



Duck, Duck, Loops

Educator's Guide

Overview

CS Hands-On is a 501(c)(3) nonprofit teaching computational thinking skills through technology-free lessons and activities. This curriculum is built to teach fundamental computer science concepts in an engaging, hands-on way. In this mission, students use for loops to play a spin-off of the game Duck Duck Goose.

Prerequisite Knowledge

Student should have completed the Looping Dance Party and Wacky While Loops activities, which introduce the concept of loops and while loops.

Lesson Details

At Patteron, students will learn to find and distinguish different patterns with Pancho the Snail. Students will learn the structure and syntax of a for loop, then use for loops to play a game of Duck Duck Loops.

This lesson was developed for students ages 8 to 13 and can be modified for all skills and ages. This lesson takes around 30 minutes.

Learning Objectives

Key Question

How can you create a for loop and use for loops to play Duck Duck Loops?

Key Terms

For loop: A type of loop that repeats a set of instructions a specific number of times using a start, end, and increment value

Curriculum Standards

Students should be able to...

- Explain how for loops are created and used (Patterns)
- Read, write, and interpret for loops (Literacy)
- Act out the process of a for loop (Creative Arts)

[View standards addressed here](#)



Lesson Plan

Materials

- Duck, Duck, Loops worksheet (per student)
- A pair of dice (per group)

Setup

- Hand out a Duck, Duck, Loops worksheet to each student
- Set up your classroom to have space for students to sit in a circle

ANSWER KEY & LESSON ANNOTATIONS

Name: _____ Date: _____

Duck, Duck, Loops

Loop de Loop

Ready to loop around for another trip at Patteron? Today, Pancho will show you the fabulous fun of for loops!

What are For Loops?

A **for loops** repeats actions over and over, for a specified number of times.

For loops have a **start**, an **end**, and an **increment** to keep track of how many times to repeat its instructions. An **increment** is a number we want to increase our count by.

Follow along to see how we can make our own for loops!

start end increment
↓ ↓ ↓
For counting from 0 to 5 and incrementing by 1,
Do a jumping jack

Let's break this down! The for loop counts from 0 and begins to perform the action below, which is to do a jumping jack. Once that is complete, they increment the count by 1, making 0 now 1. We continue this until we count to 5, our end value.

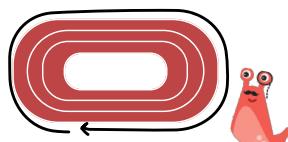
Educator Note

It may be helpful to demonstrate more examples with the class before moving on. Some examples can be repeating the action of tying knots to form a friendship bracelet or repeating the action of soccer drills at soccer practice.

Brainstorm as a class what actions students repeat, and try to write them as a for loop!

Gym Class

Let's look at an example. Every day, Pancho loves to run around his school track. Pancho will be running 3 laps for his workout today, increasing his speed by 0.2mph each time. Here's how to represent his workout in a for loop:



First Pancho jots down the start, end, and increment:

Start at 0 laps (we're starting with 0 laps)
End at 3 laps (we want to count until 3 laps)
Increment by 1 lap (we're counting lap by lap)

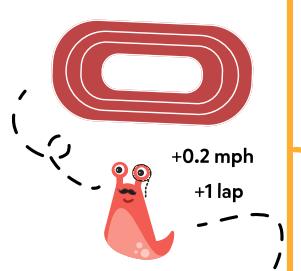


Pancho's Energetic For Loop Workout

Now, we place this information into our for loop. We start counting at 0, stop counting when it reaches 3, and increase our count by 1 each time we complete the action (increase speed by 0.2mph and run 1 lap).

For counting from 0 to 3 and incrementing by 1,
Increase speed by 0.2mph and run 1 lap

- Our count is 0 (our starting value)
Pancho increases his speed by 0.2 mph and runs 1 lap
- Our count is $0 + 1 = 1$
Pancho increases his speed by 0.2 mph and runs 1 lap
- Our count is $1 + 1 = 2$
Pancho increases his speed by 0.2 mph and runs 1 lap
- Our count is $2 + 1 = 3$ (our end value), so we stop!



Counting by miles

Surprise, Pancho's coach now has a new workout for him! Pancho will be running 4 miles, increasing his speed by 0.3 mph every mile. Instead of counting by laps, Pancho now wants to count by miles. 1 mile is 4 laps around the track.

Start at 3 laps (Pancho has already run 3 laps so far)

End at 15 laps (we want to run a total of 4 miles and 3 laps, equaling 15 laps)

Increment by 4 laps (we're counting in increments of 1 mile = 4 laps)

Reflect

What are other scenarios where our increment value will be a number other than 1?

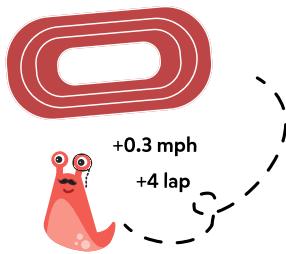
Examples include counting socks by pairs of socks, eggs by dozens of eggs, and cards by a deck of cards.

 Patteron
Mission 3

Pancho's New For Loop Workout

For counting from 3 to 15 and incrementing by 4,
Increase speed by 0.3mph and run 4 laps

- Our count is 3 (our starting value)
Pancho increases his speed by 0.3 mph and runs 4 laps
- Our count is $3 + 4 = 7$
Pancho increases his speed by 0.3 mph and runs 4 laps
- Our count is $7 + 4 = 11$
Pancho increases his speed by 0.3 mph and runs 4 laps
- Our count is $11 + 4 = 15$ (our end value), so we stop!



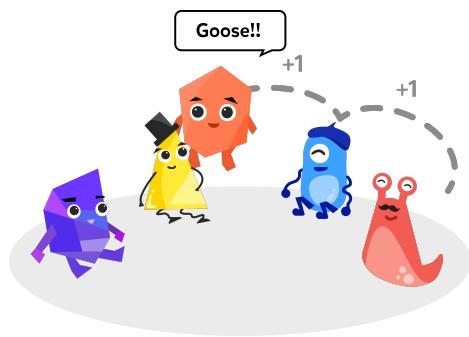
Duck, Duck, Loops

Materials

- A pair of dice 

How to Play

- Sit in a circle with a group of 4-10 people.
- Choose one player to be the tapper. Every turn, the tapper will roll the pair of dice. The increment will be the 1st number and the end value will be the 1st number times the 2nd number.
- The tapper will walk around the circle, tapping players on the head based on the increment and saying "duck". Once they reach the end number, he/she says "goose" to make the player the goose. The goose then runs after the tapper, trying to tag them before the tapper takes their seat.
- If the tapper successfully reaches the goose's seat without being tagged, the goose is now the new tapper. However, if the goose tags the tapper, then the goose keeps their seat in the circle and the tapper continues tapping.



Educator Note

When explaining the game, it may be helpful to first model a round using a for loop. For instance, if a player rolled values of **2** and **4**, the for loop would be:

For counting from 0 to **2 * 4** and incrementing by **2**,
Tap person on the head, say "duck" or "goose", and walk by **2** people



Wrap up & reflect

Group students into pairs and have them discuss the following reflection questions. Afterwards, have students share their ideas as a class.

- When do we use for loops in our everyday lives?

We can use for loops to model situations repeat instructions a specific amount of times. For instance, we can write sewing two pieces of fabric together with a for loop to make 100 stitches 1/2 inch apart, as shown below.

For counting from 0 to 100 and incrementing by 1,

Push the needle through both pieces of fabric and move the needle 1/2 inch to the right

- Why are for loops important?

- Like all loops, for loops help us organize and condense our instructions by only writing the instruction once in a loop.
- For loops are useful for repeating a set of instructions a specific amount of times, and increment through our instructions a particular number of times.