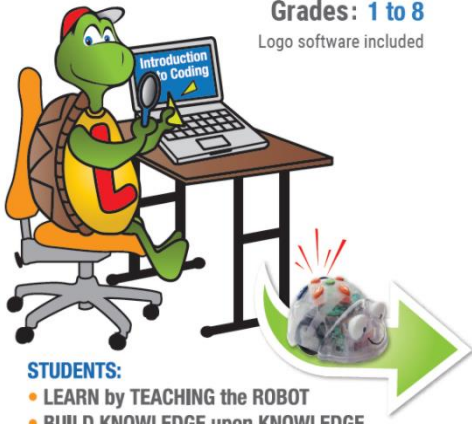


INTRODUCTION to CODING through ROBOTICS & LOGO

Grades: 1 to 8
Logo software included



STUDENTS:

- LEARN by TEACHING the ROBOT
 - BUILD KNOWLEDGE upon KNOWLEDGE
- ...and have fun doing it!

R. Neufeld

70 Reproducible Sheets Included

Introduction to Coding through Robotics & Logo with a Math Focus (A Virtual Hands-On Workshop)

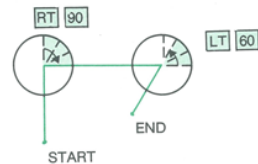
R Neufeld info@umathx.com

“An intuitive, simple, yet powerful introduction through lessons to vital coding skills, personal access to a programmable robot on a computer screen, and great activities ... present hands-on opportunities to enrich STEM with a math focus.” ... *NCTM*
(ebook at www.umathx.com)




Step 1..Ch 1 .. First Steps to Coding

(pg 16 ebook)
A person walks the code.



Step 2..Ch 2 .. Code a Floor Robot ..The Blue-Bot

(pg 25 ebook)

| Blue-Bot CODE | PREDICT the path Blue-Bot will create | The ACTION |
|----------------|---|------------|
| XX ↑ ↗ ↓ GO |  | |

Code a Floor Robot .. Blue-Bot by Computer

The **Blue-Bot** brings **Science, Technology, Engineering and Mathematics** into the classroom and builds foundational skills for lifelong learning.

One can move the Blue-Bot forward, backward, turn left and turn right and teach sequencing, directionality, problem-solving, counting and estimation.



Step 3..Ch 3 - 9 .. Coding on Logo Computer Screen

(pg 26 ebook)..

Video .. https://www.youtube.com/watch?v=Ub_nkWIgTa8

For free functionality to the Terrapin Logo Learning Environment on your own computer, enter the following address in your browser.

<https://weblogo.terrapinlogo.com>

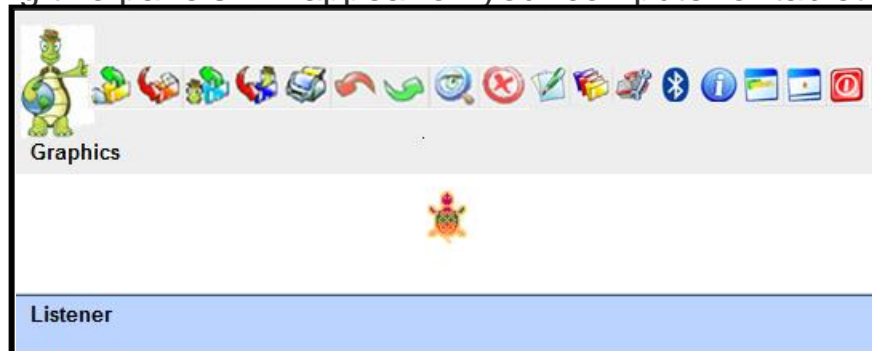
The following **Welcome** will appear on your own computer monitor or tablet.



Click on the second graphic.

Enter the **Classroom Name** that you will be given for this session.

The following two panels will appear on your computer or tablet screen.



The following examples will demonstrate the **Logo Learning Environment**.

You may wish to follow on your own computer in this workshop or later on your own.

>HOME CS SETWIDTH 3 SLOWTURTLE SETPC 4 ... then press <enter>

>HOME CS FD 67 RT 90 BK 67 ... then press <enter>

Where **BK** is ... **CS** is ... **RT** is ... **FD** is ... **LT** is ... **PD** is ...

A. PREDICTION ACTIVITY

- On computer, type in one line of **CODE** representing a sequence of commands.
- On the chart below, **PREDICT** what **ACTION** should occur.
- Tell the turtle robot to “**DO IT**” by pressing **<enter>**
- Discuss the function of all code in a line.

| CODE | PREDICTION | ACTUAL ACTION |
|---|-------------------|----------------------|
| >CS PU SLOWTURTLE FD 50 RT 90 PD FD 40 HT FD 30 ST | | |
| >HOME CS PD SLOWTURTLE BK 60 LT 90 FD 50 HOME | | |
| >HOME CS PD SETWIDTH 5 FD 60 PRINT 45*2 RT 90 FD 20*3 | | |

B. REPEATING, COLORING, TURNING

- On computer, type in the Logo command or set of commands.
- On the chart below, **PREDICT** what should happen.
- Tell the turtle to “**DO IT**” by pressing **<enter>**
- Discuss the function of all code in a line.

| CODE | PREDICTION | ACTION |
|--|------------|--------|
| >HOME CS SETPC 11 FD 50 SETPC 9 REPEAT 3[FD 60 RT 50] | | |
| >HOME CS PD SLOWTURTLE REPEAT 3[FD 30] | | |
| >HOME CS SLOWTURTLE PD REPEAT 4[FD 56 RT 90] | | |
| >CS SLOWTURTLE REPEAT 4[REPEAT 4[FD 50 RT 90] RT 90] | | |
| >CS SLOWTURTLE REPEAT 4[REPEAT 4[FD 50 RT 90] RT 90 FD 50] | | |

C. UNDERSTANDING TURNS



Predict the resulting shape then **Test** your prediction by commanding the turtle.

>HOME CS SETPC 4 SETWIDTH 1 REPEAT 12 [FD 40 BK 40 RT 30] <enter>

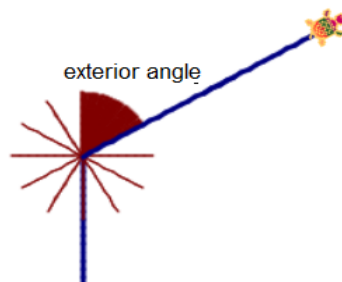
>HOME CS SETPC 9 REPEAT 60 [FD 40 BK 40 RT 1] <enter>

>HOME CS SETPC 1 SETWIDTH 3 FD 75 SETPC 0 RT 60 FD 85<enter>

The code above “**sweeps through**” the 60 degree turn.

We say that the turn is through an **EXTERIOR ANGLE OF 60 degrees**.

Think through the code above and design on paper and on the Logo computer screen.



D. CLOSED SHAPES (pg 31 ebook)

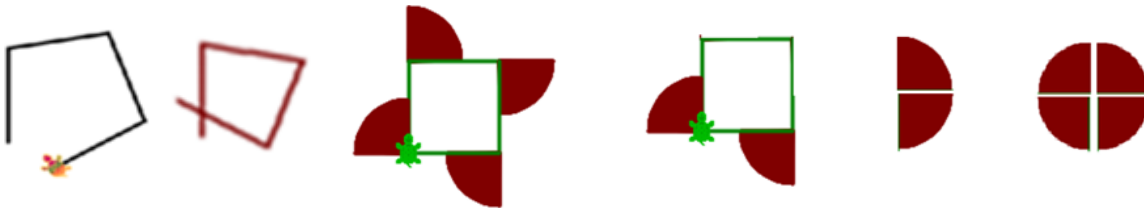
Investigations ... Lead towards code for a SQUARE:

4 sides of equal length & 4 turns of the same degrees

In a SQUARE, 4 Exterior Turns are all the same. (see diagrams)

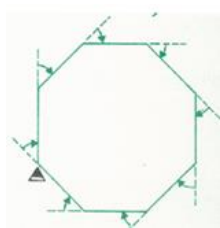
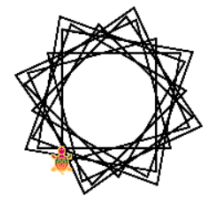
They add up to a circle. Hence, they add up to 360 degrees.

Write code to have computer design the following designs.



Hence, an example of a square is ... **REPEAT 4[FD 120 RT 90]**

CS PD SETPC 0 REPEAT 200[**REPEAT 4[FD 120 RT 100]** RT 5]



In sketch to the regular octagon to the left:

Number of equal turns: _____ Total turn: _____

Each turn is: _____

Hence, code to generate the **regular octagon** is: _____

Now command the turtle robot on the computer screen.

E. BUILDING NEW LEARNING ON EXISTING KNOWLEDGE (pg 35 ebook)

Building Lessons

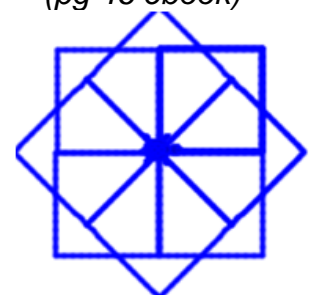
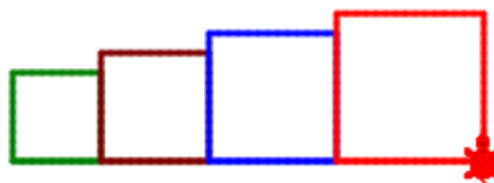
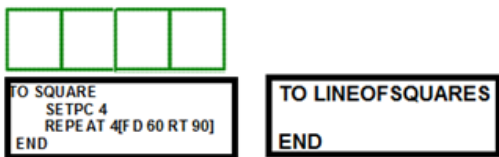
Variables

Recursion

- Build concepts on concepts
- Teach then Test
- **Coding with Robotics models Teaching with Understanding.**

(pg 39 ebook)

(pg 46 ebook)



(pg 53 ebook)

The Address

(pg 61 ebook)

Projects with Multiple Turtles

