

## Game of the Snake

Lesson \_\_\_\_

45 minutes with optional Reflection, ELA and Math Extension Activities (15 min each)

3-5th grade, Intermediate Skill Level

*Project Based Learning: Follow directions to build an object to participate in a cooperative game.*

*Duration~1 hour*

### Challenge

- Code Augie to follow a path to play a game and avoid an object.

### CSTA Computer Science Standards

- **3<sup>rd</sup> – 5<sup>th</sup> grade:** L1-3-CD-Use standard input and output devices to successfully operate computers and related technologies.
- **3<sup>rd</sup> – 5<sup>th</sup> grade:** L1-6-CT:1. Understand and use the basic steps in algorithmic problem-solving (e.g., problem statement and exploration, examination of sample instances, design, implementation, and testing).
- **3<sup>rd</sup> – 5<sup>th</sup> grade:** 1B-AP-16 - Take on varying roles, with teacher guidance, when collaborating with peers during the design, implementation, and review stages of program development.

### Common Core Math Standards

- **3<sup>rd</sup> grade:** CC.3.MD.4 Represent and interpret data. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.
- **3<sup>rd</sup> Grade:** CC.3.MD.6 Geometric measurement: understand concepts of area and relate area to multiplication and to addition. Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).
- **3<sup>rd</sup> Grade:** CC.3.MD.C.5 Recognize area as an attribute of plane figures and understand concepts of area measurement.

### Common Core ELA Standards

- **3<sup>rd</sup> Grade:** CC.RL.3.2 Recount stories, including fables, folktales, and myths from diverse cultures; determine the central message, lesson, or moral and explain how it is conveyed through key details in the text.

### Materials

- 1 Augie per group
- 1 tablet per group with the downloaded Augie App
- A teacher Augie, tablet, and projection screen linked to your tablet to demonstrate the Augie app and Coding Control Center.

- Space in your room for the Augies to travel a short distance. 20 x 20 feet, ideally, but suited for smaller area as well.
- String and rulers or tape measures for each group.
- Tape to make a winning square in the playing field.
- Stuffed animal to represent the object to be avoided.
- 8 x 8 paper to fold into a pyramid

### **Preparation**

*Prior to this lesson make sure the tablets and Augie are ready for use in the classroom. This includes:*

- *Download the Augie app on each tablet. Use WILAN setting to download the firmware and upgrade before using Augies in class.*
- *Charge each Augie and tablet.*
- *Check to make sure each Augie can connect to an individual tablet using WILAN. (Using WILAN will download the firmware and provide any upgrades before class. When you are ready to use Augies in class use the LAN setting. )*

*For more support in setting up your Augies and tablets, please visit:*

*[https://www.youtube.com/watch?v=39TDC\\_BAuXY](https://www.youtube.com/watch?v=39TDC_BAuXY)*

### **Narrative**

Mehen, or The Game of the Snake, was an Egyptian Board Game. Remains of this game have been found in the Pyramids of Giza! Historians are not positive how it was played, but they do know there was a grid, and opponents had to get their Snake (game piece) to the center first, before it was removed by a hyena, represented by another player.

Our challenge today is to build a paper pyramid, then use Augie to push the pyramid, racing other teams to the center square. You will be using coding to make your Augie follow a path to the center square, while avoiding an object placed in your way.

(Depending on the age of your students and their experience with technology, you may want to go through these directions as a whole class or allow students to work in groups to figure out how to start Augie themselves.)

### **Part 1: Turning on Augie and Connecting Augie to the Tablet (5 minutes)**

- 1) Turn your Augie upside down and turn Augie to the “on” and “LAN” positions.
- 2) Turn on your tablet and click on the Augie app.
- 3) Go to the Wi-Fi network and choose “Augie-xxxxxx.”
- 4) Return to the Augie app and click the Augie icon.
- 5) Click “Tap to Connect to Augie.” When your Augie shows up, close the screen by clicking the “x”.
- 6) Swipe until you see the “Coding Control Center.” Click on the screen. Now you’re ready to code!

## Part 2: Build Pyramid, Build Gameboard and Code Augie

1) Build a Pyramid using an 8 x 8 piece of paper, following this tutorial. (This could be done the day before if time is short. It took the focus group of 3rd and 4th graders 12 minutes total, including stopping the video and reversing for mistakes. )

<https://www.youtube.com/watch?v=rQScuSNkvr8>

2) Using as large an area as possible, tape off a square in the center of the playing field, and place starting lines 5-10 feet away from the winning square. Place an object (stuffed animal?) in the path of each contestant. Have the students measure the distance from the starting line to the animal in order to add the measurements to the code. Remember to take into account the pyramids' width.

2) Coding Augie to Communicate using the Coding Control Center (20 minutes)

Your challenge today is to code your Augie to travel up to 10 feet pushing an object, while avoiding an object placed in your path. This will require you to push the paper pyramid around the object in the way, which isn't as hard as it might seem, since the pyramid has 4 sides.

The operator of the robot will be randomly picked at game time, so each student needs to be able to operate the robot, and is required to practice.

In the Coding Control Center, click on the yellow + button and then begin coding. After you add codes click on the play button to see what you've made Augie do.

3) Coding Notes: The students will need to first measure the distance to their obstacle, then navigate Augie around the pyramid to push it through a 90 degree turn, then on to the goal. Each of these is an easy option in the coding center. This should not require any backward motion. The focus students were able to push the pyramid, then easily move beside it with three 90 degree turns, then push the pyramid around the obstacle using only 90 degree turns, then on towards the goal.

\*Speed is a variable option in the Augie coding program, and haste towards the goal was important, but it was noted that the slower we went, the easier it was to make sure the pyramid went straight.

5) **CHALLENGE** – Can you push your pyramid back to the starting line?

**Part 3: Practice your race path pushing your pyramid several times. Each student needs to successfully complete this at least once.**

Students can practice implementing their code several times before the actual race.

**Part 4: Taking Care of Augie (5 minutes)**

We can save the program you did today.

- 1) Click on the blue arrow at the top of the screen.
- 2) Type in your program in the space where it says "Custom Program Name". You may want to suggest norms for naming programs, such as: GAME OF THE SNAKE so it's easy for students to find their work.

We take care of Augie by turning Augie off and storing our tablets.

- 1) Turn off Augie on the base.
- 2) Store Augie.
- 3) Leave the App.
- 4) Turn off Tablets and store Tablets.

**Optional Activities**

**Part 5: Reflection (15 minutes)**

Ask students to reflect on coding and working in groups.

**Part 6: ELA Extension (15 minutes)**

- 3<sup>nd</sup> – 5<sup>th</sup> grade Common Core Standards
- Write a quick, dramatic story about how you helped your snake escape the hyena.

**Part 7: Math Extension (15 minutes)**



**Use a ruler or tape measure to measure your race path and answer the following questions.**

- 1) How wide is your pyramid in centimeters?
- 2) How many centimeters to the animal in your path?
- 3) How many centimeters left or right do you need to move to get beside your pyramid?
- 4) What is the angle you need to rotate to face Augie toward the pyramid?

**Math Extension**

Name:

**Plotting Augie's Path**

**Use graph paper to draw Augie's path, the obstacles, and to answer the following questions.**

1)

How many graph squares equals one meter in your design?

2) How many 90 degree turns did Augie make to navigate around the obstacle to reach the goal?