Using a Repeat Block to Generate
 Simple Number Patterns

**Algebra**

**Unit 3 Line Master 1a**

Let’s write code in Scratch that uses a repeat block to generate simple growing and shrinking patterns.

In Part 1, you’ll write code for the basic Scratch application.
In Part 2, you’ll alter the code you’ve just written to generate a variety of growing and shrinking patterns.

Part 1: Writing the basic code for a number pattern

The first number pattern you generate with your program will be:

0, 5, 10, 15, 20, 25

* What is the pattern rule for this set of numbers?

*Pseudocode* is an informal way of describing a computer program
—it is somewhere between everyday language and programming code. Computer programmers, or coders, often use pseudocode when planning their programs.

The pseudocode for the application looks like this:

clear **mypattern[]**

**number** = 0

repeat 6 times

output **number**

add **number** to **mypattern[]**

change **number** by 5

end repeat

In this code, anything that might have been stored in the list
is deleted.

The starting value of our number variable is set to 0.

In the repeat, **number** is output, saved in a list called **mypattern**,
and then changed by 5.

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Since this is repeated 6 times, you will see 6 numbers in your pattern.

Let’s write this code in Scratch. The completed code is shown below, so if you have experience with Scratch you may proceed to recreate it now and skip to Part B. Otherwise, follow the guided materials below.

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 **Note:** This code uses both a variable
 and a list. *Variables* can hold one value
 at a time, whereas a *list* can hold many
 values in an organized manner.

 In this code, **number** is a variable and
 **mypattern** is a list.

Guided Materials\*

\*Skip to Part 2 if you have already written the Scratch code
based on the image above.

Go to <https://scratch.mit.edu/>

and select Create to begin.

1. From **Events**, drag the when **green flag is clicked** block
 to the code editing area.

 

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2. Create a list called **mypattern**. To do this, from **Variables**,
 click on **Make a List**. Enter the name **mypattern** and click **OK**.
 To make sure the list starts out empty each time you run the code,
 add the **delete all of mypattern** block to your code.

 **** ****

3. Create a variable called **number**. To do this, from **Variables**,
 select **Make a Variable** and call it **number**.
 Add the **set number to 0** block to your code.

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4. From **Control**, add the **repeat** block to your code and change
 the repeat value to **6**.

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For Steps 5 to 7, you will be adding blocks inside the repeat block.

****5. From Looks, add the say hello for 2 seconds
 block to your code. Change the value from
 2 to 1 seconds.
 From **Variables**, drag the **number** block
 to inside of the **say** block to replace **Hello!**.

****6. From **Variables**, add the **add thing
 to mypattern** block to your code.
 Drag the **number** block to inside
 of the **add** block to replace **thing**.

7. Finally, from **Variables**, add the **change number by 1** block
 to the code, and adjust the value to **5**.

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 If you have a Scratch login,
 save the project in your Scratch
 account by selecting **Save now**
 from the **File** menu.

 A login is not required to work with
 the code, but you will not be able to
 save your application without it.

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8. Click on the green flag above the stage to execute the code.

The sprite should output the following numbers,
one at a time, in the speech bubble:
0, 5, 10, 15, 20, 25.
After each number appears in the bubble,
it should be added to the mypattern list.

 If the application is not working as expected,
 look through the code carefully and debug
 by checking whether each part of the code
 matches the blocks shown in Steps 1 to 7.

Part 2: Altering the code to generate other growing
and shrinking patterns

1. Alter the code to generate a pattern of numbers that increases
by 3 each time. Output 10 numbers in the pattern, beginning at 0.

The numbers output should be: 0, 3, 6, 9, 12, 15, 18, 21, 24, 27.

 Here’s the pseudocode to generate this new pattern of numbers:

clear **mypattern[]**

**number** = 0

repeat 10 times

output **number**

add **number** to **mypattern[]**

change **number** by 3

 end repeat

 Using a Repeat Block to Generate
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The Scratch code will look like this:



2. Alter this pattern slightly to begin at 9, rather than 0.
 The numbers generated should be:
 9, 12, 15, 18, 21, 24, 27, 30, 33, 36.

3. Alter the code to generate each pattern of numbers.
 What is different about the patterns in parts d) and e)
 compared to the patterns in parts a), b), and c)?

 a) 0, 4, 8

 b) 10, 12, 14, 16, 18, 20, 22

 c) 100, 200, 300, 400, 500

 d) 100, 90, 80, 70, 60, 50, 40, 30, 20, 10, 0

 e) 0, –6, –12, –18

If you get stuck, check with a classmate and/or your teacher for tips.

Additional Challenge

Generate your own patterns and challenge your classmates
to write the corresponding code.