

FRACTALS

A Tool Kit of Dynamics Activities

Fractals, chaos, and dynamics represent a popular and exciting field of mathematics developed in recent decades. Robert Devaney, Alice Foster, and Jonathan Choate have created a collection of tool kits of dynamics activities in response to the demand that this fascinating field become accessible to school-age students. Not only do students and teachers find the study of chaos and fractals to be intriguing, they also find a strong alignment with topics already present in contemporary mathematics curricula.

The availability of technology that can perform calculations quickly has allowed for much of the development of these mathematical topics. In most cases the activities are not dependent on any particular technology, in recognition of the varied access different classrooms have to different types of technology. However, technology tips indicate where graphing calculators, spreadsheets, computer graphic applications, or the World Wide Web can enhance a particular lesson. In addition, the authors support the books through a Web site that includes interactive Java™-applets for students.

Each lesson contains the following features:

Teacher Notes that give detailed advice on how to plan for and organize the lesson.

Explanation pages for the student and teacher that clearly explain the mathematical content of the lesson.

Investigations in blackline master format that lead students through a guided discovery of the content of the lesson.

Further Exploration problems that provide students with more exposure to the ideas of the lesson.

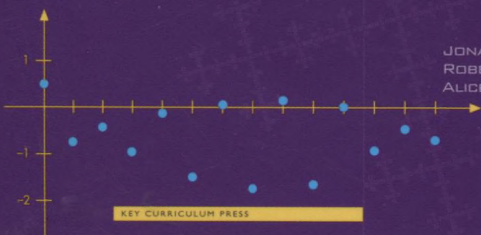
Fractals focuses on showing how to generate these remarkable shapes using a variety of techniques. Topics include self-similarity, the chaos game (also showing variations of the game), understanding and calculating fractal dimension (including the dimensions of natural fractals), and the area and perimeter of fractals. Within these contexts students create and study various fractals including the Sierpiński triangle, the Koch curve, and the Cantor middle-thirds set.

The complete Tool Kit of Dynamics Activities collection includes the following titles:

ITERATION

A Tool Kit of Dynamics Activities

JONATHAN CHOATE
ROBERT L. DEVANEY
ALICE FOSTER



FRACTALS

A Tool Kit of Dynamics Activities

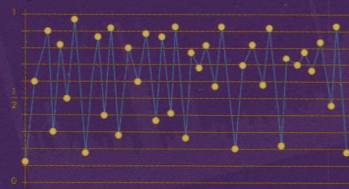
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CHAOS

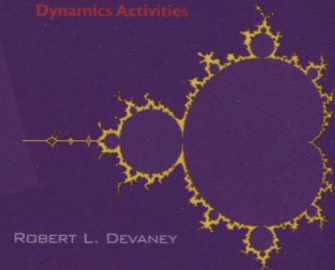
A Tool Kit of Dynamics Activities

ROBERT L. DEVANEY
JONATHAN CHOATE



THE MANDELBROT AND JULIA SETS

A Tool Kit of
Dynamics Activities



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Curriculum Correlation Key

-  Small portion of lesson is relevant to indicated stage of curriculum.
-  About half of lesson is relevant.
-  Entire lesson is relevant.
-  Lesson is particularly relevant and could replace a traditional lesson.




- MS Middle School
- A1 Algebra
- G Geometry
- A2 Algebra 2
- P/C Precalculus or Calculus

Lesson 5 ▶ Random Iteration: The Chaos Game

MS  A1  G  A2  P/C 




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Lesson 6 ▶ Other Chaos Games

G  A2  P/C 





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G  A2  P/C 



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A1  G  A2  P/C 



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A2  P/C 

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A2  P/C 

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A2 P/C



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A2 P/C



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