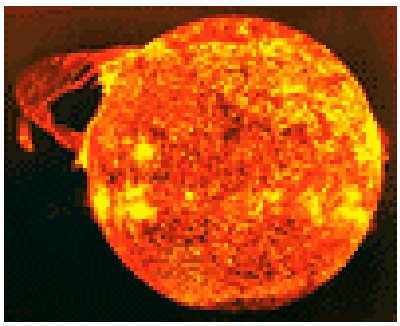
Earth

Venus

Sun
(not to scale!)



Recitation Exercise #2, Physics 142, 8-29-00

Name _____

You can earn up to 15 points for the thoroughness of your explanation.

Earth and Venus each orbit the sun in nearly circular orbits. Venus completes one orbit in approximately 225 Earth days. Earth is approximately 150 million km from the sun, and Venus is approximately 108 million kilometers from the sun. Venus and the earth are approximately the same size.

Estimate the ratio of the apparent brightness of the sun as seen from earth to the apparent brightness of the sun as seen from Venus. *Don't worry about the effects of the atmospheres of the two planets, and support your response with appropriate diagram(s).*

Recitation Activity #2, Physics 142, 8-29-00

Group members _____

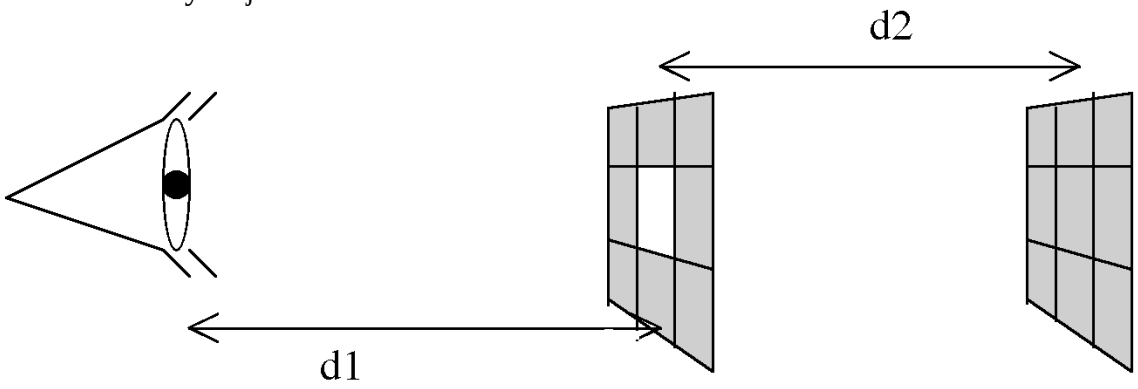
You can earn up to 15 points for your participation in this activity.

equipment: meter sticks, grid paper

1. List a few ways to make a light source *look* less bright to an observer, without changing anything about the light source.

2. Within your group, make a prediction about what would happen to the apparent brightness of a light source if the distance between the observer and the light source were (a) doubled (b) tripled or (c) cut in half. (Does this sound like the Venus question you answered a few minutes ago?)

When you complete this activity, you should have a systematic way for making predictions like the ones you just made.



3. The screen to the left has a hole in the middle. About how many grids (of the screen at the right) can the eye see, with d1 and d2 as shown above? Add some lines to the diagram to help yourselves think about this.

Try the experiment yourself. Using paper grids (from the last page) and metersticks, determine d1 and d2 so that you see 1, 4, 9, 16 and 25 squares in the second grid.

squares	**1**	**4**	**9**	**16**	**25**
d1 (m)					
d2 (m)					
(d1+d2)/d1					

4. Do you see a pattern in the numbers? Can you write a mathematical rule (an equation) describing the relationship among d1, d2 and the number of squares seen?

5. Can you make a connection between this rule and the lines you drew in the diagram above?

Let the instructor(s) know when you reach this point.

6. Imagine that you have replaced your eye with a small light source in the experiment you just did. What rule would you expect to find for the relationship among d1, d2 and the number of squares lit by the light source? *Support your answer with a sketch.*

At this point, we will darken the room and you will have a chance to test your rule.

7. Imagine that you have a light detector that collects all the light falling on a one-grid-square area. What would happen if the distance between the detector and the light source were (a) doubled (b) tripled or (c) cut in half?

8. What type of rule would you expect to find for the relationship between the detector's reading and the distance from the bulb to the detector? (For instance, should it be a linear relationship, or …?)

9. Re-consider your earth / venus light intensity prediction, in light of what you have found in this activity. How would you estimate the ratio of the apparent brightness of the sun as seen from earth to the apparent brightness of the sun as seen from Venus?