

Experiment 18

GEOMETRICAL OPTICS: REVIEW QUESTIONS

Your instructor will present the videotape "Geometrical Optics" for your viewing enjoyment and education. After watching the first section of the tape, you will have several minutes to complete the first ten questions. The tape will continue so that you may check your answers, then you will be required to answer the last five questions on your own

Please be sure to answer the first ten questions BEFORE the answers are given.

- 1) What is the value of the speed of light in air or free space?
- 2) What are some common sources of light which make objects visible?
- 3) What evidence exists to show that light travels in a straight line?
- 4) What is the law of reflection relating the incident and reflected angles?

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Draw a diagram to illustrate this concept and **label each angle.**

- 5) When light is refracted, what changes that causes its path to bend?

Is light bent *away from* or *toward* the normal when passing from water into air?

Draw a diagram showing the path of light passing from water into air. Be sure to **label** the angles of incidence and refraction, the normal, the names of the two media, and indicate the direction the ray is travelling.

- 6) What is the difference between diffuse and specular reflection? Give examples of each.
- 7) What are the two types of lenses discussed? Draw a diagram of each.

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Reflection & Refraction DATA SHEET

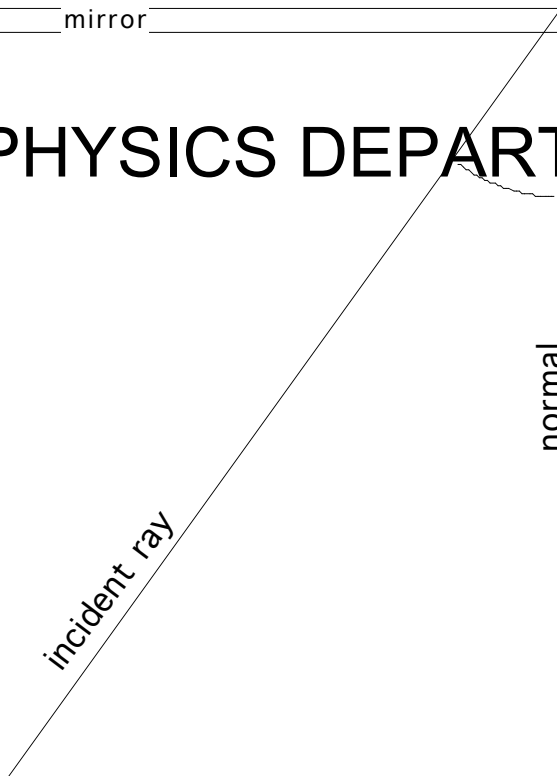
Name: _____

Table: _____ Section: _____

Tracing Diagram #1

_____ mirror _____

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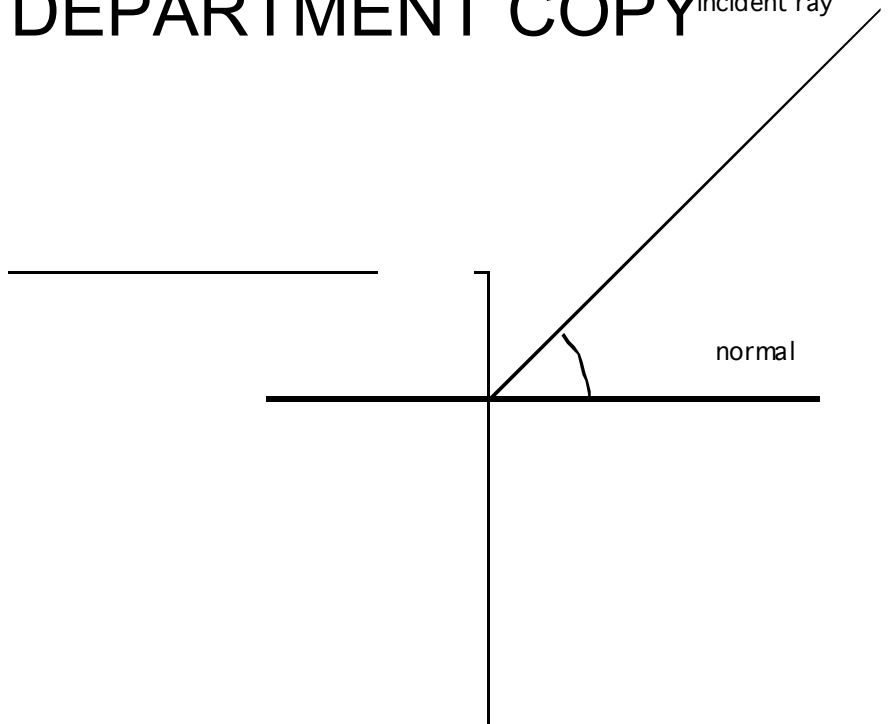
normal

incident ray

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Ray Tracing Diagram #2

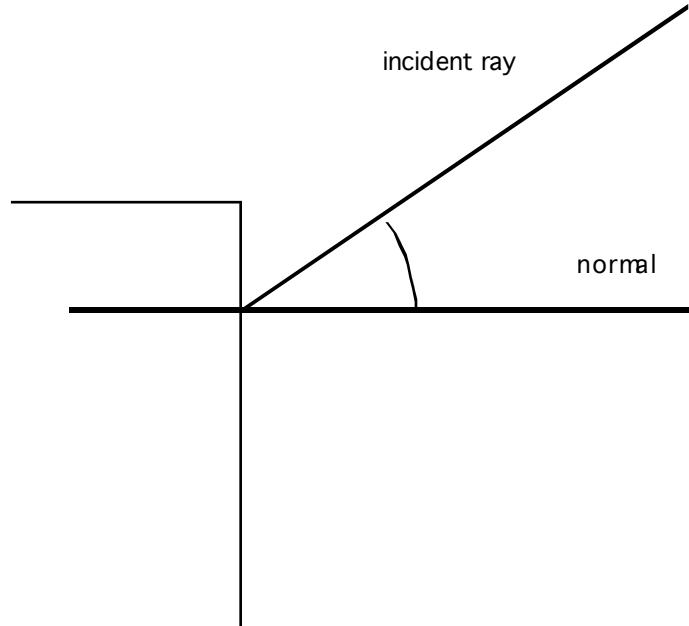
PHYSICS DEPARTMENT COPY^{incident ray}



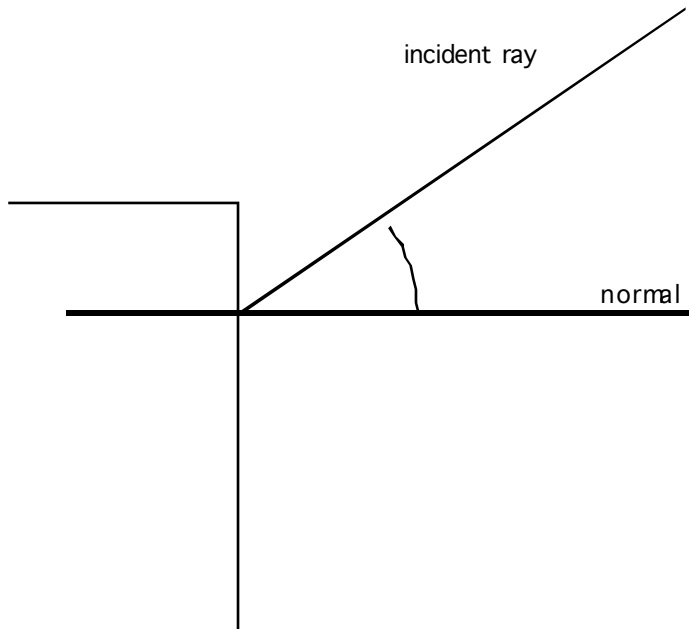
Velocity of light through plastic _____.

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Ray Tracing Diagram #3



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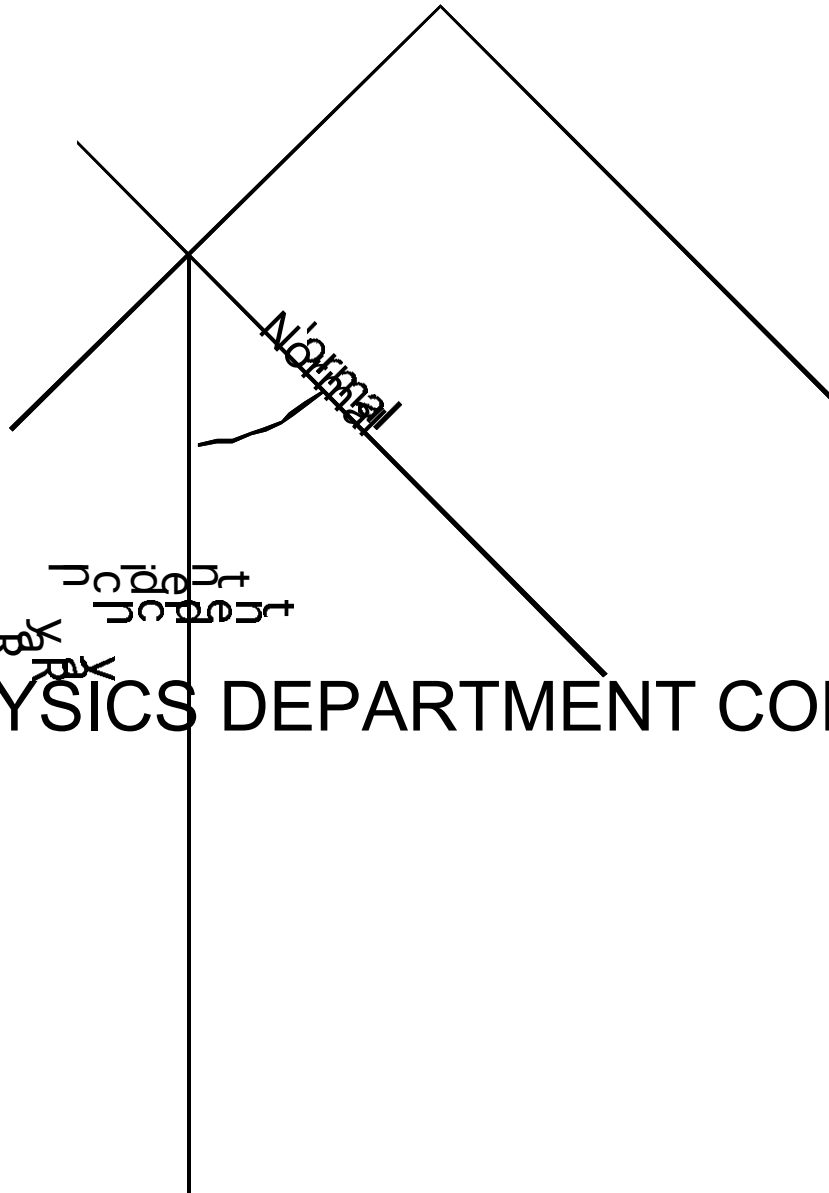


Velocity of light through air _____.

Velocity of light through water _____.

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DATA SHEET

Ray Tracing Diagram #4



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QUESTIONS

- 1) Do your results for Part A support the Law of Reflection as defined in your textbook?

Fermat's Principle is closely related to the laws of reflection and refraction. What is Fermat's Principle and how does it apply to these laws?

- 2) State the Law of Reflection.

- 3) Compare the velocities of light through the three media studied by recording the name of each media in order of slowest to fastest.

- 4) If you stick a pencil into a glass of water, it appears bent or broken depending on the angle from which it is viewed. Why is this so?

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GEOMETRICAL OPTICS

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Edouard Manet's A Bar at the Folies-Bergère has enchanted viewers ever since it was painted in 1882. Part of its appeal lies in the contrast between an audience ready for entertainment and a bartender whose eyes betray her fatigue. But its appeal also depends on a subtle distortion of reality that Manet hid in the painting—a distortion that gives an eerie feel to the scene even before you recognize what is "wrong." Can you find it?

Additional Questions

- 5) What did you observe about the transmitted angle in figure 3? (In other words compare the angle *into the plastic* to the angle *out of the plastic*).
- 6) A reading of the text describing the painting above implies that the mirror behind the young woman above is flat against the wall behind her. If that is the case what is wrong with the painting and why? How could you reorient the mirror to make the reflection correct? Show with a diagram similar to the one on page 41. *If you have a problem visualizing the solution, use your mirror and some object to represent the bartender and move the mirror around.*