

## **Paper for AY80B 29 April 2003**

First draft is due on 15 May 2003  
In class review on 15 May 2003  
Final copy of paper is due 5 June 2003

The paper should focus on an observed optical phenomenon (natural or manmade). It does not have to be a unique or exciting phenomenon, just something observed by you that relates to light and to topics discussed in this class. The aim is to learn to make accurate and insightful observations, report them clearly, and to explain them in light of what you have learned in the class. A first draft of the paper will be submitted and reviewed in class by your classmates. A final draft will then be submitted. Paper length should be 500-1000 words and should include figures to explain what was seen and why.

You should pick some topic and check with Stefan or Jerry that it is acceptable before proceeding too far.

**Some sample questions to get you started.** (You should be asking yourself these questions in order to describe the phenomenon to your reader clearly.)

Under what conditions does this phenomenon appear?  
Does the phenomenon change over time? (e.g. do shadows of craters on moon change with the phases of the moon?)  
Does the phenomenon look the same for all viewers? (Does the phenomenon's appearance change with the angle it is being viewed?)  
What angular size is the process?  
What is the light source?  
What causes the observed colors? What order are they in?

### **Some ideas of the types of things that might make good paper topics.**

Green flash.  
Shadows.  
Color mixing - paints  
Color mixing - light  
sun dogs  
mirages  
Sunset  
Rainbow.  
Moon.  
Rings around Moon or Sun.  
Glints off the ocean.  
Make and use a pinhole camera.  
Color of the sky at different places.  
Shadows in fog.  
Zodiacal light.  
house of mirrors  
an optical instrument you are interested in

**Administrative details**

Name should be clearly legible.

Paper should have a title

Prefer typed papers (this will be much easier on you since you will have to rewrite it). Double space typed or written papers. Leave at least 1 inch margins on each side for comments. Do not use microscopic fonts (10-12 points preferred for typing).

Length of paper should be in the 500-1000 word range.

**Introduction**

Introduce the topic you will be reporting on. Why did you pick this topic? What is interesting about it? What did you hope to learn about the subject? What questions are you going to ask?

**Observations**

What are you observing? What are the observing conditions? This might include the time or time duration, the location, the relative locations or angles between pertinent objects, etc. What measurements did you actually make? If you make a series of measurements, give them in a table. Did you encounter any problems? This section should be written in clear English and written in a way that your parents or siblings can understand what you are doing. Use language that is precise, but language that you understand.

Include Figures that are simple and clear and illustrate the measurements you are making and the geometry you are using. Graphs of the data can go here. Make sure figures are clearly labeled and have a clear caption. Make sure graphs have labeled axes, including units, and have a clear caption. Figures and graphs should be described in more detail in the text of the paper.

**Analysis and Conclusions**

The phenomenon behind the observation should be described. The physics describing your observation should be given. Again, you want to use precise language - but now you want to be sure that you are scientifically accurate as well. Use the concepts you have learned in class to explain what you have observed.

## **Writing Suggestions**

1. Add section headings to your paper:

Introduction

Measurements or Observations

Analysis or Interpretation

Conclusions

2. This paper must involve either measurements or observations. Include figures to show or explain the principles of what you see or did.

3. Spelling, grammar, and punctuation. Check for spelling errors. Misspelled words create a bad impression. Write in complete sentences. Eliminate run on sentences.

4. Be consistent in number and tense. Don't change from singular to plural or vice versa in the middle of a sentence or paragraph. Don't change tenses without good reason.

5. Organization: This should be clear, logical and economical. Be logical in your statements. If something follows from something else, make sure you have made clear what follows and why.

6. Paragraphs: Make sure the opening paragraph is engaging and to the point. The reader should become interested in reading what you have to say, as we all have better things to do than read papers that seem to be boring or not headed anywhere. Use paragraphs to group related thoughts together, and separate unrelated thoughts or changes of subject or view.

7. Ask a friend or classmate to read your paper and give you critical comments. Ask particularly for comments on the clarity of expression.

8. Reread your paper, sentence by sentence and eliminate any unnecessary words. Extra words make your writing more difficult to read.