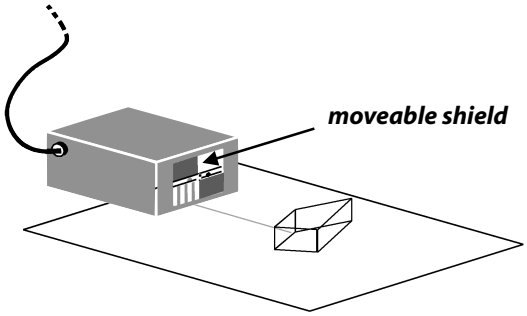
# PhyzLab Springboard: Diversion into Refraction


**• Apparatus •**

___PASCO Basic Optics System:
- __light source (out of bracket)
- __power supply (plug)
- __trapezoidal prism (in the blue box)
- __sheet of paper or white screen

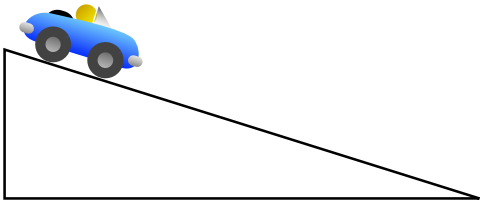
___ (optional) access to *Physics: Cinema Classics*
[Waves I / Refraction / Car on Carpet]

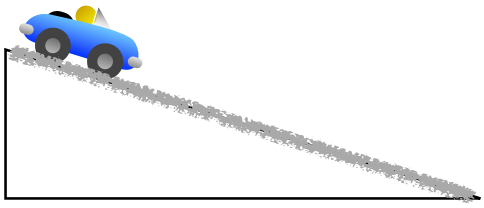



**• The Car on the Carpet •**

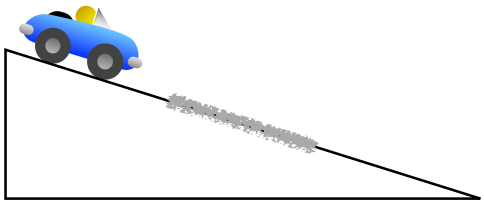
Consider a toy car that can roll down an incline.

1. One incline has a hard surface, the other has a soft, carpeted surface. Would the car roll any differently on one surface compared to how it rolls on the other? Explain.

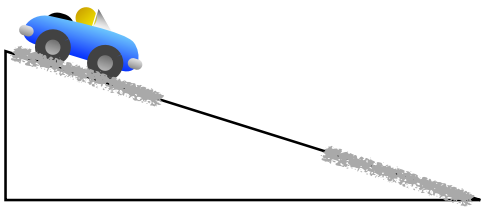




2. a. Consider the incline shown to the right. It has a hard surface followed by a carpeted surface followed by a hard surface. Write the words "slow" and "fast," at the appropriate places on the diagram to describe the motion of the car as it rolls down the incline.

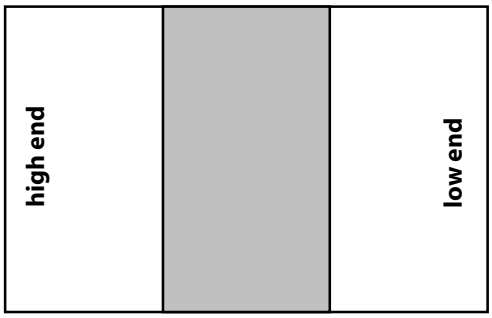


b. Consider the incline shown to the right. It has a carpeted surface followed by a hard surface followed by a carpeted surface. Write the words "slow" and "fast," at the appropriate places on the diagram to describe the motion of the car as it rolls down the incline.

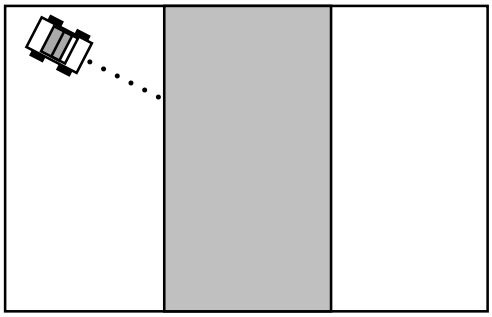


gets larger, then disappears, then reappears inverted and enlarged, then gets smaller.

3. Suppose you are viewing the first ramp from above. In this new perspective, label the **fast** and **slow** regions.




4. What if the car were sent down the incline at an oblique angle as shown to the right?
a. What would happen as the car entered the carpeted region and why?

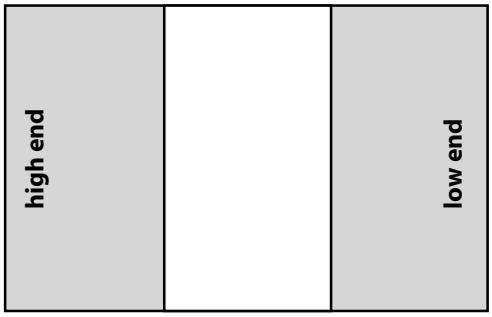


b. What would happen as the car emerged from the carpeted region and why?

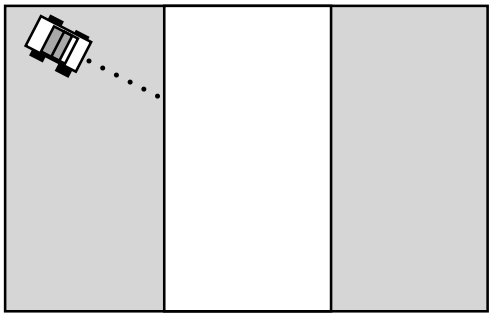
If possible, view *Physics: Cinema Classics* segment.

5. Draw the path the car would take on the diagram above and to the right.

6. Suppose you are viewing the second ramp from above. In this new perspective, label the **fast** and **slow** regions.




7. What if the car were sent down the incline at an oblique angle as shown to the right?
a. What would happen as the car entered the hard region and why?



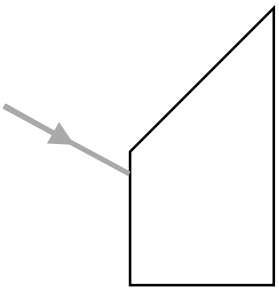
b. What would happen as the car emerged from the hard region and why?

8. Draw the path the car would take on the diagram to the right.

**• Light in the Glass •**

1. Attach the power supply to the light source and plug it in.

2. Arrange the light source to be a ray box and adjust the moveable plastic shield so that a single, strong beam of white light is emitted.



3. Place the sheet on the table. Place the ray box on the sheet.

4. Place the trapezoidal prism—**dull side down**—on the paper.

5. While observing from directly above, aim the single beam of light toward the trapezoidal prism as shown to the right. Note that the beam strikes the short side of the trapezoid at an oblique angle. Secure a PhyzBlessing when your group is confident of the arrangement.

6. Observe the path that the light takes upon passing through the prism. Be sure to observe the situation from **directly** above the prism (looking down). Record your observations in words and pictures.

**• Explain the Mystery •**

1. Why does light bend when passing from one transparent material to another? The toy car on carpet is a valid model. Based on your observation, complete the following statement by circling the correct words and crossing out the incorrect words.

Light propagates through plastic faster than slower than at the same speed as it does when propagating through air.

2. Is it possible for light to *not bend* when passing from one transparent material to another? Explain, using words and pictures.

**• So What? •**

Without an operational understanding of the principle illustrated in this exercise—refraction—the following would not be possible: telescopes, microscopes, cameras, projectors, glasses, or contact lenses, to name only a few.

**• Solve the Puzzle •**

A beam of light is incident from air to the glass shape shown below. Sketch the path the beam will take as it continues through the glass and/or air.