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## Programming organizational techniques

Use programming and organizational techniques and interpret logic

as software developers begin to create code they use some standard tools to organize their work period these tools include pseudo code which allows them to write code that is not yet in any specific programming language and flow charts which can show the general flow of software based decision making in this chapter we'll learn the first half of the material that you need to know about ITF objective 4.2 the remaining. For this objective is covered in chapter 28 logic components the objectives covered in this chapter include

- pseudo code concepts
- flow chart concepts

### pseudocode

Software developers use a fairly consistent process for creating new software. The majority of their work is dedicated to creating algorithms, which are just fancy terms for step-by-step instructions that a computer should follow when executing the code.

Let's write a basic algorithm together that will convert temperatures from Fahrenheit to Celsius. First, make sure that you understand the process of performing this conversion. Our algorithm will receive a single piece of input: a temperature in Fahrenheit. Then, it will perform a series of calculations on that input. It will subtract 32 from the Fahrenheit temperature, multiply that result by 5, and divide that result by 9, which produces the output as the equivalent temperature in Celsius.

The previous paragraph is an algorithm. It is written in text, which isn't a standard way to write an algorithm, but it is an algorithm nonetheless because it describes the sequence of steps that we need to follow. If I give you a temperature in Fahrenheit and ask you to convert it to Celsius, you could simply follow the process outlined here to perform the conversion. And I can also program a computer to do the same thing.



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Pseudocode is a more common way to write an algorithm. Pseudocode is simply a plain English description of an algorithm that a software developer can take and use as a basis for a program written in any language. Here's an example of that same algorithm written in pseudocode:

Input: T (a temperature in Celsius)

$T = T - 32$

$T = T * 5$

$T = T / 9$

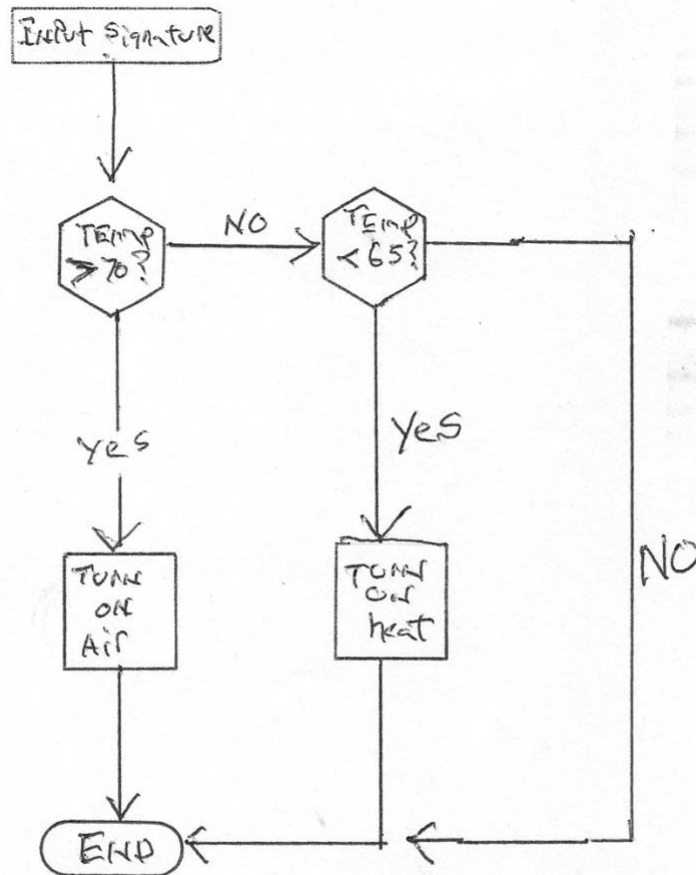
Output: T (a temperature in Celsius)

This algorithm isn't written in any specific programming language. We could write code in Python, Java, C, or another programming language, execute this code, but we haven't done that yet. All we've done here is write the steps out in plain English using the programming style.

Exam tip: there aren't correct or incorrect ways to write pseudo code. Unlike code written in a programming language, there is no syntax to worry about. When you're writing pseudo code, you're just trying to document your ideas in a way that communicates clearly to yourself and others what you've done.

### **Flowcharts**

Flow charts are another familiar design tool programmers use to help them understand the steps a program follows when making decisions. The example below shows a flow chart that we might use to adjust the temperature in a building so that it stays within the range of 65 to 70°. I enter at the top of the flow chart, and then I get the first decision: Is the temperature greater than 70? If it is, we turn on the air conditioning, and then the program is OK.



Temperature Adjustment  
Flowchart



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If the temperature is not greater than 70°, I proceed to the next decision: Is it less than 65°? If it is, I turn on the heat and end the program. If it is not, the temperature is within the range of 65 to 70 °, so I don't take any action and just end the program.

When you are creating a flowchart, there are three basic symbols that you can use.

- Ovals are used as terminators to mark an algorithm's beginning or end.
- Rectangles are used as process steps. They mark some type of action that is taking place.
- Diamonds are used as decision steps. Diamonds pose a question and then have outputs that are followed depending on the answer. In most flow charts, these questions are yes-no questions that have only two possible answers, so there are two arrows, leaving the diamond one path to follow if the answer is yes and another to follow if the answer is no.

Exam tips;

There are many other shapes used in flow charts, and different programmers may have different styles when creating flow charts. As you get ready for the exam, you should only worry about these three shapes

Pseudocodes allow software developers to write out steps in an algorithm without using a specific programming language. It's a common way to organize code before beginning to write it.

Flow charts provide a method for visually describing the logical flow of code. In a flow chart, ovals represent the start or beginning of a flow chart, rectangles represent process steps, and diamonds represent decision steps.



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## Chapter 27 Study Guide: Programming Organizational Techniques

### Key Objectives Covered

- Understand **pseudocode concepts**
- Understand **flowchart concepts**

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## I. Introduction to Programming Organization

When software developers begin to create code, they use **organizational techniques** to plan and document their logic. Two primary tools include:

- **Pseudocode:** Describes logic in plain English
- **Flowcharts:** Visualize the logical flow of decisions and actions

These tools help developers break down problems, communicate solutions, and avoid early commitment to a specific programming language.

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## II. Pseudocode Concepts

### What is Pseudocode?

- A plain English description of an **algorithm**.
- **Not tied** to any programming language (no strict syntax).
- Used to plan code before writing it.

### What is an Algorithm?

- A step-by-step **procedure or set of rules** to solve a problem.
- Example: Converting Fahrenheit to Celsius.

## Pseudocode Example: Fahrenheit to Celsius Conversion

```
plaintext
CopyEdit
Input: T (a temperature in Fahrenheit)

T = T - 32
T = T * 5
T = T / 9

Output: T (a temperature in Celsius)
```

## Pseudocode Writing Tips

- No right or wrong format.
  - Focus on **clear communication** of logic.
  - Avoid language-specific syntax.
  - Use indentation and spacing to organize steps.
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## III. Flowchart Concepts

### What is a Flowchart?

- A **diagrammatic representation** of a sequence of steps, decisions, and actions in a program.
- Especially useful for visualizing **logic and control flow**.

### Flowchart Example: Building Temperature Control

1. Start
2. Check: Is temperature > 70?
  - Yes → Turn on A/C → End
  - No → Go to next check
3. Check: Is temperature < 65?
  - Yes → Turn on Heat → End
  - No → Do Nothing → End



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## Common Flowchart Symbols

Symbol	Shape	Purpose
Oval	Terminator	Start or End of a process
Rectangle	Process	Action step (e.g., calculation, output)
Diamond	Decision	Yes/No question, two output paths

## Flowchart Design Tips

- Use **standard shapes** to convey logic clearly.
- Limit decisions to **yes/no** questions for simplicity.
- Start and end with **ovals**.
- Make sure each step logically connects to the next.

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## IV. Summary and Exam Tips

### Pseudocode

- Organizes steps **without** programming syntax.
- Helps developers focus on logic, not code.
- Ideal for planning and team communication.

### Flowcharts

- Visually represent **logical decision-making**.
- Use ovals, rectangles, and diamonds.
- Follow a **clear top-to-bottom** or **left-to-right** structure.

### Exam Tips

- Don't worry about exact pseudocode format.
  - Memorize the **three key flowchart shapes**.
  - Focus on **clear logic**, not stylistic variations.
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## Chapter 27 Quiz: Programming Organizational Techniques

Name: \_\_\_\_\_

Date: \_\_\_\_\_

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### Multiple Choice & Short Answer Questions

#### 1. What is pseudocode?

- ☐ A programming language
- ☐ A type of flowchart
- ☐ A plain English description of steps in an algorithm
- ☐ A debugging tool

Answer: \_\_\_\_\_

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#### 2. Why do developers write pseudocode before actual code?

Answer: \_\_\_\_\_

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#### 3. Is there a strict format or syntax for pseudocode?

- ☐ Yes
- ☐ No

Answer: \_\_\_\_\_

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#### 4. Write pseudocode that calculates the sum of two numbers.

Answer:

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**5. What is an algorithm?**

- ☐ A programming bug
- ☐ A decision tree
- ☐ A step-by-step problem-solving process
- ☐ A user interface design

**Answer:** \_\_\_\_\_

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**Flowchart Concepts**

**6. What is the purpose of a flowchart in programming?**

**Answer:** \_\_\_\_\_

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**7. What shape represents the start or end of a flowchart?**

- ☐ Rectangle
- ☐ Diamond
- ☐ Oval
- ☐ Circle

**Answer:** \_\_\_\_\_

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**8. What symbol is used for a process in a flowchart?**

- ☐ Diamond
- ☐ Oval
- ☐ Rectangle
- ☐ Triangle

**Answer:** \_\_\_\_\_

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**9. What does a diamond represent in a flowchart?**

**Answer:** \_\_\_\_\_

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**10. How many arrows typically exit a decision symbol (diamond)?**

- ☐ One
- ☐ Two
- ☐ Three
- ☐ Unlimited

**Answer:** \_\_\_\_\_

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### **Application & Logic Questions**

**11. In the temperature control flowchart, what happens if the temperature is 72°F?**

**Answer:** \_\_\_\_\_

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**12. Why is pseudocode useful for teams using different programming languages?**

**Answer:** \_\_\_\_\_

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**13. Convert this pseudocode into plain language:**

```
vbnet
CopyEdit
Input: X
If X > 10 then
    Output: "High"
Else
    Output: "Low"
```

**Answer:** \_\_\_\_\_

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**14. How do flowcharts help in debugging?**

**Answer:** \_\_\_\_\_

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**15. What is one similarity between pseudocode and flowcharts?**

**Answer:** \_\_\_\_\_



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# Answers

## Review Questions – Chapter 27: Programming Organizational Techniques

### Pseudocode Questions

- Q:** What is pseudocode?  
**A:** Pseudocode is a plain English description of the steps in an algorithm, used to plan a program's logic without using a specific programming language.
- Q:** Why do developers use pseudocode before writing actual code?  
**A:** To organize their thoughts and logic clearly, communicate ideas, and avoid syntax issues early in the development process.
- Q:** Is there a standard format for writing pseudocode?  
**A:** No. Pseudocode has no strict rules or syntax—it should just be clear and logical.
- Q:** Write a pseudocode to find the sum of two numbers.  
**A:**

```
makefile  
CopyEdit  
Input: A, B  
Sum = A + B  
Output: Sum
```

- Q:** What is an algorithm in the context of programming?  
**A:** An algorithm is a step-by-step procedure for solving a problem or performing a task.

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### Flowchart Questions

- Q:** What is the purpose of a flowchart in programming?  
**A:** To visually represent the logic and control flow of a program, especially when decisions are involved.
- Q:** What does an oval represent in a flowchart?  
**A:** A terminator symbol, used to indicate the start or end of a program.
- Q:** What does a rectangle represent in a flowchart?  
**A:** A process step, which performs an action or operation.



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9. **Q:** What does a diamond represent in a flowchart?  
**A:** A decision point that asks a yes/no question, leading to two possible outcomes.
10. **Q:** In a flowchart, how many arrows should typically come out of a decision symbol?  
**A:** Two—one for "Yes" and one for "No."
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## Application and Analysis Questions

11. **Q:** What happens in the temperature control flowchart if the temperature is 72°F?  
**A:** The system turns on the air conditioning and ends the program.
12. **Q:** Why is pseudocode helpful for teams working in different programming languages?  
**A:** It provides a shared logic structure that can be implemented in any language.
13. **Q:** Convert this pseudocode into a verbal algorithm:

```
vbnet
CopyEdit
Input: X
If X > 10 then
    Output: "High"
Else
    Output: "Low"
```

**A:** If the input number X is greater than 10, display "High"; otherwise, display "Low".

14. **Q:** How do flowcharts help in debugging programs?  
**A:** They make it easier to trace the program's logic and identify where decisions or actions may not be working as intended.
15. **Q:** What is one key similarity between pseudocode and flowcharts?  
**A:** Both are tools used to plan and document program logic before actual coding begins.
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