

Flowchart

Lesson 3



Learning Objectives

At the end of this lesson, the students will be able to:

- Identify the different symbols used in flowcharting;
- Explain the purpose of each symbol used in flowcharting;
- Familiarize the rules in creating a flowchart;
- Use flowcharts to solve a real-world problem;

What is a Flowchart?

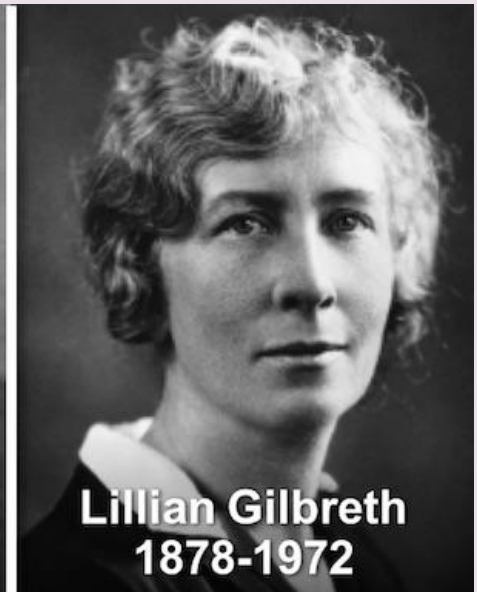
- A flowchart is a diagram that depicts a process, system, or computer algorithm.
- They are widely used in multiple fields to document, study, plan, improve and communicate often complex processes in clear, easy-to-understand diagrams.
- Programmers often use it as a program-planning tool to solve a problem.

What is a Flowchart?

- They can range from simple, hand-drawn charts to comprehensive computer-drawn diagrams depicting multiple steps and routes.
- Flowcharts are sometimes called by more specialized names such as Process Flowchart, Process Map, Functional Flowchart, Business Process Mapping, Business Process Modeling and Notation (BPMN), or Process Flow Diagram (PFD).

History

- Flowcharts to document business processes came into use in the **1920s and '30s**.
- In **1921**, industrial engineers **Frank and Lillian Gilbreth** introduced the “**Flow Process Chart**” to the **American Society of Mechanical Engineers (ASME)**.



History

- In the **early 1930s**, industrial engineer **Allan H. Morgensen** used Gilbreth's tools to present conferences on making work more efficient to business people at his company.



History

- In the 1940s, two Morgensen students, **Art Spinanger** and **Ben S. Graham** spread the methods more widely. Spinanger introduced the work simplification methods to Procter and Gamble.
- Graham, a director at Standard Register Industrial, adapted flow process charts to information processing.
- In 1947, ASME adopted a symbol system for Flow Process Charts, derived from the Gilbreths' original work.

History

- Also in the late '40s, **Herman Goldstine** and **John Van Neumann** used flowcharts to develop computer programs, and diagramming soon became increasingly popular for computer programs and algorithms of all kinds.

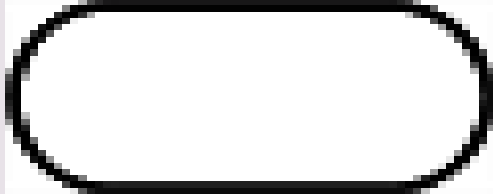


History

- In Japan, **Kaoru Ishikawa** (1915-1989), a key figure in quality initiatives in manufacturing, named flowcharts as one of the key tools of quality control, along with complementary tools such as the Histogram, Check Sheet and Cause-and-Effect Diagram, now often called the **Ishikawa Diagram**.



Flowchart Symbols



Terminal/Terminator Symbol

The oval symbol indicates Start, Stop and Halt in a program's logic flow. A pause/halt is generally used in a program logic under some error conditions. Terminal is the first and last symbol in the flowchart.

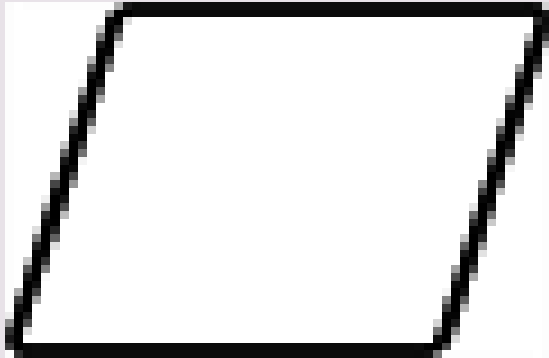
Flowchart Symbols

Process Symbol



Also known as an “Action Symbol,” this shape represents a process, action, or function. It’s the most widely-used symbol in flowcharting.

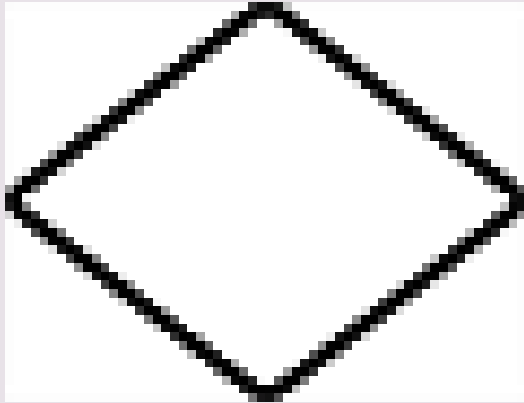
Flowchart Symbols



Input/Output Symbol

Also referred to as the “Data Symbol,” this shape represents data that is available for input or output as well as representing resources used or generated.

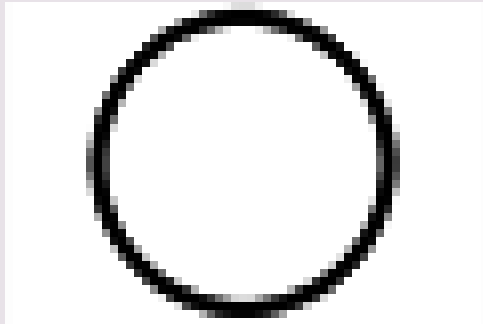
Flowchart Symbols



Decision Symbol

Indicates a question to be answered — usually yes/no or true/false. The flowchart path may then split off into different branches depending on the answer or consequences thereafter.

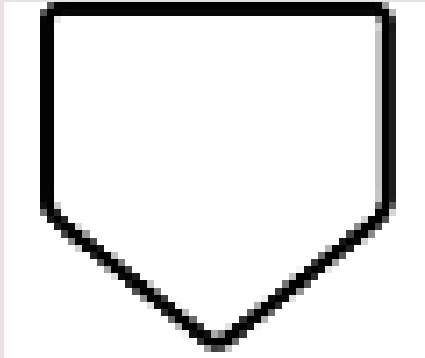
Flowchart Symbols



On-Page connector Symbol

Usually used within more complex charts, this symbol connects separate elements across one page. A **letter** is used inside the symbol.

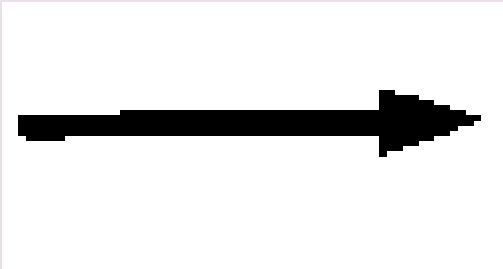
Flowchart Symbols



Off-Page connector Symbol

Frequently used within complex charts, this symbol connects separate elements across multiple pages with the page number usually placed on or within the shape for easy reference. A **number** is used inside the symbol.

Flowchart Symbols



Flow line

Indicates the flow of logic by connecting symbols. Also called Flow Arrow.

Rules in Flowcharting

A flowchart is a graphical representation of an algorithm. It should follow some rules while creating a flowchart

- Rule 1: Flowchart opening statement must be 'start' keyword.
- Rule 2: Flowchart ending statement must be 'end' keyword.
- Rule 3: All symbols in the flowchart must be connected with an arrow line.

Rules in Flowcharting

A flowchart is a graphical representation of an algorithm. It should follow some rules while creating a flowchart

- Rule 4: The decision symbol in the flowchart cannot be associated with the arrow line.
- Rule 5: Flow lines should never intersect.
- Rule 6: The flowchart should be neat and clean.

Entry and Exit Rules

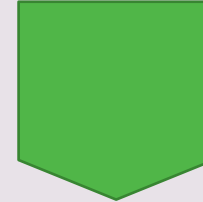
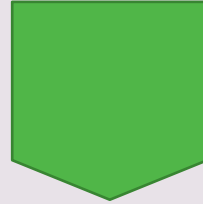
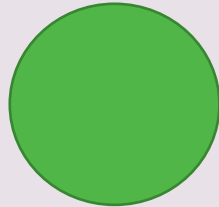
Start



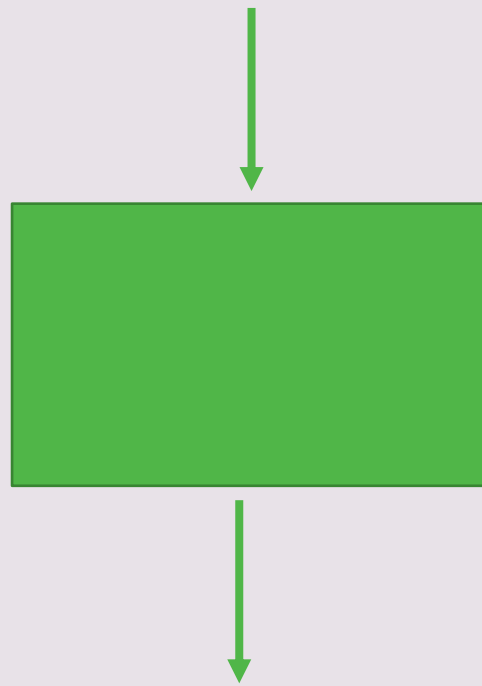
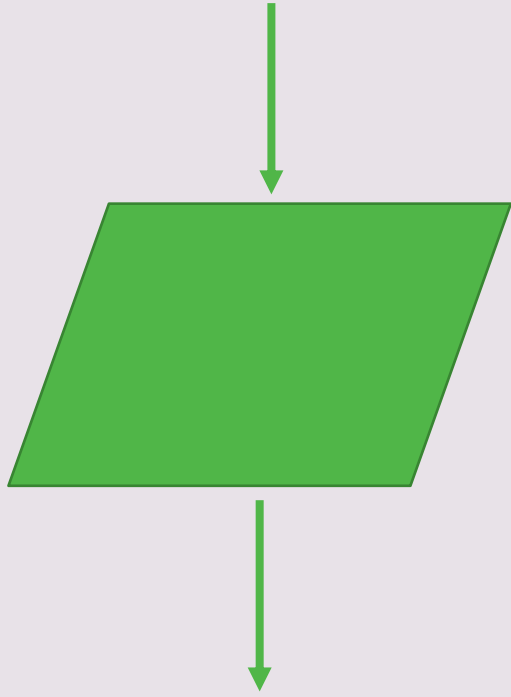
Stop



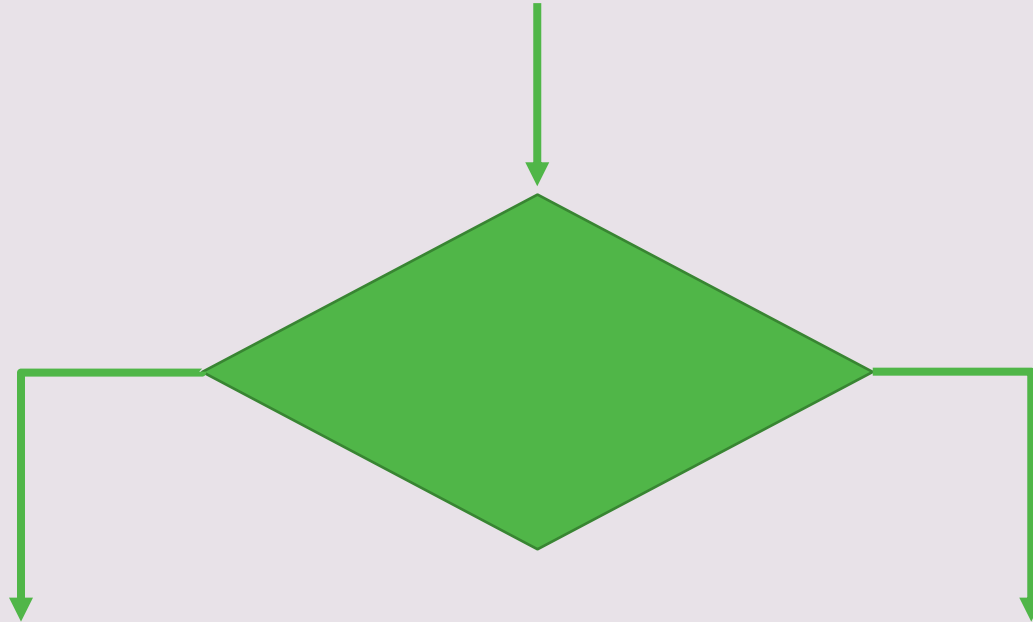
Entry and Exit Rules



Entry and Exit Rules



Entry and Exit Rules

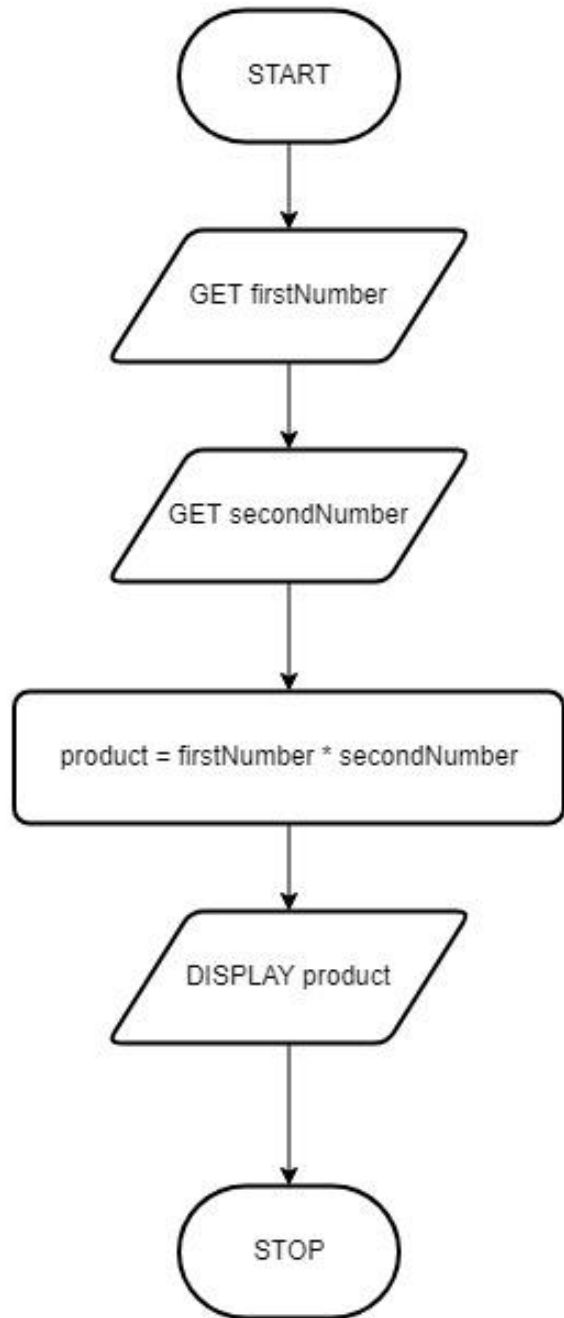


Some advantage of using Flowchart

- Easy to make
- Communication becomes effective and easy to understand
- Mistakes can be easily identified
- Analysis becomes effective
- Synthesis becomes effectual
- Debugging becomes possible
- Logics can be easily interpreted.

Some disadvantage of using Flowchart

- Difficulty in presenting complex programs and tasks.
- No scope for alteration or modification
- Reproduction becomes a problem
- It's a time-consuming process
- Difficult to understand for people who don't know flowchart symbols.
- No man-to-computer communication.

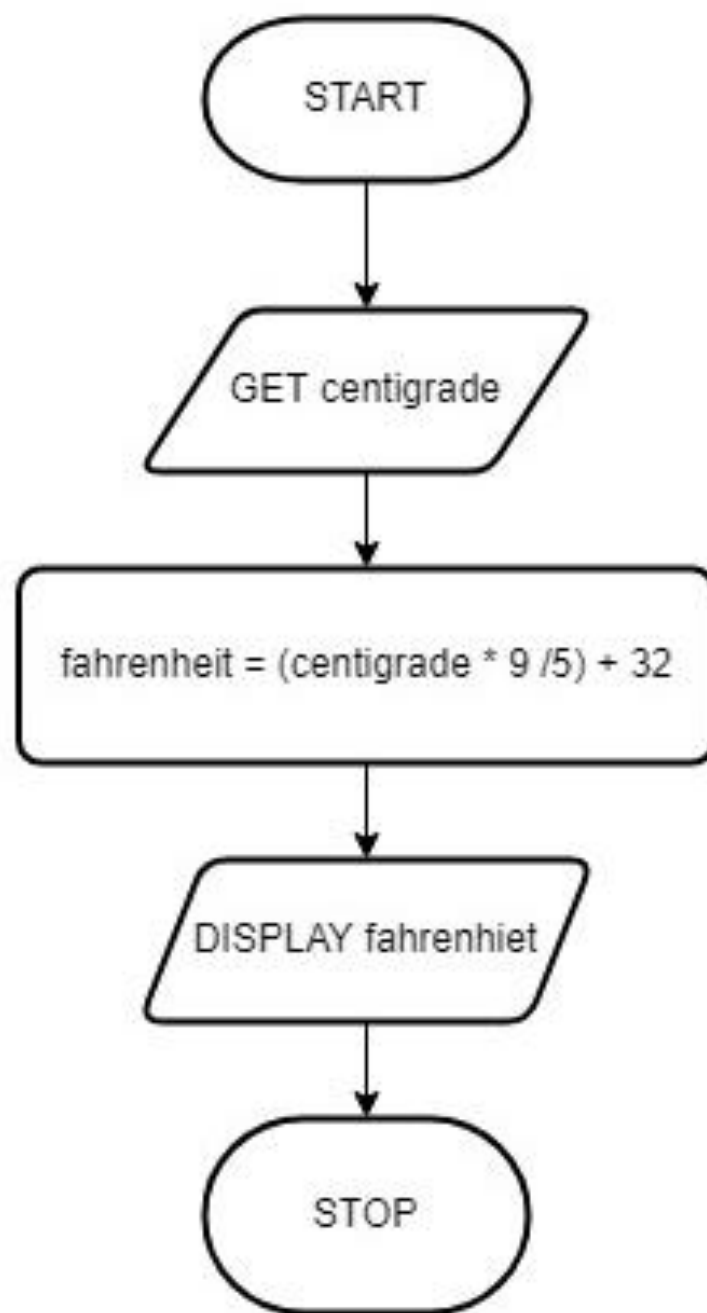


Logic of a program that asks for two numbers and calculate for the product.

Practice Exercise

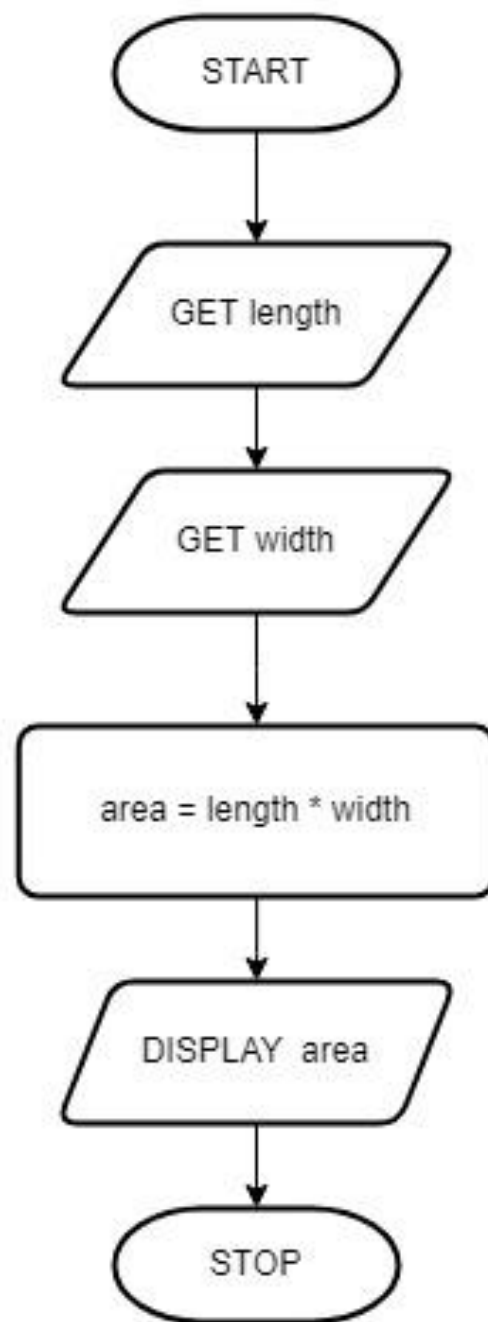
- Create the logic of a program that converts temperature from Centigrade to Fahrenheit.

$$F = (C \times 9/5) + 32$$



Practice Exercise

- Create the logic of a program that calculates area of a rectangle.



Practice Exercise

Create the logic of a program that asks for the capital and the earnings of the business for a day. Calculate the profit of the business.

