

“Extending the CTE-STEM Pipeline into Middle Schools”

Design for Change with P5.js

Solutionary Phase	Fundamentals
Lesson # and title	Lesson 3: Functions and Ice Cream Cone Designs
Duration	45 minutes
Purpose	Students learn how functions work and investigate how to use the translation() function to move objects.
Outcome	Students use a function and translations to create a design with a repeating object.

Lesson Overview

In this lesson, students build on the previous lesson by using basic shapes and colors to create a function in P5.js. Students investigate how functions can be used in a coordinate system to translate and replicate shapes. Students finish the lesson by completing a challenge problem to create a design using an ice cream cone function and a self-assessment rubric.

Learning Objectives

- Reflect on the previous lesson’s challenge problem - create a logo.
- Write a new function called iceCream() which creates an ice cream cone.
- Investigate how functions can be used to replicate shapes.
- Explore translation across a coordinate plane with the translate() function.
- Complete a challenge problem to replicate a shape using repeated function calls.

Content Standard(s)

CA NGSS, EP&Cs, CCSS-ELA, CCSS-Math, EP&Cs, History/Social Studies, Visual and Performing Arts, Computer Science, Health, CTE, PE
Insert the standards’ codes and language verbatim

CS Standards:

2-AP-15. Seek and incorporate feedback from team members and users to refine a solution that meets user needs.

2-AP-16. Incorporate existing code, media, and libraries into original programs, and give attribution.

College and Career Connection(s)

This lesson allows students to explore new features and build skills in computer programming and the role that programmers play in designing and creating programs to meet consumer needs.

Equipment, Instructional Resources, and Materials

- Computer with projector (teacher)
- Access to digital curriculum resources (teacher)
- Computers (one per student)
- Internet access

Suggested Student Grouping

It's recommended that students work in pairs through parallel programming, where two students sit side-by-side and complete tasks on their own, but they share ideas, discoveries and questions with each other. This lesson can also be completed with students working independently. Group work (3 or more) is not recommended for this lesson.

Vocabulary

Translate - a geometric transformation that moves every point of a figure by the same distance in a given direction, often referred to as "sliding."

Function - a set of statements that perform a task in a computer program, and may include parameters.

Parameter - a variable that can be assigned a value when calling the function.

Coordinate Plane - a two-dimensional surface created by the intersection of two lines, the x-axis and the y-axis.

The Lesson

Preparation

For this lesson, teachers should review the lesson slide show and watch videos included with Lesson 3 which cover the lesson topics. Teachers should also familiarize themselves with the [Ice Cream Cone Starter Project](#). Teachers should have a computer with an internet connection and a device for projecting the computer screen for students to see.

Lesson Procedure

Link to Lesson Slide Deck: [Lesson 3 Slide Deck](#)

Activity/Task	Description	Time (min)
Exploration: Share Your Logo Design	Students do a think-pair-share with the previous lesson's challenge problem. Students receive feedback on their logo designs.	10-15 min
Lesson: Functions Introduced & Defined	Students learn the definition of functions in computer programming.	10-15 min
Exploration: PPC Ice Cream Cone Starter Project	Students do parts, purposes and complexities thinking routine on the Ice Cream Cone Starter Project.	10-15 min
Lesson: Add push(), pop() and translate() to the iceCream() function.	Teachers work with students to create an iceCream() function using the Ice Cream Cone Starter Project. Students add the push, pop() and translate() functions to create a starter project for the challenge.	10-15 min
Challenge: Create a design using iceCream()	Students use the iceCream() function to create a design and complete a self-assessment rubric.	10-15 min plus homework

Assessment

- Students will submit [a completed PPC slide](#) and/or handout for the iceCream() function in class.
- Students will submit a completed ice cream cone design using the iceCream() function as a homework assignment.

- Students will submit a slide and/or handout for [a self-assessment rubric](#) for the iceCream() function design challenge.