

# Math, Patterns & Business



Grade: 4th

## Materials Needed:

- Curriculum resources
- Printouts of handouts
- Game(s) – see Engagement Activity section
- Computers with Scratch or the Scratch app

## Concepts:

- Given rules
- Patterns
- Multiplication

## Learning Objectives:

Students will be able to...

- Identify a rule to complete a pattern
- Use a pattern to identify the rules
- Interpret a table, identify an inexplicable rule, and apply the relation between two numbers given to complete or extend the table based on a real world small business plan

## What do students need to know prior to this lesson...

- Students should have had a formal introduction to decimals (to thousandths place) and fraction including comparing decimals and fractions using comparison symbols ( $<$ ,  $>$ ,  $=$ )
- Students should understand how to multiply decimals with whole numbers and how to multiply fractions with whole numbers

This lesson provides students with the opportunity to practice all of those skills while thinking about how much pets need to eat per day.

## Introduction:

The objective of the introduction is to make the learning in this lesson relevant to your students and it allows them familiarize and contextualize the content.

- Review students' prior learning connected and supporting the CCSSs
- Connect with a variety of local small businesses and invite them to speak in your classroom about their experience as a business owner. You may want to connect with the owner beforehand to review what students will be learning and doing throughout the lesson. Some questions to consider are:
  - What made you decide to open up your own business?
  - How does math, patterns, and rules support your business?
  - How has technology supported / enhanced your business?
  - What advice do you have for future small business owners?



## Introduction (continued)

- If connecting with small business owners is not a possibility, you may opt to show videos of small business owners (such as [this one](#)) or you may highlight some local small businesses that your students may be interested in, such as these:

- [Recycle Bookstore](#)
- [Stan's Donuts](#)
- [Nirvana Soul](#)
- [Pasteleria Adegá](#)

**NIRVANA SOUL**

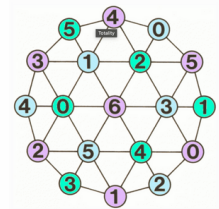
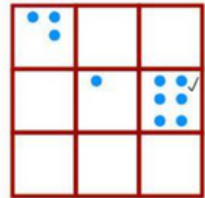


*Pasteleria*  
ADĒGA

### Engagement Activity:

There are a variety of hands-on activities that you can engage your students to find patterns and decide what comes next based on the pattern (or rule). Games are great examples of this. Students will observe how a game is played and then determine what rule(s) the game follows. Some mathematical specific games you might consider are:

- [Dotty Six](#) – students play with a partner and they have one die and a 3x3 table. Each partner takes turns and records their result on the table. Each cell can have a max of six dots and depending on what is rolled the number of dots can be added or if the number goes beyond six a new cell must be started. The goal is to have a player complete an entire row.
- [Totality](#) – player 1 decides what number (target) to reach and each player makes a move by moving the counter to get closer to the number without going over. The player that reaches the number first is the winner.
- Any other culturally relevant games that your students may know rules and like to play:
  - Dominos
  - Uno

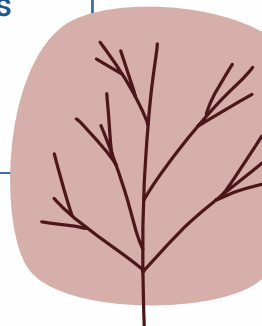


### Determining the rule(s):

- Once students have had an opportunity to see how the game is played, ask them to write what they believe to be the rules of the game.
- Play the game one more time the way it's meant to be played.
- Test a few rules and ask the class to determine if those rules match the way the game is played. If not, ask how the rules can be improved.
- Modify the rules accordingly and test again.

Note: If whole classroom testing is not possible, have each team try each other's rules and test them to see if it matches the original game. Students can modify and improve their rules as they test them.

- Ask students what patterns they observed and how those patterns supported their writing of the rules.



## Engagement Activity (continued):

Alternate activities that have students looking at patterns might include:

- Math with shapes – [this is shape algebra](#) where students have to figure out the value of the shape to solve the equation.
- Brain teasers/puzzles – there are many brain teasers or puzzles that you can have students work on. Many of them include math

$$\begin{array}{rcl} \text{Hexagon} + \text{Triangle} & = & 7 \\ \text{Triangle} + \text{Triangle} & = & 10 \\ \text{Star} + \text{Hexagon} & = & 3 \end{array}$$

Hexagon =

Triangle =

Star =

## Relevant Background Activities:

### Math

- Review relevant content including patterns, and rules of games
- Review any relevant vocabulary

### Computer Science

Explore CS First to acquaint students with Scratch. Try these lessons:

- [Welcome to CS First](#) (familiarize yourself with the platform)
- Sports – [Lesson 6: Batter up \(variables\)](#) – although there is no lesson that focus on lists (or arrays) this lesson will provide students with an opportunity to understand how to use variables in a program.

## Performance Task:

Students will be working in groups to create a small business plan. The focus of this task is for students to determine “the rule” of how much profit they will make, taking only into account initial pricing of materials of the products they will sell. You can use [this template](#) to guide the task.

Note: If you want to extend this task to a unit you can by having students develop a comprehensive small business plan. [Here](#) is an example of a more thorough business plan template from [GoHenry](#).

1. Have students determine what their small business will sell. Some options include:

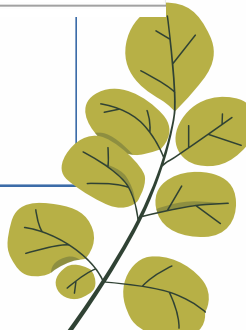
- Convenience store
- Coffee shop
- Boutique store – this could be for clothing, candles, shoes, etc.
- Bakery
- Art

Name(s): \_\_\_\_\_

### Business Plan

1. (Brainstorm) What kinds of small businesses is your group interested in?

2. What is the name of your small business?



## Performance Task (continued):

2. Have students do research on the type of products that their small business might sell.

*Note: It's recommended that you limit students to 3-5 products so it can be manageable. Additional products can be added depending on time and student's needs.*

- If there is limited time for research, we recommend that you do some research and provide some starting price points for students.

3. As a group, have them discuss “a rule” that they want to implement to ensure a profit for their small business.

*Note: The rule should be the same for all of the products. This will help with the following step.*

4. Depending on what has been covered previously, this might be a good place to have students practice using a rule to complete a number pattern (use your own curriculum here – the linked resource is an example) or having students figure out the rule using input/output tables (use your own curriculum here – the linked resource is an example)

5. Have students exchange their input/output tables and see if they can figure out what the rule is.

*Note: Depending on time this could be an opportunity where students can share their business plan to others and get feedback.*

4. What is the cost per item/product?

Product	Cost per product
Example: Chocolate Chip Cookies	\$0.50 per cookie or \$6 per dozen cookies

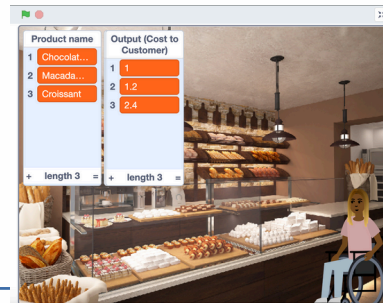
5. What rule do you want to add so that your business can make a profit? Use the input/output table to decide what the rule will be. The rule must be the same for all products.

Input (Cost per product)	Rule	Output (Cost to customer)
Example: \$6 per dozen chocolate chip cookies	Multiply by 2	\$12 per dozen chocolate chip cookies
Example: \$6.00 per dozen macadamia nut cookies	Multiply by 2	_____ per dozen macadamia cookies

## Scratch Activity:

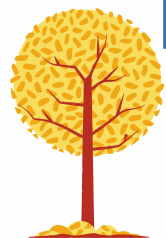
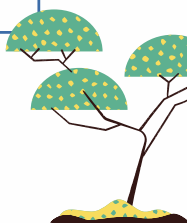
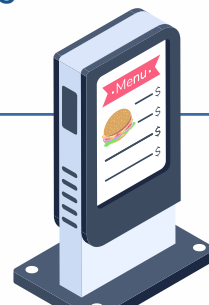
Complete a similar task with [this Scratch Program](#).

- Have students modify the rule, products, and questions being asked to fit the small business they have developed.



## Extension:

- Currently the profit rule is the same for all of the products. However, that is not usually the case because of supply and demand amongst other things. Challenge students to modify each product with a different profit rule.
- Additionally, you can ask students to think about other ways that technology can support small businesses such as creating an interface of a kiosk to order food, like this [one](#).

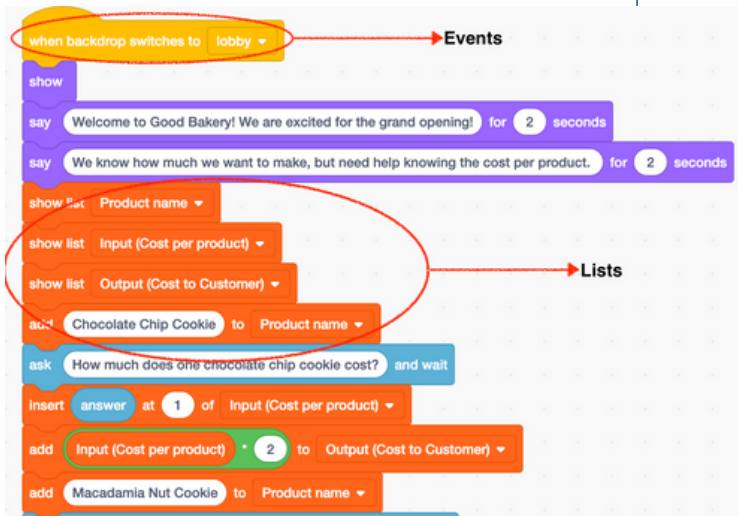


## Computer Science Concepts:

An explicit call out of a few select computer science concepts is important for students to realize that they are engaging in CS. In this lesson you can explicitly call out:

- Events
- Lists – Lists (or arrays as they are called in other programs) are a special kind of variable because it's able to hold multiple pieces of information unlike a traditional variable.

*It's recommended that only 1-2 concepts are introduced at a time. This allows students to grasp the concepts in a manageable way.*



## Assessment:

- Teacher observation of student work (formative assessment of conceptual understanding – got it/didn't get it).
- If you decide to extend this lesson to a unit, you can have students create a formal business presentation to pitch their idea to others. This may be another opportunity where you can invite small business owners to hear about the different businesses students are interested in.
- Formative assessment from your own curriculum.

## Career Connections:

Did you know...

That there are many careers that require an understanding of patterns that follow given rules in their everyday work?

- **Small business owners** need to understand patterns to thrive in a competitive environment. Many times they have to do supply chain research to find the best supplier for their products and then assess what rule they can follow to ensure their business will thrive.
- **Analysts** also use patterns (and data) to try and improve the performance of a business and use those patterns to predict a profitable outcome.



## Common Core Math Standards

**4.OA.5.**

Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule “Add 3” and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.

## Computer Science Student Standards

**CACS**  
**3-5.AP.11.**

Create programs that use variables to store and modify data.

**CACS**  
**3-5.AP.12.**

Create programs that include events, loops, and conditionals.

**CACS**  
**3-5.AP.14.**

Create programs by incorporating smaller portions of existing programs, to develop something new or add more advanced features.

**CSTA**  
**1B.AP.09.**

Create programs that use variables to store and modify data.

**CSTA**  
**1B.AP.10.**

Create programs that include sequences, events, loops, and conditionals.

**CSTA**  
**1B.AP.12.**

Modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.

All images represented in this lesson were obtained through Canva and/or are part of the fair use law.

## CSTA Teacher Standards

**1a.**

Apply CS practices

**2c.**

Represent diverse perspectives

**2e.**

Use accessible instructional materials

**4c.**

Design inclusive learning experiences

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