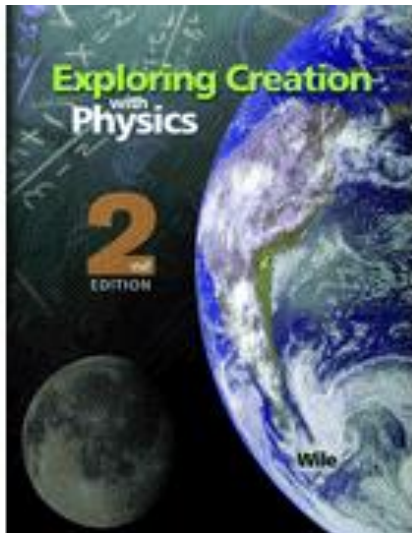


Apologia “Exploring Creation With Physics” 2nd Edition Lapbook Journal



This Lapbook Journal has been specifically designed for use with the book, “Exploring Creation with Physics” 2nd Edition by Apologia Science.

Designed by
Cyndi Kinney
of Knowledge Box Central
with permission from Apologia Science



Exploring Creation With Physics 2nd Edition Lapbook Journal

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This book is dedicated to my amazing family. Thank you to my wonderful husband, Scott, who ate a lot of leftovers, listened to a lot of whining (from me!), and sent lots of positive energy my way. Thank you to my daughter, Shelby, who truly inspired me through her love for learning. Thank you to my parents, Judy and Billy Trout, who taught me to trust in my abilities and to never give up.

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Welcome to our Lapbook Journal for Apologia's Exploring Creation
With Physics 2nd Edition by Dr. Jay Wile.

We are very pleased to offer this product, as authorized by Dr. Wile.

So...now you bought it...what do you do with it?

I'll try to answer your questions here. Please note that there are several ways to use our Lapbook Journal, and the BEST way is the way that works for your student.

First, purchase a 4 inch 3-ring binder, and divide it into 4 sections. Your dividers should be labeled as follows:

On Your Own Journal (OYOJ)

Review Questions (RQ)

Practice Problems (PP)

Lab Reports (LR)

You may use the acronyms if your label space is limited.

Now you have your binder ready....so what next?

It's time to print! As for the order or printing...you may choose to print needed pages as you finish one module and begin the next....or you may choose to print everything up front. The choice is yours, but I would suggest marking off some time to print it all at once....that's just my opinion. Obviously, your time will dictate what you print when.

You will find 16 sections (besides this section) within this product. Within each of these sections (one per module), you will find the following:

1. On Your Own Journal Pages
2. Review Questions Lapbook Pages - Booklet Templates
3. Review Questions Lapbook Pages - Background Pages
4. Review Questions Journal Pages
5. Practice Problem Journal Pages
6. Lab Reports (Supplies, Introduction, & Procedure filled out already)
7. Lab Reports (No information already filled in...only the report itself with the title of the experiment at the top)

Now I will go into detail about how to print each of these files, what type of paper to print them on, and how to use them.

As I said on the previous page, there are 16 files (one for each module of the book) included in this product, and within each of these files, you will find the following:

1. On Your Own Journal Pages
2. Review Questions Lapbook Pages - Booklet Templates
3. Review Questions Lapbook Pages - Background Pages
4. Review Questions Journal Pages
5. Practice Problem Journal Pages
6. Lab Reports (Supplies, Introduction, & Procedure filled out already)
7. Lab Reports (No information already filled in...only the report itself with the title of the experiment at the top)

1. On Your Own Journal Pages

Supplies Needed: Regular White Copy Paper (unless you desire differently)

These pages will be solely devoted to the “On Your Own” questions that appear throughout each of the modules. Instead of the student having to re-write the questions in a notebook, we have provided the questions in a “Notebooking” styled setting. There will be ample space for the students to answer the questions within these Journal Pages, and the borders and graphics provide a decorative page for documenting learning.

We recommend that these pages be printed on regular, white paper. There is no need to print these pages on any special type or color, unless that is your preference.

For each module, print these pages, and file them all together under your “On Your Own Journal Pages” divider tab. As your student comes to these questions, he will go to this section to document his answers.

IMPORTANT NOTE About Next Section:

NOTE:** There are TWO DIFFERENT OPTIONS for the **Review Questions** – they are the **Lapbook Pages** **OR** the **Journal Pages** – depending on your student’s preference). **There is NO NEED TO PRINT BOTH!!!!

IMPORTANT NOTE About THIS Section:

*NOTE: There are **TWO DIFFERENT OPTIONS** for the **Review Questions** – they are the Lapbook Pages (#2 & 3) **OR** the Journal Pages (#4) – depending on your student's preference).
There is NO NEED TO PRINT BOTH!!!!*

HOW do I know which one of these options to use???

*** If your child enjoys hands-on projects, scrapbooking, crafty projects, etc., then you will probably want to use the Review Questions Lapbook Pages and their Background Pages (#2 and #3).

*** If your child does NOT enjoy these types of hands-on projects and would rather have a journaling-style area for documenting the answers to the Review Questions, then you will probably want to use the Review Questions Journal Pages.

You may change after a few modules. You may even want to use both...but not at the same time....just every other module.

2. Review Questions Lapbook Pages Booklet Templates & Background Pages

Supplies Needed: Regular White Copy Paper, Colored Paper, White Cardstock Paper (if desired), Glue, Scissors, Metal Brad Fasteners (if desired), Ribbon (if desired), Staples

This section is used with the Review Questions at the end of each module of the book. Instead of writing the questions and answers in a regular notebook, the student would complete these booklets to place in his binder.

This section provides more of a “hands-on” opportunity for your students. It is similar to the traditional lapbooks, but there are no folders in which to place the booklets.

SPECIAL NOTE: Remember, *IF your student DOES NOT want to create the lapbook booklets, we have added another option for the Review Questions, and that is the Review Questions Journal in section 4.*

Review Questions Lapbook Pages Booklet Templates & Background Pages...cont.

We recommend that you print these on the following types of paper:

- * Review Questions Lapbook Pages Booklet Templates: colored paper, any weight (we use 24#, multi-colored paper)
- * Review Questions Lapbook Pages Booklet Templates Instructions: white copy paper (these will ultimately be thrown away, so the weight of the paper isn't important)
- * Review Questions Lapbook Pages Background Pages: white cardstock (These can be printed on white paper, if you prefer. We print on white cardstock because it is more durable, holds the weight of the booklets, and holds up to years of "thumbing through" the pages.)

These lapbook-style booklets will provide a 3-dimensional aspect to your student's learning experience. Science has proven that the more senses a student uses when learning and reviewing new material, the more he will retain. So, by adding this section, your student will be able to use his own hands to create these memories. Also, the colors and shapes of the booklets will stimulate memory as well.

At the end of each module, allow the student time to create these booklets, and place them randomly (be creative!) on the Review Questions Lapbook Journal Background Pages (print as many copies of these as you need).

This is the most time consuming portion of the Lapbook Journal, and I know that time is very precious. So, if you simply cannot make time for creating ALL of the booklets, or if your student is at first resistant to this hands-on method, you may choose to have your student only complete a few of the booklets...maybe the ones that cover areas in which he needs extra study.

Allow the student to have fun with this section. As he cuts, glues, and folds, he will be creating something to look back on for years to come. He will also be creating something that will be WONDERFUL when it comes time to review! There is NO better way to learn, in my opinion, than for the student to be intensely involved in the process by using his hands.

3. The Review Questions Lapbook Background Pages – *SPECIAL NOTE:* You will need to print as many of these as necessary. How many you need depends on how many booklets that your student made. Allow your student to arrange the completed booklets in any order he desires – be creative! You may need a bunch of these pages printed if he really gets the hang of this!

4. Review Questions Journal Pages

Supplies Needed: Regular White Copy Paper

This section is OPTIONAL and **could** replace the Review Questions Lapbook Pages. These pages will be solely devoted to the Review Questions that appear at the end of each of the modules. Instead of the student having to re-write the questions in a notebook, we have provided the questions in a “Notebooking/Journal” styled setting. There will be ample space for the students to answer the questions within these pages, and the borders provide a decorative page for documenting learning.

If you choose to use these pages, print them, and file them all together under your “Review Questions” divider tab.

5. Practice Problems Journal Pages

Supplies Needed: Regular White Copy Paper

These pages will be solely devoted to the Practice Problems that appear at the end of each of the modules. Instead of the student having to re-write the questions in a notebook, we have provided the questions in a “Notebooking/Journal” styled setting. There will be ample space for the students to answer the questions within these pages, and the borders provide a decorative page for documenting learning.

If you choose to use these pages, print them, and file them all together under your “Practice Problems” divider tab.

6 & 7. Lab Reports

Supplies Needed: Regular White Copy Paper

This section is where the student will document all of the work done on the lab experiments within each module.

I conducted a poll before finalizing this section. I wanted to know if parents would like the Lab Reports to be partially completed....or whether they would rather have the student write in all of the information themselves. The responses were split right down the middle. Then, a really smart mom emailed and said, “Why don’t you just put both formats in the Lapbook Journal?” So....that’s exactly what I did!

There are **2 different sections of each file** that are devoted to Lab Reports. There will be a section that gives you Lab Reports with the Experiment Title & Number, Supplies, Introduction, & Procedure already filled in. The back of these reports has no information filled in – this is where the student will document his observations, conclusions, etc. and draw any diagrams necessary. The other section gives you Lab Reports with ONLY the Experiment Title & Number filled in...the rest is blank. So, choose which works for you. You may even want to try both...or you may change midway through the year...or depending on your time that week. The choice is yours!

Print these on regular white paper, unless you WANT to print them on cardstock. They are meant to be printed double-sided, but feel free to print them as a 2-page report, if that works better for you (or for your printer!). PLEASE NOTE: Some Lab Reports are longer than others (3-4 pages max), so be aware when printing. File them in the “Lab Reports” section, and refer to them each time your student performs a lab experiment.

BOTTOM LINE:

Here is what your 3-ring binder will look like:

- ** Section 1: On Your Own
- ** Section 2: Review Questions (either the lapbook booklets OR the journal pages)
- ** Section 3: Practice Problems
- ** Section 4: Lab Reports

ONE OTHER OPTION:

I have had a few moms tell me that they would RATHER divide their notebook into 16 sections – one for each module. These moms said that they put all of the above mentioned items in order in EACH section of the notebook.

The choice is yours.



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Frequently Asked Questions:

1. What if I don't have enough time to do all of this? What's ok to leave out?

If you are really pushed for time, please don't feel that you have to "do it all!" I am cursed with this syndrome, and it rears its head every time I get in a new piece of curriculum. YOU alone know what is best for your student, school, and family.

With that said, I'll say this. If I had to choose something to omit, I would probably first allow my student to use the Lab Reports that are partially filled in. This will save a lot of time....and frustration on the part of the student. If I still needed to omit something, then I would probably allow the student to answer some of the Review Questions either using the journal pages or verbally and only do some of the Lapbook Pages. However, I would be sure to NOT choose the lapbook booklets that deal with the easiest subject matter to leave out. I would allow the questions that deal with the easiest subject matter to be answered orally or via the journal pages, and require that the others be answered within the booklets.

2. What if I only have white paper, and I cannot afford to get (or don't have time to get) colored paper or cardstock?

We have made suggestions as to the colors and paper types that we would suggest, but they are ONLY suggestions. If your daughter is really into pink, and everything has to be pink....then print the whole thing on pink! If you are cramped for extra money, and you only have white paper, then print it all on white! I assure you that the color of the paper will not KEEP your child from learning. There is scientific research to support the improvement in memory when using colored paper, but who says the child can't color the paper themselves (the lapbook booklets)...draw pictures on them...make them his own. Or...just leave them white. The choice is ALWAYS yours.

Frequently Asked Questions...continued...

3. My friend wants to use this Lapbook Journal too. Can I let her use my copy? Oh, and my Co-op might want to use it too.

Our copyright states that any Ebook or CD is purchased for use by ONE household. If your Aunt Mary, Cousin Martha, and all of their children live in YOUR household (God Bless You!), then that includes them. You may print as many copies of the material as you need from the Ebook or CD for those in your household. However, PLEASE do not share these with friends and family who do NOT live with you.

As for Co-Ops, we do have a Co-Op License available. All you have to do is purchase the Ebook or CD version of the product as well as the Co-Op License through our website. In the “comments” section of the purchase, state which product(s) will be used at the Co-Op. That’s it! It doesn’t matter how many children are represented in your Co-Op....print away!! I assure you that it’s WAY less expensive than for each family to purchase their own copy. You can all split the cost, and it comes out great for everyone.

4. Why are there very few color graphics in this product?

After much research, we believe that the children of this generation are visually over-stimulated. Between video games, internet, and television, there is very little left to the imagination. While colors play an important role in memory and retention of information, OVER-stimulation with colors has just the opposite effect.

Research ALSO shows that colored shapes have an effect on the memory that is amazing. Students will remember colored shapes much more than they will remember colored graphics on white paper.

Another reason.....colored ink costs homeschool moms TONS!

Without colored graphics, students will create their own! Allow them to draw pictures, color the borders, use their imaginations.

For these reasons, we have chosen to use few color graphics. We feel that this decision, although not the popular one, will benefit your students in the long run.

Frequently Asked Questions...continued some more...

5. My child doesn't like lapbooks, so why use this product?

If your child has never used lapbooking, he may not know what he's missing. However, if he just doesn't want to do it – no how and no way – then we have included “Review Questions Journal Pages” to replace the lapbooking portion of the product. They are included within the product, right after the lapbooking section.

6. What if I don't have a printer, or my printer isn't working?

Most print shops will allow you to email your document to them for printing. Or, you may choose to burn the Ebook to a CD and take it to them for printing.

7. Is it OK to burn the Ebook to a CD?

Yes, absolutely! In fact, I would suggest it. My computer crashed last year, and I lost SO many wonderful homeschool products that were in Ebook format!! (still crying!)

8. What if I'm not creative, crafty...etc....and I don't really want to be?

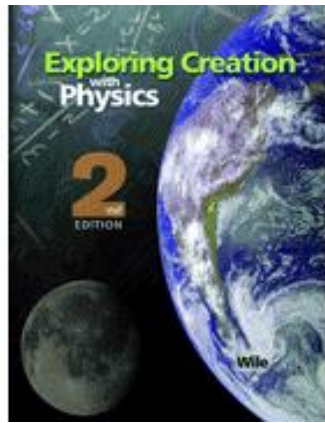
That's ok. Not everyone enjoys working with “hands-on” products. That's why this product will work for you! All of the planning is done, and the instructions are written so that the student can read and follow them without assistance from an adult!



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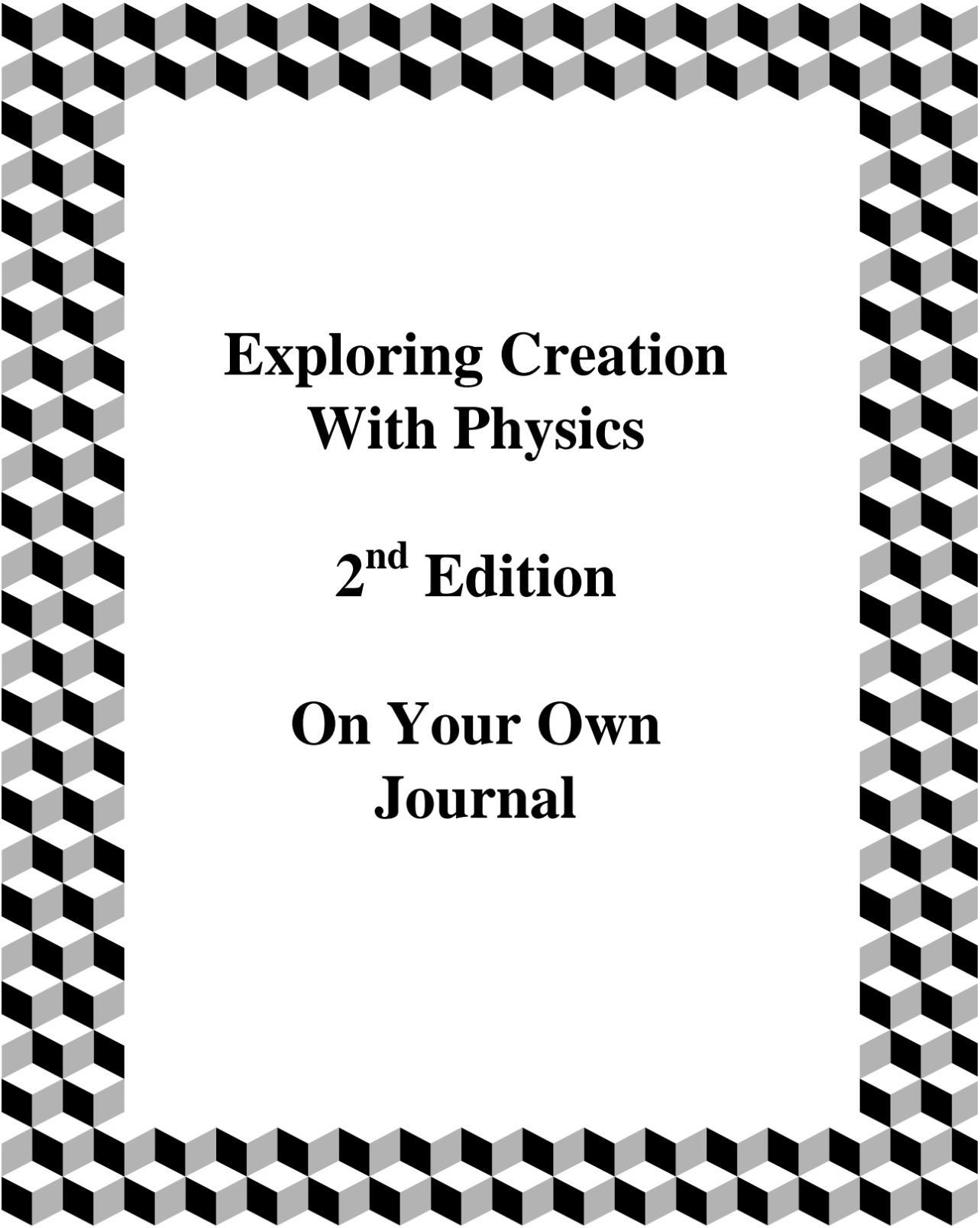
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**Use the following
pages at the
beginning of each
section of your
notebook.**



**Lapbook Journal
For
Exploring Creation
With Physics
2nd Edition**

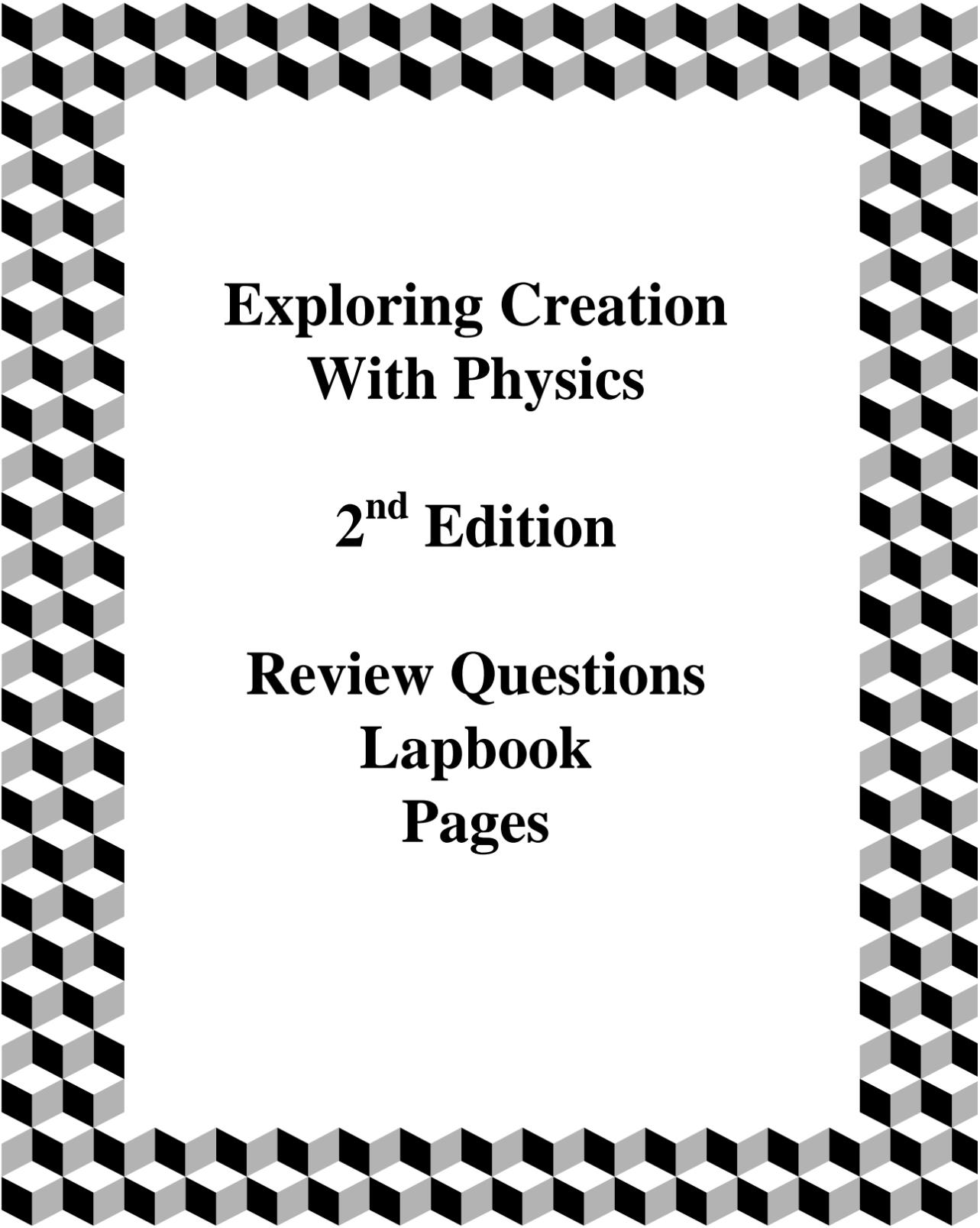
By



**Exploring Creation
With Physics**

2nd Edition

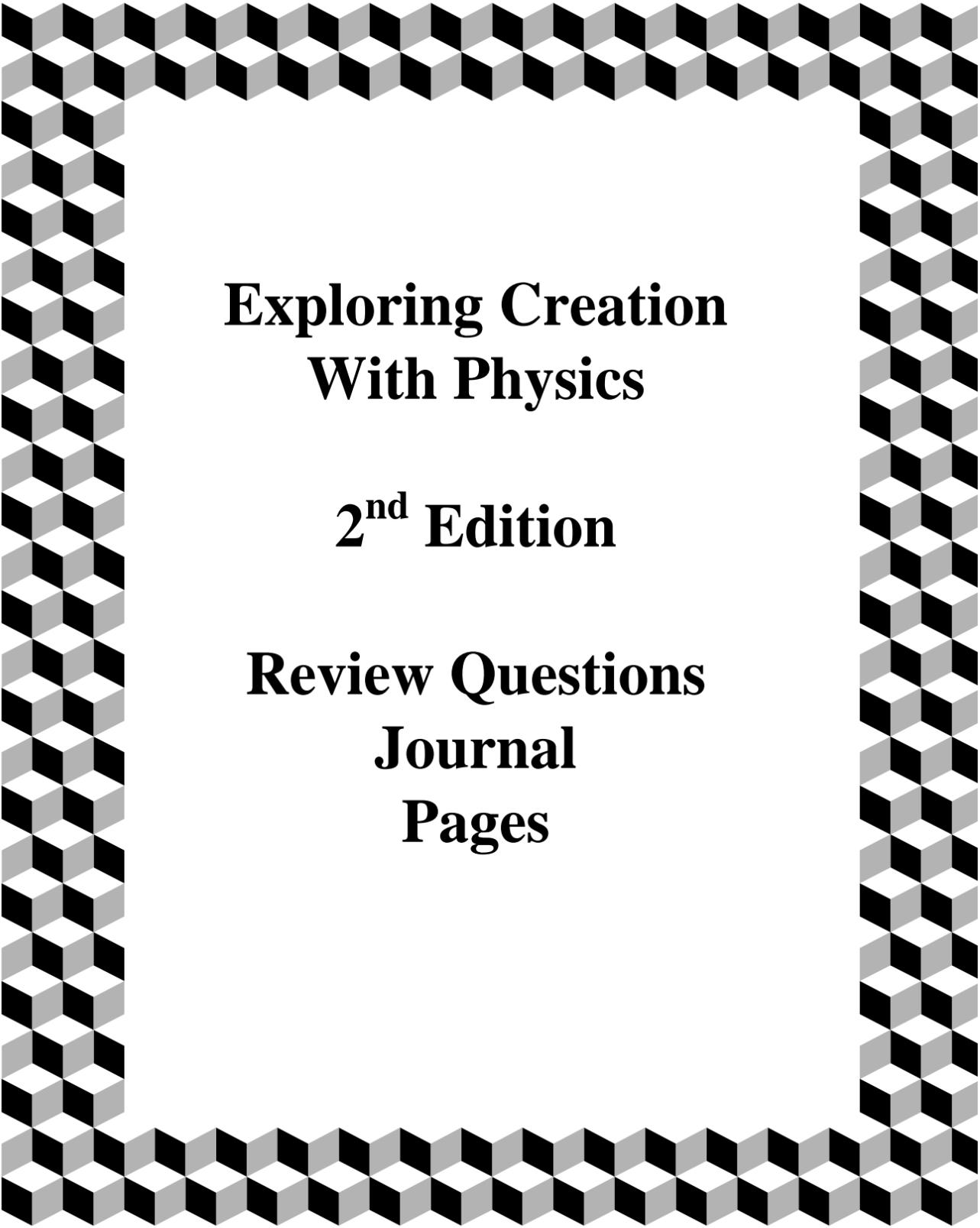
**On Your Own
Journal**



**Exploring Creation
With Physics**

2nd Edition

**Review Questions
Lapbook
Pages**



**Exploring Creation
With Physics**

2nd Edition

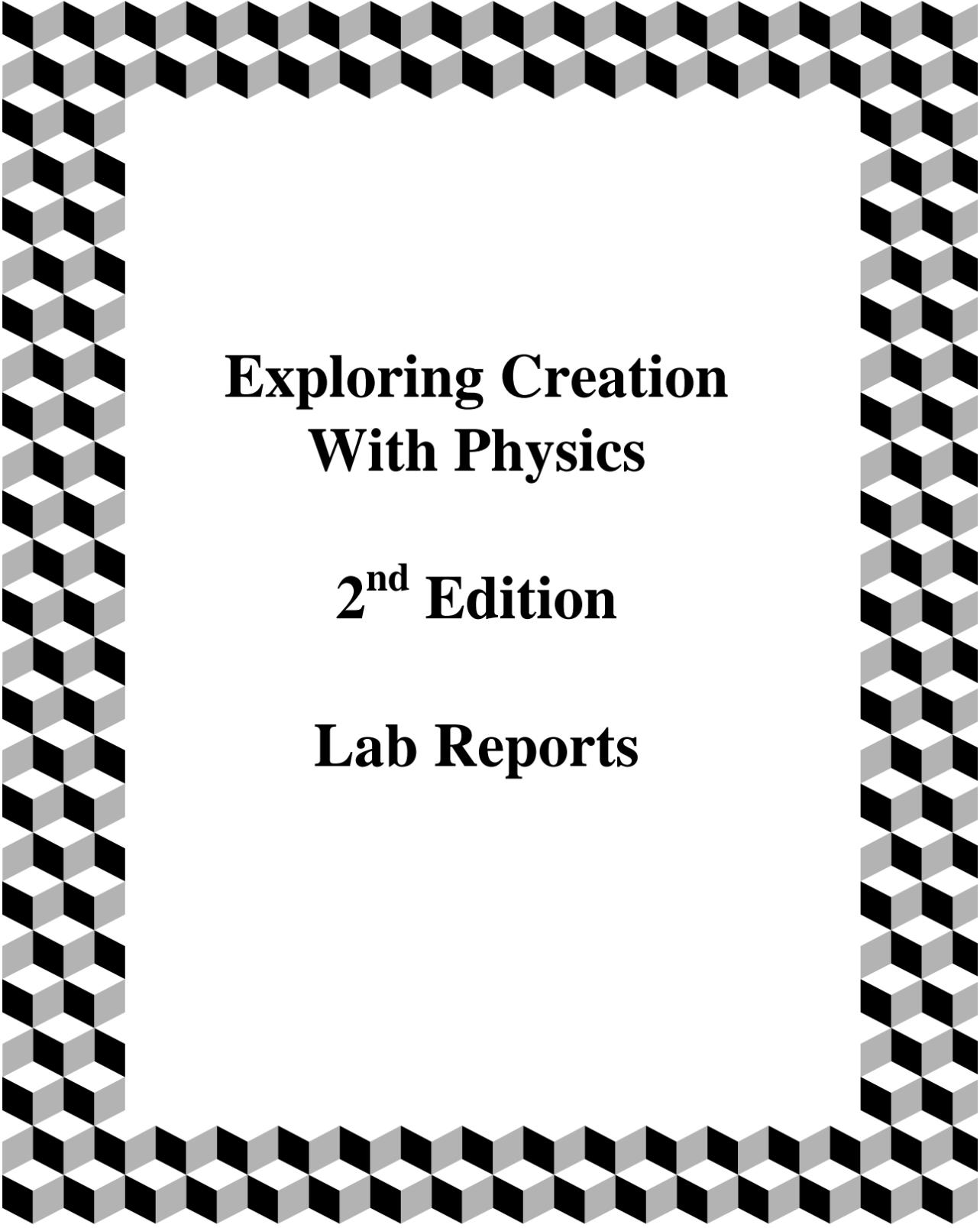
**Review Questions
Journal
Pages**



Exploring Creation With Physics

2nd Edition

Practice Problems



**Exploring Creation
With Physics**

2nd Edition

Lab Reports

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Apologia Physics 2nd Edition Module 1

The following pages are divided into 7 sections,
with a page like this one between each section.

The sections are:

ON YOUR OWN QUESTIONS:

- (1) On Your Own Journal

REVIEW QUESTIONS:

(Choose either #2 & 3 OR #4 for these questions)

- (2) Review Questions Lapbook Pages – Booklet Instructions & Templates

- (3) Review Questions Lapbook Pages – Background Pages

- (4) Review Questions Journal Pages

PRACTICE PROBLEMS:

- (5) Practice Problems Journal Pages

LAB REPORTS:

(Choose either #6 OR #7)

- (6) Lab Reports (Partially Completed)

- (7) Lab Reports (Blank)

The following section is:

**Physics 2nd Edition
Module 1**

On Your Own Journal Pages

1.1 An ant starts at his anthill and walks 15.2 cm to a crust of bread. He takes the bread, turns around and walks back towards his anthill. He stops after he has traveled 3.8 cm and eats part of the crust of bread. What is the total distance he has traveled up to that point? What is the total displacement?

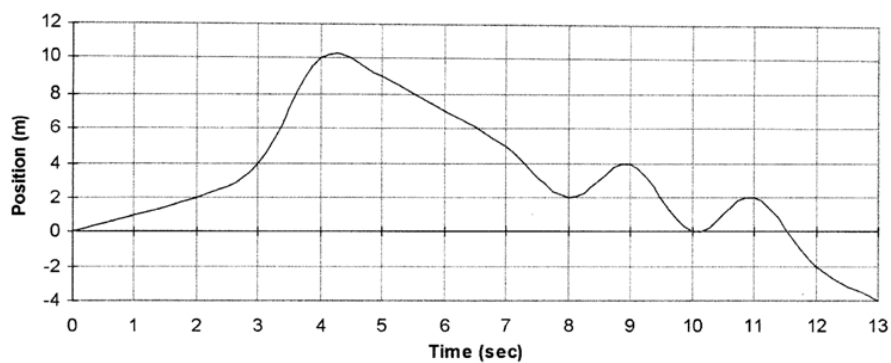


1.2 A mail carrier drives down a street delivering mail. She travels 3.00×10^2 meters down the street in 332 seconds. She then turns around and heads back up the street, but because of the way the mailboxes are placed, she only needs to travel 208 meters in that direction, and that trip takes her only 2.30×10^2 seconds. What was her velocity as she traveled down the street? What was it as she traveled up the street? What was her velocity for the entire trip?

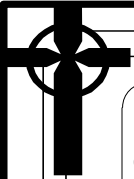
1.3 A boat travels straight down a river at a speed of 15 m/sec. If the boat travels a distance of 34.1 km, how long was the boat ride?



Consider the following position-versus-time curve for questions 1.4 -1.6 :



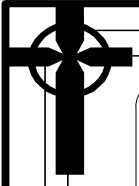
1.4 Is the object moving faster at 3.5 seconds or at 8.5 seconds?



1.5 How many times does the object change directions?

1.6 What is the instantaneous velocity at 1.0 seconds?

1.7 A boat is traveling up a river against the current. A boy on a raft is floating down the river with the current. They are both being observed by a fisherman sitting on the shore. The fisherman observes the boat traveling 15 m/sec up the river. He also notices that the boy and his raft have a velocity of 3 m/sec down the river. What is the velocity of the raft as observed by someone on the boat? What is velocity of the boat as observed by the boy on the raft ?



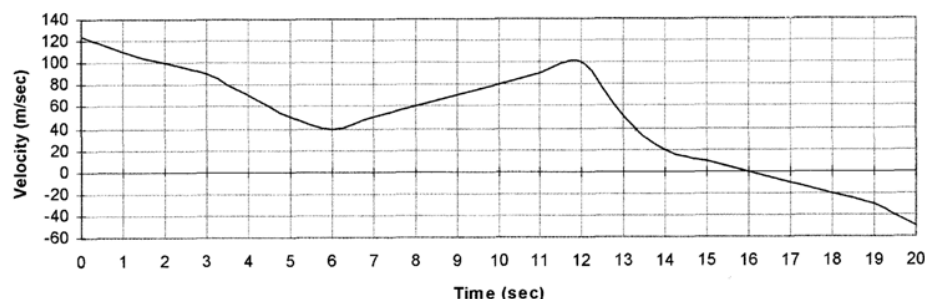
1.8 A sprinter starts from rest and, in 3.4 seconds, is traveling with a velocity of 16 m/sec east. What is the sprinter's acceleration?

1.9 A race car accelerates at -7.2 m/sec^2 when the brakes are applied. If it takes 3.1 seconds to stop the car when the brakes are applied, how fast was the car originally going?



1.10 In Experiment 1.2, we made an assumption that the velocity of the ball was constant while it was rolling from the end of the board to the tape. However, we know that this assumption is wrong to some extent, because we know that given enough time, the ball will eventually stop rolling. Describe a way that we could use the same experimental setup to evaluate the validity of this assumption.

Consider an object whose motion is described by the following graph for questions 1.11 and 1.12 :



1.11 During what time intervals is the object's speed increasing?



The following section is:

**Physics 2nd Edition
Module 1**

**Review Questions
Lapbook Pages – Booklet
Instructions & Templates**

Physics 2nd Edition - Module 1

Review Questions

Lapbook Pages - Booklet Templates

Assembly Instructions

Question 1

Cut out along the outer black lines of the booklet and the text box. Fold, accordion-style, so that the title is on the top. Glue the text box inside the booklet.

Question 2

Cut out along the outer black line edges of the booklet and the text box. Fold along the center line so that the title is on the front. Glue the question inside the booklet.

Question 3

Cut out along the outer black line edges of the booklet. Fold along the center line so that the title is on the front.

Question 4

Cut out along the outer black line edges of the booklet. Fold along the center line so that the title is on the front.

Question 5

Cut out along the outer black line edges of the booklet. Fold along the center line so that the title is on the front.

Questions 6-10

Cut out along the outer black line edges of all pages of the booklet. Now stack them so that the title is on top, and the questions are in order. Along the top of the stack, staple, or punch holes and secure with metal brad fasteners or ribbon.

Question #1

Scalar & Vector Quantity

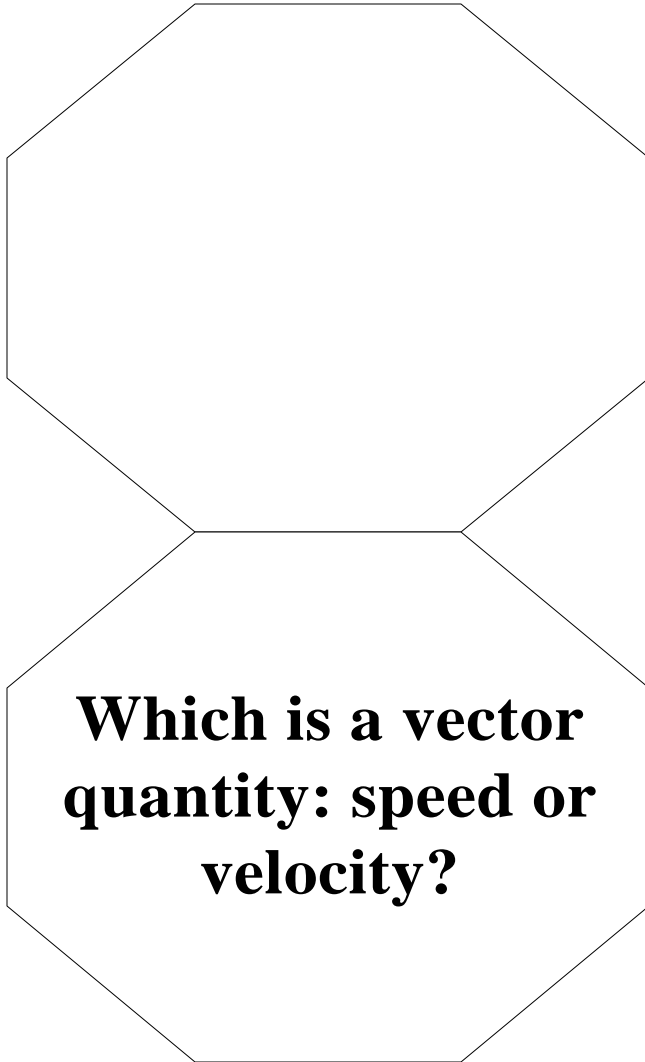
What is the main difference between a scalar quantity and a vector quantity?

Question #2

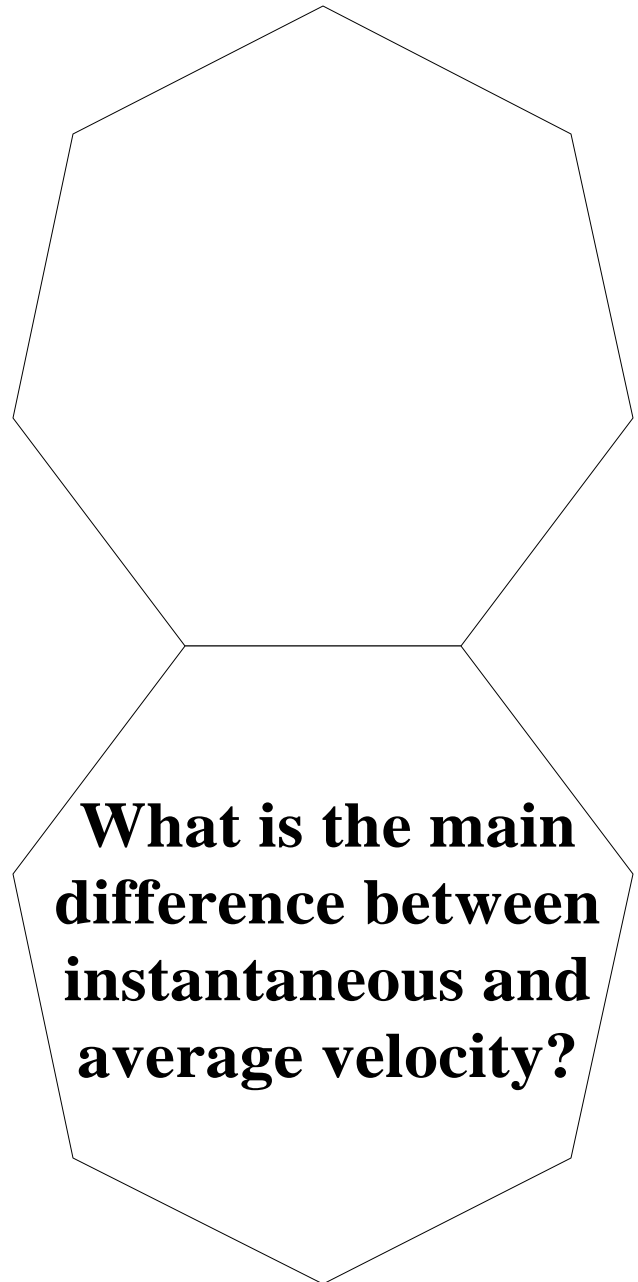
Calculating Acceleration

On a physics test, the first question asks the students to calculate the acceleration of an object under certain conditions. Two students answer this question with the same number, but the first student's answer is positive while the second student's answer is negative. The teacher says that they both got the problem 100% correct. How is this possible?

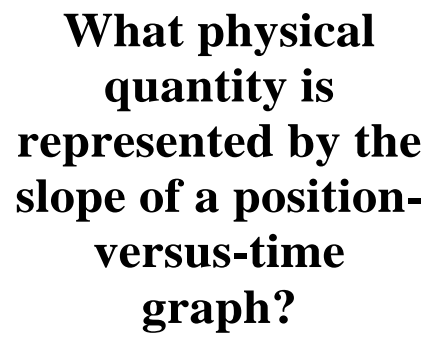
Question #3



Question #4

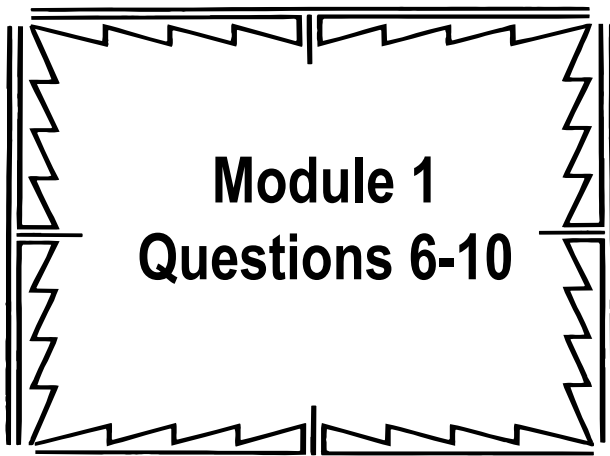


Question# 5



**What physical
quantity is
represented by the
slope of a position-
versus-time
graph?**

Questions #6-10



What do physicists mean when they say that velocity is "relative?"

Question #6

You are reading through someone else's laboratory notebook, and you notice a number written down: 12.3 m/sec^2 . Even though it is not labeled, you should immediately be able to tell what physical quantity the experimenter measured. What is it?

Question #7

Another experiment in the same laboratory notebook says that an object has a 1.4 m/sec^2 acceleration when it has a -12.6 m/sec velocity. At that instant in time, is the object speeding up or slowing down?

Question #8

What kinds of graphs do you study if you are interested in learning about acceleration?

Question #9

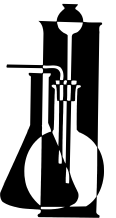
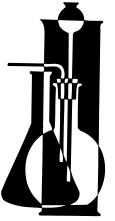
An object's velocity is zero. Does this mean its acceleration is zero? Why or why not?

Question #10

The following section is:

**Physics 2nd Edition
Module 1**

**Review Questions Lapbook
Background Page
(print as many as needed)**



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The following section is:

Physics 2nd Edition Module 1

Review Questions Journal Pages

**You MAY choose to use these
INSTEAD of the preceding
Review Questions
Lapbook Pages.**

Physics 2nd Edition - Module 1 Review Questions Journal

- 1. What is the main difference between a scalar quantity and a vector quantity?**
- 2. On a physics test, the first question asks the students to calculate the acceleration of an object under certain conditions. Two students answer this question with the same number, but the first student's answer is positive while the second student's answer is negative. The teacher says that they both got the problem 100% correct. How is this possible?**
- 3. Which is a vector quantity: speed or velocity?**
- 4. What is the main difference between instantaneous and average velocity?**
- 5. What physical quantity is represented by the slope of a position-versus-time graph?**

6. What do physicists mean when they say that velocity is "relative?"

7. You are reading through someone else's laboratory notebook, and you notice a number written down: 12.3 m/sec^2 . Even though it is not labeled, you should immediately be able to tell what physical quantity the experimenter measured. What is it?

8. Another experiment in the same laboratory notebook says that an object has a 1.4 m/sec^2 acceleration when it has a -12.6 m/sec velocity. At that instant in time, is the object speeding up or slowing down?

9. What kinds of graphs do you study if you are interested in learning about acceleration?

10. An object's velocity is zero. Does this mean its acceleration is zero? Why or why not?

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The following section is:

**Physics 2nd Edition
Module 1**

**Practice Problems
Journal Pages**

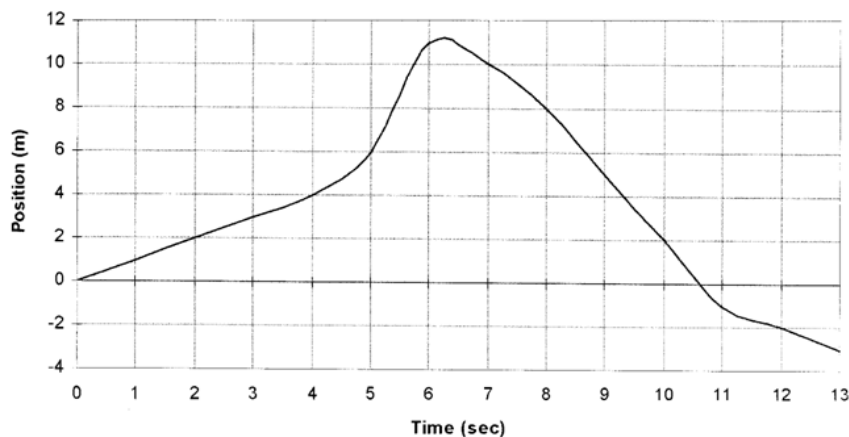
Physics 2nd Edition - Module 1

Practice Problems Journal

- 1. A delivery truck travels down a straight highway for 35.4 km to make a delivery. On the way back, the truck has engine trouble, and the driver is forced to stop and pull off the road after traveling only 13.2 km back towards its place of business. How much distance did the driver cover? What is his final displacement?**
- 2. If the driver in the above problem took 21.1 minutes to reach the delivery point and broke down 7.5 minutes into the return trip, what was the average speed? What was the driver's average velocity?**
- 3. A plane flies straight for 672.1 km and then turns around and heads back. The plane then lands at an airport that is only 321.9 km away from where the pilot turned around. If the plane's average velocity over the entire trip was 42 m/sec, how much time did the entire trip take?**
- 4. An athlete runs 1600.0 meters down a straight road. Over the first 800.0 meters, the runner's average velocity is 6.50 m/sec. Over the remaining 800.0 meters, his average velocity is 4.30 m/sec. What is the runner's average velocity over the entire race? [Be careful on this one. Remember what Equation (1.1) tells you.]**

Questions 5 and 6 refer to the figure below:

A car's motion is described by the following position-versus-time curve:



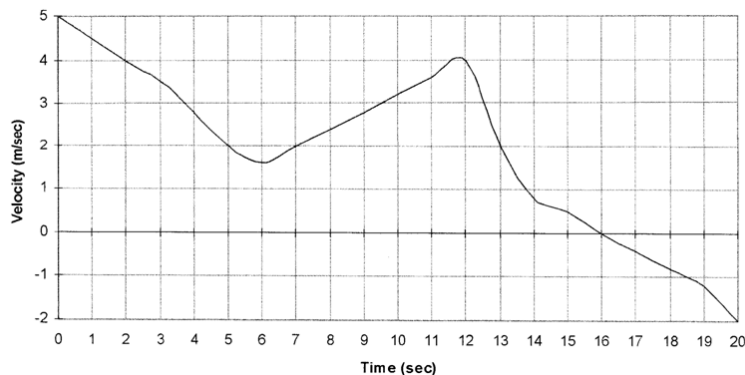
5. At approximately what time does the car change its direction?

6. Over what time interval is the car moving the fastest?

7. A train is traveling with an initial velocity of 20.1 m/sec. If the brakes can apply a maximum acceleration of -0.0500 m/sec^2 , how long will it take the train to stop?

Questions 8 - 10 refer to the figure below:

A runner's motion is described by the following velocity-versus-time graph:



8. Over what time intervals is the runner slowing down?

9. What is the runner's acceleration at 6.0 seconds?

10. What is the runner's acceleration at 1.0 seconds?

The following section is:

**Physics 2nd Edition
Module 1
Lab Reports
(partially completed)**

****Some lab reports contain
more than 2 pages, so be aware
when printing.**

Exploring Creation With Physics 2nd Edition

Lab Report Experiment #1.1 Measuring Average Velocity

Date: _____ Name: _____

Supplies:

- * Safety goggles
- * A stopwatch (A watch with a second hand will do.)
- * A pile of books between 6 and 9 centimeters thick
- * A wooden board, about 1 meter long (Any long, flat surface that you can prop up on one end will do. It needs to be as smooth as possible.)
- * A pencil (Anything that you can use to mark the board will do.)
- * A ball that will easily roll down the board

Procedure:

1. Choose the smoothest side of the board and clear it of any debris.
2. Make a mark on the board in the center. Make sure the mark is easy to see.
3. Prop the board up on one end with the books, so that the board forms an incline as shown below. In a moment, you will be rolling the ball down the incline. Your experiment should look something like this:

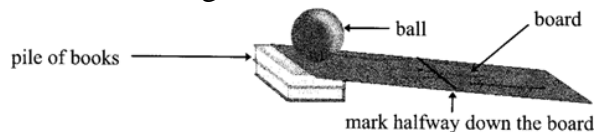


Illustration by Megan Whitaker

4. Measure the distance from the top of the board to the mark halfway down the board. Make sure you record the distance to the proper precision. Since you can estimate between the lines, most metric rulers can be read to 0.01 cm. Call this distance " d_1 ."
5. Measure the distance from the mark to the end of the board as well, once again writing your answer with the proper precision. Call it " d_2 ." If you really made the mark in the center of the board, d_1 and d_2 should be the same. If not, don't worry about it. They do not have to be equal.
6. Once you have set up your experiment and made both distance measurements, hold the ball on the very top of the board and be ready to release it. At the exact moment that you release the ball, start the stopwatch. Stop the watch when the ball hits the mark.
7. Write down the time you measured. Be as precise as the stopwatch allows.
8. Repeat this measurement four more times. After you have a total of five measurements for the time, average them and write down your answer. Why did I have you measure the same thing five times and average the result? Well, there are many errors which can occur when you make these kinds of measurements. Most likely, you did not start the stopwatch at *exactly* the time that you released the ball. You probably started it a bit before or a bit after. In the same way, you probably did not stop it at *exactly* the time that the ball reached the mark. You probably stopped it shortly before or shortly after. These types of errors (called "random errors") make a single measurement inaccurate. However, if you make several such measurements and average the results, the random errors in the individual measurements will (to some extent) cancel out, making the average a better estimate of the true value. The more measurements you make, the better this works.

Exploring Creation With Physics 2nd Edition

Lab Report Experiment #1.1 Measuring Average Velocity

Date: _____ Name: _____

Procedure, continued:

9. Once you have that average, divide it into the distance from the top of the board to the first mark (d_1). Let's say that motion down the board is positive. That way, the distance you measured is also the ball's displacement. Thus, the calculation you just made took displacement and divided it by time, which gives you the velocity of the ball as it traveled from the top of the board to the first mark. Call this velocity v_1 .
10. Hold the ball at the top of the board again, and be ready to release it. This time, however, *do not start the stopwatch until the ball hits the first mark*. Stop the watch when the ball hits the end of the board. Do this measurement a total of five times as well, and once again, average the results.
11. Take the average and divide it into d_2 . This will give you the velocity of the ball as it traveled down the second half of the board. Call it v_2 .
12. Finally, do the same thing again, this time starting the watch the instant that you release the ball and stopping the watch once the ball hits the end of the board.
13. Average the five results and divide that average into the total length of the board ($d_1 + d_2$). This is the velocity of the ball over the entire trip. Call it v_3 .
14. Clean up your mess, but save the supplies, because you will use them again in Experiment 1.2.

Exploring Creation With Physics 2nd Edition

Lab Report Experiment #1.1 Measuring Average Velocity

Date: _____ Name: _____

Observations:

Diagram:

Summary:

Exploring Creation With Physics 2nd Edition

Lab Report Experiment #1.2 Measuring an Object's Acceleration

Date: _____ Name: _____

Supplies:

- * Safety goggles
- * A stopwatch (A watch with a second hand will do.)
- * A wooden board, about 1 meter long (Any long, flat surface that you can prop up on one end will do. It needs to be as smooth as possible.)
- * A pile of books between 18 and 27 centimeters thick
- * A pencil (Anything that you can use to mark the board will do.)
- * A ball that will easily roll down the board
- * A few extra books
- * Masking tape or electrical tape
- * An uncarpeted floor

Procedure:

1. Construct the same experimental setup that you had for Experiment 1.1. This time, however, use the tape to make a mark on the floor exactly 1.00 meter from the end of the board.
2. Hold the ball at the top of the board and release it. Do not start the stopwatch until the instant that the ball rolls off of the board and onto the floor. Stop the watch when the ball reaches the tape. In this way, you have measured the time it takes for the ball to roll one meter once it has left the end of the board.
3. Just as you did in Experiment 1.1, make this measurement five times and average the result.
4. Take that average and divide it into 1.00 m. This measures the average velocity of the ball once it rolls off of the board.
5. If you think about it, the ball rolls down the board because of gravity. We'll discuss that subject several times throughout this course, so I don't want to talk about gravity itself in depth at this time. Nevertheless, you should be aware that the reason the ball rolls down the board is that gravity is pulling it down. Since gravity is pulling down on the ball, the ball accelerates. It starts with a velocity of zero (because you held it still to begin with), and it rolls off of the board with a large velocity. Since velocity changed, by definition, there must have been acceleration. Gravity supplies that acceleration. Once the ball leaves the board, however, gravity can no longer accelerate it. Therefore, the ball rolls across the floor with a relatively constant velocity. Now, of course, the ball eventually slows down and stops because it either runs into something or because of *friction*, which we will explore in a later module. For the first meter after it rolls off the board, however, it is a reasonably good assumption that the ball rolls with a constant velocity, as long as the floor that you set the experiment on is not carpeted. Thus, the velocity that you measured is approximately the same as the velocity the ball had when it rolled off the end of the board.

Exploring Creation With Physics 2nd Edition

Lab Report Experiment #1.2 Measuring an Object's Acceleration

Date: _____

Name: _____

Procedure, continued:

6. Hold the ball at the top of the board again and release it. This time, start the watch as soon as you release the ball and stop it when the ball reaches the end of the board. Once again, make this measurement five times and average the result. Do not calculate any velocities. You are only measuring time in this portion of the experiment.
7. What does this measurement represent? Well, it represents the time it takes for the ball to roll down the board. What's so important about that? Think about it. The ball started (at the top of the board) with a velocity of zero and ended (at the bottom of the board) with the velocity that you measured in the first part of this experiment. Thus, it must have accelerated. When did that acceleration take place? When the object was on the board. Remember, the velocity of the ball stayed constant once it rolled off of the board. This means that all of its acceleration took place while it was on the board. Therefore, we know the beginning velocity (0), and the ending velocity (the velocity that you measured in the first part of this experiment). If we subtract the former from the latter, we will get Δv , the change in velocity while the ball was on the board. The time that you just measured is the time interval over which the ball stayed on the board, or Δt . Take your value for Δv and divide it by Δt , and you get the acceleration that the ball experienced!
8. Add 6-9 more centimeters of books to the book pile so that the board tilts more steeply. Repeat the entire experiment, so that you get a new value for acceleration.
9. Add another 6-9 cm worth of books to the pile and repeat the experiment one more time to get yet another value for the ball's acceleration.
10. Clean up your mess.

Exploring Creation With Physics 2nd Edition

Lab Report Experiment #1.2 Measuring an Object's Acceleration

Date: _____ Name: _____

Observations:

Diagram:

Summary:

The following section is:

**Physics 2nd Edition
Module 1**

**Lab Reports
(blank)**

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more than 2 pages, so be aware
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Exploring Creation With Physics 2nd Edition

Lab Report Experiment #1.1 Measuring Average Velocity

Date: _____ Name: _____

Supplies:

Procedure:

Exploring Creation With Physics 2nd Edition

Lab Report Experiment #1.1 Measuring Average Velocity

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Exploring Creation With Physics 2nd Edition

Lab Report Experiment #1.2 Measuring an Object's Acceleration

Date: _____ Name: _____

Supplies:

Procedure:

Exploring Creation With Physics 2nd Edition

Lab Report Experiment #1.2 Measuring an Object's Acceleration

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