

Recitation Exercise #5, Physics 142, 9-19-00

Recitation: 8:30 11:00 12:30

Name _____

You can earn up to 15 points based on your work.

You are a forensic pathologist investigating a motorcycle accident that occurred at the intersection of 17th and South Street sometime last night. The blood from the unconscious victim was rushed to your crime lab in south Lincoln. To determine the time of the accident, you measure the light-transmitting properties of a thin smear of the victim's blood at 10:30 AM. You find that the blood sample has an optical density of 2.

To determine how the light-transmitting properties of blood change with time, you look up some calibration data from your files. You find that fresh human blood transmits 50% of incoming light, blood that has been exposed to air for 2.8 hours transmits 20% of incoming light, and blood that has been exposed to air for 4.0 hours transmits 13.5% of incoming light. Since you are somewhat sophisticated about blood-physics, you expect that percent-transmission vs. time-exposed data will form a straight line on a semi-log graph. (See attached graph.)

1. To convince police of your estimate for the time of the accident, you make a graph of Optical Density vs. Time-exposed. (6 points)
2. To be sure you can communicate your reasoning, you determine the equation of your OD vs Time graph. (2 points)
3. And, of course, you must estimate the time of the accident. (7 points)

Be sure to explain your reasoning in language that both policemen and lawyers can understand!

(If you run out of space, continue on the back of the page.)

Recitation Activity #5, Physics 142, 9-19-00

Recitation: 8:30 11:00 12:30

Group member: _____

Group member: _____

You can earn up to 15 points based on your work and participation. Turn in one paper for the group.

You and a partner will investigate some image-forming properties of lenses, and practice sketching ray diagrams.

1. Obtain a lens. Record the number on your envelope here: +_____
2. Determine the focal length (f) of your lens by focusing the overhead lights on a piece of paper. (Assume the lights are an infinite distance away, so the incoming light is essentially parallel.) Sketch a ray diagram, including a "box" for the observer's eye.
3. You and your partner should each look at the image of an object (a piece of graph paper, for instance) with three different object distances (d_o):
 - (a) $d_o < f$
 - (b) $f < d_o < 2f$
 - (c) $2f < d_o$
4. For each object distance:
 - (a) record an estimate for d_o .
 - (b) describe the image, including observations about its size and orientation.
 - (c) sketch a ray diagram, including a "box" for the observer's eye.

(If you run out of space, continue on the back of the page.)