



Programming Languages

Reading & Vocabulary Development
for CS50x Learners

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Table of Content

- **Study Guide**

1. **Reading 1**

2. Vocabulary & Self Assessment

3. Definitions

4. **Exercise 1**

5. **Exercise 1-2**

6. **Exercise 1-3**

1. **Reading 2**

2. Vocabulary & Self Assessment

3. Definitions

4. **Exercise 2**

1. **Reading 3**

2. Vocabulary & Self Assessment

3. Definitions

- **Answer Key**

- **Sources**

□ How to Study?

- **Step 1:**

In the first section (Reading), read through the article once completely.

Don't worry about understanding every word—just focus on getting a general sense of the content.

- **Step 2:**

Next, check out the list of words and expressions from the text.

See which ones are familiar to you and which ones are new.

Some unfamiliar words can be guessed from the context, and some familiar ones might have a different meaning here than usual.

- **Step 3:**

In the following sections, you'll find explanations and example sentences for those words and phrases.

Some of them might not appear directly in the article, but since they're related, it's a good opportunity to get to know them.

This process continues throughout the material.

You can study at your own pace, take breaks whenever you need to, and come back to it later.

□ About the Vocabulary

The vocabulary in this article isn't sorted by language level, but it generally falls into three categories:

- 1. High-frequency**, common words that you'll remember naturally over time through repetition and exposure.
- 2. Specialized IT and computer terms** that will become easier to learn the more you engage with tech-related content.
- 3. Less common words** that you might only see in a few specific contexts.

❖ Important Note

You don't need to memorize any of these words or expressions my friend. They're just here to support your learning journey. The more you come across them in different contexts, the more naturally they'll stick.

[complete article link](#)

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Introduction to Programming Languages

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Introduction:

A programming language is a set of instructions and syntax used to create software programs. Some of the key features of programming languages include:

1. **Syntax:** The specific rules and structure used to write code in a programming language.
2. **Data Types:** The type of values that can be stored in a program, such as numbers, strings, and booleans.
3. **Variables:** Named memory locations that can store values.
4. **Operators:** Symbols used to perform operations on values, such as addition, subtraction, and comparison.
5. **Control Structures:** Statements used to control the flow of a program, such as if-else statements, loops, and function calls.
6. **Libraries and Frameworks:** Collections of pre-written code that can be used to perform common tasks and speed up development.
7. **Paradigms:** The programming style or philosophy used in the language, such as procedural, object-oriented, or functional.

Examples of popular programming languages include Python, Java, C++, JavaScript, and Ruby. Each language has its own strengths and weaknesses and is suited for different types of projects.

A programming language is a formal language that specifies a set of instructions for a computer to perform specific tasks. It's used to write software programs and applications, and to control and manipulate computer systems. There are many different programming languages, each with its own syntax, structure, and set of commands. Some of the most commonly used programming languages include Java, Python, C++, JavaScript, and C#. The choice of programming language depends on the specific requirements of a project, including the platform being used, the intended audience, and the desired outcome. Programming languages continue to evolve and change over time, with new languages being developed and older ones being updated to meet changing needs.

Are you aiming to become a software engineer one day? Do you also want to develop a mobile application that people all over the world would love to use? Are you passionate enough to take the big step to enter the world of programming? Then you are in the right place because through this article you will get a brief introduction to programming. Now before we understand what programming is, you must know what is a computer. A computer is a device that can accept human instruction, processes it, and responds to it or a computer is a computational device that is used to process the data under the control of a computer program. Program is a sequence of instruction along with data.

The basic components of a computer are:

1. Input unit
2. Central Processing Unit(CPU)
3. Output unit

The CPU is further divided into three parts-

- Memory unit
- Control unit
- Arithmetic Logic unit

□ Phrases & Vocabulary

specific

specify

string

boolean

flow

paradigm

suit

intended and desired

control and manipulate

passionate enough

take the big step to do sth

audience

sequence

component

divide

arithmetic

string

very thin rope used for tying things
a string of beads/pearls
a string of sth (a number of similar things)

boolean

In Python, the term "boolean" refers to a data type that can hold one of two values: True or False.

This nomenclature honors George Boole, a 19th-century English mathematician who pioneered the field of mathematical logic. Boole's work laid the foundation for what is now known as Boolean algebra, a branch of algebra that deals with true or false values. This system became fundamental in computer science, especially in areas like programming and digital circuit design, where binary decisions are essential. Consequently, many programming languages, including Python, adopted the term "boolean" to represent this binary data type.

flow

- to continue to arrive or be produced
 - if money, goods, etc. flow, they move from one company, organization, or place to another in large amounts
 - if discussions or ideas flow, people talk and exchange information in a relaxed way
- flow freely/easily

paradigm

- a very clear or typical example used as a model
- a set of theories that explain the way a particular subject is understood at a particular time

procedure

- a set of actions which is the usual or official way of doing something
accepted/established/standard procedure
normal/proper/usual procedure
adopt/follow/review procedures
- a set of instructions in a computer program that does a particular task

procedural

- relating to (procedure) the usual or official way in which something is done
procedural issues/problems/questions

suit

- to be convenient and cause the least difficulty for someone
- (usually of a color or style of clothes) to make someone look more attractive

audience

the people who watch a particular television program or film, read a particular book, etc.

to attract/reach/engage an audience

target/address an audience

a large/wide/mass audience

audience for sth

passionate

having very strong feelings or emotions

Antonyms:

emotionless, passionless

sequence

a series of related things or events, or the order in which they happen

sequence of events

in sequence

component

a particular feature or part of something

automobile/computer, etc. component

essential/key/major, etc. component

divide

to separate into parts or groups, or to cause something to separate in such a way

arithmetic

the part of mathematics that involves the adding and multiplying, etc. of numbers

specific [adj.]

relating to one thing and not others

specifics [noun]

exact details about something

specify [verb]

to say or describe something in a detailed way

specifically [adv.]

- for a particular reason, purpose, etc.
- clearly, exactly, or in detail

specification [noun, formal]

a detailed description of how something should be done, made, etc.

When organizing a community event, it's important to specify the objectives clearly. Begin by outlining the specifics, such as the target audience, location, and budget. For example, if the event is specifically aimed at young professionals, choose a venue and activities that appeal to that demographic. Ensure that every specification is detailed in the planning documents to provide a clear roadmap for the organizing team.

special [adj.]

better or more important than usual things
different from normal things, or used for a
particular purpose

specialize [verb]

to spend most of your time studying one
particular subject or doing one type of business

specialized [adj.]

relating to a particular subject or activity and
not general

specially [adv.]

for a particular purpose

especially [adv.]

- for a particular purpose
- particularly, above all

specialty [noun]

a product, skill, etc. that a person or place is
especially known for

specialist [noun]

someone who has a lot of experience,
knowledge, or skill in a particular subject

species [noun]

a group of plants or animals that share similar
characteristics

Dr. Thompson is a specialist in ornithology, with a particular interest in bird species that exhibit unique behaviors. She decided to specialize in this field after observing a specially adapted beak in a rare finch species. Her research has led to several publications in specialized journals, focusing on the feeding habits of these birds. Recently, she discovered a new species with a unique feeding mechanism, which she believes evolved due to a special environmental niche. This discovery has become her specialty, and she often collaborates with other specialists to further understand these remarkable birds.



□ Exercise 1

Fill in the blanks with the words below. Some word forms may need to be changed.

suit(x2) flow(x2) paradigm reach audience
procedure follow sequence

1. With fewer cars on the roads, traffic is _____ more smoothly than usual.
2. My thoughts _____ more easily if I work on a word processor.
3. The company has new _____ for dealing with complaints.
4. The magazine is trying to _____ a younger audience.
5. His account of the effects of globalization does not fit into either of the economic _____ that are dominant today.
6. We could go now or this afternoon - whatever time _____ you best.
7. You should wear more red - it _____ you.
8. Staff must _____ correct procedure at all times.
9. The _____ was/were clearly delighted with the performance.
10. Is there a particular _____ in which you have to perform these tasks?

[Answer Key](#)

□ Exercise 1-2

Fill in the blanks with the words below. Some words may need to be used twice.

**specialize species specialty specialized
specialist specialists specially**

In the realm of computer science, cybersecurity has become a highly _____(1) field.

Professionals who _____(2) in this area are often referred to as cybersecurity _____(3).

Their _____(4) involves protecting systems from various threats and vulnerabilities. Recently, a _____(5) designed algorithm was developed to detect malware that mimics legitimate software _____(6). This algorithm is a product of _____(7) research and has been implemented in various security protocols to provide an extra layer of protection. The development of such tools requires a deep understanding of both the system architecture and the potential threats, making the role of a cybersecurity _____(8) both challenging and essential.

[Answer Key](#)

☐ Exercise 1-3

Fill in the blanks with the words below

specifics specification specify specifically

In software development, it's essential to

_____ (1) the system requirements before initiating a project. Developers must understand the _____ (2) of the desired functionality to create effective solutions. _____ (3), they need to address user interface design, performance metrics, and security protocols. A detailed _____ (4) document serves as a blueprint, guiding the development process and ensuring that the final product meets the client's expectations.

[Answer Key](#)

Most of us have heard that CPU is called the brain of our computer because it accepts data, provides temporary memory space to it until it is stored(saved) on the hard disk, performs logical operations on it and hence processes(here also means converts) data into information. We all know that a computer consists of hardware and software. Software is a set of programs that performs multiple tasks together. An operating system is also software (system software) that helps humans to interact with the computer system.

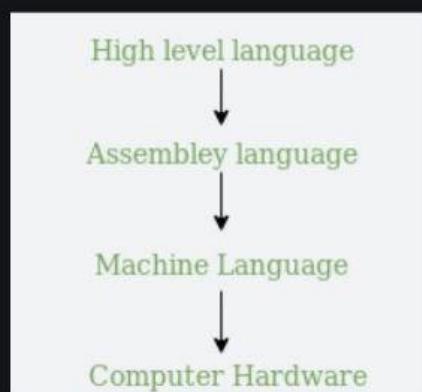
A program is a set of instructions given to a computer to perform a specific operation. or computer is a computational device that is used to process the data under the control of a computer program. While executing the program, raw data is processed into the desired output format. These computer programs are written in a programming language which are high-level languages. High level languages are nearly human languages that are more complex than the computer understandable language which are called machine language, or low level language. So after knowing the basics, we are ready to create a very simple and basic program. Like we have different languages to communicate with each other, likewise, we have different languages like C, C++, C#, Java, python, etc to communicate with the computers. The computer only understands binary language (the language of 0's and 1's) also called machine-understandable language or low-level language but the programs we are going to write are in a high-level language which is almost similar to human language.

The piece of code given below performs a basic task of printing "hello world! I am learning programming" on the console screen. We must know that keyboard, scanner, mouse, microphone, etc are various examples of input devices, and monitor(console screen), printer, speaker, etc are examples of output devices.

```
main()
{
    clrscr();
    printf("hello world! I am learning to program");
    getch();
}
```

At this stage, you might not be able to understand in-depth how this code prints something on the screen. The `main()` is a standard function that you will always include in any program that you are going to create from now onwards. Note that the execution of the program starts from the `main()` function. The `clrscr()` function is used to see only the current output on the screen while the `printf()` function helps us to print the desired output on the screen. Also, `getch()` is a function that accepts any character input from the keyboard. In simple words, we need to press any key to continue(some people may say that `getch()` helps in holding the screen to see the output). Between high-level language and machine language, there are assembly languages also called symbolic machine code. Assembly languages are particularly computer architecture specific. Utility program (**Assembler**) is used to convert assembly code into executable machine code. High Level Programming Language is portable but requires Interpretation or compiling to convert it into a machine language that is computer understood.

Hierarchy of Computer language –



Most Popular Programming Languages –

- C
- Python
- C++
- Java
- SCALA
- C#
- R
- Ruby
- Go
- Swift
- JavaScript

Characteristics of a programming Language –

- A programming language must be simple, easy to learn and use, have good readability, and be human recognizable.
- Abstraction is a must-have Characteristics for a programming language in which the ability to define the complex structure and then its degree of usability comes.
- A portable programming language is always preferred.
- Programming language's efficiency must be high so that it can be easily converted into a machine code and its execution consumes little space in memory.
- A programming language should be well structured and documented so that it is suitable for application development.
- Necessary tools for the development, debugging, testing, maintenance of a program must be provided by a programming language.
- A programming language should provide a single environment known as Integrated Development Environment(IDE).
- A programming language must be consistent in terms of syntax and semantics.

□ Phrases & Vocabulary

raw data

in-depth

utility

hierarchy

integrated

consistent

semantics

in depth [phrase]
in a serious and detailed way

depth [noun]

- the state of having serious qualities or the ability to think seriously about something
lack depth
hidden depths
- the fact of a feeling, state, or characteristic being strong, extreme, or detailed
depth of
depth of knowledge

the depths [plural, noun]
the lowest part of the sea

semantic [adj.]
connected with the meanings of words

semantics [noun]
the study of meanings in a language

semantically [adv.]
in a way that is connected with the meaning of words
provide a resource/service
provide support/security/shelter
please provide your [name and address, contact details]

consist [verb]

- be composed or made up of.
consist of something

consistent [adj.]

- always happening or behaving in a similar way
- agreeing with something said or done previously

consistency [noun]

- the state or condition of always happening or behaving in the same way
- the quality expressing how thick or firm a mixture is, esp. a liquid

consistently [adv.]

in a way that does not change

utility [formal]

- how useful something is; usefulness
- a service for supplying electricity, gas, etc.
utility bill/company/costs
- a large company that provides a service such as electricity, gas, etc.
public utilities
- [IT] a computer program that is used to do a particular task
fair on somebody

hierarchy

a system in which people or things are arranged according to their importance
social/political hierarchy

- **What is Raw Data (source data or atomic data)?**

Raw data is the data originally generated by a system, device or operation, and has not been processed or changed in any way. It. Raw data can come from a wide range of sources, such as machinery, monitors, instruments, sensors, surveys, log files, online transactions and countless other operations and places.

Raw data is also called source data, atomic data and primary data.

Unlike raw data, **processed data** has been corrected, cleansed, aggregated or in some other way transformed.

Most analytics projects collect raw data first and then process and analyze it. The analyzed data is presented to decision-makers and other interested parties in a format that makes the information much easier to understand than if it were still in its raw form. From the refined information, they can gain important insights into the data and make more informed decisions. Raw data that has undergone processing is sometimes referred to as cooked data.

• **Types of Raw Data**

Despite the various sources and formats, most raw data can be categorized as the following:

- **Quantitative raw data.** This is numerical data that can be counted, measured or quantified in some way. It might include student grades, baseball scores, temperature readings, sales figures, click-through rates or other types of quantifiable data.
- **Qualitative raw data.** Qualitative data is descriptive in nature and cannot be easily synthesized down to numerical values. It might include comments, responses to questionnaires, feedback from focus groups or other narrative types of input.

Although analytics and data-related projects often rely heavily on quantitative raw data, qualitative data can also be useful, depending on what the organization hopes to learn from the data. Some projects incorporate both types of data to gain different insights into the patterns they uncover.

□ Exercise 2

Fill in the blanks with the words below. Some word forms may need to be changed.

depth(x2) thick superficial utility(x2) consist
public consistency depend knowledge

1. We will analyze this topic in greater _____ later in the chapter.
2. I was amazed at her depth of _____.
3. He spoke with great _____ of feeling.
4. Terry lacks depth - he's a very _____ person.
5. Its basic _____ lies in being able to drive where other vehicles can't go.
6. With energy consumption rising, many _____ utilities are struggling to meet peak-time demand.
7. The program includes a set of _____ and file recovery tools for advanced users.
8. The team _____ of four Europeans and two Americans.
9. They've won a few games this season but they lack _____.
10. The team's success will _____ on the consistency of its pitching.
11. It had a consistency like that of _____ glue.

[Answer Key](#)

Basic Terminologies in Programming Languages:

- **Algorithm:** A step-by-step procedure for solving a problem or performing a task.
- **Variable:** A named storage location in memory that holds a value or data.
- **Data Type:** A classification that specifies what type of data a variable can hold, such as integer, string, or boolean.
- **Function:** A self-contained block of code that performs a specific task and can be called from other parts of the program.
- **Control Flow:** The order in which statements are executed in a program, including loops and conditional statements.
- **Syntax:** The set of rules that govern the structure and format of a programming language.
- **Comment:** A piece of text in a program that is ignored by the compiler or interpreter, used to add notes or explanations to the code.
- **Debugging:** The process of finding and fixing errors or bugs in a program.
- **IDE:** Integrated Development Environment, a software application that provides a comprehensive development environment for coding, debugging, and testing.
- **Operator:** A symbol or keyword that represents an action or operation to be performed on one or more values or variables, such as + (addition), - (subtraction), * (multiplication), and / (division).
- **Statement:** A single line or instruction in a program that performs a specific action or operation.

Advantages of programming languages:

1. **Increased Productivity:** Programming languages provide a set of abstractions that allow developers to write code more quickly and efficiently.
2. **Portability:** Programs written in a high-level programming language can run on many different operating systems and platforms.
3. **Readability:** Well-designed programming languages can make code more readable and easier to understand for both the original author and other developers.
4. **Large Community:** Many programming languages have large communities of users and developers, which can provide support, libraries, and tools.

Disadvantages of programming languages:

1. **Complexity:** Some programming languages can be complex and difficult to learn, especially for beginners.
2. **Performance:** Programs written in high-level programming languages can run slower than programs written in lower-level languages.
3. **Limited Functionality:** Some programming languages may not have built-in support for certain types of tasks or may require additional libraries to perform certain functions.
4. **Fragmentation:** There are many different programming languages, which can lead to fragmentation and make it difficult to share code and collaborate with other developers.

Tips for learning new programming language:

1. **Start with the fundamentals:** Begin by learning the basics of the language, such as syntax, data types, variables, and simple statements. This will give you a strong foundation to build upon.
2. **Code daily:** Like any skill, the only way to get good at programming is by practicing regularly. Try to write code every day, even if it's just a few lines.
3. **Work on projects:** One of the best ways to learn a new language is to work on a project that interests you. It could be a simple game, a web application, or anything that allows you to apply what you've learned that is the most important part.
4. **Read the documentation:** Every programming language has documentation that explains its features, syntax, and best practices. Make sure to read it thoroughly to get a better understanding of the language.
5. **Join online communities:** There are many online communities dedicated to programming languages, where you can ask questions, share your code, and get feedback. Joining these communities can help you learn faster and make connections with other developers.
6. **Learn from others:** Find a mentor or someone who is experienced in the language you're trying to learn. Ask them questions, review their code, and try to understand how they solve problems.
7. **Practice debugging:** Debugging is an essential skill for any programmer, and you'll need to do a lot of it when learning a new language. Make sure to practice identifying and fixing errors in your code.

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A Categorical List of programming languages

□ Phrases & Vocabulary

terminology

algorithm

advantages/disadvantages

fragmentation

terminology

special words or expressions used in relation to a particular subject or activity

Synonyms:

terminology, jargon(disapproving)

algorithm

a process that a computer or a computer program uses to complete a task

The term "algorithm" is derived from the name of a Persian mathematician, Muhammad ibn Musa al-Khwarizmi, who lived during the 9th century. Al-Khwarizmi was a prominent scholar in the House of Wisdom in Baghdad, an intellectual center during the Islamic Golden Age. His works in mathematics, particularly in algebra, were groundbreaking and laid the foundation for many modern mathematical principles.

advantages and disadvantages

pros and cons

strengths and weaknesses

positives and negatives

benefits and drawbacks

fragment

- to break something into small parts or to be broken up in this way
- a small piece or part, esp. one that is broken off of something

fragmentation [noun]

the action or process of breaking something into small parts or of being broken up in this way

1 [back to exercise](#)

1. flowing
2. flow
3. procedures
4. reach
5. paradigms
6. suits
7. suits
8. follow
9. audience
10. sequence

1-2 [back to exercise](#)

1. specialized
2. specialize
3. specialists
4. specialty
5. specially
6. species
7. specialized
8. specialist

1-3 [back to exercise](#)

1. Specify
2. Specifics
3. Specifically
4. specification

2 [back to exercise](#)

1. depth
2. knowledge
3. depth
4. superficial
5. utility
6. public
7. utilities
8. consists
9. consistency
10. depend
11. thick

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