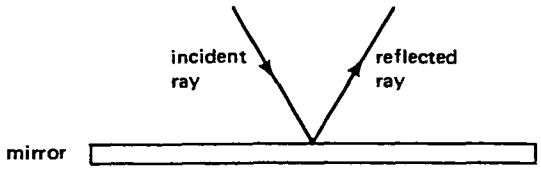
LESSON 11 | What is reflection?

How does a ball bounce back to you after you throw it against a wall? It depends upon how you throw it. If you throw the ball straight on, it will bounce back straight on. If you throw it at an angle, it will bounce back at an angle.

Light, you know, can bounce. "Bounced" light is reflected light. We can predict how reflected light will behave. Just follow the explanation.

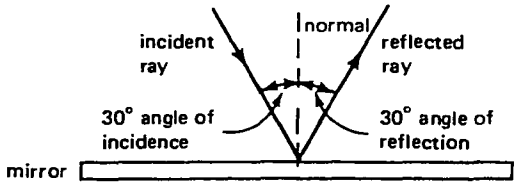
A single beam of light is called a light **ray.** Light is made up of many, many light rays. But let us look at one light ray.



This is a single light ray. It is hitting a flat mirror at an angle. Then it is bouncing off. It is reflecting.

The ray that hits the mirror is called the **incident** [IN si dent] **ray.**

The ray that bounces off the mirror is called the **reflected ray.**



Now let's draw a line that makes a right angle (90 degrees) where the incident ray hits the mirror. This line is called the **normal.**

- The angle between the incident ray and the normal is called the **angle of incidence.**
- The angle between the reflected ray and the normal is called the **angle of reflection.**

The **Law of Reflection** states that "the angle of incidence is equal to the angle of reflection."

In the example on this page, the angle of incidence is 30 degrees. The angle of reflection, then, is also 30 degrees.

REFLECTING RAYS

Two reflecting rays are shown in Figures A and B. Identify the parts shown by number. Choose from the following:

incident ray
reflected ray
normal
angle of incidence
angle of reflection

Write your answers next to the correct numbers.

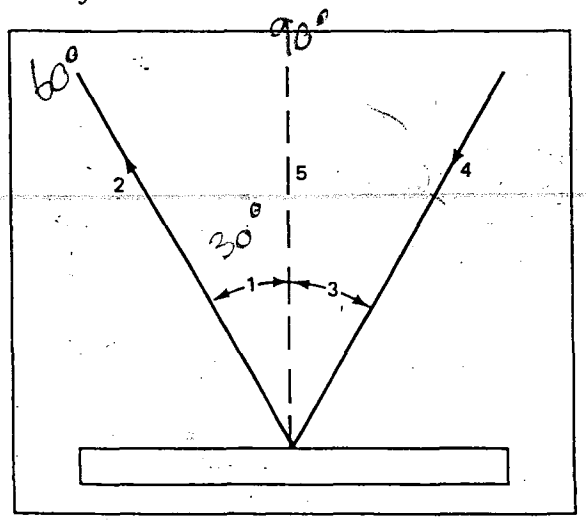


Figure A

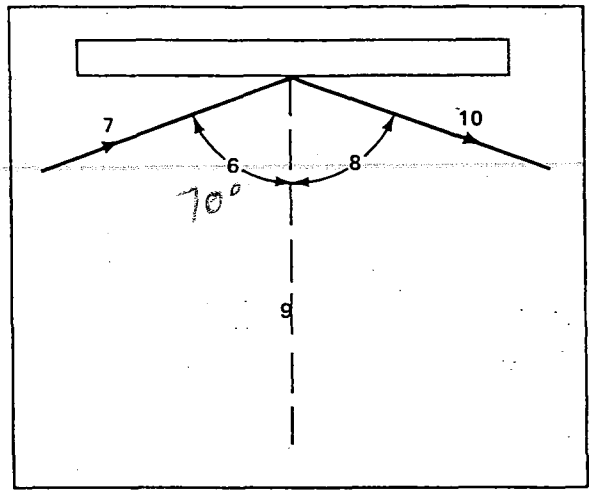


Figure B

1. angle of reflection
2. reflected ray
3. angle of incidence
4. incident ray
5. normal
6. angle of incidence
7. incident ray
8. angle of reflection
9. normal
10. reflected ray

11. State the Law of Reflection. The angle of incidence is = to the angle of reflection & all in the same plane.

12. Which of the angles above are equal? (Use numbers.)

    a) In Figure A, 1 and 3 are equal.

    b) In Figure B, 6 and 8 are equal.

Something Extra

If you have a protractor, measure the angles in Figures A and B. What degrees do the angles measure? Figure A 30° 30 × 2 each = 30°

Figure B 70° 70 × 2 = 140

KINDS OF REFLECTIONS

There are two kinds of reflections: regular and diffuse [di FYOOS]. What are the differences? Find out for yourself. It's easy! Figures C and D show the two kinds of reflection. They also show light rays all coming from a single source.

Study each figure. Then answer the questions that go with each.

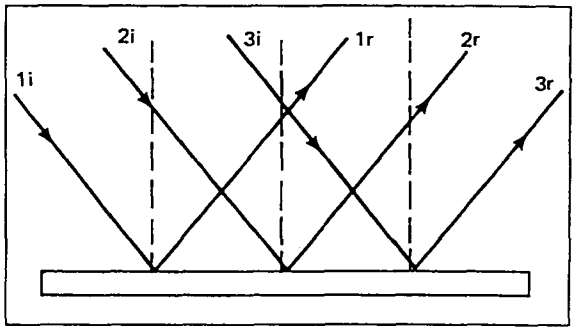


Figure C *Regular reflection*

1. Figure C shows _____ (regular, diffuse) reflection.
2. A surface that gives a regular reflection is _____ (even, uneven).

3. Every ray has its own normal. In regular reflection, the normals _____ (do, do not) face in the same direction.

In a regular reflection . . .

a) every angle of incidence _____ (is, is not) the same.

b) every angle of reflection _____ (is, is not) the same.

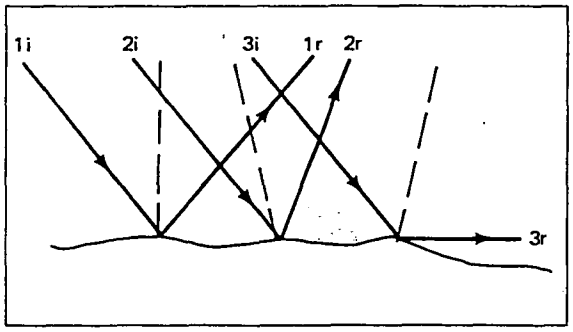


Figure D *Diffuse reflection*

5. Figure D shows a _____ (regular, diffuse) reflection.
6. A surface that gives a diffuse reflection is _____ (even, uneven).

7. In a diffuse reflection, the normals _____ (do, do not) face in the same direction.
8. In a diffuse reflection . . .

a) every angle of incidence _____ (is, is not) the same. (Careful, remember where the angle of incidence is!)

b) every angle of reflection _____ (is, is not) the same.

What do you think?

9. Which kind of reflection do you think a mirror gives, regular or diffuse?

reg

10. Hold your book up and look at this page.

a) Does the page reflect like a mirror? no

b) This shows that paper gives a _____ (regular, diffuse) reflection.

11. Run your hand over this page. To your sense of touch, paper is _____ (rough, smooth).

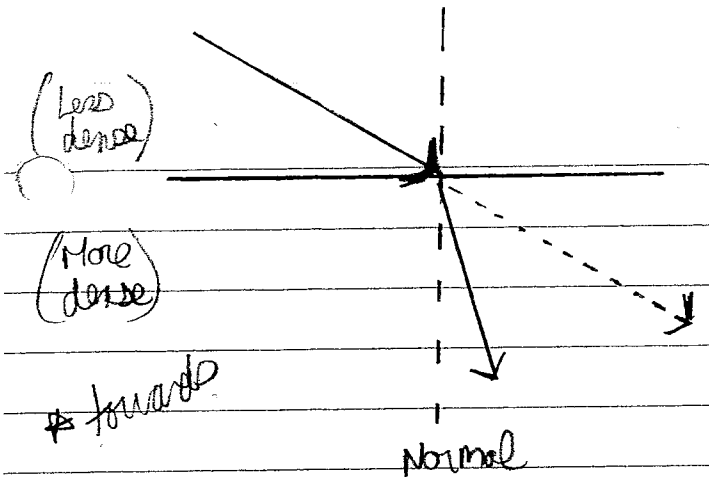
12. To light, the surface of the paper is _____ (even, uneven).

FILL IN THE BLANK

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some words may be used more than once.

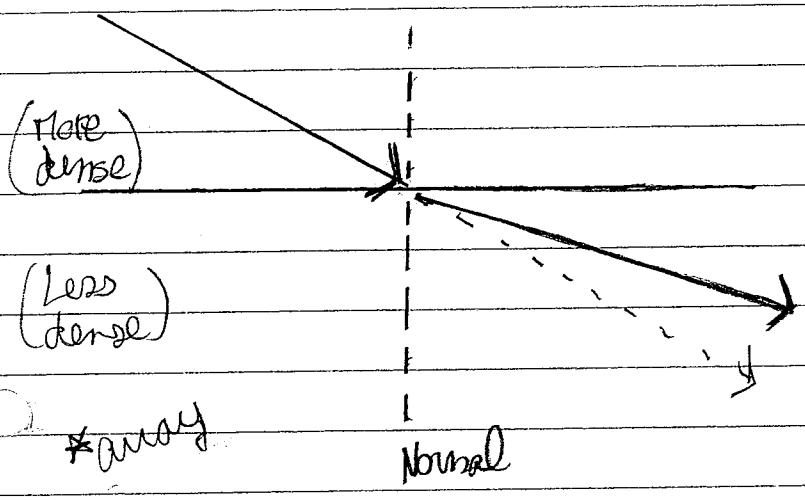
incident	diffuse	angle of incidence
equal	angle of reflection	ray
normal	reflected	regular

1. A single line of light energy is called a ray.
2. A ray that strikes a surface is called an incident ray.
3. A "bounced" ray is called a reflected ray.
4. A line that makes a 90° angle to a surface is called a normal.
5. The angle between an incident ray and its normal is called the angle of incidence.
6. The angle between a reflected ray and its normal is called the angle of reflection.
7. An angle of incidence is equal to its angle of reflection.
8. There are two kinds of reflections. They are regular and diffuse.
9. A perfectly even surface gives a regular reflection.
10. An uneven surface gives a diffuse reflection.



* Less to more towards N
* More to less away

* towards



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