



Fourth and Fifth Grade STEAM Curriculum

Board of Education Presentation • May 10, 2022

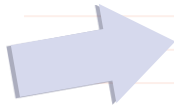
Presentation Overview

1. Introduction to unit one of the fourth grade STEAM Curriculum
 - a. A closer look at the art and science of creating the 'slugs'
 - b. Robotics introduction
 - c. Artifact examination
2. Introduction to unit two of the fourth grade STEAM Curriculum
 - a. Math and creating armatures
 - b. Digital art, beastie friend, and robotics
 - c. Artifact examination
3. Introduction to unit one of the fifth grade STEAM Curriculum
 - a. Learning the basics and terminology of block coding - simple to advanced
 - b. Game design
 - c. Artifact examination
4. Introduction to unit two of the fifth grade STEAM Curriculum
 - a. Engineering and design of newspaper and glue chariot style vehicles
 - b. Combining coding with the engineering project
 - c. Artifact examination

Introduction

4th Grade, Unit 1 - Professional Slugball League

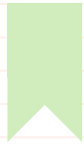
The students learn how to use a vector art program, learn about the external structures of the eyeball, how to engineer a plastic cup into a slug, and then learn how to control their slug through a robotic means.



Profile of a
Graduate:

Design &
Product Creation

Slug Engineering Design Process



Skins

Students are introduced to a professional vector art program, learn to use the different tools and filters while expressing their own creativity.



Eyeballs

Students first learn about the outer structures of the eyeball and then build off their previous knowledge while learning new techniques to create eyeballs of their own design.

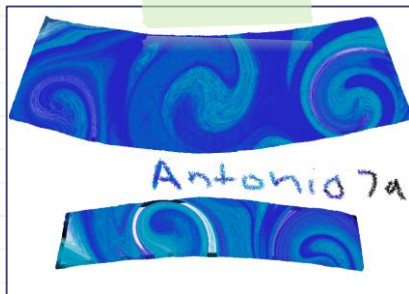
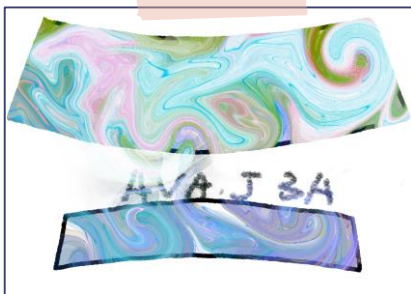


Slugs

After color printing the slugs and eyeballs, the students build their slug with a plastic cup, hot glue, and tape.



Slug Skin Examples



Eyeball Examples



Annelise78



Annelise78



Melilah 78



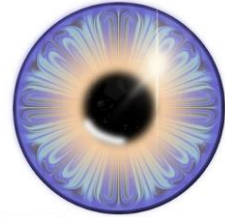
Melilah 78



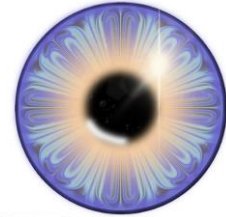
christina 7A



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Completed Slugs - Examples



Front View

Side View



Using their slugs, the students are introduced to robotics by learning how to control their slug via a Sphero Bolt robot while playing a game of slugball.



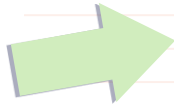
Slugs in Action



Introduction

4th Grade, Unit 2 - My Beastie Friend and I

Building off of their previously acquired knowledge of vector art and robotics, the students will design a digital art version of themselves in the style of a Funko Pop character. They will then design a beastie friend, who is controlled by robotic means, and perform a series of skill based tests while their character is riding their beastie friend.



Profile of a Graduate:

Design & Collective Intelligence

Character Design



01

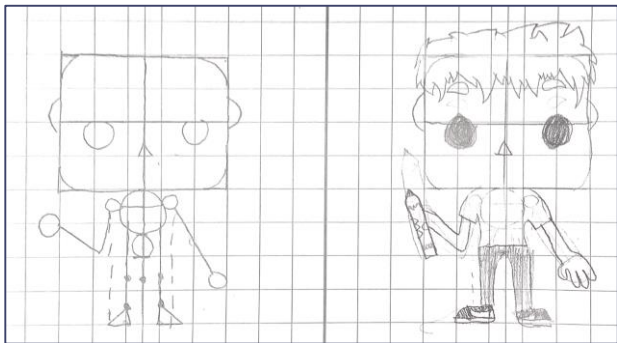
Armatures

The first step in creating a Funko Pop style version of themselves is to learn how to draw an armature. The students learn how to draw and pose an armature before turning that armature into a sketch drawing of themselves.

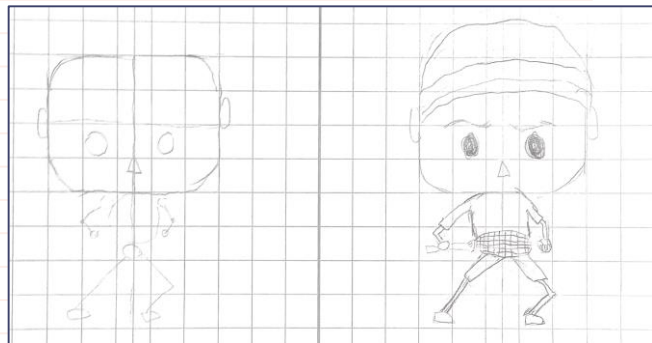
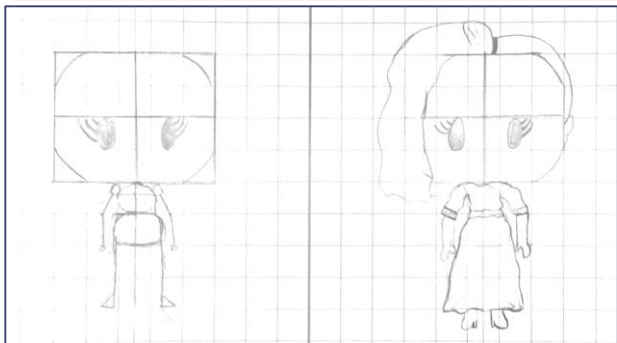
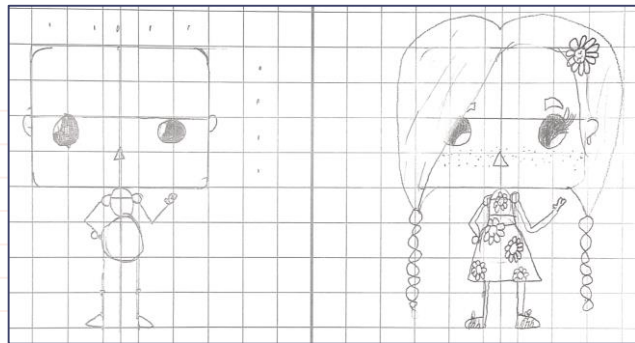
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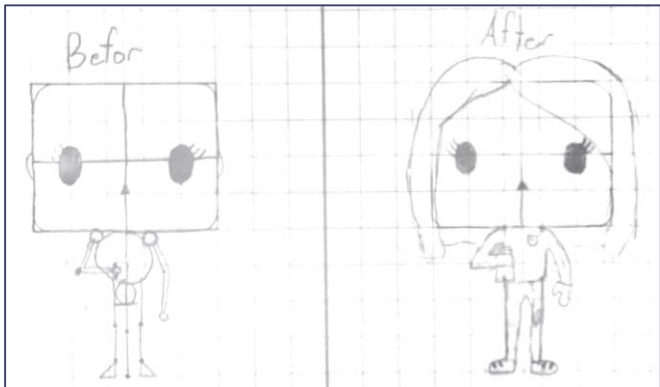
Digital Characters

Once the sketch drawing is complete, the students learn how to transfer the character into a digital format via their iPad. Using their original sketch, the students learn how to turn the sketch into a digitally rendered and colorized character.

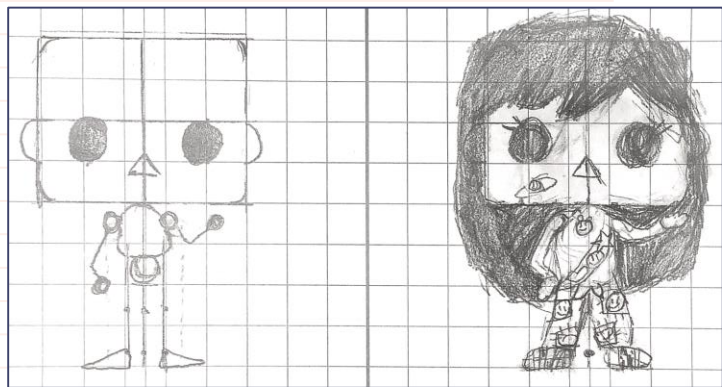
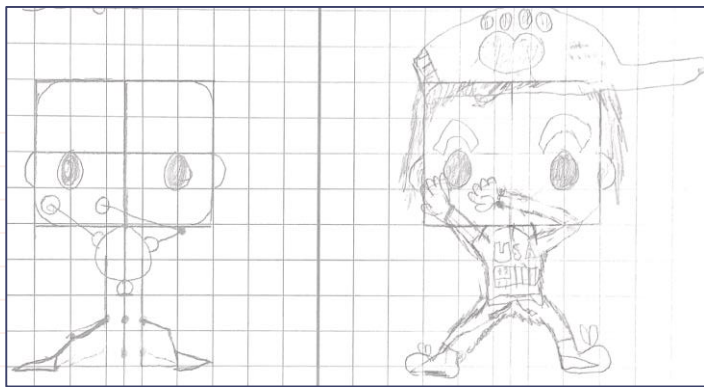


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Oliver
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Beastie Friends



Skills Demonstration

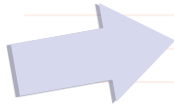
Students show off their robotics skills by navigating their beastie and friend through an obstacle course.



Introduction

5th Grade, Unit 1 - Coding + Robotics

The students learn how to code their Sphero Bolt using block code. They are introduced to all of the categories of blocks that are available to them through a series of coded games. The unit culminates with the students designing their own game to play with Bolt.



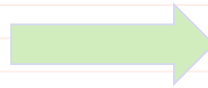
Profile of a Graduate:

Design & Collective Intelligence

We Start Slowly...

```
on start program
roll 0° at 60 speed for 1s
roll 90° at 60 speed for 1s
roll 180° at 60 speed for 1s
roll 270° at 60 speed for 1s

delay for 0s
```



```
on start program
heading 270°
loop 4 times
roll heading + 90 at 60 speed for 1s
delay for 1s
```

Gradually We Build...

```
on start program
set makeACounter to 0
heading 270°
loop until makeACounter == 3
loop 4 times
roll heading + 90 at 60 speed for 1s
delay for 0.5s
set makeACounter to makeACounter + 1
loop makeACounter times
play coin sound and wait
speak That's all folks and wait
```

The image shows a Scratch script with the following blocks:

- on start program
- set makeACounter to 0
- heading 270°
- loop until makeACounter == 3
- loop 4 times
 - roll heading + 90 at 60 speed for 1s
 - delay for 0.5s
- set makeACounter to makeACounter + 1
- loop makeACounter times
 - play coin sound and wait
- speak That's all folks and wait

Until We Can Build Some Complex Programs...

The image displays four Scratch code snippets, each defining a function. Each snippet starts with a 'define' block followed by a function name in a light green box. The functions are:

- clapYourHands:** A 'speak' block with 'Clap Your Hands' and 'wait', a 'matrix animation' block with a grid icon and a 'loop' block, a 'delay for' block set to '2s', and a 'clear matrix' block.
- stompYourFeet:** A 'speak' block with 'Stomp Your Feet' and 'continue', a 'matrix animation' block with a grid icon and a 'loop' block, a 'delay for' block set to '2s', and a 'clear matrix' block.
- spinAround:** A 'speak' block with 'Spin Around' and 'continue', a 'matrix animation' block with a grid icon and a 'loop' block, a 'raw motor left' block with '255', 'right' with '-255', and 'for' with '1.5s', a 'delay for' block set to '1s', and a 'clear matrix' block.
- jumpAround:** A 'speak' block with 'Jump up and down' and 'continue', a 'matrix animation' block with a grid icon and a 'loop' block, a 'raw motor left' block with '255', 'right' with '255', and 'for' with '1.5s', a 'delay for' block set to '1s', and a 'clear matrix' block.

Culminating in Student Created Games

Rock, Paper, Scissors

```
on start program
  speak "When the light is blue, shake me. When the light flashes white select rock, paper or scissors." and wait

loop forever
  stabilization off
  main.LED on
  if total > accelerometer > 3 then
    set pickANumber to random int from 1 to 3
    shake for 0.2s 3 times
    play ding sound and wait
    if pickANumber == 1 then
      speak "Rock" and wait
      matrix animation loop
      delay for 2s
      clear matrix
    else
      if pickANumber == 2 then
        speak "Paper" and wait
        matrix animation loop
        delay for 2s
        clear matrix
      else
        speak "Scissors" and wait
        matrix animation loop
        delay for 2s
        clear matrix
```

```
on start program
  set notff to true
  if notff then
    loop forever
      matrix animation [cat] loop
      roll random int from heading + 90 to 270 at random int from 175 to 255 speed for random int from 2 to 4
      evade channels: 0 and 1
  else
    loop forever
      broadcast channels: 0 and 1
      matrix animation [matrix] loop
      roll random int from heading + 90 to 270 at random int from 125 to 175 speed for random int from 2 to 4
```

```
on collision
  if notff then
    matrix animation [matrix] loop
    loop 3 times
      spin 90° for 0.3s
      spin -90° for 0.3s
    play sad sound and continue
  loop forever
    follow channels: 6 and 7
    broadcast channels: 0 and 1
    matrix animation [matrix] loop
    roll random int from heading + 90 to 270 at random int from 125 to 175
    send message 4 at intensity 1
  else
    loop forever
      matrix animation [cat] loop
      roll random int from heading + 90 to 270 at random int from 175 to 255
      evade channels: 0 and 1
```

A game of tag

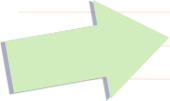
```
on start program
  set theColor to true
  if theColor then
    speak "When the light is blue, shake me. When the light flashes white select rock, paper or scissors." and wait
  loop forever
    stabilization off
    main LED
    if colorChoice == 1 then
      speak "Red" and wait
      send message 0 at intensity 5
      matrix animation loop
      delay for 2s
      clear matrix
    else
      if colorChoice == 2 then
        speak "Yellow" and wait
        send message 1 at intensity 5
        matrix animation loop
        delay for 2s
        clear matrix
      else
        speak "Green" and wait
        send message 2 at intensity 5
        matrix animation loop
        delay for 2s
        clear matrix
  if false then
    on message 0 received
      if theColor then
        stop
    on message 1 received
      if theColor then
        rot 0 at 60 speed for 2s
        stop
    on message 2 received
      if theColor then
        rot 0 at 120 speed for 2s
        stop
```

Red Light, Green Light



Introduction

5th Grade, Unit 2 - Paper Engineering



In this first part of this unit, the students are introduced to design with paper engineering. The students use newspaper and glue to design a chariot style vehicle that can be powered by their Bolt. In the second part of the unit, the students code their Bolt to travel five times around the racetrack without hitting the sides or center divider.

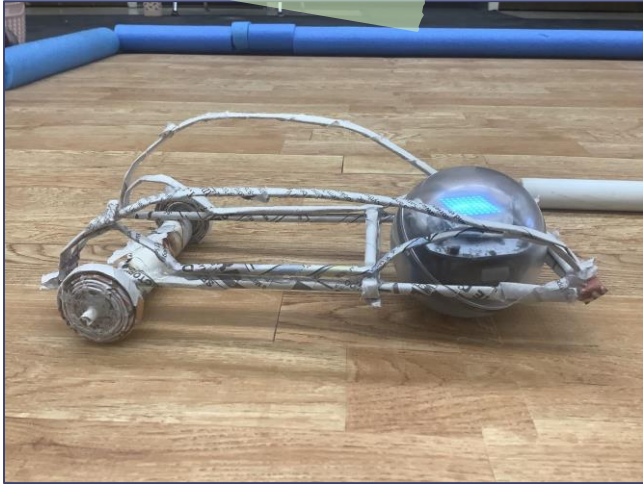


Profile of a Graduate:
Design & Product Creation

Materials



The Designs



The Designs



The Designs



The Designs



Code in All Shapes and Sizes

```
on start program
  set long to 3.985
  set short to 1.7500001
  matrix animation
  heading 270°
  loop 10 times
    stop
    roll heading + 90 at 110 speed for long
    delay for 1s
    stop
    roll heading + 90 at 110 speed for short
    delay for 1s
```

The image shows a Scratch script with the following blocks: 'on start program', 'set long to 3.985', 'set short to 1.7500001', 'matrix animation', 'heading 270°', 'loop 10 times', 'stop', 'roll heading + 90 at 110 speed for long', 'delay for 1s', 'stop', 'roll heading + 90 at 110 speed for short', and 'delay for 1s'.

```
on start program
  firstWay
  secondWay
  thirdWay
  fourthWay
  f1
  secondWay
  t3L2
  fourthWay
  loop 3 times
    f1
    secondWay
    t3L5
    fourthWay
  matrix animation
  exit program
```

```
define firstWay
  roll 0° at 150 speed for 4.25s
  delay for 1s
```

```
define secondWay
  roll 270° at 150 speed for 1.5s
  delay for 1s
```

```
define thirdWay
  roll 180° at 150 speed for 3.75s
  delay for 1s
```

```
define fourthWay
  roll 90° at 150 speed for 1.5s
  delay for 1s
```

```
define f1
  roll 0° at 150 speed for 3.5s
  delay for 1s
```

```
define t3L2
  roll 180° at 150 speed for 3.6s
  delay for 1s
```

```
define t3L5
  roll 180° at 150 speed for 3.6s
  delay for 1s
```

```
on start program
  set goStraight to 3
  set goLeft to 1.5
  set goRight to 3
  set goBack to 1.5
  set makeACounter to 0
  loop 5 times
    roll 0° at 95 speed for 4.3s
    delay for 1s
    roll 270° at 95 speed for 1.6s
    delay for 1s
    roll 180° at 95 speed for 4.3s
    delay for 1s
    roll 90° at 95 speed for 1.7s
    delay for 1s
  set makeACounter to makeACounter + 1
  LapCount
```

```
define LapCount
  if makeACounter == 1 then
    speak 1 and wait
  else
    if makeACounter == 2 then
      speak 2 and wait
    else
      if makeACounter == 3 then
        speak 3 and wait
      else
        if makeACounter == 4 then
          speak 4 and wait
        else
          speak 5 and wait
```