Franklin High School

AP Physics Part 1 2019-20

Instructor: David Stroup • Mrstroupscience.org • dstroup@pps.net

Course Description:

Advanced Placement Physics Part 1 is an algebra-based course in general physics, roughly equivalent to an introductory algebra-based university-level physics "mechanics" (motion and forces) course. This course will be covered in two semesters, and will include mechanics, Newtonian physics, gravity, circular motion, harmonic motion, waves, sound, and the fundamentals of electrostatics and electrical currents. The emphasis in the course is on gaining an understanding of essential physics concepts and skills, and using the concepts and formulae to solve problems. Laboratory work will be covered as an integral part of this course.

Class meets for approximately 90 minutes every other day. The school year starts in late August, and we will have about 28 weeks to cover the material, with *hopefully* two weeks for review before the AP Physics Part 1 test the afternoon of Thursday, May 7, 2020 (test starts at noon). Whatever time remains is spent covering topics we choose together, likely including water-bottle rockets and a "Rube Goldberg" simple machines lab.

Students will sign up for an account with the AP College Board and add this class during the first few weeks of school (this will be an in-class activity). You will sign up for the AP test at this time. Registration on the AP website is required, and will be needed to access online resources and workbooks. It is expected tat everyone wil take the AP test. Financial assistance is available to anyone who wants to take the AP test and may have difficulty affording it. If you get a "3" on the AP test, I will raise your grade to a "B." If you get a "4" or "5" I will rise your grade to an "A." For more information about the AP Exam, visit www.apcentral.collegeboard.com

Peer coaching, peer teaching and peer review are an essential part of our course. Students are encouraged from the first day to create or join a study group to work with in and out of class — nobody works in a vacuum. Course goals include developing each student's intuition, creativity, and investigative skills to do the following (abbreviated from the 2014-15 College Board AP Physics Course Description):

- Use representations and models to communicate scientific phenomena and solve scientific problems.
- Use mathematics appropriately.
- Engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course.
- Plan and implement data collection strategies in relation to a particular scientific question.
- Perform data analysis and evaluation of evidence.
- Work with scientific explanations and theories.
- Connect and relate knowledge across various scales, concepts, and representations in and across domains.

Standards:

Next Generation Science Standards: HS.Forces and Interaction, including HS-PS2-1 through HS-PS2-1 through 5; HS.Energy, including HS-PS3-1 through 5; parts of HS.Waves and Electromagnetic Radiation.

Materials Needed:

- *College Physics for AP Courses* from OpenStax (https://openstax.org/details/college-physics-ap-courses). Acquire your copy for free online ASAP. This text is officially listed by the AP College Board as a text that meets the Board's curricular requirements (http://www.collegeboard.com/html/apcourseaudit/courses/physics_1_textbook_list.html).
- Scientific Calculator (graphing preferred).
- A composition book (stitched) or similar book to serve as a lab note-book. You may be asked about lab results on a test, in which case that part of the test will be 'open notebook' for this book — so you'd better have it on you.
- Some way of taking and keeping notes separate from the lab notebook.
- A three ring binder WITH DIVIDERS to keep handouts and homework, AP documents, formal lab write-ups, and tests. You will be expected to maintain this jotebook by the instructor *and possibly by your college*, if you want college credit for this course!
- *Physics* by Giancoli, 3rd Ed. (classroom set).

Evaluation:

- Tests 45%
- Labs Papers: 45%
- Bi-weekly quizzes, "pop" quizzes (waem-ups and exit tickets), lab hand outs, other projects: 10%

This break-down is approximate.

Homework will be issued in the form of packets at the start of each unit, and/or assigned online (as those resources become available). It will be discussed in class and collected, and may be entered in the gradebook for a small number of points. Homework packets include an answer key, so to get credit for having done the homework you must, naturally, show all work. You must be up to date on homework to take advantage of options like re-tests and test corrections. Not up to date? Get up to date!

Tests are at the end of major units. Re-tests are allowed with no penalty, but only if you are up to date on all homework and papers! The first semester final will be a larger test with cumulative elements; there will be no final for everyone who takes the AP test. If you do not take the AP test, there will be a final.

Lab Papers are major projects, and are considered to be an important summative (test-like) component of the hands-on lab practices part of this class. In other words, you demonstrate that you "get" this part of the class by doing the paper. There will be just four of these papers throughout the year, and they will be in science journal format. The intent will be for you to learn to do college-level work in this format. Don't panic if you don't know this yet! Before your first paper is due we will discuss this extensively, read sample papers, and go over a rubric for the work you are expected to do. We'll learn it together. **If you turn in the paper on time** you will be allowed to revise for points. If you don't get it in in on time you still owe me a paper—see me to make a commitment as to when you will turn it in.

Quizzes are about every two weeks, and are a "quick check" for what we learned over the past two weeks. If you do better on the test than you did on the quiz, I may drop the quiz. **Pop quizzes** include 'warm-ups' and 'exit tickets.' They will be irregular, filling in between tests and quizzes, and aren't worth a lot of points. There are no re-takes on pop quizzes.

In addition to tests and quizzes, **pre-assessments** will be delivered before key units, including the unit on Newton's physics, forces, and gravity.

In addition, **we will be using new on-line resources** (especially periodic self-checks and workbooks) provided by the AP College Board. These resources were just made available to us in August, so we will be rolling out their use as the year goes on.

Behavior & Expectations:

This is a high-intensity course equivalent to college physics. It is important that everyone be on their best behavior. Respect for your classmates is expected at all times; disrespect for your fellow scholars will not be tolerated.

Academic dishonesty will result in an assignment grade of F (ZERO). Plagiarism is considered academic dishonesty: on papers, any material that you copy from a source must be obviously a quote (for example, in quotation marks), and must be attributed. Excessive use of quoted material may be considered plagiarism—only quote primary sources. Copying from another student is also plagiarism. On a test, a pattern of identical wrong answers among people sitting next to each other may be taken as a sign of cheating!

Absences and Late Work: As a general rule, due dates are not negotiable, but see the instructor for special cases. If students have an excused absence on a due date, material is due when they return to school. If students are absent for a lab it must be made up before school, lunchtime, or after school by appointment with the teacher within one week of the assigned date. The teacher is under no obligation to accept late work if it is due on a day that the student has an unexcused absence. *It is student's responsibility to obtain assignments for the time that they are absent and to make appointments with the teacher for lab make-up.*

Safety: Since this is a laboratory class, students are expected to adhere to common sense safety rules for their protection as well as the protection of others in the classroom, no running, or using equipment as a toy or weapon. We will use lasers in this class, and their improper use can result in eye damage; unsafe behavior may result in removal from the lab! Respect for lab equipment is imperative, and deliberate mistreatment of lab equipment will also result in exclusion from labs until it is determined that the student can be trusted. The student or group of students responsible for broken equipment will be charged for its replacement.

Tutorials: Tutorials are part of the school day, and will be used to hold periodic recitation sessions which may be integral to your success in the class. A recitation session in college is a period dedicated to going over material and problems in depth, focusing on problem solving, practicing the material, and responding to student questions. Because of the amount of material covered in AP Physics it may not always be possible to cover all types of problems during the normal class period! It is an expectation of this class that you attend one or more recitation session per unit, and material covered in depth in a recitation session — but mentioned only briefly in class — may appear on tests. You will be informed of dates for recitation sessions for particular material or problem types. (Some tutorials will be used for other classes or periods, or for catch-up work.)

Cell phone policy: Call phones and related devices are **not to be used except with the explicit permission of the instructor, and only as a scientific instrument (timer, to take videos of an experiment, etc.)!** If a cell phone is being used inappropriately (which is almost at any time without permission) you will be told to put it away; if you don't, or if the phone comes out again, it will be confiscated, and may be sent to the office (as per school rules). You may be given permission to take out your phones to use in connection with the class; please be familiar with apps such as your scientific calculator, stopwatch, inclinometer (look it up), etc. High-speed video camera apps (240+ fps) are available free, as are lots of other cool tools. **In general, phones or other connected devices will not be permitted as a substitute for a calculator on a test; bring your calculator!**

Labs:

Labs are open-ended and inquiry-based; at least 25% of class time will be spent on labs and related activities (preparation, write-up). At least 12 will be assigned during the course of the year. Students are given an objective, e.g. "Determine the coefficient of static friction of wood on wood," and standard materials such as string, ruler, protractor, mass set, light pulley, etc. Students are allowed to create their own experimental design, but ultimately most of the lab designs must lead to the collection of data which can be analyzed through graphical methods. Students are encouraged to use whatever technology is available to them, including smartphones and laptops (note that shooting a video and analyzing it is an acceptable practice). Students work in small groups, but each student must submit independent lab papers. In addition to the papers described below, you may be asked about labs on following quizzes or tests. You are still responsible for these questions if you missed (and failed to make up) the lab, and the question will be phrased in such a way that you could apply what you have learned and answer it (e.g. 'how would you set up a lab to…). This is practice for the AP test!

Lab papers, rubric, and format:

Although participation in all labs is mandatory (and anything covered in a lab is fair game on a test), only two full lab write-ups will be assigned per semester. Eact will be worth 100 points. The expected format is based on the expectations of college lab courses. We will go over this at length and do practice pre-write exercises! Here is a sample resource for this style fo writing and why it is important: http://abacus.bates.edu/~ganderso/biology/resources/writing/HTWsections.html

I expect the whole report to be **at least three pages in length**, typed, in a readable font, with normal margins, etc. Three pages is an absolute minimum! I will reject it (and tell you top try again) if it isn't at least three full pages. Not two and a bit! Not two and ¾!

Instead of individual paragraphs for items like hypothesis, background, etc, the report should have these parts:

0) The report needs a title, your name, date, and period. In addition, it needs an **abstract** — a short (two to five sentence) summary of the entire paper. It should state what you did and what your results were in a brief, clear fashion. A very simple example would be "We investigated force and acceleration with cart and weights. We determined that F=ma and confirmed Newton's second law." (5 pts.)

1) Introduction: A statement of the question to be tested, why it is important, and any relevant background, as well as your hypothesis. This is one area where you could do a little research and cite a source to list in your References section (below). (15 pts.)

2) Methods and materials: This is where you explain what you did and how you did it. Include a discussion of your materials, how you conducted the experiment, and any modifications you had to make along the way. **At least one illustration is mandatory here**; it may be a hand drawing, an illustration done in Word or with another application, or a well-labeled and clear photograph with explanatory text. (25 pts.)

3) Results: Include a narrative of what you found along with all relevant data. Use whatever combinations of graphs, tables and photographs you need. Anything you show (in a table or graph, for example) should also be explained in the narrative. In other words, don't just say "see fig. 1," write something along the lines of "as you can see from fig. 1, we found that force increases…" etc. Make sure all graphs and tables are properly labeled and explained. (30 pts.)

4) Discussion and conclusions: Discuss what you found **and what it means**. Make a scientific argument: "We claim we found X, our evidence was Y, and we think our evidence means we're right because…" Analyze error. This is another area where you could do some research, find someone else's findings, and cite that source, listing it in your References section (below). (20 pts.)

5) References: I expect you to provice at least one reference (more on later papers), in proper format (see owl.english.purdue.edu/owl/ if necessary). This may be an on-line source, but you already know Wikipedia doesn't count, right? Good. (5 pts.)

Academic honesty on lab papers: Just to be absolutely clear about this, plagiarism is considered academic dishonesty. Any material quoted from another source must be placed in quotation marks (or otherwise set off from the text by font choice, indentation, etc.) and properly attributed, and quoted material should be kept to a minimum — less than 10% of the word count. You should also provide attribution for your sources, even if you didn't quote directly from them (and you get points for doing so in the "References" section). Copying from another student is also plagiarism!

As a resource, here's one good guide to plagiarism from a college you may have heard of:
http://usingsources.fas.harvard.edu/icb/icb.do?keyword=k70847&pageid=icb.page342054

Differentiation:

The nature of inquiry labs and the emphasis on writing projects (in the form of science journal articles) are intended to allow students ot go beyond the "bare bones" of the class and challenge themselves to come up with their own lab procedures and conduct research outside class. Honors will be available to students who complete additional projects, including an optional video project of science fair project.

Portfolios:

All students are required to maintain a portfolio (binder with dividers) of all assignments, notes, and labs, in case the college of their choice requires evidence, artifacts or documentation prior to awarding college credit for physics. This portfolio (typically a three-ring binder) is kept throughout the year.

Organizing Principals:

What's the Big Idea?

AP Physics is organized around a set of seven "Big Ideas" that we will revisit throughout the class:

Big Idea 1: Objects and systems have properties such as mass and charge.
Big Idea 2: Fields existing in space can be used to explain interactions.
Big Idea 3: The interactions of an object with other objects can be described by forces
Big Idea 4: Interactions between systems can result in changes in those systems
Big Idea 5: Changes that occur as a result of interactions are constrained by conservation laws
Big Idea 6: Waves can transfer energy and momentum from one location to another without the permanent transfer of mass and serve as a mathematical model for the description of other phenomena
Big Idea 7: The mathematics of probability can be used to describe the behavior of complex systems and to interpret the behavior of quantum mechanical systems

Science Practices:

Science practice 1: The student can use representations and models to communicate scientific phenomena and solve scientific problems.
Science practice 2: The student can use mathematics appropriately.
Science practice 3: The student can engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course.
Science practice 4: The student can plan and implement data collection strategies in relation to a particular scientific question.
Science practice 5: The student can perform data analysis and evaluation of evidence.
Science practice 6: The student can work with scientific explanations and theories.
Science practice 7: The student is able to connect and relate knowledge across various scales, concepts, and representations in and across domains.

Learning Objectives:

Learning objectives are outlined at the start of each chapter of OpenStax College Physics for AP Courses.

Syllabus:

UNIT 1. KINEMATICS [CR2a]
• Kinematics in one-dimension: constant velocity and uniform accelerated motion
• Vectors: vector components and resultant
• Kinematics in two-dimensions: projectile motion
Big Idea 3
Learning Objectives: 3.A.1.1, 3.A.1.2, 3.A.1.3

UNIT 2. DYNAMICS [CR2b]
• Forces, types, and representation (FBD)
• Newton's First Law
• Newton's Third Law
• Newton's Second Law
• Applications of Newton's Second Law
• Friction
• Interacting objects: ropes and pulleys
Big Ideas 1, 2, 3, 4
Learning Objectives: 1.C.1.1, 1.C.1.3, 2.B.1.1, 3.A.2.1, 3.A.3.1, 3.A.3.2, 3.A.3.3, 3.A.4.1, 3.A.4.2, 3.A.4.3, 3.B.1.1, 3.B.1.2, 3.B.1.3, 3.B.2.1, 3.C.4.1, 3.C.4.2, 4.A.1.1, 4.A.2.1, 4.A.2.2, 4.A.2.3, 4.A.3.1, 4.A.3.2

UNIT 3. CIRCULAR MOTION AND GRAVITATION [CR2c]
• Uniform circular motion

• Dynamics of uniform circular motion
• Universal Law of Gravitation
Big Ideas 1, 2, 3, 4
Learning Objectives: 1.C.3.1, 2.B.1.1, 2.B.2.1, 2.B.2.2, 3.A.3.1, 3.A.3.3, 3.B.1.2, 3.B.1.3, 3.B.2.1, 3.C.1.1, 3.C.1.2, 3.C.2.1, 3.C.2.2, 3.G.1.1, 4.A.2.2

UNIT 4. ENERGY [CR2f]
• Work
• Power
• Kinetic energy
• Potential energy: gravitational and elastic
• Conservation of energy
Big Ideas 3, 4, 5
Learning Objectives: 3.E.1.1, 3.E.1.2, 3.E.1.3, 3.E.1.4, 4.C.1.1, 4.C.1.2, 4.C.2.1, 4.C.2.2, 5.A.2.1, 5.B.1.1, 5.B.1.2, 5.B.2.1, 5.B.3.1, 5.B.3.2, 5.B.3.3, 5.B.4.1, 5.B.4.2, 5.B.5.1, 5.B.5.2, 5.B.5.3, 5.B.5.4, 5.B.5.5, 5.D.1.1, 5.D.1.2, 5.D.1.3, 5.D.1.4, 5.D.1.5, 5.D.2.1, 5.D.2.3

UNIT 5. MOMENTUM [CR2e]
• Impulse
• Momentum
• Conservation of momentum
• Elastic and inelastic collisions
Big Ideas 3, 4, 5
Learning Objectives: 3.D.1.1, 3.D.2.1, 3.D.2.2, 3.D.2.3, 3.D.2.4, 4.B.1.1, 4.B.1.2, 4.B.2.1, 4.B.2.2, 5.A.2.1, 5.D.1.1, 5.D.1.2, 5.D.1.3, 5.D.1.4, 5.D.1.5, 5.D.2.1, 5.D.2.2, 5.D.2.3, 5.D.2.4 , 5.D.2.5, 5.D.3.1

UNIT 6. SIMPLE HARMONIC MOTION [CR2d]
• Linear restoring forces and simple harmonic motion
• Simple harmonic motion graphs
• Simple pendulum
• Mass-spring systems
Big Ideas 3, 5
Learning Objectives: 3.B.3.1, 3.B.3.2, 3.B.3.3, 3.B.3.4, 5.B.2.1, 5.B.3.1, 5.B.3.2, 5.B.3.3, 5.B.4.1, 5.B.4.2

UNIT 7. ROTATIONAL MOTION [CR2g]
• Torque
• Center of mass
• Rotational kinematics
• Rotational dynamics and rotational inertia
• Rotational energy
• Angular momentum
• Conservation of angular momentum
Big Ideas 3, 4, 5
Learning Objectives: 3.F.1.1, 3.F.1.2, 3.F.1.3, 3.F.1.4, 3.F.1.5, 3.F.2.1, 3.F.2.2, 3.F.3.1, 3.F.3.2, 3.F.3.3, 4.A.1.1**,** 4.D.1.1, 4.D.1.2, 4.D.2.1, 4.D.2.2, 4.D.3.1, 4.D.3.2, 5.E.1.1, 5.E.1.2, 5.E.2.1

UNIT 8. MECHANICAL WAVES [CR2j]
• Traveling waves
• Wave characteristics
• Sound
• Superposition
• Standing waves on a string
• Standing sound waves
Big Idea 6
Learning Objectives: 6.A.1.1, 6.A.1.2, 6.A.1.3, 6.A.2.1, 6.A.3.1, 6.A.4.1, 6.B.1.1, 6.B.2.1, 6.B.4.1, 6.B.5.1, 6.D.1.1, 6.D.1.2, 6.D.1.3, 6.D.2.1, 6.D.3.1, 6.D.3.2, 6.D.3.3, 6.D.3.4, 6.D.4.1, 6.D.4.2, 6.D.5.1

UNIT 9. ELECTROSTATICS [CR2h]
• Electric charge and conservation of charge
• Electric force: Coulomb's Law
Big Ideas 1, 3, 5

Learning Objectives: 1.B.1.1, 1.B.1.2, 1.B.2.1, 1.B.3.1, 3.C.2.1, 3.C.2.2, 5.A.2.1

UNIT 10. DC CIRCUITS [CR2i]

- Electric resistance
- Ohm's Law
- DC circuits
- Series and parallel connections
- Kirchhoff's Laws

Big Ideas 1, 5

Learning Objectives: 1.B.1.1, 1.B.1.2, 1.E.2.1, 5.B.9.1, 5.B.9.2, 5.B.9.3, 5.C.3.1, 5.C.3.2, 5.C.3.3

Contract for AP Physics with Mr. Stroup

I have read and understand the expectations and consequences for AP Physics, 2018–2019, with Mr. Stroup:

- I understand that my student needs a composition book and three-ring binder (ASAP) and a scientific calculator (by week of 9/9). Dollar-store quality is fine, but please choose a calculator with basic scientific functions like exponents.
- I understand that my student must have turned in a safety form, signed by the student and parent or guardian, by the week of 9/9 to be allowed to participate in labs.
- I understand that cell phones and similar devices (that means iPods, iPads, iEtc.) are tolerated only with explicit teacher permission—that means when the class is told they may use it as a scientific instrument.
- I understand that cell phones may be confiscated and sent to the office under school rules. This is school and district policy; see the student handbook.
- I understand all students are expected to behave like scholars and scientists, and to show respect for their fellow students (as well as the teacher).
- I understand that late work may result in a penalty; academic dishonesty will result in a ZERO.
- I understand that unsafe behavior during labs may result in exclusion from the lab and loss of points.
- I understand that students should advocate for themselves and ask the instructor for help, if needed (and in return I will do everything I can to give them that help).

Student Name Student Signature

Parent Name Parent Signature

Return this sheet to Mr. Stroup by 9/10

Parents: Anything else I should know about the your student? Tell me below.

Portland Public Schools
Science Safety Agreement (Physics)
Franklin High School
Instructor: David Stroup

Science is a hands-on laboratory class. Many laboratory activities require the use of hazardous chemicals, materials, and equipment. Safety in the science classroom is the number one priority for students, teachers, and parents. To ensure a safe science classroom, a list of rules has been developed and provided for you in this science safety agreement. These rules must be followed at all times! Please read through these rules carefully. After reviewing the rules, please have the agreement signed by both you and a parent or guardian and return to your science instructor.

I. General Safety Guidelines

1. **Perform only those experiments and procedures authorized by the instructor.**
2. **Be properly prepared to conduct all experiments. Pay attention to laboratory safety instructions and be sure you understand what you are doing before you proceed.**
3. **Conduct yourself in a responsible manner at all times. No horseplay, or other fooling around should ever occur in the laboratory.**
4. **Wear proper eye protection at all times during laboratory activity as directed by the instructor. Additional safety equipment may be required by the instructor.**
5. **Know the locations of fire extinguisher, fire blanket, eyewash, safety shower, and first aid kit. Emergency exits and aisles must be kept clear at all times.**
6. **Confine or securely tie hair that reaches to the shoulders. Wear clothing appropriate to the laboratory as specified by the teacher.**
7. **Do not eat food, drink beverages, or chew gum in the laboratory area.**
8. **Work areas and equipment should be kept clean and tidy at all times. Bring only materials specified by your instructor to the work area. Other items such as books, purses, backpacks, etc. must be stored in an area designated by the instructor.**
9. **Dispose of all waste materials in an appropriate manner as designated by the instructor.**
10. **Read chemical labels very carefully. Make sure that you have the correct substance in the correct concentration. Check the label twice before removing any of the contents. Follow the instructor's safety instructions for handling hazardous materials.**
11. **Do not return chemicals to their original containers unless you are specifically instructed to do so.**
12. **Always work in a well-ventilated area when using volatile substances or hazardous vapors.**
13. **Handle all chemicals with care. Never taste a chemical. Never draw material in a pipette by mouth. Check odors when instructed to do so by gently wafting some of the vapor toward your nose by hand.**
14. **Never take chemicals, supplies, specimens, or equipment out of the laboratory without the knowledge and consent of the instructor.**
15. **Never work alone in the laboratory without adult supervision.**
16. **Do not enter the laboratory stockroom(s) or storage areas without specific permission from your instructor.**
17. **Transport chemicals, materials and equipment properly as directed by the instructor.**
18. **Human body fluids pose potential dangers and can only be used under strict teacher supervision.**

II. Physics-Specific Safety Guidelines

1. **Never point a laser at your face or another person's face.**
2. **Be careful when using weights and masses, and never toss or throw them; they are heavy enough to cause injury.**
3. **Always follow the teacher's instructions when using electricity, and never energize a circuit (attach the power source) until all lab group members are clear.**
4. **When launching a rocket, make sure all students and lab group members are standing clear of danger, and no pedestrians are standing downrange.**
5. **Be aware that some powerful magnetic devices may damage mobile phones, tablets, or other devices! It is recommended that you keep all electronics away from magnets.**

III. Accidents and Injuries

1. **Report any accident (spill, breakage, etc.) or injury (cut, burn, etc.) to the instructor immediately.**
2. **Water spills on the floor need to be cleaned up immediately.**
3. **If a chemical should splash in your eye(s) or on your skin, immediately flush with running water from the eye wash station or safety shower for at least 15 minutes. Notify the instructor immediately.**
4. **Treat burns immediately by putting the burned area under cold water.**

THE PURPOSE OF THE AGREEMENT IS TO MAKE THE STUDENT AWARE OF HIS/HER RESPONSIBILITY FOR LABORATORY SAFETY!

I will:

- **Follow all instructions given by the teacher**
- **Protect eyes, face, hands, and body when involved in science experiments.**
- **Carry out good housekeeping practices and keep my laboratory work area neat and orderly.**
- **Know the location of first aid, eyewash and fire extinguisher.**
- **For my own safety and the safety of others, conduct myself in a responsible manner at all times.**
- **Report potentially hazardous conditions and behaviors.**

I, _____, have read and agree to follow all the safety guidelines set forth. I will closely follow all instructions provided by the teacher.

Date _____ Student Signature_____

Date _____ Parent Signature _____

List of allergies or other medical problems that could endanger my safety in the laboratory.

1.
2.
3.
4.
5.