

# Computer Programming: Flowchart

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# What is flowchart

A diagram that uses graphic symbols to depict the nature and flow of the steps in a process.

## **Benefits of Using Flowcharts:**

- Promotes understanding of a process
- Identifies problem areas and opportunities for process improvement
- Provides a way of training employees
- Depicts customer-supplier relationships

# Flowchart building blocks

- A typical flowchart from older basic computer science textbooks may have the following kinds of symbols:
- **Start and end symbols:** Represented as circles, ovals or rounded rectangles, usually containing the word "Start" or "End", or another phrase signaling the start or end of a process / procedure / subprogram.

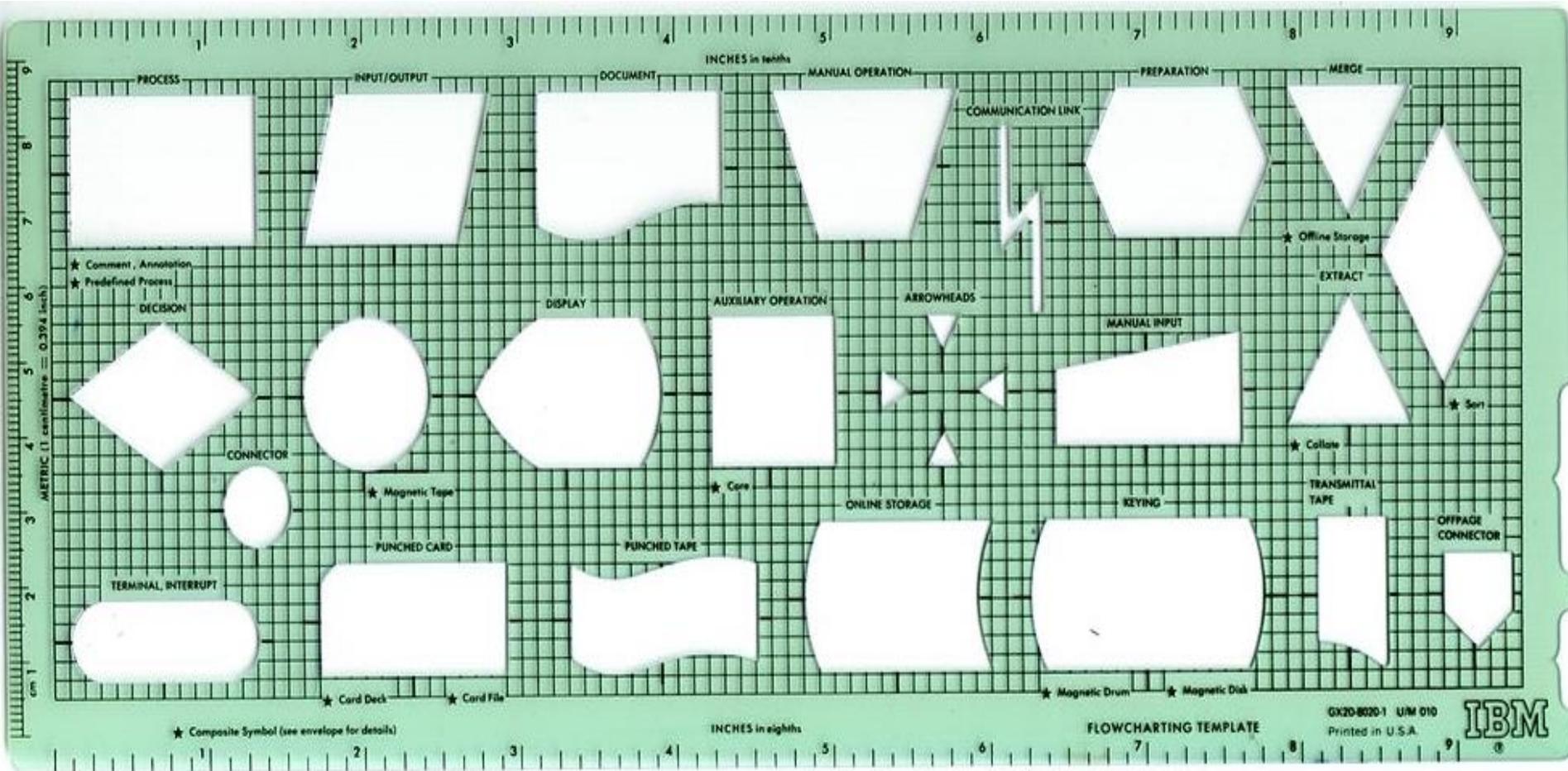
# Flowchart building blocks

- **Arrows:** Showing "flow of control". An arrow coming from one symbol and ending at another symbol represents that control passes to the symbol the arrow points to.
- **Generic processing steps:** Represented as rectangles. Examples: "Add 1 to X"; "replace identified part"; "save changes" or similar.
- **Calling Subroutines:** Represented as rectangles with double-struck vertical edges; these are used to show complex processing steps which may be detailed in a separate flowchart. Example: Process-files. One subroutine may have multiple distinct entry points or exit flows (see coroutine); if so, these are shown as labeled 'wells' in the rectangle, and control arrows connect to these 'wells'.

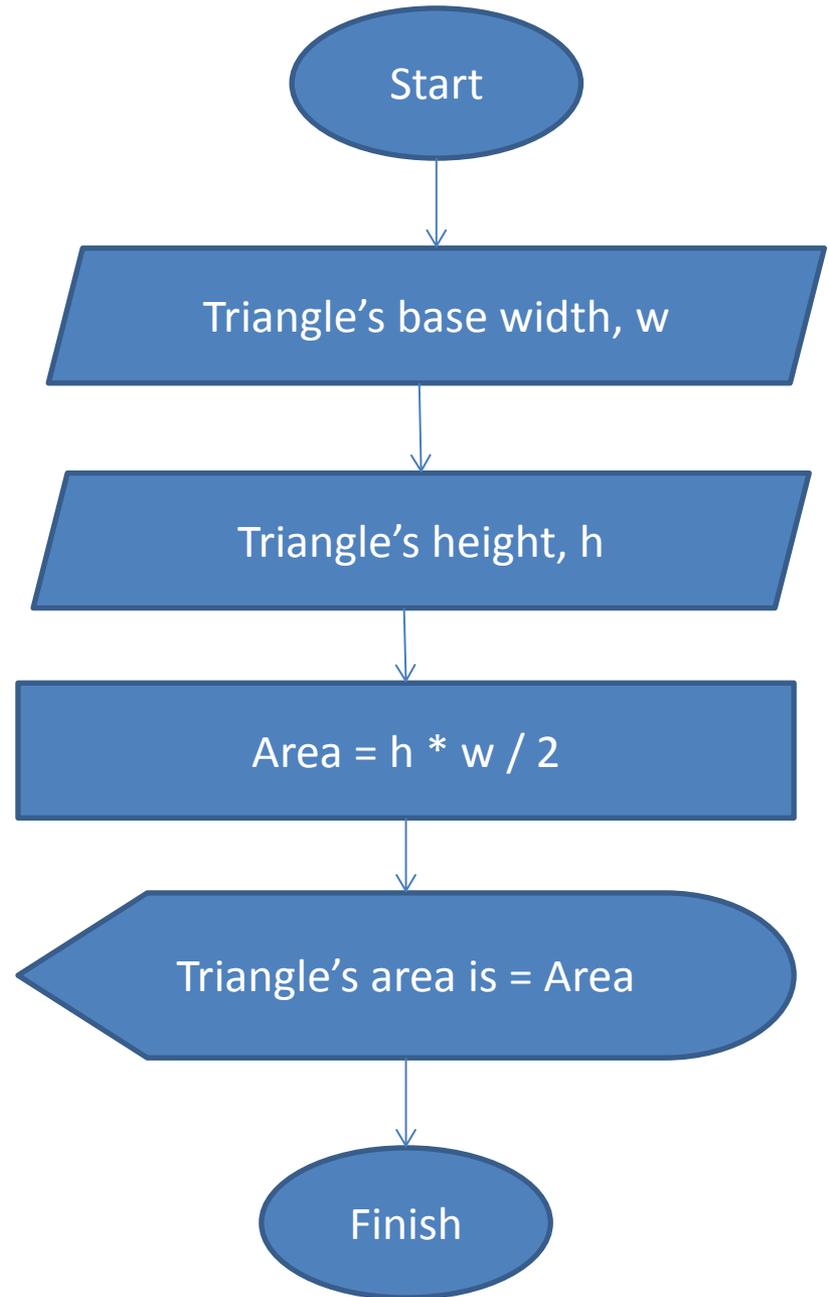
# Flowchart building blocks

- **Input/Output:** Represented as a parallelogram. Examples: Get X from the user; display X.
- **Prepare conditional:** Represented as a hexagon. Shows operations which have no effect other than preparing a value for a subsequent conditional or decision step (see below).
- **Conditional or decision:** Represented as a diamond (rhombus) showing where a decision is necessary, commonly a Yes/No question or True/False test. The conditional symbol is peculiar in that it has two arrows coming out of it, usually from the bottom point and right point, one corresponding to Yes or True, and one corresponding to No or False. (The arrows should always be labeled.) More than two arrows can be used, but this is normally a clear indicator that a complex decision is being taken, in which case it may need to be broken-down further or replaced with the "pre-defined process" symbol.
- **Junction symbol:** Generally represented with a black blob, showing where multiple control flows converge in a single exit flow. A junction symbol will have more than one arrow coming into it, but only one going out. In simple cases, one may simply have an arrow point to another arrow instead. These are useful to represent an iterative process (what in Computer Science is called a loop). A loop may, for example, consist of a connector where control first enters, processing steps, a conditional with one arrow exiting the loop, and one going back to the connector. For additional clarity, wherever two lines accidentally cross in the drawing, one of them may be drawn with a small semicircle over the other, showing that no junction is intended.

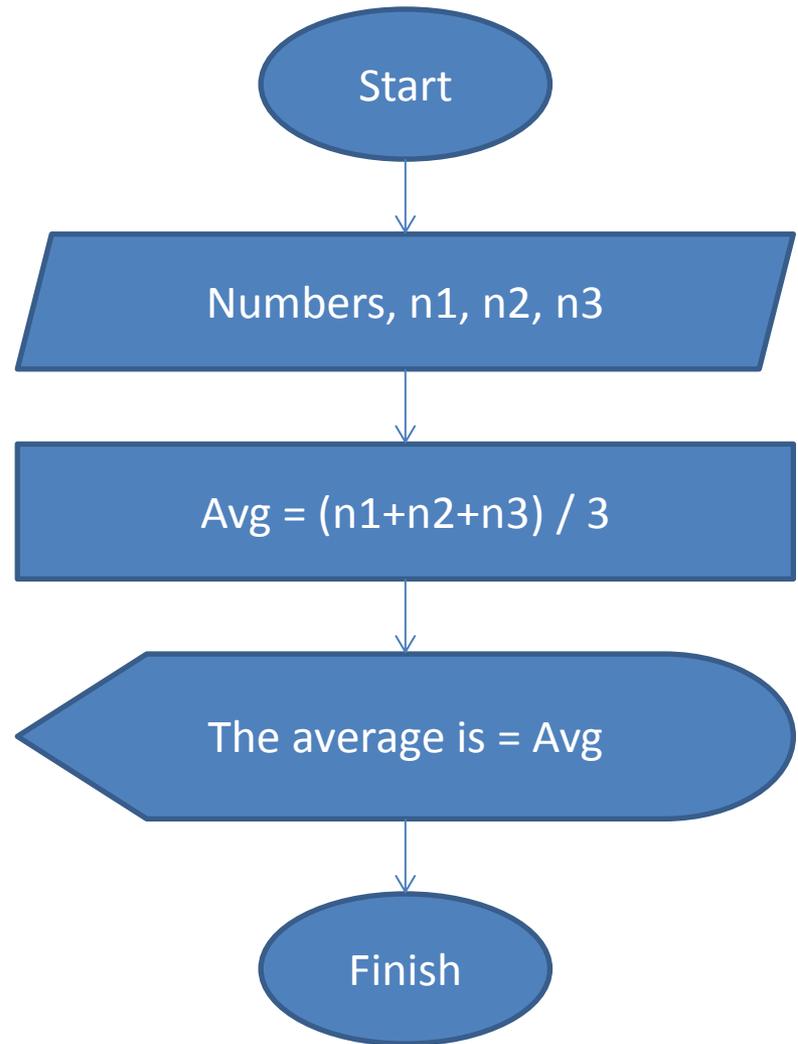
# Flowchart Template, 1969@IBM



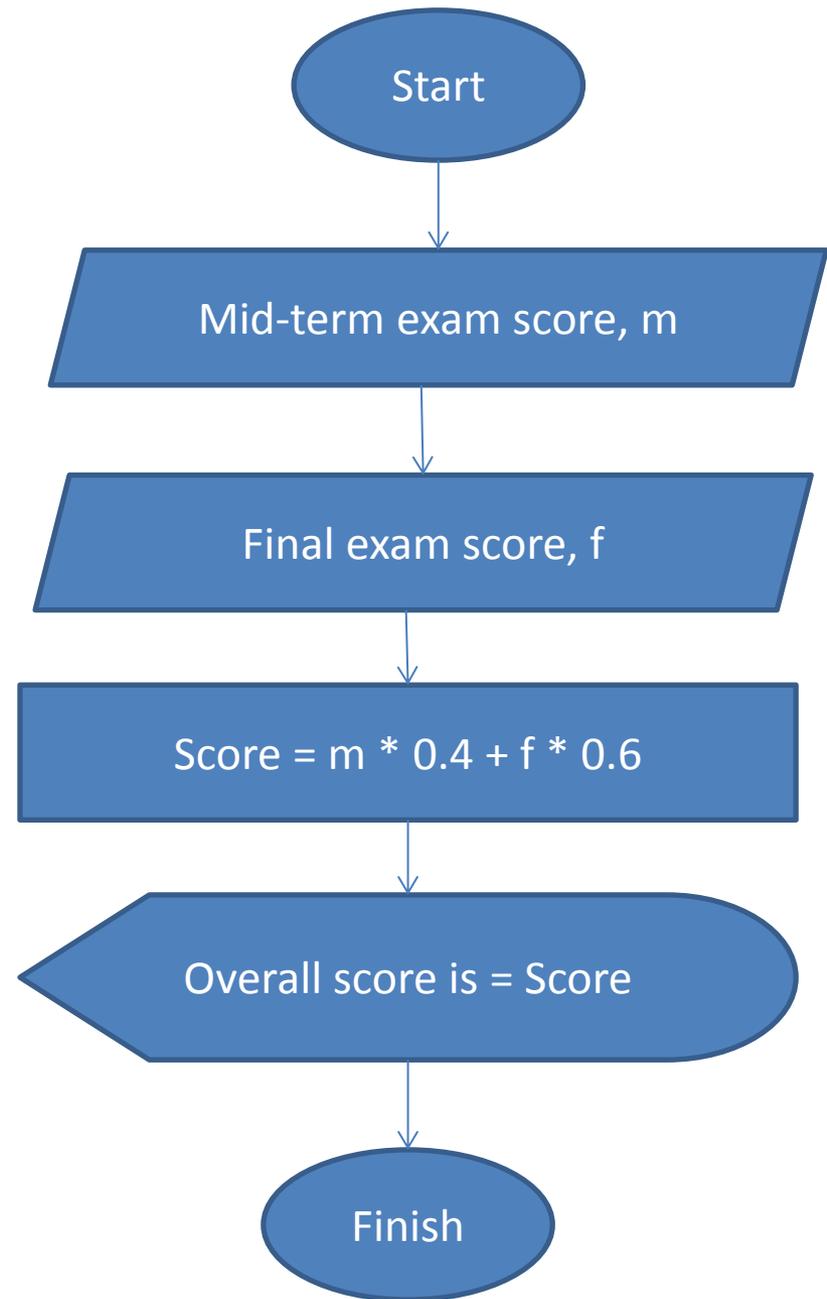
Example:  
Calculating the  
area of a  
triangle



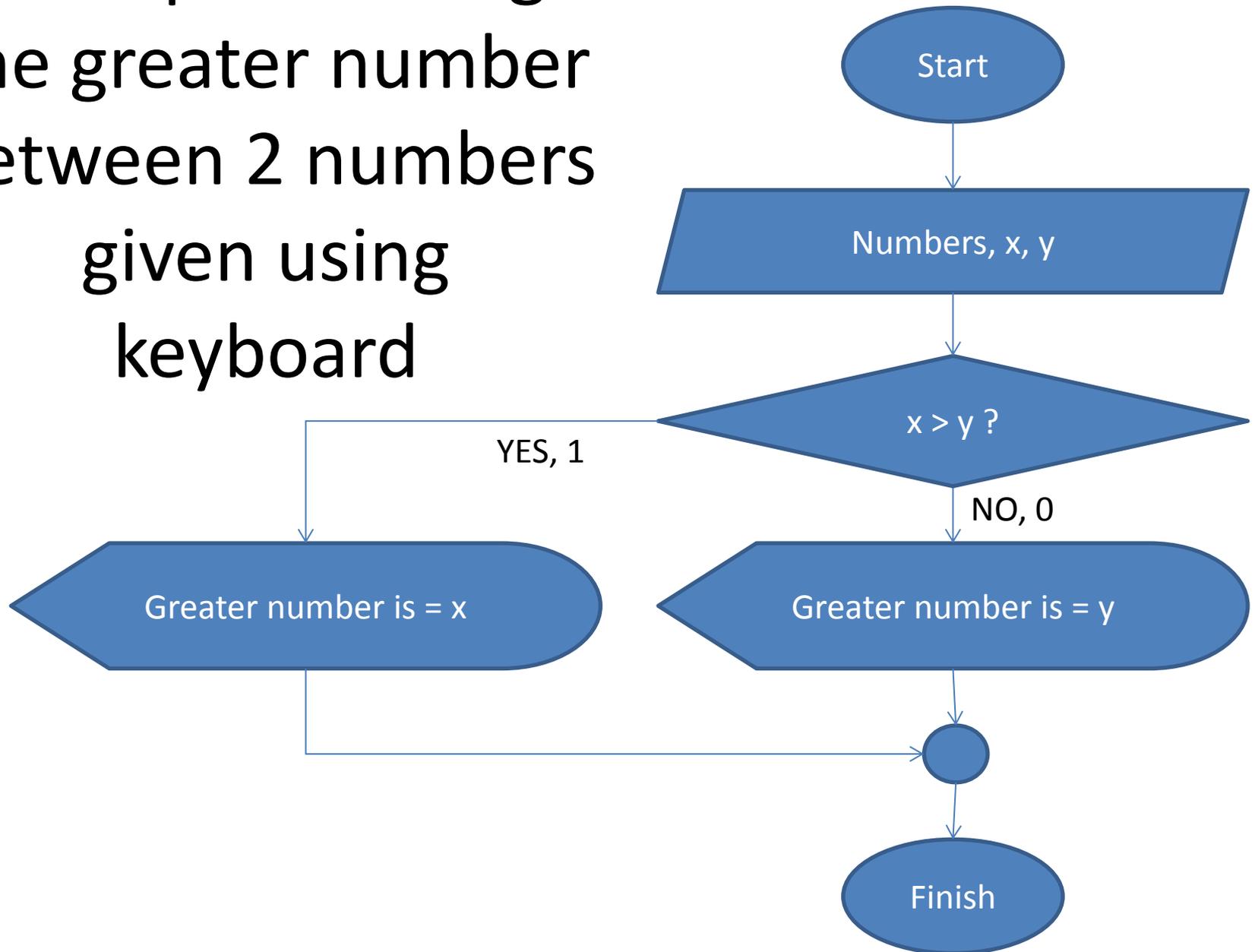
Example:  
Calculating the  
average of 3  
numbers given  
from the  
keyboard



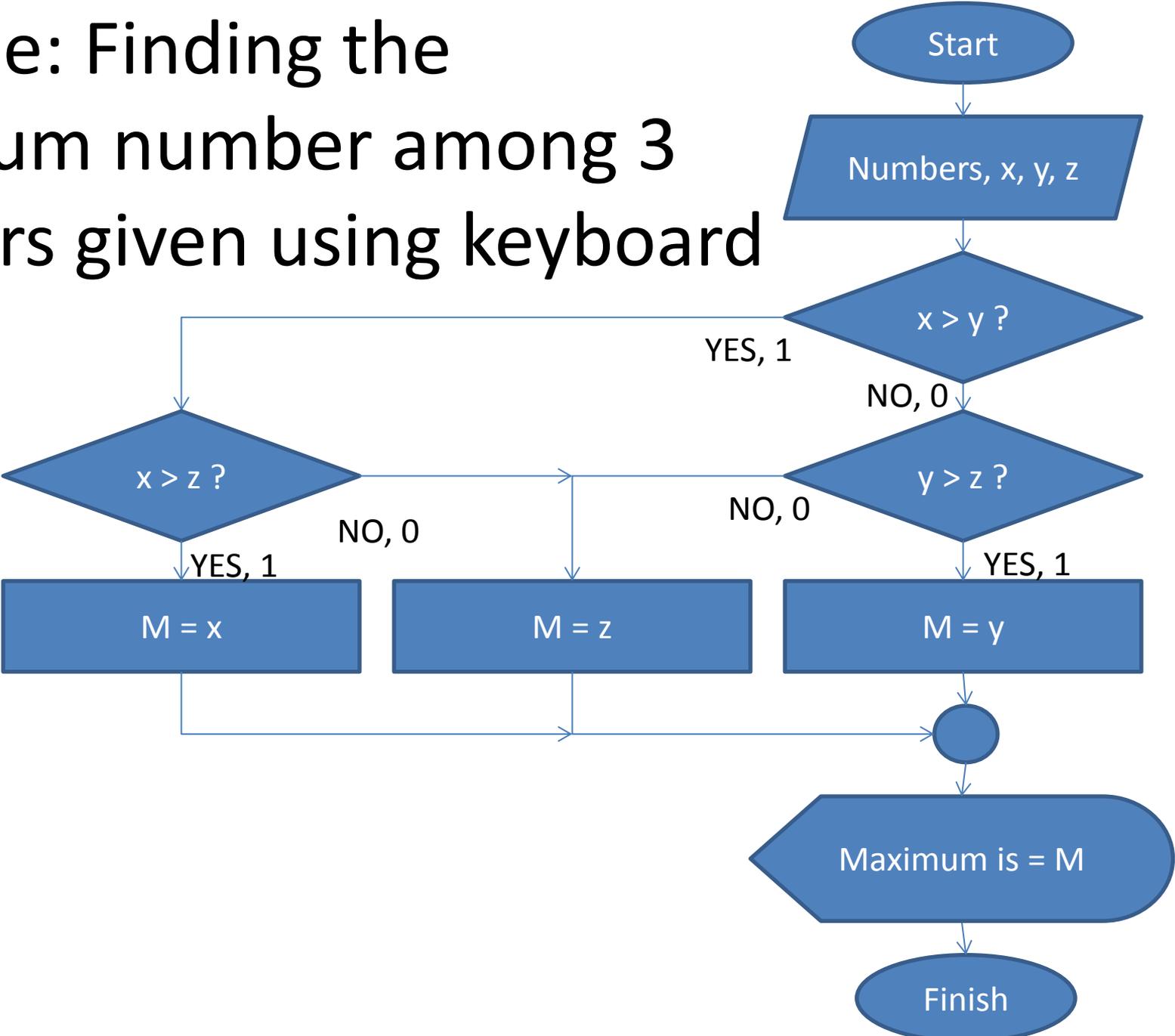
Example:  
Calculating the  
overall score  
from given  
mid-term  
(%40) and final  
(%60) exam  
scores



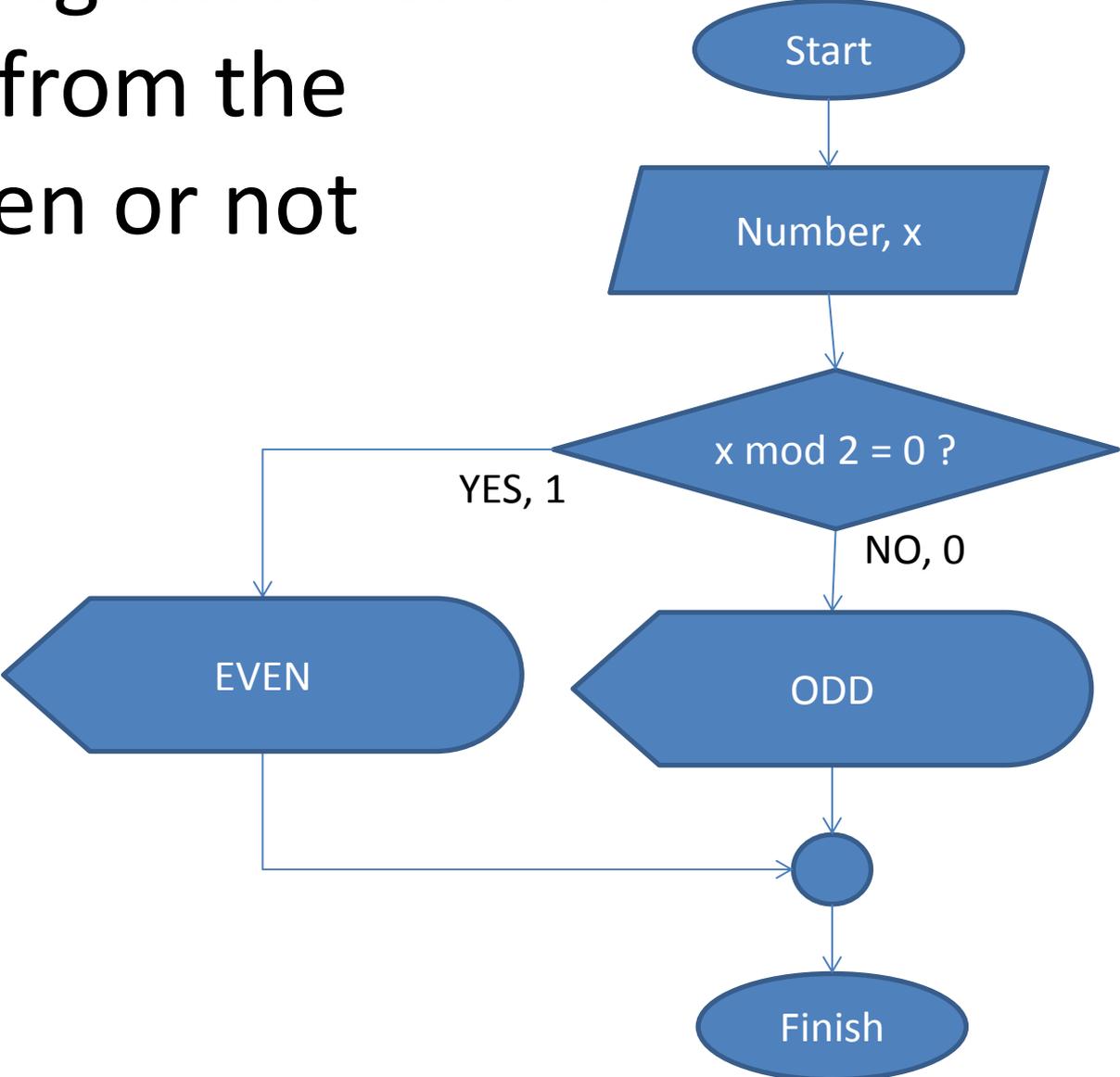
Example: Finding the greater number between 2 numbers given using keyboard



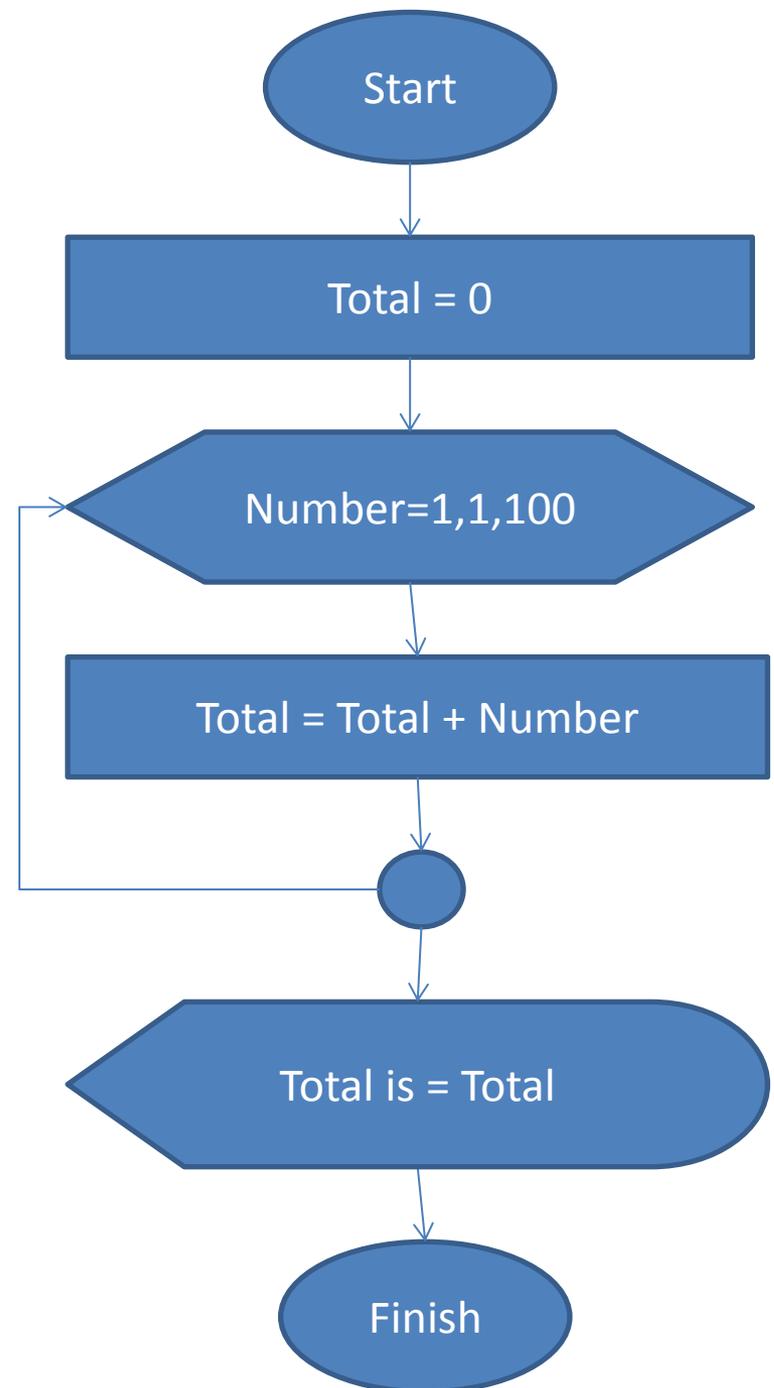
# Example: Finding the maximum number among 3 numbers given using keyboard



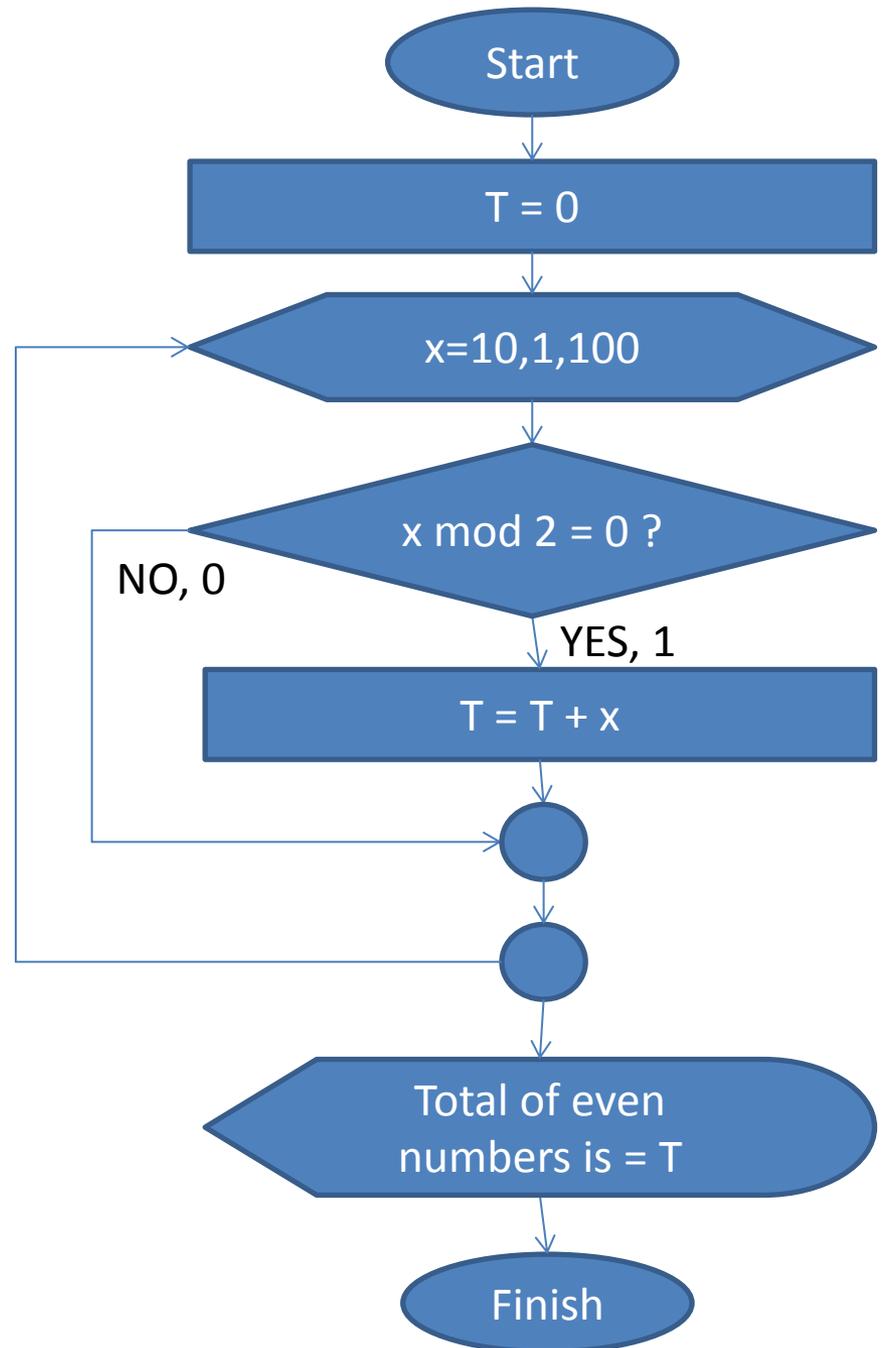
Example: Finding whether the number given from the keyboard is even or not



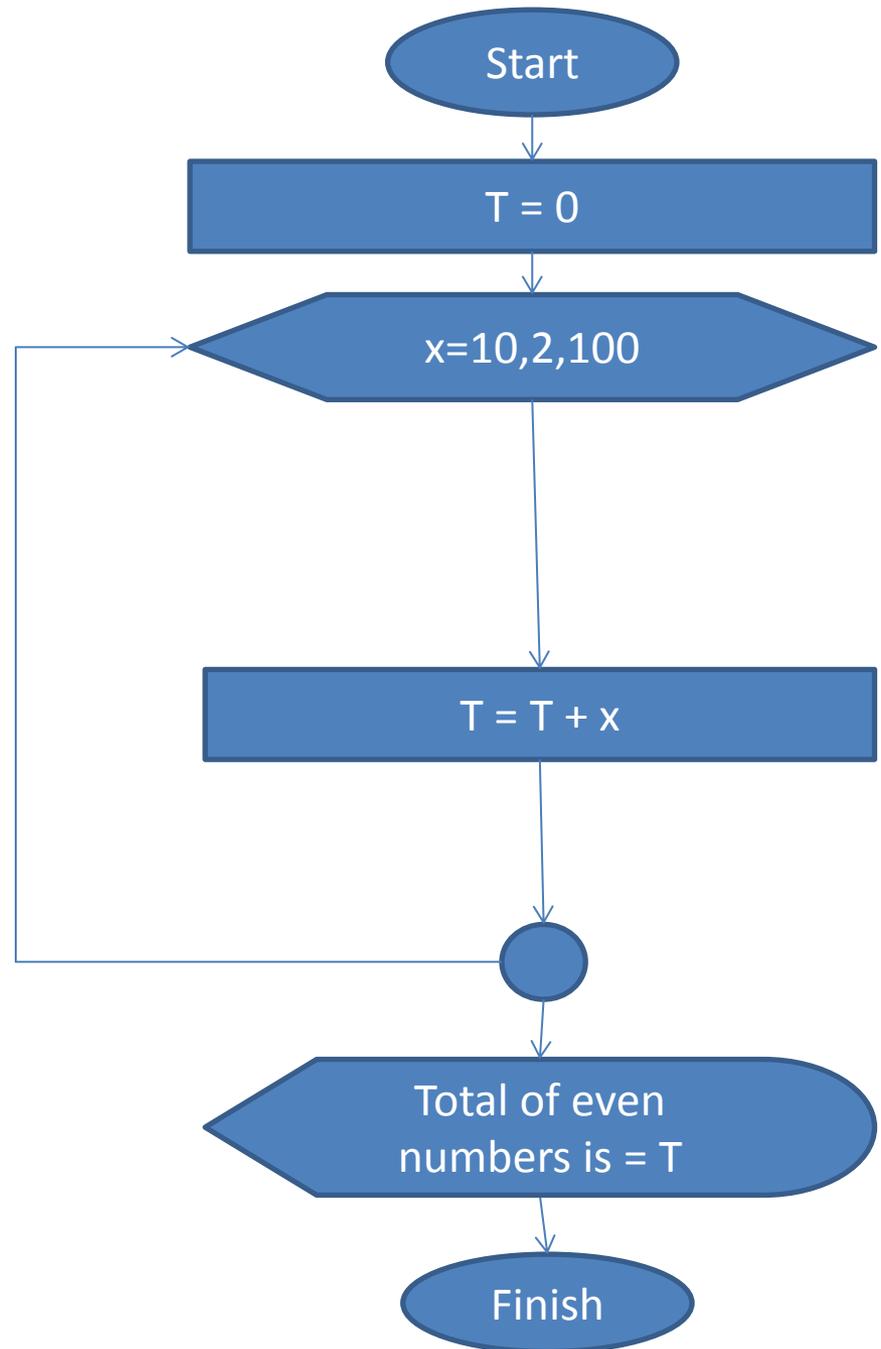
Example:  
Calculating the  
sum of all  
numbers  
between 1 and  
100



Example:  
Calculating  
the sum of  
only even  
numbers  
between 10  
and 100



Example:  
Calculating  
the sum of  
only even  
numbers  
between 10  
and 100



# Homework #2

Not later than the next week:

1. Draw a flowchart that displays the type of triangle when the border lengths are given using the keyboard.
2. Draw a flowchart that finds and displays the average of even numbers and odd numbers separately between 10 and 250.
3. Draw a flowchart that finds and displays how many numbers can be divided by 5 without remaining.
4. Draw a flowchart that finds and displays the average of non-negative numbers ( $\geq 0$ ) between the lower and upper limits given from the keyboard.
5. Draw a flowchart that finds and displays the number of negative numbers given from the keyboard until the value of 0 given.