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Book Review: Introductory Algebra: A Just In Time Approach, by Alice Kaseberg

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Book Review: *Introductory Algebra: A Just In Time Approach*

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INTRODUCTION

The community college introductory algebra population (not including the math lab population) comprises approximately 20-25% of the total mathematics student population. Each student in this group can be characterized by one of the following statements: "I have never had an algebra class"; "I have been out of school for many years and need to review forgotten algebra skills"; "I've just graduated high school but need to review my algebra"; or "I failed algebra in high school". What a diverse group of students! It can also be assumed from the above descriptions that there will be variations in age, learning styles, and educational goals.

The question naturally arises: "Is there an introductory algebra text that has a chance of meeting the needs of each of these adult students?" The answer is, "Yes, most definitely." One only needs to consider Alice Kaseberg's *Introductory Algebra: A Just in Time Approach*. This textbook offers each introductory algebra student the opportunity to master needed algebra skills in a way that encourages problem solving, critical thinking, and the use of technology, while motivating the student to study mathematics for its power and usefulness.

BOOK REVIEW

In the title, the phrase "just in time" reflects the author's philosophy of presenting the algebraic principles and procedures as they are needed — and not presenting what is not needed. Also, "just in time" is the phrase chosen by the author to indicate that the standards of the 21st century, set forth by the American Mathematical Association of Two-Year Colleges (AMATYC) and the NCTM Standards, have been met.

Reading through the table of contents, one can see that this is a nontraditional text. All of the necessary topics for introductory algebra are included, but not in the expected order. New topics appear and some old topics are altered — all to present algebra as an active and useful discipline, and bring it up to current standards.

For example, necessary, rich experience with rational expressions is provided in Chapter Four: Ratios, Rates and Proportional Reasoning. A focus on applications, geometry, statistics, tables, calculators, and graphs is the rationale behind the choice and arrangement of topics.

Alice Kaseberg's text keeps the student active and involved. George Polya's four problem solving steps and strategies are important foci of the text. Applications, geometry, and statistics are woven throughout the examples, exercises, and projects. And, as "just in time" indicates, information needed to understand important associated ideas is an integral part of the instruction.

Alice Kaseberg speaks to the reader humanistically, the way she teaches in the classroom. Her presentation is more informal than traditional, and focused on application. Her explanations are clear, detailed, and precise.

For example, Chapter Three: Equations opens with a letter written to the author's grandfather. The question in the letter states:

> Assume a 12 inch section to be fitted into a steel cable that formerly fitted the earth snugly on a great circle. If the cable is now held a uniform distance from the earth's surface, could a mouse go under it?

The solution to this question involves manipulating a literal formula, the circumference of a circle. Chapter Three is the student's first experience with equations. Can an introductory algebra student be expected to understand the question that this letter offers? The answer is yes, since the author very carefully lays the foundation for the student.

First, the concept of equations is developed by having students look at input/output tables, hunt for pat-

terns, recognize and translate patterns symbolically, draw and analyze graphs, and look at the effect of scale on a graph. Next, equations are solved by "working backwards", using tables, algebra tiles, and graphing as well as symbolic means. Attention is given to vocabulary and the distributive property. Solving equations happens informally, then formally. Then, in section 3.5 (Solving Formulas), students are ready to solve the "mouse problem". They are familiar with the concept of circumference from Chapter 2. The formula is manipulated numerically: for each of three radii, students are asked to

1) calculate the circumference,
2) add 12 inches to the circumference,
3) find the resulting radius,
4) compare the beginning and ending radii.

Finally, equation-solving steps, previously developed, are used to prove that the answer to the letter is "yes, an ordinary mouse can go under the cable!"

As I studied the text, the intent of the author became clear to me. I found her style to be friendly, yet challenging. An analogy came to mind of a parent interacting with his/her child. Let me explain. When you interact with your child, your desire is to maximize the richness of the opportunity. You will be verbal but you may also refer to models or pictures, or use manipulatives or technology to aid understanding.

I hope I have given students permission to think for themselves. One of my favorite phrases is "Choose the method that makes the most sense to you." Unfortunately, that kind of choice is going to frustrate those students who want "one way" to do things.

You will capitalize on real-life examples that are meaningful to your child. You will bring in connections of interest (including previous, related sharings) to broaden the scope of your sharing. You will rely on previous learning, but assist in the learning of new skills as needed during your sharing. In her text, the author offers a maximal experience to her readers!

Alice Kaseberg speaks to the reader humanistically, the way she teaches in the classroom. Her presentation is more informal than traditional, and focused on application. Her explanations are clear, detailed, and

precise. Manipulatives, drawings, alternate ways to solve a problem, comparisons of equivalent solutions, inclusion of warm-up exercises, and group activities are each presented to respect different learning styles and to keep the student involved. The text is intended to be read completely by both student and instructor.

Intent, important vocabulary, definitions, and summarizing statements are offered as part of the narrative. Examples include complete solutions with narrative. Often, examples are revisited. Examples, exercises, projects, and photographs are the original work of the author unless otherwise indicated. The author shares her professional expertise of mathematics, business administration and engineering, her years of teaching, and herself with the reader. In a few cases, she shares behind-the-scenes, personal history of an exercise with the reader.

For example, in Section 7.5 (Solving Radical Equations and Formulas), Example 6 is an application of square roots, with a personal touch:

As a child I dropped a paper-wrapped sugar cube from the open window of the Washington Monument in our nation's capital. Fortunately it was a cold winter day in the 1950's, and no one was at the base of the 555-foot tower.

The author goes on to offer the radical equation that represents the time for a dropped object to hit the ground. Students are then asked to work through a sequence of related questions. The solution to this example ends with the following note: *P.S. My parents were furious! The Washington Monument windows are now sealed.*

It is impossible to describe the entire text, with its many instances of non-traditional excellence, to the reader! I close with a few reflections, written by the author.

REFLECTIONS BY ALICE KASEBERG

Having taught three years from the manuscript, I was amazed at how different, and how improved, the typeset version is. I appreciate even more the effort made by the students and field-test instructors to use the manuscript version.

There are many more illustrations (tables, graphs, drawings, and pictures) than in other introductory algebra books. I am surprised at the impact they made. The tables and graphs add a visual continuity to the text that those of us who are visual learners have missed in the symbolic algebra presentation.

I have written the book to answer these questions: "Why are we learning math?"; "Where is math used?"; and "What does it mean?". I tried to answer these questions in a spirit of discovery. One of the most frustrating things for me to teach from my own material is that the book now contains all the neat things I used to share with the students in class to make the course more interesting.

I wonder if the students will have the patience to read the book. Both the teacher and the students need to read the book. The student can be taught to scan before class: read the boxes, boldface words, and italic definitions. After class, a more careful reading may make more sense.

I think good teachers get students dependent upon good lectures and forget to teach the student to read the book. It reminds me of the saying "Give a hungry person a fish and they eat for a day. Teach them to fish and they can eat forever." (Sadly, the fishing analogy no longer works because we have wiped out the fish populations, but nevertheless the concept fits in teaching students to read their mathematics books.)

I hope I have given students permission to think for themselves. One of my favorite phrases is "Choose the method that makes the most sense to you." Unfortunately, that kind of choice is going to frustrate those students who want "one way" to do things.

The numeric, symbolic, and graphic approaches are becoming more of an environment. I used to think of them as processes. I think teaching communication skills will help students acquire verbalization needed to make connections among the three approaches. There are lots of questions in the book that ask students to write, to explain in sentences, or to summarize ideas.

I wonder what more can be done to teach the thinking skills needed to do this writing. Without the communication skills the numeric, symbolic, and graphic approaches result in tripling the things the students memorize. Before the next edition I want to learn more about how people teach sentence and paragraph writing.

ADDITIONAL INFORMATION

Features of the Text
- the text is rich with non-traditional topics: interval notation, the binomial theorem, Pascal's Triangle, variations on slope, range and standard deviation, and non-linear graphs
- warm-up exercises are presented at the beginning of each section to act as openers
- mathematical and non-mathematical definitions of important vocabulary are discussed
- tables and graphs are used extensively to connect algebra, geometry, and statistics

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George Polya's four problem solving steps and strategies are important foci of the text. Applications, geometry, and statistics are woven throughout the examples, exercises, and projects.

- patterns, their corresponding equations, and graphs emphasize that algebra is a language that connects arithmetic to analysis
- keystrokes for the scientific calculator are presented, as appropriate (the graphing calculator is introduced as an option to students, occasionally; more information is offered to instructors in the Annotated Instructor Edition)
- an index of applications is included for reference
- the Glossary/Index gives all chapter review vocabulary (with definitions) and a full index
- exercises/projects are noted if intended for group work, or if a graphing calculator is required
- each chapter contains a Mid-Chapter Test, a Chapter Review, Review Exercises and Test; a comprehensive Final Exam Review is included

Materials and Availability
- the student edition (ISBN 0-53494-392-2) contains solutions to selected odd exercises
- the student edition sells for $40.00 to bookstores
- in "To the Student", following the Preface, the author offers information on learning styles, independent thinking, alternative approaches and strategies for success, in a friendly and encouraging tone

- the annotated instructor's edition (ISBN 0-53494-395-0) contains annotations in the margin, answers to exercises, and "How to Use" which gives section-by-section teaching hints and strategies and information on course planning
- the carefully written student solution manual (not authored by Ms. Kaseberg) gives solutions for all odd numbered exercises
- assessment materials (ISBN 0-53494-397-7) painstakingly modeled after the author's style contain two versions of tests, a list of other questions, and one project problem for each chapter
- assessment materials are available in hard copy, and on disc for Mac and IBM
- the textbooks and all supplementary materials are due at the distribution center August 21, 1995
- for more information contact International Thompson Publishing Co., 1-800-423-0563

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Letter Division

Paul J. Tobias

Test your math logic! Each letter stands for a digit from 0 through 9; the same digit stands for the same letter throughout the problem (answers on p.46).

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      THINK │ NEW WAYS     EASY │ SOLVE       MATH │ CRUSADE
              YWS TSA              ZYXL                 SMMMD
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