GRAPH PAPER PROGRAMMING[1]

INTRODUCTION

By programming one another to draw pictures, students will begin to understand what programming is really about.

An **algorithm** is a series of instructions that describe how a computer can accomplish a task. These instructions should be concise and unambiguous. Writing these instructions in a particular symbolic language that the computer can understand is the act of **programming**. By transforming algorithms in the form of instructions like "Move One Square Forward" or "Move One Square Backward" into program composed of a pre-defined set of instructions, students can experience programming.

[1] Adapted from Code.org "Graph Paper Programming". Online: https://studio.code.org/unplugged/unplug3.pdf
[2] Adapted from CS Unplugged Activity "Searching Algorithms". Online: http://csunplugged.org/searching-

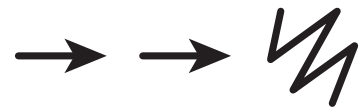## ACTIVITY: "PROGRAMMING" A COLLEAGUE

Students are divided into groups of 2. In each group, students instruct each other to color squares on graph paper in an effort to reproduce an existing picture.

We will use the following programming key:

→ — Move One Square Forward

← — Move One Square Backward

↑ — Move One Square Up

↓ — Move One Square Down

↻ — Change to Next Color

⚡ — Fill-In Square with Color

Example:

The algorithm "*Move one square forward, Move one square forward, Fill-in square with color*" can be transformed into the following "program":
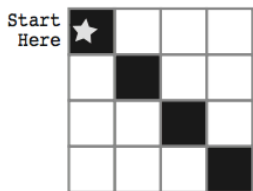
→ → ⚡

After completing a few sample drawings with other people, each student can make the practice worksheet.
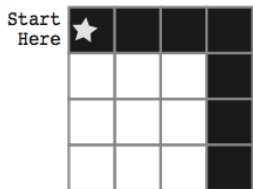
PRACTICE WORKSHEET

You have just learned how to create algorithms and programs from drawings, and how to draw an image from a program that someone gives to you. Now you can use the drawings and programs below to practice by yourself.

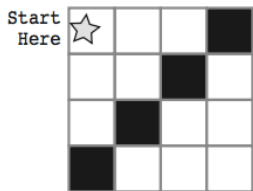**1. Use the symbols below to write a program that would draw each image.**

→ Move One Square Forward	← Move One Square Backward	↑ Move One Square Up	↓ Move One Square Down	Fill-In Square with Color

Step 1	2	3	4	5	6	7	8	9	10
Step 11	12	13	14	15	16	17	18	19	20

Step 1	2	3	4	5	6	7	8	9	10
Step 11	12	13	14	15	16	17	18	19	20

Step 1	2	3	4	5	6	7	8	9	10
Step 11	12	13	14	15	16	17	18	19	20

2. Now, read the program below and draw the image that it describes.

→ Step 1	↯ 2	→ 3	↓ 4	↯ 5	← 6	↓ 7	↯ 8	→ 9	↓ 10
↯ Step 11									