## LESSON 1: ALGORITHMS - TANGRAMS (UNPLUGGED)

<table>
<thead>
<tr>
<th>Objectives</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>● Tackle the challenge of translating an image into actionable instructions</td>
<td></td>
</tr>
<tr>
<td>● Convey instructions to teammates in order to reproduce an image</td>
<td></td>
</tr>
<tr>
<td>● Analyze the work of teammates to determine whether an outcome was successful</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Themes</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Algorithms, Sequence</td>
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<table>
<thead>
<tr>
<th>Practices</th>
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<tbody>
<tr>
<td>Creativity, Collaboration, Communication, Persistence, Problem Solving</td>
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<table>
<thead>
<tr>
<th>Standards</th>
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<tbody>
<tr>
<td>ISTE: 1c, 2d, 4b, 6c</td>
<td></td>
</tr>
<tr>
<td>CSTA: CT.L1:6.01, CT.L1:6.02, CPP.L1:6.05</td>
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</tr>
<tr>
<td>NGSS: 3-5-ETS1-2</td>
<td></td>
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<tr>
<td>CC Mathematical Practices: 1, 6</td>
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<tr>
<td>CC Math Standards: 3.G.A.1, 5.G.B.3</td>
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</tr>
<tr>
<td>CC ELA: L.3.6, L.4.6, L.5.6</td>
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## LESSON 2: MAZE AND BEE

<table>
<thead>
<tr>
<th>Objectives</th>
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</thead>
<tbody>
<tr>
<td>● Create a program for a given task using sequential steps</td>
<td></td>
</tr>
<tr>
<td>● Count the number of times an action should be repeated and represent it as a loop</td>
<td></td>
</tr>
<tr>
<td>● Analyze a problem and complete it as efficiently as possible</td>
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<tr>
<td>● Employ conditional statements to assess which actions are correct for a given step</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Themes</th>
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</thead>
<tbody>
<tr>
<td>Algorithms, Computing Practice, Programming</td>
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<table>
<thead>
<tr>
<th>Practices</th>
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</thead>
<tbody>
<tr>
<td>Persistence, Problem Solving</td>
<td></td>
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</tbody>
</table>
## LESSON 3: ARTIST - LOOPS REVIEW

**Objectives**
- Create programs that utilize repetition to create gorgeous designs
- Use trial and error to recreate detailed designs in proper scale
- Divide the number of degrees in a circle into even segments
- Calculate the angles in equilateral and 30 60 90 triangles
- Decompose a shape into its smallest repeatable sequence

**Themes**
Loops, Computing Practice, Programming

**Practices**
Persistence, Problem Solving

**Standards**
ISTE: 1a, 1b, 1c, 4b, 6a, 6c, 6d,
CSTA: CL.L1:3-02, CT.L1:3-01, CT.L2-01, CT.L2-06, CT.L2-08, CT.L2-12, CPP.L1:6-05, CPP.L1:6-06, CPP.L2-05
NGSS: 3-5-ETS1-2
CC Mathematical Practices: 1, 2, 5, 6, 7, 8
CC Math Standards: 3.OA.3, 3.MD.C.6
CC ELA: L.3.6, L.4.6, L.5.6

## LESSON 4: VARIABLES IN ENVELOPES (UNPLUGGED)

**Objectives**
- Identify variables and determine their values
- Define and call variables in the context of real-life activities
- Create situations which require the use of variables
- Utilize teamwork to enrich creative gameplay

**Themes**
Variables, Abstraction
<table>
<thead>
<tr>
<th>Practices</th>
<th>Creativity, Collaboration, Communication, Problem Solving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standards</td>
<td>ISTE: 1c, 2d, 4b, 6c</td>
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<tr>
<td></td>
<td>CSTA: CL.L2-03, CT.L1:6-01, CT.L1:6-02, CPP.L1:6-05</td>
</tr>
<tr>
<td></td>
<td>NGSS: 3-5-ETS1-1</td>
</tr>
<tr>
<td></td>
<td>CC Mathematical Practices: 2, 6, 7, 8</td>
</tr>
<tr>
<td></td>
<td>CC ELA: L.3.6, L.4.6, L.5.6</td>
</tr>
</tbody>
</table>

### LESSON 5: ABSTRACTION WITH MAD GLIBS (UNPLUGGED)

#### Objectives
- Have the chance to internalize the idea of “abstraction”
- Combine writing and abstraction to test their own creativity
- Analyze their day to find differences that they can turn into similarities

#### Themes
Abstraction, Pattern Matching

#### Practices
Creativity, Collaboration, Communication, Problem Solving

#### Standards
ISTE: 1a, 1c, 2d, 4b
CSTA: CL.L2-03, CT.L1:6-01, CT.L1:6-02, CT.L2-12
CC Mathematical Practices: 2, 6, 7, 8
CC ELA: L.3.6, L.4.6, L.5.6

### LESSON 6: ARTIST - VARIABLES

#### Objectives
- Create programs that utilize repetition to create gorgeous designs
- Use trial and error to recreate detailed designs in proper scale
- Calculate angles by dividing 360 by the number of sides in a polygon
- Decompose a shape into its smallest repeatable sequence

#### Themes
Variables, Computing Practice, Programming

#### Practices
Persistence, Problem Solving
### LESSON 7: PLAY LAB - VARIABLES

**Objectives**
- Identify the numbers that are responsible for specific elements of a program
- Create a game that incorporates numerical parameters
- Replace numbers with descriptive variables

**Themes**
- Variables,
- Computing Practice,
- Programming

**Practices**
- Persistence,
- Problem Solving

**Standards**
- ISTE: 1a, 1b, 1c, 4b, 6a, 6c, 6d
- CSTA: CL.L1:3-01, CL.L1:3-02, CT.L2-01, CT.L2-06, CT.L2-12, CPP.L1:6-05, CPP.L1:6-06
- NGSS: 3-5-ETS1-2
- CC Mathematical Practices: 1, 2, 4, 6, 7, 8
- CC ELA: L.3.6, L.4.6, L.5.6

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### LESSON 8: FOR LOOP FUN (UNPLUGGED)

**Objectives**
- Determine starting value, stopping value, and interval of “for loop”
- Illustrate the counter values hit each time through a for loop during runtime

**Themes**
- Loops

**Practices**
- Creativity,
- Collaboration,
- Communication

**Standards**
- ISTE: 1a, 1b, 1c, 4b, 6a, 6c, 6d
- CSTA: CL.L1:3-02, CT.L1:3-01, CT.L2-01, CT.L2-12, CT.L2-14, CT.L3A-03, CPP.L1:3-03, CPP.L1:6-05, CPP.L1:6-06, CPP.L2-08
- NGSS: 3-5-ETS1-2
- CC Mathematical Practices: 1, 2, 4, 6, 7, 8
- CC Math Standards: 4.NBT.B.4
- CC ELA: L.3.6, L.4.6, L.5.6
**LESSON 9: BEE - FOR LOOPS**

**Objectives**
- Break one long sequence of steps into shorter looped sequences
- Use the "for loop" structure to repeat an action a variable number of times each iteration.

**Themes**
Loops, For Loops, Computing Practice, Programming

**Practices**
Persistence, Problem Solving

**Standards**
- ISTE: 1a, 1c, 4b, 6a, 6c, 6d
- CSTA: CT.L1:3-01, CT.L1:3-02, CT.L1:6-01, CT.L2-01, CT.L2-06, CT.L2-12, CT.L2-14, CT.L3A-03, CPP.L1:6-05, CPP.L1:6-06
- NGSS: 3-5-ETS1-2
- Mathematical Practices: 1, 2, 4, 6, 7, 8
- CC ELA: L.3.6, L.4.6, L.5.6

**LESSON 10: ARTIST - FOR LOOPS**

**Objectives**
- Predict the number of steps needed to increment in each for loop iteration
- Determine start and stop values for multiple for loop examples

**Themes**
Loops, For Loops, Computing Practice, Programming

**Practices**
Problem Solving, Programming
Standards
ISTE: 1a, 1b, 1c, 4b, 6a, 6c, 6d
CSTA: CT.L1:3-01, CT.L1:3-02, CT.L1:6-01, CT.L2-01, CT.L2-06, CT.L2-12, CT.L2-14, CT.L3A-03, CPP.L1:6-05, CPP.L1:6-06, CPP.L2-08
NGSS: 3-5-ETS1-2
CC Mathematical Practices: 1, 2, 4, 6, 7, 8
CC ELA: L.3.6, L.4.6, L.5.6

LESSON 11: PLAY LAB - FOR LOOPS

Objectives
- Utilize for loops to count from 1 to 100
- Count by tens repeatedly using the for loop structure
- Employ skills from previous lessons to create more difficult looping algorithms

Themes
Loops, For Loops, Computing Practice, Programming

Practices
Persistence, Problem Solving

Standards
ISTE: 1a, 1c, 6a, 6c, 6d
CSTA: CL.L1:3-02, CT.L1:3-01, CPP.L1:6-05, CPP.L1:6-06, CT.L2-01, CT.L2-06, CT.L2-12, CT.L2-14, CT.L3A-03
NGSS: 3-5-ETS1-2
CC Mathematical Practices: 1, 2, 4, 6, 7, 8
CC Math Standards: 3.OA.3, 4.NBT.B.4
CC ELA: L.3.6, L.4.6, L.5.6

LESSON 12: ARTIST - FUNCTIONS

Objectives
- Identify repeated movements and utilize functions to simplify their program
- Use trial and error to re-create complex patterns
- Break complex tasks into smaller repeatable sections
- Combine simple shapes into complex designs with functions
### Themes
- Functions, Computing Practice, Programming

### Practices
- Persistence, Problem Solving

### Standards
- ISTE: 1a, 1b, 1c, 4b, 6a, 6c, 6d
- CSTA: CL.L1:3-02, CT.L1:3-01, CT.L1:6-01, CT.L2-01, CT.L2-06, CT.L2-08, CT.L2-12, CT.L2-14, CT.L3A:01, CT.L3A-03, CPP.L1:6-05, CPP.L1:6-06, CPP.L2-08
- NGSS: 3-5-ETS1-2
- Mathematical Practices: 1, 2, 4, 5, 6, 7, 8
- CC ELA: L.3.6, L.4.6, L.5.6

### LESSON 13: SONGWRITING WITH PARAMETERS (UNPLUGGED)

#### Objectives
- Locate repeating phrases inside song lyrics
- Identify sections of a song to pull into a function (chorus)
- Modify functions to accept parameters
- Describe how functions and parameters can make programs easier to write

#### Themes
- Functions, Variables

#### Practices
- Creativity, Collaboration, Communication, Problem Solving

#### Standards
- ISTE: 1a, 1c, 2a, 2d, 4b, 4d
- CSTA: CL.L1:3-02, CT.L2-01, CT.L2-06, CT.L2-07, CT.L2-08, CT.L2-12, CT.L2-14, CT.L3A-01, CT.L3A-03, CPP.L1:6-05
- NGSS: 3-5-ETS1-2
- CC Mathematical Practices: 1, 2, 3, 6, 7, 8
- CC ELA: SL.3.1.D, SL.3.3, RL.3.1, L.3.6, L.4.6, L.5.6

### LESSON 14: ARTIST - FUNCTIONS WITH PARAMETERS
<table>
<thead>
<tr>
<th>Objectives</th>
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<tbody>
<tr>
<td>Identify repeated movements and utilize</td>
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<tr>
<td>functions to simplify a program</td>
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</tr>
<tr>
<td>Break complex tasks into smaller</td>
<td></td>
</tr>
<tr>
<td>repeatable sections</td>
<td></td>
</tr>
<tr>
<td>Combine simple shapes into complex</td>
<td></td>
</tr>
<tr>
<td>designs with functions</td>
<td></td>
</tr>
<tr>
<td>Utilize parameters to make one function</td>
<td></td>
</tr>
<tr>
<td>work for multiple purposes</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Themes</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Functions, Variables, Computing Practice,</td>
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<tr>
<td>Programming</td>
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<table>
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<tr>
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<tbody>
<tr>
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<td></td>
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<table>
<thead>
<tr>
<th>Standards</th>
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<tbody>
<tr>
<td>ISTE: 1a, 1b, 1c, 4b, 6a, 6c, 6d</td>
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<tr>
<td>CSTA: C.L.1.3-02, C.T.1.3-01, C.T.1.6-01</td>
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<td>C.T.2-01, C.T.2-06, C.T.2-07, C.T.2-08,</td>
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<td>C.T.2-12, C.T.2-14, C.T.3A-01, C.T.3A-03</td>
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<td>C.PP.L1.6-05, C.PP.L1.6-06, C.PP.L2-08</td>
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<td>NGSS: 3-5-ETS1-2</td>
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<td>Mathematical Practices: 1, 2, 4, 5, 6,</td>
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<td>6, 7, 8</td>
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<td>CC Math Standards: 3.OA.3, 3.MD.C.6,</td>
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<td>4.NBT.B.4, 4.MD.A.3, 4.MD.C.5, 4.MD.C.7,</td>
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**LESSON 15: PLAY LAB - FUNCTIONS WITH PARAMETERS**

<table>
<thead>
<tr>
<th>Objectives</th>
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</thead>
<tbody>
<tr>
<td>Identify repeated movements and utilize</td>
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</tr>
<tr>
<td>functions to simplify a program</td>
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</tr>
<tr>
<td>Utilize parameters to make one function</td>
<td></td>
</tr>
<tr>
<td>work for multiple purposes</td>
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</tr>
<tr>
<td>Adapt their understanding of functions</td>
<td></td>
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<tr>
<td>to allow for the use of multiple</td>
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</tr>
<tr>
<td>parameters</td>
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<table>
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<tr>
<th>Themes</th>
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<td>Functions, Variables, Computing Practice,</td>
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<td>Programming</td>
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<table>
<thead>
<tr>
<th>Practices</th>
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<tbody>
<tr>
<td>Persistence, Problem Solving</td>
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<tr>
<td>ISTE: 1a, 1b, 1c, 4b, 6a, 6c, 6d</td>
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<tr>
<td>CSTA: C.T.1.3-01, C.L.1.3-02, C.L.1.6-01</td>
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<td>C.T.2-01, C.T.2-06, C.T.2-07, C.T.2-12,</td>
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<td>C.T.2-14, C.T.3A-03, C.PP.L1.6-05, C.PP.</td>
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<td>L1.6-06, C.PP.L2-08</td>
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<td>NGSS: 3-5-ETS1-2</td>
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<td>CC Mathematical Practices: 1, 2, 4, 6,</td>
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<td>7, 8</td>
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<td>CC Math Standards: 4.NBT.B.4</td>
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<tr>
<td>CC ELA: L.3.6, L.4.6, L.5.6</td>
<td></td>
</tr>
</tbody>
</table>
## LESSON 16: BEE - FUNCTIONS WITH PARAMETERS

| Objectives       | Edit existing functions to make them work for specific tasks  
|                  | Combine similar functions into a single one by utilizing parameters |
| Themes           | Functions, Variables, Computing Practice, Programming |
| Practices        | Persistence, Problem Solving |
| Standards        | ISTE: 1a, 1c, 4b, 6a, 6c, 6d  
|                  | CSTA: CL.L1:3-02, CT.L1:3-01, CT.L1:6-01, CT.L2-01, CT.L2-06, CT.L2-12, CT.L2-14, CT.L3A-03, CPP.L1:6-05, CPP.L1:6-06  
|                  | NGSS: 3-5-ETS1-2  
|                  | CC Mathematical Practices: 1, 2, 4, 6, 7, 8  
|                  | CC Math Standards: 4.OA.C.5  
|                  | CC ELA: L.3.6, L.4.6, L.5.6 |

## LESSON 17: BINARY IMAGES (UNPLUGGED)

| Objectives       | Identify methods for encoding images into binary  
|                  | Relate images to a peer using binary encoding  
|                  | Reproduce an image, based on binary code |
| Themes           | Binary |
| Practices        | Creativity, Collaboration, Communication, Persistence, Problem Solving |
LESSON 18: ARTIST - BINARY

Objectives
- Match binary sequences to encoded images
- Utilize loops and binary code to recreate provided images
- Identify repeated sequences and break long codes up into smaller chunks that can be looped
- Create pictures using unique combinations of on and off

Themes
Binary, Computing Practice, Programming

Practices
Persistence, Problem Solving

Standards
ISTE: 1c, 2d, 4b, 4d, 6d
CSTA: CL.L1:3-02, CL.L1:6-01, CL.L2-03, CT.L2-06, CT.L2-07, CT.L2-14, CT.L3A-05, CT.L3B-07, CT.L1:6-02
NGSS: 3-5-ETS1-2
CC Mathematical Practices: 1, 2, 4, 6, 7, 8
CC Math Standards: 4.OA.C.5
CC ELA: L.3.6, L.4.6, L.5.6

LESSON 19: SUPER CHALLENGE - VARIABLES

Objectives
- Create programs that utilize repetition to create gorgeous designs
- Decompose large, difficult puzzles into manageable pieces
- Use variables to capture patterns in complex tasks

Standards
ISTE: 1a, 1b, 1c, 4b, 6a, 6c, 6d
CSTA: CL.L1:3-02, CT.L1:3-01, CT.L1:6-01, CT.L2-01, CT.L2-06, CT.L2-07, CT.L2-12, CT.L2-14, CT.L3A-03, CT.L3B-07, CPP.L1:6-05, CPP.L1:6-06
NGSS: 3-5-ETS1-2
CC Mathematical Practices: 1, 2, 4, 6, 7, 8
CC Math Standards: 4.OA.C.5
CC ELA: L.3.6, L.4.6, L.5.6
### LESSON 20: SUPER CHALLENGE - FOR LOOPS

#### Objectives
- Predict the number of steps needed to increment in each for loop iteration
- Determine how to use a for loop in a way that makes sense for each unique puzzle
- Decompose large complex problems into smaller pieces

#### Themes
- Loops, For Loops, Abstraction, Computing Practice, Programming

#### Practices
- Creativity, Persistence, Problem Solving

#### Standards
- ISTE: 1a, 1c, 4b, 6a, 6c, 6d
- CSTA: CT.L1.3-01, CL.L1.3-02, CT.L1.6-01, CT.L2-01, CT.L2-06, CT.L2-12, CT.L2-14, CT.L3A-03, CPP.L1.6-05, CPP.L1.6-06
- NGSS: 3-5-ETS1-2
- CC Mathematical Practices: 1, 2, 4, 6, 7, 8
- CC ELA: L.3.6, L.4.6, L.5.6

### LESSON 21: SUPER CHALLENGE - FUNCTIONS WITH PARAMETERS

#### Themes
- Variables, Abstraction, Computing Practice, Programming

#### Practices
- Persistence, Problem Solving

#### Standards
- ISTE: 1a, 1c, 4b, 6a, 6c, 6d
- CSTA: CT.L1.3-01, CL.L1.3-02, CT.L1.6-01, CT.L2-01, CT.L2-06, CT.L2-12, CT.L2-14, CT.L3A-03, CPP.L1.6-05, CPP.L1.6-06
- NGSS: 3-5-ETS1-2
- CC Mathematical Practices: 1, 2, 4, 6, 7, 8
- CC ELA: L.3.6, L.4.6, L.5.6
| **Objectives** | ● Look for patterns where they can implement functions  
● Utilize parameters to make a single function work for multiple problems |

| **Themes** | Functions, Variables, Abstraction, Computing Practice, Programming |

| **Practices** | Creativity, Persistence, Problem Solving |

| **Standards** | ISTE: 1a, 1c, 4b, 6a, 6c, 6d  
CSTA: CT.L1:3-01, CL.L1:3-02, CT.L1:6-01, CT.L2-01, CT.L2-06, CT.L2-12, CT.L2-14, CT.L3A-03, CPP.L1:6-05, CPP.L1:6-06  
NGSS: 3-5-ETS1-2  
CC Mathematical Practices: 1, 2, 4, 6, 7, 8  
CC ELA: L.3.6, L.4.6, L.5.6 |

### LESSON 22: EXTREME CHALLENGE - COMPREHENSIVE

| **Objectives** | ● Choose from many techniques to find the one that best suits each problem  
● Think critically about what they need to accomplish, given the tools that they have |

| **Themes** | Loops, For Loops, Functions, Variables, Computing Practice, Programming |

| **Practices** | Creativity, Persistence, Problem Solving |

| **Standards** | ISTE: 1a, 1c, 4b, 6a, 6c, 6d  
CSTA: CT.L1:3-01, CL.L1:3-02, CT.L1:6-01, CT.L2-01, CT.L2-06, CT.L2-12, CT.L2-14, CT.L3A-03, CPP.L1:6-05, CPP.L1:6-06  
NGSS: 3-5-ETS1-2  
CC Mathematical Practices: 1, 2, 4, 6, 7, 8  
CC Math Standards: 3.MD.C.6, 4.NBT.B.4  
CC ELA: L.3.6, L.4.6, L.5.6 |