

# Physics II: Gizmos, Gadgets, Gears and Gravity

## **INSTRUCTOR**

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## Syllabus—2008-2009 Academic Year

We are using the Noeo Physics II curriculum. Each week, I will send out a reading assignment and corresponding lab book assignment. This curriculum requires several books and experiment kits, as well as some common household supplies.

## **LABS**

Each month we will participate jointly in a lab. We will work on correct lab techniques. Research methods and ethics will be stressed throughout. We will read the book *How to Think like a Scientist*. Over the weeks, each child will use the scientific method to ask a question, state a hypothesis, design an experiment, and publish his/her findings.

## **REQUIRED BOOKS**

Most of these books are available from the public library. The first two, *Usborne Science Encyclopedia*, and *Usborne Mysteries and Marvels of Science*, are keepers. We will use them throughout this year and then again for Biology and Chemistry in subsequent years. There are plenty of used copies at Amazon.

1. *Usborne Science Encyclopedia*, by Peter Tachell
2. *Usborne Mysteries and Marvels of Science*, by Phillip Clarke, Laura Howell, Sarah Khan
3. *Gizmos and Gadgets*, by Jill Frankel Hauser (Author), Michael Kline (Illustrator)
4. *Archimedes and the Door of Science*, by Jeanne Bendick
5. *Along Came Galileo*, by Jeanne Bendick
6. *How to Think Like a Scientist*, by Stephen P. Kramer (Author), Felicia Bond (Illustrator)

## **KEEPING A LAB NOTEBOOK**

Good scientists keep detailed lab notebooks. Each child will keep a lab notebook. He or she will make entries for all experiments, and keep notes and sketches of study material. There are some specific rules for keeping a lab notebook:

1. Purchase a bound, quad ruled notebook, such as a composition book.
2. Keep two or three pages blank at the front to create an index as you go.
3. Each entry should include the page number and name of project or experiment at the top. The child's name and date should appear at the bottom. In a real lab setting, a supervisor would verify the data and sign off at the bottom as well. Include a place for a parent to sign and date at the bottom.
4. Never erase or remove pages from the lab notebook. Mistakes should be neatly crossed out and kept. If your child is ready, have him use a pen. This is a permanent record.
5. Never tuck in papers between pages. Use tape to affix all photos, notes or other papers to the lab notebook.

### **EXPERIMENT KITS**

We will use a set of seven experiment kits by The Young Scientists Club. Each kit contains several experiments for hands-on exploration of the subject at hand.

There is a significant discount for 10-packs. If there are enough of us, we can take advantage of the discount. We will not begin using these kits until later in the year, so we can wait to order them.

### **SUPPLY LIST**

The following is a complete list of items that will be used for the required experiments over the entire 36-week course. This list includes many common household items. The list does not include the items that are provided in *The Young Scientists Club* kits.

- ½ liter plastic soda bottle
- Flashlight
- Cardboard tube from a paper towel roll
- Shoebox
- Tape
- Paper towel
- Glue
- Disposable container
- Piece of wool (e.g. sweater or sock)
- Size C or D batteries (3)
- Phillips screwdriver
- Scissors
- Pencil

- Cereal bowl
- Plastic bottle caps (2)

## Assignments by Week

USE: Usborne Science Encyclopedia  
 MMS: Usborne Mysteries and Marvels of Science  
 GG: Gizmos and Gadgets  
 ADS: Archimedes and the Door of Science  
 ACG: Along Came Galileo

<b>Week 1</b>	Topics	Energy
	Reading	MMS 38-39 USE 106-109
	Lab Book	State: The law of conservation of energy
<b>Week 2</b>	Topics	Energy
	Reading	GG 118-136
	Lab Book	
<b>Week 3</b>	Topics	Energy, Heat, Radio
	Reading	USE 110-115
	Lab Book	Define: convection, conduction and radiation
<b>Week 4</b>	Topics	Nuclear Power, Forces
	Reading	USE 116-121MMS 42-43
	Lab Book	Explain the difference between nuclear fusion and nuclear fission.
<b>Week 5</b>	Topics	Newton's Law Of Motion, Momentum
	Reading	GG 128-131USE 122-123GG 8-17
	Lab Book	Describe: Newton's Laws of Motion Define: inertia, momentum
<b>Week 6</b>	Topics	Motion, Friction
	Reading	GG 18-33 USE 124-125
	Lab Book	Define: friction, air resistance
<b>Week 7</b>	Topics	Motion, Friction, Gravity
	Reading	GG 34-43 USE 126-127 MMS 44-45
	Lab Book	Define: speed, velocity, acceleration
<b>Week 8</b>	Topics	Motion, Gravity
	Reading	GG 44-48 USE 128-131 GG 106-110
	Lab Book	Define: gravity, resistance, centripetal force

		Explain the difference between mass and weight
<b>Week 9</b>	Topics	Gravity
	Reading	GG 49-67
	Lab Book	
<b>Week 10</b>	Topics	Balance
	Reading	GG 68-88
	Lab Book	
<b>Week 11</b>	Topics	Pressure, Simple Machines
	Reading	MMS 48-49 USE 132-137
	Lab Book	Define: pressure, atmospheric pressure, load, effort, work, power
<b>Week 12</b>	Topics	Floating, Archimedes
	Reading	USE 138-139 ADS vii-x (teacher) ADS 1-23
	Lab Book	State: Archimedes' principle
<b>Week 13</b>	Topics	Archimedes
	Reading	ADS 24-53
	Lab Book	
<b>Week 14</b>	Topics	Archimedes
	Reading	ADS 54-85
	Lab Book	
<b>Week 15</b>	Topics	Archimedes
	Reading	ADS 86-121
	Lab Book	
<b>Week 16</b>	Topics	Archimedes, Famous Scientists, Floating
	Reading	ADS 122-131 USE Internet Link on page 141
	Experiments	Experiment Kit #36 Experiments 1-3
	Lab Book	Make an entry for each experiment.
<b>Week 17</b>	Topics	Flight, Engines
	Reading	USE 142-147
	Experiment	Experiment Kit #36 Experiments 4-5, Read page 2 (teacher), 11-13 (student, stop at the end of the first text box)
	Lab Book	Explain: Bernoulli's principle Make an entry for each experiment.
<b>Week 18</b>	Topics	Engines, Waves

	Reading	USE 148-151, 202-205
	Lab Book	Define: Frequency, amplitude
<b>Week 19</b>	Topics	Waves, Sound
	Reading	MMS 50-513 USE 206-207, 210-211
	Lab Book	
<b>Week 20</b>	Topics	Waves, Electromagnetism
	Reading	USE 212-215 MMS 66-69
	Lab Book	Draw and Label: Electromagnetic spectrum like the one in the book Define: luminous, transparent, translucent, opaque
<b>Week 21</b>	Topics	Color, Light
	Reading	USE 216-219 MMS 74-75, 70-71
	Lab Book	Define: white light List: the colors that make up the visible spectrum List: primary and secondary colors
<b>Week 22</b>	Topics	Light, Lenses, Optics
	Reading	MMS 72-73, 6-77 USE 220-223
	Lab Book	Describe and Draw: convex lens, concave lens
<b>Week 23</b>	Topics	Galileo
	Reading	ACG vi-viii (teacher), 1-25
	Experiment	Experiment Kit #36 – Experiment 6, read pages 3-4 (teacher), 13-14 (student)
	Lab Book	Make an entry for the experiment
<b>Week 24</b>	Topics	Galileo
	Reading	ACG 26-59
	Lab Book	
<b>Week 25</b>	Topics	Galileo, Space
	Reading	ACG 60-90 USE 174-175
	Lab Book	

<b>Week 26</b>	Topics	Space
	Reading	USE 154-161
	Lab Book	Define: The Big Bang, light years Define: nebulae, dwarf stars, giant stars, supergiant stars Define: constellation, red giant, white dwarf, black hole
<b>Week 27</b>	Topics	Stars
	Experiments	Experiment Kit #31 Experiments 1 and 2, read pages 1-2 (teacher), 6-7 (student, beginning at the last text box on page 6) Experiment 3, Read page 2 (teacher) and 8 (student) Experiment 4, Read page 2 (teacher) and 9 (student) Experiment 5, Read page 2-3 (teacher) and 10-11 (student)
	Lab Book	Make an entry for each experiment.
<b>Week 28</b>	Topics	The Solar System
	Reading	USE 162-169
	Lab Book	Define: day, year, asteroids, comets Draw and label: 8 phases of the moon
<b>Week 29</b>	Topics	The Solar System
	Reading	USE 170-1713
	Experiment	Experiment Kit #32 – Planets Experiment 1, read page 1 (teacher) and 5 (student) Experiment 2, read page 2 (teacher) and 6-10 (student)
	Lab Book	Explain the difference between meteoroids, meteors, and meteorites .Make an entry for each experiment.
<b>Week 30</b>	Topics	Planets, Time, Electricity
	Reading	MMS 46-47 USE 228-231
	Experiments	Experiment Kit #32 — Experiment 3, read pages 3-4 (teacher) and 11 (student)

	Lab Book	Define: electric current, conductors, insulators, static electricity Draw a simple: electric circuit, series circuit, parallel circuit. Make an entry for each experiment.
<b>Week 31</b>	Topics	Electricity
	Reading	
	Experiments	Experiment Kit #23 – Electricity Experiments 1-7, read teacher and student parts accordingly Supplies: wool (sock or sweater), three size C or D batteries, Phillips screwdriver, scissors
	Lab Book	Make an entry for each experiment.
<b>Week 32</b>	Topics	Circuits and Electromagnetism
	Reading	
	Experiments	Kit #24 – Circuits and Electromagnets Experiments 1 -4, read teacher and student parts accordingly Supplies: glue, scissors
<b>Week 33</b>	Topics	Electricity, Magnetism
	Reading	MMS 58-65
	Lab Book	
<b>Week 34</b>	Topics	Magnetism
	Reading	USE 232-235
	Lab Book	Describe the difference between temporary magnets and permanent magnets
	Experiments	Kit #25 – Magnetism Experiments 1-4, read teacher and student parts.
<b>Week 35</b>	Topics	Magnetism, Static Electricity
	Reading	
	Experiments	Kit #25 – Magnetism Experiments 5-8, read teacher and student parts accordingly. Kit #26 – Static Electricity Experiments 1-4, read teacher and student parts.

	Lab Book	Make an entry for each experiment
<b>Week 36</b>	Topics	Static Electricity, Technology
	Reading	MMS 92-93
	Experiments	Kit #26 – Static Electricity Experiments 5-10, read teacher and student parts
	Lab Book	Make an entry for each experiment