

**Ontario Math Curriculum Expectations 2020  
Coding Strand .. Grade 8**

**Ontario Mathematics September 2021, EXPECTATIONS for CODING**

**Resource - "First Steps in Coding to Learn" (Neufeld Learning Systems INC)**

**RS are Reproducible Sheets**

**Grade 8 Coding Expectations**

- 8.C3.1 Coding Skills** .. Solve problems and create computational representations of mathematical situations by writing and executing code, including code that involves the analysis of data in order to inform and communicate decisions.
- 8.C3.2 Coding Skills** .. read and alter existing code involving the analysis of data in order to inform and communicate decisions, and describe how changes to the code affect the outcomes and the efficiency of the code.

**In Preparation for Upcoming Lessons, discuss following from Resource with Students/Teachers/Parents.**

- 1. FORWARD** - An opportunity to set up a special learning environment for all.
- 2. PREFACE - The Role of Robots** to facilitate a special learning environment - learn by teaching.
- 3. PREFACE - The Role of Journaling** is an essential way to express understanding.

**Chapter 3 of Resource - "First Steps in Coding to Learn" Neufeld - Interactive Coding**

**Overview:** Introducing the LOGO Learning Environment.

**Concepts:** Apply clear and concise learning skills.

Sequencing, Directionality, Problem-solving, Counting, Estimation, Repeating

**SPECIFIC ACTIVITIES: SEQUENTIAL EVENTS, REPEATING EVENTS**

Introduction to LOGO Learning Environment; Acquiring LOGO	pg 66 to 68
The LOGO Screen	pg 70
Activity #1: Explanation	pg 71
Activity #1: Investigate, Predict, Journal	<b>Duplicate 3RS.1</b> pg 72

**Chapter 4 of Resource - "First Steps in Coding to Learn" Neufeld - Of Shapes and Patterns**

**Overview:** Work through Patterns based on Squares, Triangles, Rectangles and Beyond

**Concepts:** Changing Code into a more Efficient Code

Sequencing, Directionality, Problem-solving, Counting, Estimation, Repeating, Nesting

**SPECIFIC ACTIVITIES: SEQUENTIAL EVENTS, REPEATING EVENTS, NESTING**

**Part A: Think Square**

Activity #1: Introduce the Square	<b>Duplicate 4RS.1</b> pg 98 to 99
Activity #3a: Squares ... Again #2 NESTED	<b>Duplicate 4RS.4</b> pg 104

**Part B: Think Triangle**

Activity #1: Introduce the Triangle	<b>Duplicate 4RS.7</b> pg 108
Activity #3: Triangles ... Again & Again #2 NESTED	<b>Duplicate 4RS.9</b> pg 112

**Part C: Art Class**

Activity #1: Turn & Repeat a Square .. NESTED	pg 114
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**Part E: Closed Shapes**

Activity #1: Investigate Closed Shapes	pg 126
Activity #4: Given code, Design Regular Polygon	<b>Duplicate 4RS.18</b> pg 130

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**Grade 8 Coding Expectations continued**

**RS are Reproducible Sheets**

**Chapter 5 of Resource - "First Steps in Coding to Learn" Neufeld - Building New Learning**

**Overview:** Introduction to "Procedures" - a more efficient way of programming

**Concepts:** A "procedure" is a set of commands used to perform a specific task.

A "procedure" introduces a control structure leading to conditional statements

**SPECIFIC ACTIVITIES:PROCEDURES leading to efficient CONTROL STRUCTURES**

**Part A: TURTLE'S FIRST DAY IN SCHOOL**

Activity #1: Introduce the First Lesson		pg 134
Your Second Task	<b>Duplicate 5RS.1</b>	pg 135
Activity #2: The Second Lesson		pg 140
Your Second Task	<b>Duplicate 5RS.2</b>	pg 141
Activity #4: The Daisy		pg 147
Idea #1		pg 147
<b>Part B: HOMEWORK on the FIRST DAY</b>		pg 150
Activity #1: SQUARES Everywhere	<b>Duplicate 5RS.3</b>	pg 151
Activity #5: The WREATH		pg 155
<b>Part C: LESSONS ON DAY 2 IN SCHOOL</b>		pg 156
Activity #1: Investigate Plans		pg 156
Plan #1, #2, #3, #4		pg 156, 157
<b>Part D: HOMEWORK ON DAY 2</b>		pg 158
Activity #1: Building Square to Flag to Ferris	<b>Duplicate 5RS.6</b>	pg 158
Activity #3: Build Square to Panes to Condo	<b>Duplicate 5RS.8</b>	pg 160
Activity #4: Build Tri to Para to Trap to Wow	<b>Duplicate 5RS.9</b>	pg 161

**Chapter 6 of Resource - "First Steps in Coding to Learn" Neufeld - Coding with Variables**

**Overview:** By creating procedures with variables & subprograms, one becomes more efficient

We will learn how to code using variables or placeholder and subprograms

**Concepts:** The variable is a placeholder in which contents "vary" to perform a task.

A "procedure" with variables introduces a control condition depending on Count.

**SPECIFIC ACTIVITIES:PROCEDURES leading to efficient CONTROL STRUCTURES**

**Part A: INTRODUCTION: CODING WITH VARIABLES**

From 4 Boxes to a ChineseBox Pattern **Duplicate 6RS.3** pg 170

**Part B Procedures with ONE VARIABLE**

Activity #1:TEACH CROSS		pg 177
Solution without Variables .. CROSS1 ... CROSS5		
Solution with Variables .. CROSS :LENGTH		
Activity #2 TEACH STRING		pg 180
STRING :L		
Activity #4 Procedure within a Procedure .. A SubProgram		pg 184
PANE :WIDTH	WINDO :WIDTH	

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**Part C Procedures with TWO VARIABLES**

RECTANGLE :L :W	<b>Duplicate 6RS.5</b>	pg 187
A REGULAR SHAPE      POLY :N :T	<b>Duplicate 6RS.6</b>	pg 190
ZIG IT to ART              ZIG :X :Y		pg 192
STREET ACTIVITY...Program and SubProgram	<b>Duplicate 6RS.7</b>	pg 193

**Chapter 7 of Resource - "First Steps in Coding to Learn" Neufeld - Again & Again with Recursion**

**Overview:** By creating procedures with variables & recursion, one becomes more efficient  
We will learn how to code using variables and recursion.

**Concepts:** Recursion creates efficiency, making procedures much shorter to create and modify

**SPECIFIC ACTIVITIES:PROCEDURES with RECURSION leading to efficient control.**

<b>Part A      First Lesson with RECURSION</b>	pg 196
Activity #1    SQUARES	pg 196
Idea 1 and Idea 2	
Activity #2    EXAMPLE	pg 198
Activity #3    STAIRS	pg 199
Activity #4    MILL	pg 200
Activity #5    SQUARRAL	pg 201
Conditional ...              The Runaway Turtle ... IF ... THEN	pg 203

<b>Part B      Recursion Homework</b>	
Activity #1    Homework #1	<b>Duplicate 7RS.1</b> pg 205
Activity #2    Homework #2	<b>Duplicate 7RS.2</b> pg 206
Activity #4    A Polygon Challenge	pg 208

<b>Part C      Recursion and Variables in Art Class</b>	pg 210
Spin N Grow a SQUARE	pg 210
The POLYSPI Series	pg 212
Grow & Stop SPINTRIANGLE & SPINSQUARE	<b>Duplicate 7RS.4</b> pg 215
The PATTERNS Series	pg 216

**Chapter 8 of Resource - "First Steps in Coding to Learn" Neufeld - Projects**

**Overview:** Solve problems and create computational representations of  
mathematical situations.

**Concepts:** Understand the importance of sequencing and breaking down  
steps in challenges in filling shapes.

**SPECIFIC ACTIVITIES:PROCEDURES using mathematical ideas to create design  
and to exercise control.**

<b>Part A      The Address - Ordered Pairs</b>	
Concept #1..Addresses in the First Quadrant	pg 218
Concept #2..Activity to Reinforce Codes	<b>Duplicate 8RS.1</b> pg 221
Concept #3..Activity to Challenge	<b>Duplicate 8RS.2</b> pg 222

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Concept #4..4 Quadrants of X-Y Plane	pg 223
Concept #5..Marking & Pointing in 4 Quadrants	pg 224
Concept #6..Marking & Pointing in first Quadrant	pg 225
<b>Part B</b> Filling a Square	
FillSquare1 .. A First Idea	pg 226
FillSquare2 .. A Second Idea	pg 229
FillSquare3 .. A Third Idea	pg 231
FillSquare4 .. A Fourth Idea	pg 232
FillSquare5 .. A Fifth Idea	pg 233
<b>Part C</b> Filling a Square	
FillTriangle1 .. The First Method	pg 235
FillTriangle2 .. The Second Method	pg 236
<b>Part D</b> Fill it up	pg 238
Examples to try "FILL"	pg 239
<b>Part E</b> The Circle	pg 241
From Regular Polygons to Circles	pg 241
Factors to Change Circle Size	pg 243
Codes to Create Circular Shapes	pg 244
<b>Part F</b> RepCount - Opportunity for Art <b>Duplicate 8RS.3</b>	pg 246
Investigate repCount with graphics	pg 247
Investigate repCount with graphics	pg 248

**Chapter 9 of Resource - "First Steps in Coding to Learn" Neufeld - Projects with Multiple Turtles**

**Overview:** Solve mathematical challenges using multiple turtles in a line or circle

**Concepts:** Understand the importance of sequencing and breaking down steps to solve challenges in coding multiple turtles to reflect mathematics of lines and planes.

**SPECIFIC ACTIVITIES:**

PROCEDURES using mathematical ideas to create design with multiple turtles

**Predict - Test - Explain - Followup**

Concept #1: Controlling Many Turtles	pg 250
Concept #2: Turtles Form a Circle	pg 251
Activity on Controlling Many	<b>Duplicate 9RS.1</b> pg 252
Concept #3: Selected Turtles on a Circle	pg 253
Activity with Selected Turtles	<b>Duplicate 9RS.2</b> pg 255
Concept #4: Turtles Moving from a Circle	pg 257
Concept #5: Challenges Involving Turtles	pg 260
Reinforce Codes for Turtles on a Circle	<b>Duplicate 9RS.3</b> pg 262

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Concept #6: Turtles in a Line	pg 263
A Challenge	pg 264
Code for a Colorful Design	pg 265
Concept #7: A String Art Challenge	pg 266
Concept #8: Bouncing Turtles	
Example 1	Pg 267
Example 2	pg 268
Example 3	pg 269
Example 4	pg 270
Example 5	pg 271