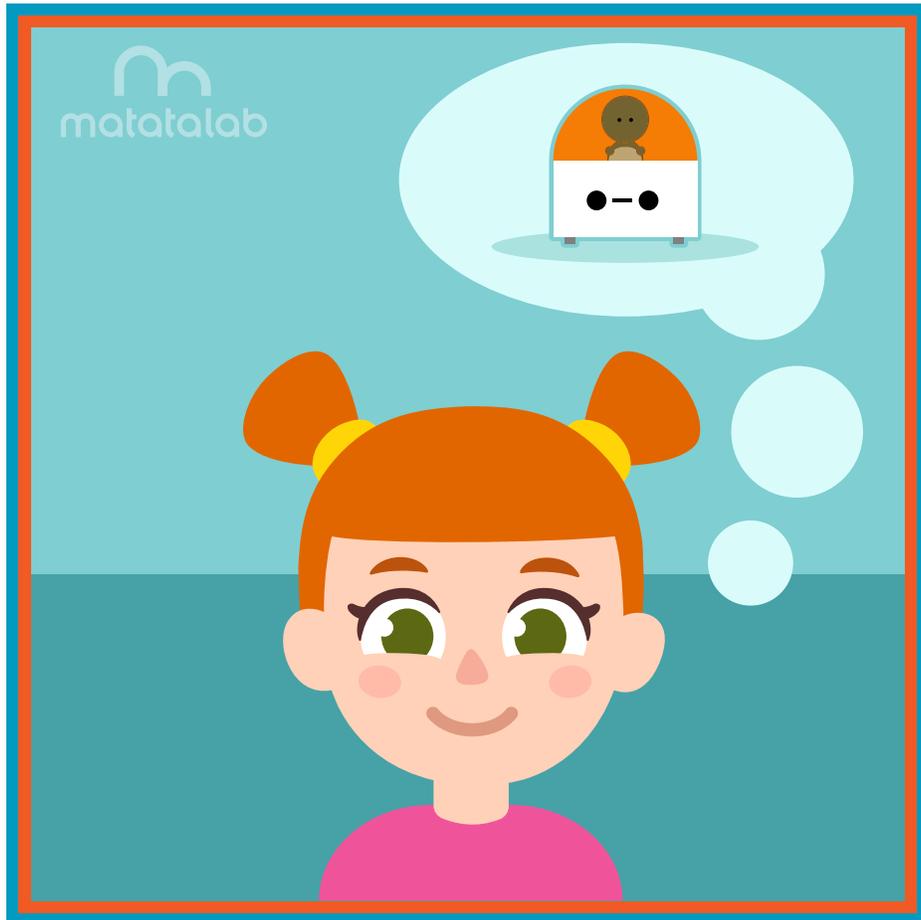# Matatalab
Artist Add-On
Overview and Introduction

Artist Add-On

Table of Contents

Overview and Introduction

The following lessons utilize the Matatalab Coding Set along with the Matatalab Artist Add-On set in order to code Matatabot and to create unique projects. Coding, number, and angle blocks are used within these projects which incorporate various types of materials and media. These lessons are aligned with the CSTA (Computer Science Teachers Association) standards and with the NCAS (National Core Arts) standards. The NCAS standards were established in 2014 through the National Art Education Association to ensure consistent guidelines and expectations in the teaching of visual arts.

Standards
NCAS, CSTA

Aligned Standards

NCAS (National Core Arts Standards)

Creating

Investigate - Plan - Make

VA:Cr1.1.1a Engage collaboratively in exploration and imaginative play with materials.
VA:Cr1.2.2a Make art or design with various materials and tools to explore personal interests, questions, and curiosity.

Investigate

VA:Cr2.1.2a Experiment with various materials and tools to explore personal interests in a work of art or design.
VA:Cr2.3.2a Repurpose objects to make something new.

Reflect - Refine - Continue

VA:Cr3.1.2a Discuss and reflect with peers about choices made in creating artwork.

Presenting

Analyze

VA:Pr5.1.7a Based on criteria, analyze and evaluate methods for preparing and presenting art.

Share

VA:Pr6.1.3a Identify and explain how and where different cultures record and illustrate stories and history of life through art.

Responding

Perceive

VA:Re7.1.2a Perceive and describe aesthetic characteristics of one's natural world and constructed environments.

Analyze

VA:Re8.1.5a Interpret art by analyzing characteristics of form and structure, contextual information, subject matter, visual elements, and use of media to identify ideas and mood conveyed.

Interpret

VA:Re9.1.5a Recognize differences in criteria used to evaluate works of art depending on styles, genres, and media as well as historical and cultural contexts.

Connecting

Synthesize

VA:Cn10.1.Ka Create art that tells a story about a life experience.
VA:Cn10.1.2a Create works of art about events in home, school, or community life.

Relate

VA:Cn11.1.Ka Identify a purpose of an artwork.

CSTA (Computer Science Teachers Association)

K-2

1A-CS-01 Select and operate appropriate software to perform a variety of tasks, and recognize that users have different needs and preferences for the technology they use.

1A-AP-10 Develop programs with sequences and simple loops, to express ideas or address a problem.

1A-AP-11 Decompose (break down) the steps needed to solve the problem into a precise sequence of instructions.

1A-AP-12 Develop plans that describe a program's sequence of events, goals, and expected outcomes.

1A-AP-14 Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops.

1A-AP-15 Using correct terminology, describe steps taken and choices made during the iterative process of program development.

3-5

1B-AP-08 Compare and refine multiple algorithms for the same task and determine which is the most appropriate.

1B-AP-09 Create programs that use variables to store and modify data.

1B-AP-10 Create programs that include sequences, events, loops, and conditionals.

1B-AP-11 Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.

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.

1B-AP-13 Use an iterative process to plan the development of a program by including others' perspectives and considering user preferences.

1B-AP-15 Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.

1B-AP-16 Take on varying roles, with teacher guidance, when collaborating with peers during the design, implementation, and review stages of program development.

1B-AP-17 Describe choices made during program development using code comments, presentations, and demonstrations.

Grade by grade descriptions of art standards can be found at the National Core Arts Standards website: **https://www.arteducators.org/learn-tools/national-visual-arts-standards**
Detailed description of computer science standards can be found at the Computer Science Standards website: **http://www.csteachers.org/page/standards**

These lessons provide a sequential, meaningful curriculum with fundamental learning experiences. The lessons are sequenced by level of difficulty for each project. Difficulty is reflected in the learning progression and the use of complex problem-solving with angles, as well as difficulty and time needed with different types of media and instructions.

Lessons Overview

LESSON 1: Grades K-1   Introduction to Coding Shapes
OBJECTIVE: Students will practice the steps involved in manipulating coding blocks and angle blocks in order to create shapes. Students will learn how to code and manipulate Matatabot to create simple shapes.

LESSON 2: Grades K-1   Ice Cream Cones
OBJECTIVE: Students will learn how to code and manipulate Matatabot in order to code, create a simple shape and work in two-dimensions creating a two-dimensional ice cream cone.

LESSON 3: Grades K-1   Hanging Mobile
OBJECTIVE: Students will learn how to code and manipulate Matatabot in order to code, create and display a variety of simple shapes to create a hanging mobile.

LESSON 4: Grades 2-3   Sailboat
OBJECTIVE: Students will learn how to code and manipulate Matatabot in order to code, create and

display a variety of simple shapes as a cohesive design.

LESSON 5: Grades 2-3   Pinwheel
OBJECTIVE: Students will learn how to code and manipulate Matatabot in order to code, create and display a variety of simple shapes as a simple machine.

LESSON 6: Grades 2-3   Family Tree
OBJECTIVE: Students will learn how to code and manipulate Matatabot in order to code, create and display a more complex shape.

LESSON 7: Grades 2-3   Robot
OBJECTIVE: Students will learn how to code and manipulate Matatabot in order to code, create and display a robot as a compilation of a complex design.

LESSON 8: Grades 4-5   Dreamcatcher
OBJECTIVE: Students will learn how to code and manipulate Matatabot in order to code, create and display the complex design of a traditional Native American Dreamcatcher.

LESSON 9: Grades 4-5   Marionette
OBJECTIVE: Students will learn how to code and manipulate Matatabot in order to code, create and display a more complex design adding movement and engineering.

LESSON 10: Grades 4-5   Go Fish Game
OBJECTIVE: Students will learn how to code and manipulate Matatabot in order to code, create and display a more complex design adding movement and engineering.

LESSON 11: Grades 4-5   3D Geometric Shapes
OBJECTIVE: Students will learn how to sequence coding in order to draw a geometric net that can be assembled into a 3D geometric shape and display a more complex design.

LESSON 12: Grades 4-5   Coding a Message
OBJECTIVE: Students will learn how to code and manipulate Matatabot in order to code, create and display a series of letters and to form a word as a message.

Matatalab
Lesson 1
Introduction To Coding Shapes

Overview

Geometric shapes are found throughout nature, used in building skyscrapers, analyzed in geometric proofs, and are the basis of art pieces. The Matatalab Artist Add-On Set, used in conjunction with the Matatalab Coding Set, gives students the necessary tools to create a large variety of geometric shapes.

In this lesson, students will code Matatabot to draw various geometric shapes using instructions on the six Matatalab Artist Warm-Up Cards. Students will extend their understanding of coding shapes by exploring ways to create additional shapes.

Additional resources for this lesson can be found at the end of the lesson.

Essential Objective

» Understand coding and manipulation of Matatabot to create various basic shapes.

Learning Objectives

» Learn how to code and manipulate Matatabot in order to create each of the six basic shapes on the Matatalab Draw Warm-Up cards.

Standards

» NCAS: VA:Cr1.1, VA:Cr1.2, VA:Cr2.1 VA:Cr2.3, VA:Cr3.1
» CSTA: K-2: 1A-CS-01, 1A-AP-10, 1A-AP-11, 1A-AP-12, 1A-1P-14, 1A-AP-15

Time

60 minutes

Materials

For each student group:
» 1 Matatalab Coding Set - Parts used in this lesson will include:
  » Command Tower
  » Control Board
  » Matatabot
  » Direction, Parameter and Loop Blocks
» 1 Matatalab Artist Add-On Set

- Marker
- Large sheet of white paper (approximately 3 feet x 2 feet)
- Tape
- 1 copy of each worksheet per student
- Student journals

Teacher Set-Up and Preparation

- Charge all Matatalab Command Towers and Matatabots.
- Ensure there are enough copies of worksheets for each student.
- Locate a place for each student group to work. Tape a large sheet of paper (approx. 3 ft. x 2 ft.) to table.
- Distribute 1 Matatalab Coding Set, 1 Matatalab Artist Add-On Set for each student group.

Vocabulary

- **Shape:** The outline appearance of an area or a figure.
- **Angle:** The space, measured in degrees, between two intersecting points or lines at or close to where they meet.
- **Triangle:** A plane figure with three straight sides and three angles.
- **Square:** A plane figure with four straight sides and four right ninety-degree angles.
- **Sunburst:** A decoration resembling the sun and its rays.

Introduction

- Are students in a classroom? Are they outside?
- Ask students to look around and make observations about their surroundings; what objects do they see?
- Next, ask students to name some of the shapes of some of these objects. (rectangles of doors, square floor blocks, circle clock, triangular shape of leaves, etc.)
- Discuss with students other places where they can see different shapes.
- Explain to students that in this lesson they will use a robot and programming blocks to draw a variety of shapes.

Matatalab Activity

- Point out each of the various parts: Command Tower, Control Board, Matatabot, various types of coding and angle blocks.
- Explain and demonstrate how to turn on both the Command Tower and Matatabot.
- Explain how the tower communicates with the robot via Bluetooth communication.

�» **Ask students to examine Draw 1 Warm-up card. Ask students to name the shape they see on the card. Explain that Matatabot can draw that card using the coded blocks shown below the square.**

�» **Demonstrate how to set up Matatabot with one of the markers and placement of the coding blocks on the Control Board.**

�» **Place the Matatabot on a sheet of paper and press the Play button. Students will observe the movement of Matatabot as it draws a square.**

�» **Allow student groups time to code and draw their own square by following the coding instructions on the Draw 1 Warm-Up Card.**

�» **Explain to students that a left or right turn coding block tells Matatabot to turn 90° to the left or 90° to the right. Demonstrate this movement with student volunteers.**
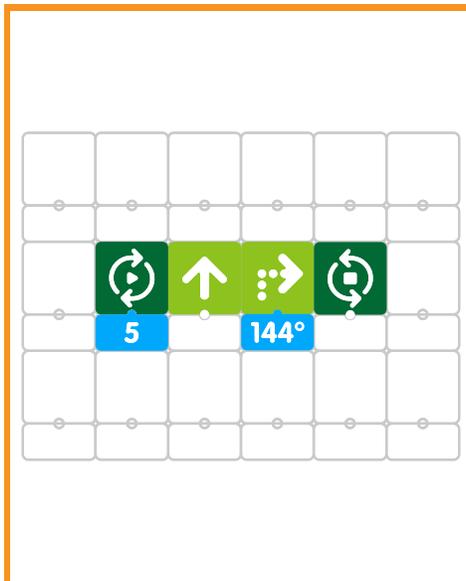
Draw 1 Warm-Up Card:
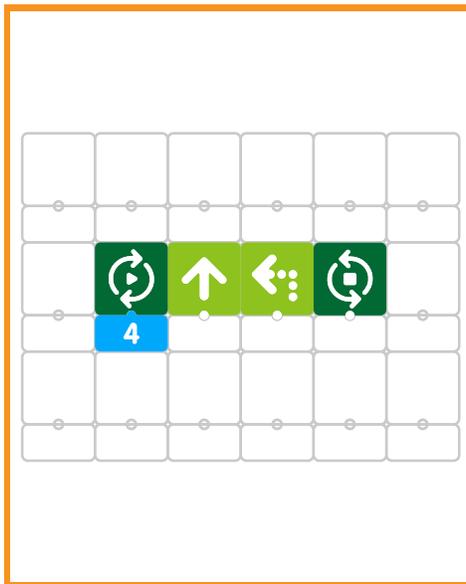
�» **Tell students to look at the Draw 2 Warm-Up Card. Ask students how this object is different from the square. (It has three sides instead of four and the angles are different. At this point it isn't necessary to explain the size of the angles, but point out that the coding of the triangle is different from the square because it is a different shape, and that each shape has its own unique coding.)**

�» **Allow student groups time to code and draw their own triangle by following the coding instructions on the Draw 2 Warm-Up Card.**
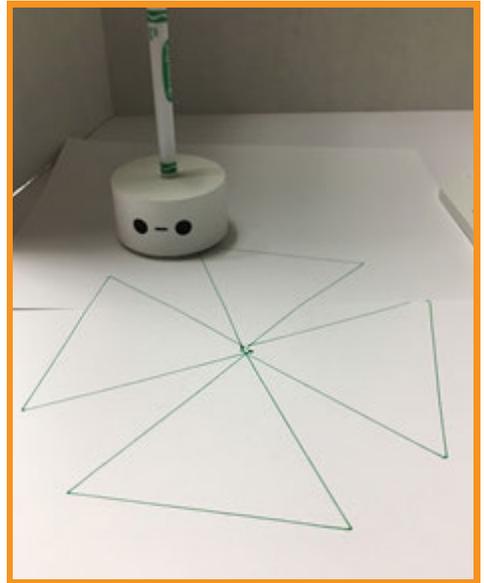
Draw 2 Warm-Up Card:
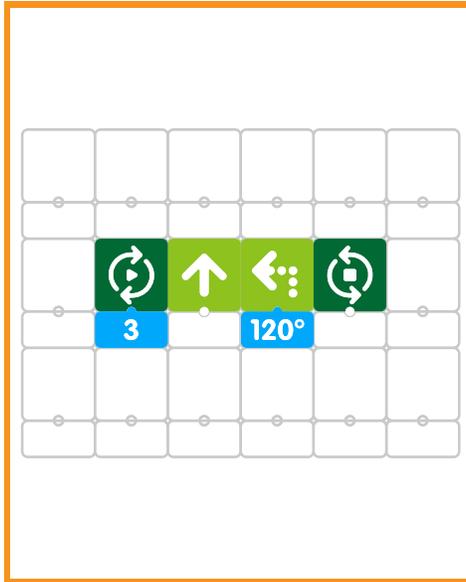
▸ **At this point, students should be allowed to work collaboratively in their groups and continue to code and draw the remaining shapes shown on the Warm-Up Cards. Circulate to help students with coding and answer questions they may have regarding the procedures.**
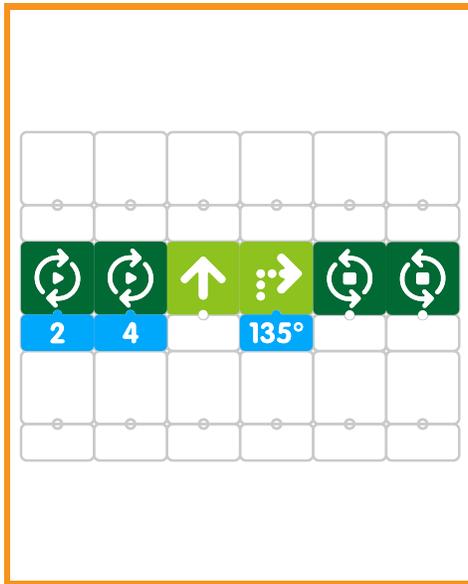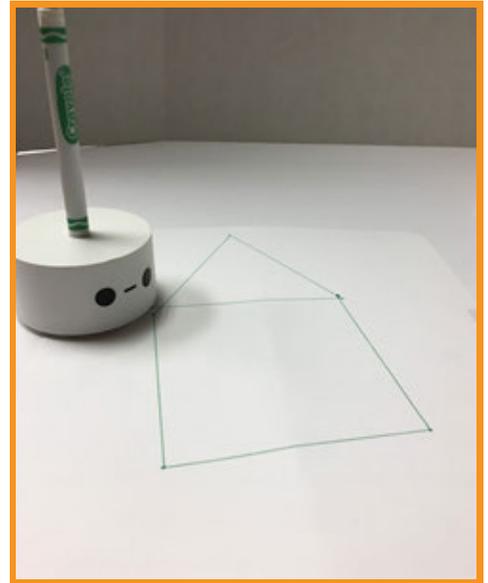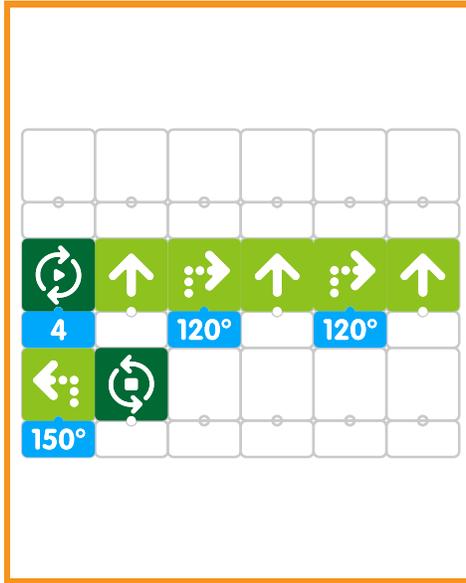
Draw 3 Warm-Up Card:

Draw 4 Warm-Up Card:

Draw 5 Warm-Up Card:

Draw 6 Warm-Up Card:

Closing

Assessment

Today we have practiced coding and creation of a variety of shapes using the Matatalab Artist Warm-Up Drawing Cards. All collaborative groups were given time to complete each of the shapes on the cards.

Have students answer the following questions:
- Which shapes did your group find to be the most difficult to create? Why?
- Which shapes did your group like best?
- How helpful was each of the Warm-Up Drawing Cards in the creation of each shape?
- How would you strengthen or change this project?

Once students have been given a chance to answer these questions, ask students to draw pictures of each of the shapes they created and their experiences with their creations in their journals.

Extensions

So far we have utilized each of the Artist Warm-Up Drawing Cards which help students to code each shape on each card successfully. Use your student journal to draw and write the coding needed to create a unique shape different than the shapes found on the Warm-Up Drawing Cards. Use Matatalab Artist Add-On Set along with the Matatabot and command tower to configure the blocks according to your plan and create your unique shape based upon a new configuration. What was the unique shape that you created? How difficult was it to code the creation of that shape?

Real World Connections

The Matatalab Draw Warm-Up Cards give hints and clues that allow you to successfully complete a project. In what other activities might someone get hints and clues to complete something successfully? Do hints and clues help? Why? What would happen if an activity or a project had to be completed without any help or clues? How might this make the completion more difficult? Have you ever worked on a project without any help at all? How did this affect your success with the project?

Lesson 1 - Introduction to Coding Shapes

Match the Shapes and Tiles with the Correct Description

	Triangle
	Start
	Square
	Right Turn
	Stop
	Forward

Matatalab
Lesson 2
Ice Cream Cone

Overview

As students learned in the first lesson, the simple shapes coded using Matatabot and the Artist Add-On Set can be connected together to make more complex and interesting objects. Matatabot can be coded to draw a square and a triangle to create a house. The length of the sides of these geometric objects can be increased by changing the coding to create larger objects.

In this lesson, students will alter the coding for a triangle to create a larger triangle which will become the cone of an ice-cream cone. Students will then decorate the top to look like ice cream and embellish the ice cream with sprinkles and other decorations.

Additional resources for this lesson can be found at the end of the lesson.

Essential Objective

❱ Understand coding and manipulation of Matatabot to create various basic shapes.

Learning Objectives

❱ Code and manipulate Matatabot in order to create a large triangle.
❱ Utilize the large triangle to create a large decorated ice cream cone.

Standards

❱ NCAS: VA:Cr1.1, VA:Cr1.2, VA:Cr2.1 VA:Cr2.3, VA:Cr3.1, VA:Cn10.1, VA:Cn10.2
❱ CSTA: K-2: 1A-CS-01, 1A-AP-10, 1A-AP-11, 1A-AP-12, 1A-1P-14, 1A-AP-15

Time

60 minutes

Materials

For each student group:
❱ 1 Matatalab Coding Set - Parts used in this lesson will include:
  ❱ Command Tower
  ❱ Control Board
  ❱ Matatabot
  ❱ Direction, Parameter and Loop Blocks

- 1 Matatalab Artist Add-On Set
- White Cardstock - 2-3 pieces per student
- Scissors
- Markers
- Glitter and/or candy sprinkles
- Glue
- 1 copy of each worksheet per student
- Student journals

Teacher Set-Up and Preparation

- Create a display model of the ice cream cone with one or two scoops of ice cream.
- Charge all Matatalab Command Towers and Matatabots.
- Ensure there are enough copies of worksheets for each student.
- Locate a place for each student group to work.
- Distribute a set of materials for each student group.

Vocabulary

- **Triangle:** A plane figure with three straight sides and three angles.
- **Flavor:** The way something tastes when you eat it.
- **Geometric Objects:** Shapes that include circles, triangles, squares, rectangles and others.
- **Weather:** The condition of the atmosphere in a given area at a given time and date.

Introduction

- Ask students to imagine they are outside playing on a hot, hot summer day.
- What would help them cool off? (running through a sprinkler, a dip in a pool, a walk along a beach, maybe an ice cream cone)
- Ask students to name their favorite flavor of ice cream.
- Choose 3-5 flavors and ask students, "Out of these which one do you like the most?"
- Have students stand up, form groups according to their choice and make observations about the number of students who chose each flavor.
- Explain to students that they will code Matatabot to draw an ice cream cone. They will color and cut out the cone, draw and color one or two scoops of ice cream, add sprinkles and assemble their ice cream cone.

Matatalab Activity

▶ Ask students to take out and examine the triangle shown on the Draw 2 Warm-Up Card. Review the coding blocks with students and discuss how Matatabot drew a triangle by reading the coding blocks.

▶ Ask students what 1 other block they could add to the line of coding in order for Matatabot to draw a larger triangle. (adding an additional ↑ block). Explain that this will give them a larger cone to hold more ice cream.
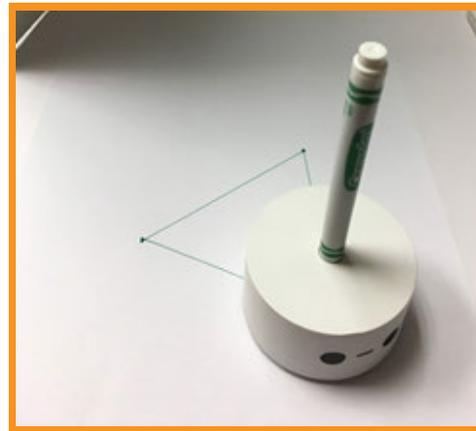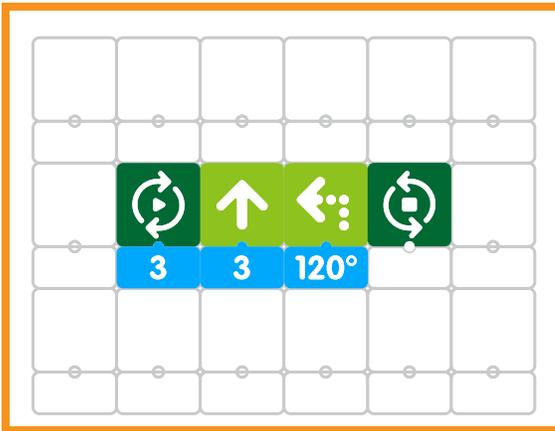
▶ Tell students to draw a picture of their ice cream cone on the Planning Worksheet and to plan out and write/draw the coding they will use to draw their cone.

▶ Check coding on the Planning Worksheet and address any misconceptions.

▶ Using a piece of white cardstock, student groups will program Matatabot to draw a large triangle that students will use for the cone. Circulate to help students with coding questions.

▶ Ask students to color their cone, draw and color one or two scoops of ice cream on paper and color the scoops. Students will then cut out their cones and ice cream, glue on sprinkles and/or glitter and assemble their ice cream cone using tape and/or glue.

Closing

Assessment

We have planned out, coded, and created a large cone for an ice cream cone. We then decorated the ice cream.

Have students answer the following questions:
» How did you change or modify the coding to enlarge the sides of your triangle cone?
» What surprised you about this project?
» What did you like best about this project?
» What would you change about this project if you could?

Once students have been given a chance to answer and discuss these questions, ask students to draw pictures of each of the shapes they created and write about their experiences with their creations in their journals.

Extensions

An ice cream cone is a favorite snack or dessert for many people. What are some other snacks or desserts that you like? Some examples might be apple pie, cheesecake, chocolate cake, chocolate bars or candy.

Plan out the coding needed to create a different snack or dessert. Write the coding with the number and angle block configurations needed to create the shapes for your snack or dessert in your student journal.

Using the Matatalab Coding Set with the Artist Add-On Set, configure the blocks according to your plan, and create your unique snack or dessert. Decorate your unique creation and add other types of media.

Real World Connections

When eating ice cream, people often like to add additional things like sprinkles, marshmallows, and other types of treats. With what other types of treats do people like to add decorations and other things? Think about the shapes of the things you add on. Think about the shapes of decorations, for example chocolate chips are three dimensional triangles. What other shapes are used for decorations?

Ice Cream Cone Planning Worksheet

Plan the shape for your cone	Draw your ice cream cone

Lesson 2 - Ice Cream Cones

Copy the coding word. Choose
a tile that matches each word.
Draw the tile next to the word.

Start		
Forward		
Right Turn		
Angle		
Stop		

Matatalab
Lesson 3
Hanging Mobile

Overview

The Matatalab Artist Add-On Set includes six Warm-Up Cards which help students understand the coding involved in creating geometric shapes. Students can alter the coding to enlarge and change these shapes. For instance, the coding for a square can be altered to create a rectangle. Additionally, the Artist Add-On Set includes a variety of angle blocks with which students can experiment to move beyond the six basic geometric shapes to code and create even more shapes.

In this lesson, students will create and construct a mobile comprised of geometric shapes. Students will code Matatabot to draw each of the six basic shapes and will be challenged to code and draw two or three additional geometric shapes to add to their mobile.

Additional resources for this lesson can be found at the end of the lesson.

Essential Objective

» **Understand coding and manipulation of the Matatabot to create various basic shapes.**

Learning Objectives

» **Learn how to code and manipulate the Matatabot in order to create a series of shapes.**
» **Learn how to create a hanging mobile using dowels, ribbons and other media, and shapes through coding the Matatabot to create a variety of shapes.**
» **Experiment with the Matatabot in order to create two or three unique shapes to add to the hanging mobile.**

Standards

» **NCAS: VA:Cr1.1, VA:Cr1.2, VA:Cr2.1 VA:Cr2.3, VA:Cr3.1, VA:Re8.1, VA:Cn11.1**
» **CSTA: K-2: 1A-CS-01, 1A-AP-10, 1A-AP-11, 1A-AP-12, 1A-1P-14, 1A-AP-15**

Time

60 minutes

Materials

For each student group:
- 1 Matatalab Coding Set - Parts used in this lesson will include:
    - Command Tower
    - Control Board
    - Matatabot
    - Direction, Parameter and Loop Blocks
- 1 Matatalab Artist Add-On Set
- 10 pieces cardstock
- Note: Students could use colored cardstock for shapes. Alternatively, students could use white cardstock and then color/decorate each shape.
- Scissors
- Single hole punch
- Markers
- Ribbon (approximately 20 feet)
- 2 pieces dowel (approximately 18 inches each)
- String (approximately 24 inches)
- 1 copy of each worksheet per student
- Student journals

Teacher Set-Up and Preparation

- Create a display model of a hanging mobile.
- Charge all Matatalab Command Towers and Matatabots.
- Ensure that there are enough copies of worksheets for each student.
- Locate a place for each student group to work.
- Distribute a set of materials for each student group.

Vocabulary

- **Shape:** The outline appearance of an area or a figure.
- **Angle:** The space, measured in degrees, between two intersecting points or lines at or close to where they meet.
- **Triangle:** A plane figure with three straight sides and three angles.
- **Square:** A plane figure with four straight sides and four right ninety-degree angles.
- **Sunburst:** A decoration resembling the sun and its rays.
- **Maltese Cross:** A cross with arms of equal length that broaden from the center and have their ends indented.
- **Hanging Mobile:** A decoration or sculpture whose parts are balanced in order to move in response to

air currents.

Introduction

❱ **Ask students if they have heard of the word "mobile."**

❱ **Ask students if they understand the meaning of the term "mobile." Explain that the term refers to the ability to show movement. (Teacher may ask students to stand up and become mobile for a minute.)**

❱ **Ask students why they think that a mobile is the name given to a set of hanging toys that might be found above a baby's crib.**

❱ **Explain that in this lesson students will code Matatabot to draw different geometric shapes and create a mobile with the shapes.**

Matatalab Activity

- ❯❯ Have student groups set up and turn on the Matatalab coding set and examine the coding for the six Draw Warm-Up Cards. Explain to students that they have coded these shapes in the first two lessons. Review coding as necessary.
- ❯❯ Have students plan out their mobiles on the Hanging Mobile Planning Worksheet.
- ❯❯ Using one piece of cardstock for each shape and the Matatalab set, students draw and cut out the six shapes found on the Draw 1- 6 Warm-Up Cards.
- ❯❯ In student groups, students discuss possible coding to create three additional shapes: rectangle, diamond, pentagon. Teacher directions for coding these shapes are found below.

Rectangle with Coding:
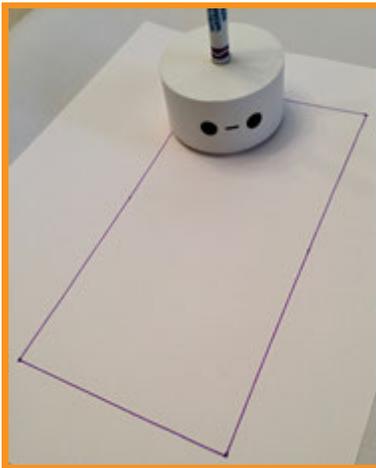
Diamond with Coding:
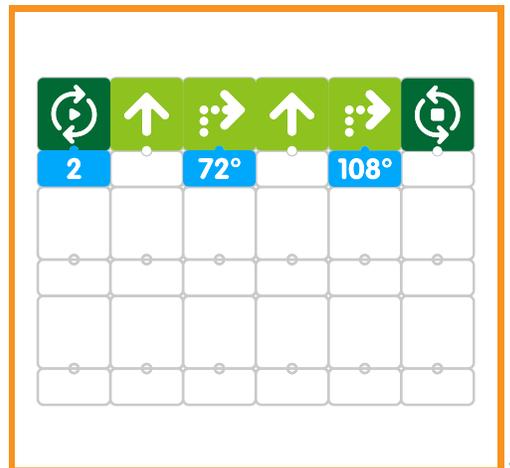
Pentagon with Coding:

- ❯ Students can decorate their shapes using any available material - markers, glitter, yarn, stickers, etc.
- ❯ Explain to students that to assemble their mobile they will need to:
  - ❯ Assemble 2 pieces of dowel perpendicular to each other and use string to tie the 2 pieces of dowel together.
  - ❯ Add a string loop to the middle of the mobile which will be used to suspend the completed mobile.
  - ❯ For each shape, use a piece of ribbon (approximately 12 inches) in length. Tie one end to each shape.
  - ❯ Tie each shape to the dowel. The shapes should be placed so when suspended the mobile hangs level. Students adjust placement of the shapes if needed.
- ❯ Locate a place in classroom to hang mobile.

Closing

Assessment

We have utilized the Matatalab Artist Add-On Set to code various shapes in order to create a decorated hanging mobile. We also coded and created at least three additional and unique shapes that we added to the hanging mobile.

Have students answer the following questions:

- ❱ How difficult was it to create the shapes for which you did not have clues from any Warm-Up Card?
- ❱ What was your favorite part of this project?
- ❱ How successful were you at creating the various shapes for this project?
- ❱ What would you change for this project that may have strengthened or made this project more successful? Why?

Once students have been given a chance to answer and discuss these questions, ask students to draw pictures of each of the shapes they created and write about their experiences with their creations in their journals.

Extensions

We created a hanging mobile and decorated it with various shapes that we coded and created using the Matatalab Art Add-On Set. The decorations we used were shapes themselves.

Imagine how shapes like triangles and squares could be combined to look like different kinds of animals. You could plan out the coding of the coding blocks, angles, and numbers you would need, and create a variety of different shapes using the Matatabot and command tower along with the Matatalab Art Add-On Set. You could create three to four different animals by combining these shapes, and then arrange these animals on a different set of dowels to create a new mobile. You could then decorate these animals with color and other media.

Real World Connections

Hanging mobiles move in response to the movement of air currents. Mobiles are balanced and hung high in the air. There are other types of machines that are high in the air and/or are propelled or move forward through the movement of air currents.

What causes the movement of air currents? What causes wind?
What types of other machines are powered by the movement of air currents? Examples might be sailboats, wind turbines, weathervanes, and other examples.
What role does each of these machines play in our country's economy or in our country's daily life? Explain.

Hanging Mobile Planning Worksheet

Draw a plan or design for your hanging mobile.

Lesson 3 - Hanging Mobile

Put a ✅ *in the box that shows the correct code to draw a triangle with sides 3 steps in length*

☐ [loop 3] [up ↑] [turn left ⬅ 120°] [loop ↻]

☐ [loop 3] [up ↑] [turn left ⬅ 3] [loop ↻]

☐ [loop 3] [up ↑ 3] [turn left ⬅ 120°] [loop ↻]