

Table of Contents

Teacher Materials

0. Overview

Foreword	v
0.1 Introduction to Using System Dynamics in Mathematics	0- 1
0.2 STELLA vs. Equation Interface	0- 9
0.3 Path Through the Lessons.....	0- 11
0.4 Overview of STELLA Components and Operations.....	0- 17

1. Linear Behavior

1.0 Introducing Linear Functions	1- 1
1.1 Motion worksheet #1 (Algebra I).....	1- 7
1.2 Motion worksheet #2 (Algebra II).....	1- 13
1.3 Motion worksheet #3 (Pre-Calculus).....	1- 21
1.4 Finite Differences - Linear (Algebra I or II).....	1- 27
1.5 Linear Growth Pattern (Transparency)	1- 31
1.6 Linear Models 1 (Algebra I).....	1- 33
1.7 Linear Models 2 (Algebra II).....	1- 39
1.8 Linear Systems (Algebra I or II).....	1- 43

2. Quadratic Behavior

2.0 Introducing Quadratic Functions	2- 1
2.1 Motion worksheet #4 (Algebra I).....	2- 9
2.2 Motion worksheet #5 (Algebra II).....	2- 13
2.3 Motion worksheet #6 (Pre-Calculus).....	2- 19
2.4 Finite Differences - Quadratic (Algebra I or II).....	2- 25
2.5 Quadratic Models 1 (Algebra I).....	2- 29
2.6 Quadratic Models 2 (Algebra II).....	2- 33
2.7 Quadratic Growth Pattern (Transparency)	2- 39

3. Exponential Behavior

3.0 Introducing Exponential Functions	3- 1
3.1 Finite Quotients - Exponential (Algebra II).....	3- 5
3.2 Exponential Models 1 (Algebra I).....	3- 9
3.3 Exponential Models 2 (Algebra II).....	3- 15
3.4 Exponential Models 3 (Algebra II or Pre-Calculus).....	3- 21
3.5 Exponential Models 4 (Pre-Calculus).....	3- 29
3.6 The Bank Account Story (Algebra I/II).....	3- 37

4.	Review	
4.0	Review	4- 1
4.1	Mathematical Footprints (Algebra II or Pre-Calculus).....	4- 3
4.2	Systems of Non-Linear Behavior (Algebra II or Pre-Calculus).....	4- 5
4.3	Alcohol in Body Story (Pre-Calculus).....	4-13
5.	Oscillatory Behavior	
5.0	Introduction to Sinusoidal Functions	5- 1
5.1	Motion Worksheet #7 (Algebra II).....	5- 5
5.2	Motion Worksheet #8 (Pre-Calculus).....	5- 9
5.3	Motion worksheet #9 (linear, quadratic, oscillatory) (Calculus)	5- 13
5.4	Predator/Prey Oscillation 1 (Algebra II).....	5- 21
5.5	Predator/Prey Story (Pre-Calculus).....	5- 27
5.6	Bouncing Spring Problem (Algebra II or Pre-Calculus).....	5- 37
5.7	The Pendulum Story (Algebra II or Pre-Calculus).....	5- 43
5.8	Distance-Velocity-Acceleration Graphs (Blank Transparency Master).....	5- 51
6.	Convergent and Logistic Behavior	
6.0	Introduction to Convergent and Logistic Growth Patterns	6- 1
6.1	From Exponential to Convergent to Logistic Models 1 (Pre-Calculus).....	6- 3
6.2	Variations of Exponential Function (Transparency Master)	6- 13
6.3	Deer and Vegetation Story (Pre-Calculus).....	6- 15
7.	Differential Equations	
7.0	Introduction to Differential Equations	7- 1
7.1	From Exponential to Convergent to Logistic Models 2 (Calculus)	7- 5
7.2	A Study of Contagious Disease Using Differential Equations (Calculus)..	7- 21
7.3	Tracking Lead Through the Human Body (Calculus)	7- 27
7.4	Predator-Prey Interaction Using Differential Equations (Calculus).....	7- 35
7.5	Solving Differential Equations Numerically (Calculus)	7- 43
8.	Miscellaneous Topics	
8.0	Introduction to Miscellaneous Topics	8- 1
8.1	Arithmetic and Geometric Sequence & Series (Pre-Calculus)	8- 7
8.2	The Study of an Age Specific Population (Pre-Calculus)	8- 17
9.	Appendix	
9.1	System Dynamics Generic Modeling Structures (Algebra II - Calculus) ...	9- 1
9.2	Motion Summary (Pre-Cal, Calculus)	9- 9
9.3	Student Handout - Review Descrip, Dist, Vel, Accel graphs (Calculus).....	9- 11
9.4	Six Differential Equations and Their Growth Patterns (Calculus).....	9- 13