

## Syllabus

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This block explores the phenomena of light, optics and color. We will trace the history of ideas about light from ancient times through the classic Greek and Arabic cultures, the European Renaissance, and into the current era. We will study multiple models of light, including Aristotle's, Newton's, Goethe's and Einstein's. We will observe the physical phenomena of light, including reflection, refraction, absorption, wave/particle duality, and the Electromagnetic Spectrum. We will study light rays and diffraction using a variety of mirrors and lenses. We will explore additive vs. subtractive color, the human eye, and the phenomenon of sight. Data from our observations will be used to confirm important mathematical models. This is a college preparatory class and is approved by the University of California for transfer credits. All assignments are required.

### **Class Guidelines**

1. Be kind.
2. Do your best.
3. Have fun.

### **Class Participation and Group Work**

This class requires your proactive participation. Successful participation includes:

1. Arriving on-time and prepared for class
2. Proactively supporting a positive learning environment, such as by keeping the classroom clean, safely handling lab equipment, avoiding side-conversations and other distractions, working collaboratively in groups, helping other students when possible.
3. Participating thoughtfully in class discussions by contributing your observations, questions and ideas.

### **Required Student Materials**

1. Journal: A binder or notebook with at least 50 blank pages
2. A few #2 graphite pencils
3. A few colored pencils (helpful for making diagrams)
4. Eraser
5. Scientific calculator (optional)

### **School Supplied Materials**

1. All laboratory and safety equipment
2. Ruler, protractor and compass
3. Scientific calculator
4. Duotang folder (for organizing your main lesson book pages)
5. Reader (Will be assigned on the first day of class, and must be returned by the last day.)

### **Typical Assignments**

1. Journal Notes
2. Lab Reports
3. Projects and Presentations
4. Main lesson Book
5. Quizzes

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### Journal

You will keep a journal using the Cornell Notes format to record class notes, observations, ideas, sketches, questions, etc. All entries should be dated. Depending on how your journal is bound, it can be turned in separately or as part of your Main Lesson Book.

1. During class, write notes in your journal (using Cornell Notes style when possible). Include important information, sketches of demonstrations, and your own observations, ideas, conclusions and questions.
2. Each evening, review your journal for accuracy and completeness. Add new ideas and questions. Be prepared the next morning to show your notes, and to share your thoughts during class discussion.

### Main Lesson Book

You will be given a Duotang folder to organize all main lesson book content. Your completed main lesson book folder should include:

1. Table of Contents
2. All main lesson book pages
3. All lab reports
4. All journal entries (if not bound separately)
5. All other written assignments, such as math worksheets and quizzes

### Main Lesson Book Page Requirements

- **Paper:** Use 8.5 x 11 inch, white, bond or better paper; plain, lined or gridded as appropriate for your content. No torn edges.
- **Length:** Minimum one page.
- **Title:** Add a short, one-line title at the top of the page. You can use the title suggested in class, or create one of your own that is relevant to the page content.
- **Text:** Minimum one paragraph; most topics require more than one paragraph. Handwritten or word processed. Summarize observations from demonstrations, labs, discussions, assigned readings, and your own independent research. Add a conclusion and any follow-up questions. Use clear, scientific writing, with accurate terms, definitions and equations. Handwriting must be dark enough to be clearly legible.
- **Mathematics:** Whenever appropriate, include related mathematical variables, equations, formulas, etc.
- **Graphics and Diagrams:** One or more diagrams are required. Illustrate related demonstrations and labs. Always add labels to diagrams. Always use a straight edge to draw lines that are meant to be perfectly straight. Create a legend if there is not enough space in the diagram for longer labels.
- **Data:** Whenever appropriate, include related data in tabular and/or graphic format.
- **Margins:** Use one inch margins. Margins and borders DO NOT need to be colored.
- **Layout:** You can paste printouts (of graphics, data, photos, etc.) onto the main page. Do not use tape.
- **Binding:** Three-hole punched and bound into your Main Lesson Book binder in chronological order.

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### MLB Table of Contents

Make a list of the contents of your Main Lesson Book in chronological order (i.e., by due date). You do not need to add your notes pages to the table of contents, but notes should be bound along with the topics to which they refer. You DO NOT need to add page numbers to the table of contents.

### Demonstrations

Demonstrations are in-class, teacher-led presentations of a specific topic. Most demonstrations are planned in advance. However, depending on weather conditions, interesting questions raised during discussions, or other unforeseen events, alternate demonstrations may be attempted at any time. All demonstrations—including those created in the moment—are of equal importance, and must be carefully observed. During demonstrations, students carefully observe the process. In followup discussions, students share their thoughts and add notes to their journal. The information gathered during demonstrations is an important part of a complete main lesson book page.

### Labs

During Labs, students work together in small groups to complete assignments. Most Labs follow a three-day cycle.

1. **Day 1:**
  - **Classwork:** Goals and procedures are explained. Student will work on Labs to collect data, take notes and discuss their observations.
  - **Homework:** Students will review their journal entries, tabulate data, and note new ideas or questions.
2. **Day 2:**
  - **Classwork:** In-class discussion of previous day's observations, development of scientifically verifiable conclusions, and suggestions for further questions.
  - **Homework:** Students write the Lab Report, and add it to their Main Lesson Book.
3. **Day 3:**
  - Main Lesson Books are due at the start of class.

### Lab Report Content Requirements

Lab Reports include the following sections

1. **Purpose:** A brief statement explaining the purpose of the research.
2. **Safety:** A list of all important safety warnings. (*Note: If the instruction sheet contains a detailed Safety section, you do not need to rewrite it again. Simply reference the instruction sheet with, "See Instruction Sheet", and include it with your report.*)
3. **Materials and Equipment:** A list of materials and equipment needed to perform the research. When applicable, include appropriate quantities and units. (*Note: If the instruction sheet contains a detailed Equipment and Materials section, you do not need to rewrite them again. Simply reference the instruction sheet with, "See Instruction Sheet", and include it with your report.*)
4. **Procedures:** An accurate description of the procedures. Write this so that a knowledgeable researcher in another part of the world will have enough information to duplicate and verify your results.
5. **Observations:** A description of the results using clear and scientific language. **Never alter actual observations to match expectations!**
6. **Diagrams:** One or more illustrations supporting your observations and conclusions. Always label diagrams. Add a legend if there is not enough space in the diagram for longer labels.

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7. **Data:** When applicable, include relevant data in tabular and/or graph form.
8. **Conclusion:** A concise and accurate description of your conclusions. Only add information that is scientifically supported (observable, measurable, repeatable) by your observations. In some case, such as when your research is inconclusive, you might list concerns with the research process, or propose follow up questions that might help lead to more useful conclusions.
9. **References:** A list of citations for all quotations taken from other sources.

### Lab Report Format

1. One to four pages; 8.5 x 11 inches; 1 inch borders
2. Underline headings.
3. Either handwritten or word processed.
4. If word processed, use 11 or 12 PT type, and 1.5em line leading.
5. You are responsible to print your report *before* it is due. (Do not rush the high school office just before the start of class.)

### Math Worksheets

Math worksheets provide practice in thinking through scientific principles and in converting observable patterns into the language of mathematics. If you are unable to solve a problem, show the steps as far as you were able to calculate, and write a short note explaining why you got stuck. Complete solutions must include the following:

1. Original equations, formulas and variables
2. Each algebraic step (lined up vertically on the equality sign)
3. Your solution (including units if applicable)

### Homework

Homework is due as soon as class starts. There will usually be homework on Mondays through Thursdays. Homework should not take more than one hour/day. New homework will usually NOT be assigned over the weekend, but these are excellent days to catch up on missing work, review for quizzes, or prepare for group presentations. Homework includes:

1. Review the day's journal entries, and add additional details, thoughts and questions.
2. Work on main lesson book pages and lab reports.
3. Prepare projects and group presentations.
4. Study for quizzes.

### Additional Research

Expanding your understanding through the use of other resources, such as libraries, the Internet, or knowledgeable people in your community, is encouraged. Whenever possible cite your sources.

### Citing Sources

1. Include essential source information, such as author, publication, and page number.
2. If you are citing an online source, include the full URL and the date you viewed it. Example:
  - <https://en.wikipedia.org/wiki/Physics> (Accessed: 2023-05-12)

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**Plagiarism**

Do not copy, partially copy, or paraphrase from other sources without adding quotation marks and a matching citation.

There is a fine line between studying with other students (*highly encouraged*) and blindly copying (*highly discouraged*). The essential difference is whether or not you understand the topic well enough to rephrase it in your own words. If you copy another student's work, but fail to demonstrate a clear understand what you wrote, you may be accused of plagiarism.

**Quizzes**

1. Frequent (almost daily) short quizzes will check for understanding of the previous day's topics.
2. Weekly quizzes (typically 10 to 25 questions) will test your recall of a wider range of topics.

Some quizzes may be "open notes", in which case you can use your own journal. Such quizzes can be more difficult because they may require a deeper understanding of the topic.

There will most likely not be a final block test. This has two major implications:

1. Every quiz counts, but no one quiz counts too much.
2. You must keep up with the class every day. There is no way to cram in the last week to pass this class.

**Grading Policy**

Grade	%
A	$\geq 98$
A	$\geq 94$
A	$\geq 90$
B	$\geq 88$
B	$\geq 84$
B	$\geq 80$
C	$\geq 78$
C	$\geq 74$
C	$\geq 70$
D	$\geq 68$
D	$\geq 64$
D	$\geq 60$
F	$< 60$

Percentage of grade	%
Participation	20%
Written Work	40%
Quizzes	40%

**Late Work**

Late work scores are usually reduced about 10%. Work more than a week late is not accepted. Exceptions can be made if arranged in advance.

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**Contacting the Teacher**

- **Email:** [ron@summerfieldwaldorf.org](mailto:ron@summerfieldwaldorf.org)
- **Meeting:** Most school days between 10:30 am and 12:30 pm. Other times by appointment.