

# PHYSICS 101

*The Mechanics of God's Physical World*

## Course Accreditation Program

Westfield  
Studios



101

Name of Student \_\_\_\_\_ Age \_\_\_\_\_

Start date \_\_\_\_\_

Completion date \_\_\_\_\_

Total hours taken to complete program \_\_\_\_\_

## **Welcome to Physics 101!** ***The Mechanics of God's Physical World***

We are very excited for you to watch these films and learn new and wonderful information about God and His creation!

The DVD films are the heart of this program. The films contain the distilled basics of an introduction to physics, that you can watch over and over. If you grasp these basics, you'll have a rock-solid understanding of God's mechanical world.

We made the films to stand by themselves, so you can just watch, enjoy, and learn. But if you desire further study, the Guidebook is a condensed version of the DVD in print so you can remember what you saw and study more in depth. Included at the most chapters are discussion questions and every chapter has a quiz covering that section.

If you are looking to fulfill a required one-year high school credit, the Accreditation Program is for you! Typically, one credit in a high school course means you are required to study between 120-180 hours on that topic. There are about 135 hours' worth of projects and study in the Physics 101 Accreditation Program, plus over 40 lab hour in physics. You don't have to do all of them and the course is *very flexible* to meet your schedule and what fits your family best. Program activities include:

- Using the DVDs and Guidebook
- Making a Physics 101 Notebook to record all your work
- Research and lab reports
- Interesting discussion questions
- Conducting one of the many labs using items mostly found around your home
- Taking field trips
- Using resources on the web and at your local library

When it comes to the reading sections, we don't require you to purchase and wade through heavy texts on physics. Rather, we encourage you to make use of your local library and especially the juvenile section. These publications typically present the information in a visually interesting and easy to understand form. They condense ideas and are often filled with entertaining and relevant information. This helps make learning possible as well as making it fun.

We hope your whole family enjoys the process of learning together.

-The Olson family at Westfield Studios

## GETTING STARTED

1. **THE GUIDEBOOK AND ACCREDITATION BOOKLET.** Some people use these right from their computer screens and others print them. The files for these resources are found on Disc D and the instructions to open them are on the cover of Disc A. Many families take Disc D to a print shop like Staples® to get it printed. Have them print the Guidebook in black and white, double sided, spiral bound with a clear front cover and black back cover. The copyright section in the Guidebook gives you our permission to do this. The Accreditation Booklet can be printed front and back, then center stapled.
2. **CREATE A PHYSICS 101 NOTEBOOK.** Students are asked to start a "Physics 101 Notebook" in segment one. All the work, research, and reports should be recorded in this book.
3. **COLLECT THE ITEMS.** The next page in this booklet has a list of items used in each lab. Half of these you probably already have in your home. The items you may not have are marked with a ◀ symbol, and most of those you can probably pick up in a trip to your local “dollar” store or other variety/hardware store. The most technically difficult lab will probably be the segment on electricity/magnetism. It requires a few magnets, batteries and some wire. Also, the parabolic microphone in the sound segment requires a hat umbrella and an inexpensive microphone; again, I picked all these up at a “dollar” store. Get what you can, don’t stress about getting everything perfect. You can even make a field trip out of getting the items!

**THE BIG PLAN.** There are 20 segments in *Physics 101*. If you do one segment every two weeks (that’s two segments every month) it will take you 10 months to finish. So, if you start in September you’ll be done at the end of June the following year. If you are more ambitious, you’ll get done at the end of May. The accreditation booklet averaged 7 hours of work for every segment, or about 3½ hours of work per week.

4. **WATCH THE FILM & DISCUSS.** Once you have an idea of what is ahead, watch the film together and do the *Discussion Questions* found at the end of each segment in the Guidebook. Then formulate a plan for how you want to do the activities in the Accreditation Program.
5. **LABS.** Students will repeat many of the labs seen in the film. This icon ☺ means the experiment is located about that many minutes into the film, giving a quick way to locate that section. There are 32 labs.
6. **REPORTS.** Students are often required to do brief research and write reports. This can be on a lab or on a research topic. The reports are 200 words long. To give you an idea of length, paragraphs 1, 2, and 3 in this “Getting Started” section are about 200 words long when added together. You can use library books, encyclopedias, or Internet articles to gather the information. After being written, these reports should be read aloud and discussed by the student to the family or to the teacher.

Parental Note: On occasion I suggest you Google® a video online and watch it. YouTube® is one of the primary resources to watch video clips. But sites such as YouTube can have side advertisements and video recommendations that show possibly inappropriate thumbnails or topics. Likewise, the comments people make can sometimes be inappropriate. I suggest you look at the site first and, if it not appropriate, find another website with the video.

7. **SIGN OFF EACH TASK.** A lot of learning is gained by having to explain a concept to someone else. All sections, especially those orally presented to another person, should be signed off by the person who heard the presentation or by the instructor.

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of this Accreditation program and Guidebook for your family or class.

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Physics 101: The Mechanics of God’s Physical World

## List of Lab Items

### Segment 1

- Physics\_101 notebook

### Segment 2

- Paper
- Glass of water

### Segment 3

- Coin
- Glass mug ◀
- Unopened glass soda bottle ◀
- Cola soda to pour into mug
- Deep glass dish (6–8")
- Shiny spoon
- Concave shower mirror ◀
- Magnifying glass (concave lens)
- Candle

### Segment 4

- Dollar store jelly marbles ◀

### Segment 5

- Canned air horn ◀
- String
- 2 plastic cups or tin cans

### Segment 6

- Hat umbrella ◀
- Cheap lavalier microphone with jack to plug into your cell phone ◀
- Cheap ear buds
- Cell phone to record sound
- Ear plugs and sound muffs

### Segment 7

- Trick party candles ◀
- Candle
- Matches
- Empty clear plastic bottle
- Rubbing alcohol
- Plastic Baggie® or balloon

### Segment 8

- Magnesium fire starter ◀
- Wood for a bow drill

### Segment 9

- Regular party balloons ◀
- Plastic water bottle
- Pan
- Aerosol duster can ◀
- Ivory® soap ◀

### Segment 10

- Balloon
- Styrofoam® cup
- Pieces of paper

### Segment 11

- AA battery
- Gum foil wrapper ◀
- 9 volt battery
- Steel wool

### Segment 12

- Inexpensive volt meter ◀
- Zinc washers ◀
- Pennies
- Cardboard pieces
- Glass cup or bowl
- Foil
- Dollar store calculator ◀
- Needle
- Long bar magnet ◀

### **MAKE A MAGNET & ELECTRICITY**

### **MAKE A MOTOR**

- Two D cell battery
- Iron nail
- 10 feet small electrical wire (plastic coated) ◀
- Paper clips
- Inexpensive plastic compass ◀
- Plastic cup
- Rubber bands
- 2–4 magnets (the stronger the better) ◀
- 2 Alligator clip leads ◀

**Segment 13**

none

**Segment 14**

- Coin

**Segment 15**

- String

**Segment 16**

- Regular party balloon
- String
- Several marbles of different sizes
- Drinking straw
- 6' length of  $\frac{3}{4}$ " pipe insulation ◀
- Scissors
- Tape
- 4-5 different sized marbles
- Ruler

**Segment 17**

none

**Segment 18**

- Blindfold
- Money for ice cream!

**Segment 19**

none

**Segment 20**

none

## Segment 1 Introduction

ACTIVITY	Target hours	Actual hours	Sign off
<b>Watch Segment 1 "Introduction to Physics"</b>	½ hr		
Read the Guidebook and talk about "Discussion Questions"	1 hr		
<b>START THE NOTEBOOK</b>			
Start your "Physics 101 Notebook" where you record all of your work done in this accreditation booklet.	1 hr		
<b>RESEARCH AND REPORT</b>			
⌚7:30 One of the ways the film mentions to show the difference between physics and chemistry is the following statement: <i>"The chemist wants everything to be different and is surprised when everything is the same. The physicist wants everything to be the same and is surprised when everything is different."</i> Write this statement in your notebook, then explain what it means. ♦Write a 200-word report.	1 hr		
<b>RESEARCH AND REPORT</b>			
⌚17:00 The films talks about three areas in which science is limited: morality, art/aesthetics and the supernatural. Write a report defining each of these and why science is limited in these areas. ♦Write a 200-word report.	1 hr		
<b>FINAL</b>			
Watch Segment 1 "Introduction to Physics" (2nd time).	½ hr		
Take the quiz at the end of Segment 1.	½ hr		
<b>TOTAL HOURS FOR THE INTRODUCTION</b>	<b>5½ hrs</b>		

## Segment 2

### The Physics of Light: *Light and Color*

ACTIVITY	Target hours	Actual hours	Sign off
<b>Watch Segment 2 "Light and Color"</b>	1 hr		
Read the Guidebook and talk about "Discussion Questions"	1 hr		
<b>LAB</b>			
<p style="text-align: center;"><b>Reveal the Spectrum</b></p> <p style="text-align: center;">Repeat the mirror in the water experiment to separate the color spectrum.</p> <p>Alternatively, take a glass of water and a white piece of paper on a sunny day. Hold the water above the paper at different heights, until you see the color spectrum. Try darkening the area a bit with the shadow from your hand to see whether that enhances the color visibility.</p>	½ hr		
<b>RESEARCH AND REPORT 1</b>			
<p style="text-align: center;"><b>Color addition and subtraction</b></p> <p>These color theories can be confusing unless you work with them on a daily basis. Work for 1 hour on the difference between how light color and pigments work. Go online and search "interactive online primary light colors." Find two or three websites with interactives for light and pigment, and play around with them. Write your findings in your notebook.</p> <p style="text-align: center;">-----</p> <p style="text-align: center;"><i>Here are three websites active when I was researching:</i></p> <p style="text-align: center;"><a href="http://www.oms.edu/tech/colormix.php">OMSI Color Mixing Site</a> www.oms.edu/tech/colormix.php</p> <p style="text-align: center;"><a href="http://phet.colorado.edu/sims/html/color-vision/latest/color-vision_en.html">PHET Colorado Color and Vision Site</a> http://phet.colorado.edu/sims/html/color-vision/latest/color-vision_en.html</p> <p style="text-align: center;"><a href="http://www.physics-chemistry-interactive-flash-animation.com/optics_interactive/additive_color_model_mixing_synthesis.htm">Physics and Chemistry Interactive Site</a> www.physics-chemistry-interactive-flash-animation.com/optics_interactive/additive_color_model_mixing_synthesis.htm</p>	1 hr		
<b>RESEARCH AND REPORT 2</b>			
<p style="text-align: center;"><b>Sky Colors</b></p> <p style="text-align: center;">"Why is the sky blue?" "Why are sunsets red?"</p> <p>Do some research from books or websites answering this question, so that you get information from a variety of sources. Write your paper, in your own words, as to why these two phenomena happen.</p> <p style="text-align: center;">♦Write a 200-word report.</p>	1½ hrs		
<b>FINAL</b>			
Watch Segment 1 "Light and Color" (2nd time).	1 hr		
Take the quiz at the end of Segment 2.	½ hr		
TOTAL HOURS FOR "Light and Color"	6½ hrs		