

Introduction to Computer Science
Homework Packet
March 30th – April 3rd

Students, please complete this packet on days that we would normally have class (Tuesday and Friday). Although school has been cancelled, I want to ensure that you are still getting the necessary work to keep your minds fresh and ready for when we return back to school.

Day #1

Quick Start: Please answer the following and explain your reasoning.

“In the near future will mobile devices serve as our digital ID to access enterprise services and data?”

Activity: Complete Worksheet #1

“Programming Basics: Crash Course Computer Science #12”

Directions: Watch the video (link is on the handout) and answer the questions

Day #2

Quick Start: Please answer the following and explain your reasoning.

“What will be the next electronic revolution?”

Activity: Complete Worksheet #2

“Intro to Algorithms: Crash Course Computer Science #13”

Directions: Watch the video (link is on the handout) and answer the questions

Programming Basics: Crash Course Computer Science #12

Available at <https://youtu.be/l26oaHV7D40> or just youtube/google "Crash Course Computer Science 12"

1. Just like spoken languages, programming languages have _____. The set of rules that govern the structure and composition of statements in a language is called _____.
2. To "**initialize**" our variables means to _____.
3. An **IF statement** is like a fork in the road—which path you take is conditional on whether the expression is _____ or _____—so these expressions are called _____.



- a. What's one example of an **if-then-else statement** from one of the popular programming languages mentioned? Indicate the language and the statement.
4. To repeat some statements many times, we need to create a conditional _____. One way is a _____ statement, also called a _____.
 - a. Instead of being a condition-controlled loop that can repeat forever until the condition is false, a _____ is count-controlled; it repeats a specific number of times.
 5. To compartmentalize and hide complexity, programming languages can package pieces of code into named **functions**, also called _____ or _____ in different programming languages.

- a. We need to send the result of our exponent code back to the part of the program that requested it; for this, we use a _____ statement, and specify the value in 'result' be returned.
- b. Modularizing programs into functions not only allows a single programmer to _____, but also allows teams of people to work _____ on even bigger programs.
- c. Modern programming languages come with huge bundles of pre-written functions, called _____.



Intro to Algorithms: Crash Course Computer Science #13

Available at <https://youtu.be/rL8X2mlNHPM> or just youtube/google "Crash Course Computer Science 13"

6. One of the most storied algorithmic problems in all of computer science is _____.

a. A series of items like airfare prices is called an _____.

b. Describe, in your own words, how **Selection Sort** is performed.

c. The relationship of _____ to the _____
_____ the algorithm takes to run characterizes the _____
of the Selection Sort algorithm.

d. How does **Merge Sort** work?

i. Merge Sort is much more _____ than Selection Sort.

7. A **graph** is a _____ of nodes connected by _____.

a. In terms of determining the shortest path from one node to another, what is a **brute force approach**? What's the downside of this approach?

b. **Dijkstra's algorithm** always starts with the node with the _____
_____. It follows all paths from that node to all connecting nodes that are
_____ away, and records the cost to get to each of them.

i. Dijkstra's algorithm was improved a few years later to take the number of nodes in the graph, times the _____ of the number of nodes, _____ the number of lines.

8. A central part of being a computer scientist is _____ existing algorithms and _____ new ones when needed.

