# Design - Flowchart

# Flowcharts

Flowcharts are another visual data technique that are used to represent the flow of data through a program.

Flowcharts are read by following the flow line (arrow).

# Flowchart Symbols

The following symbols are used in flowcharts:

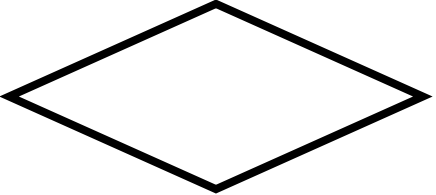| Symbol | Name | Use |
|---|---|---|
| ⟶ | Flow line | Shows the direction of flow between symbols |
| (rounded rectangle) | Terminal | Shows the start and end of the program |
| (hexagon) | Initialisation | Shows the declaration of a variable, and assignment to an initial value (i.e. set total to 0 for a running total algorithm) |
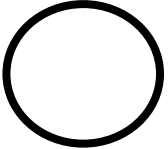
# Flowchart Symbols continued...

The following symbols are used in flowcharts:

| Symbol | Name | Use |
|---|---|---|
| | Input/Output | Shows data is input or output |
| | Process | Used to show that a process is needed, e.g. a calculation |
| | Pre-Defined Function | Used to show that a pre-defined function will be used (such as random, round or length) instead of a developer writing the process themselves. |

# Flowchart Symbols continued…

The following symbols are used in flowcharts:

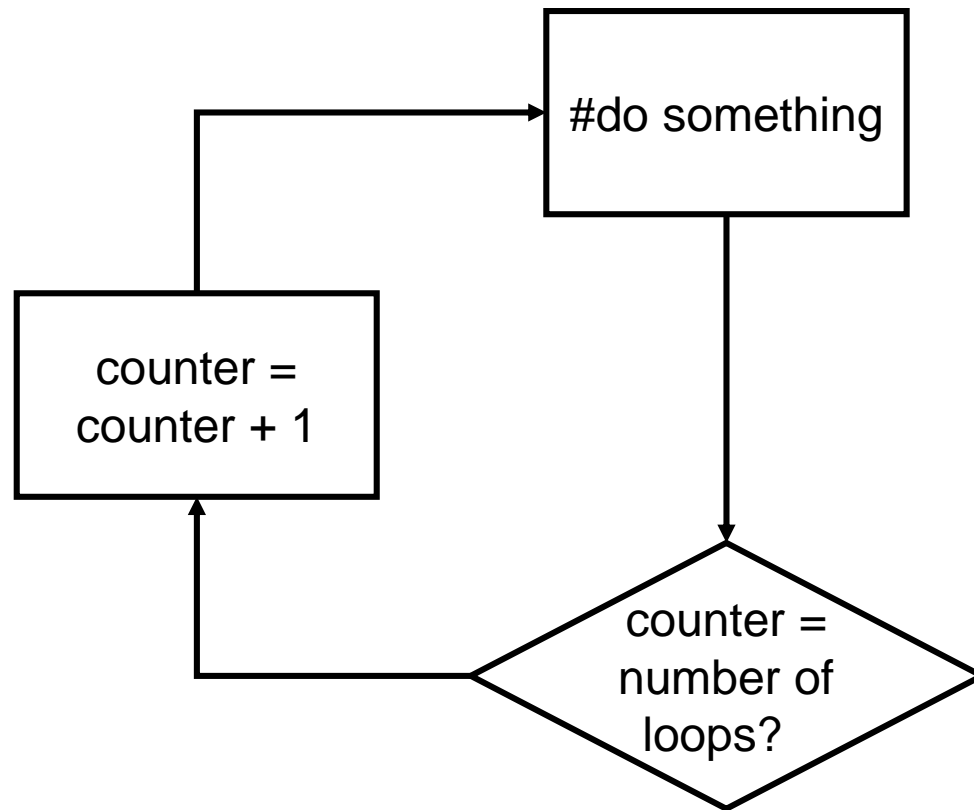| Symbol | Name | Use |
|---|---|---|
| | Decision | Shows a decision has to be made, with branches for different outcomes. Often used for conditional loops and selection statements |
| | Connector | Used if you are running out of room on the page so you can keep it all on one page |

# Flowchart Loops

There is no dedicated symbol for a loop because of the way a flow chart is read – by following the arrow. If the arrows returns to a symbol that has already executed then a loop should be used.
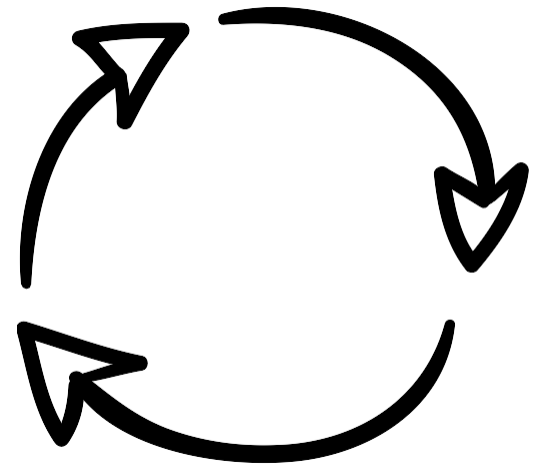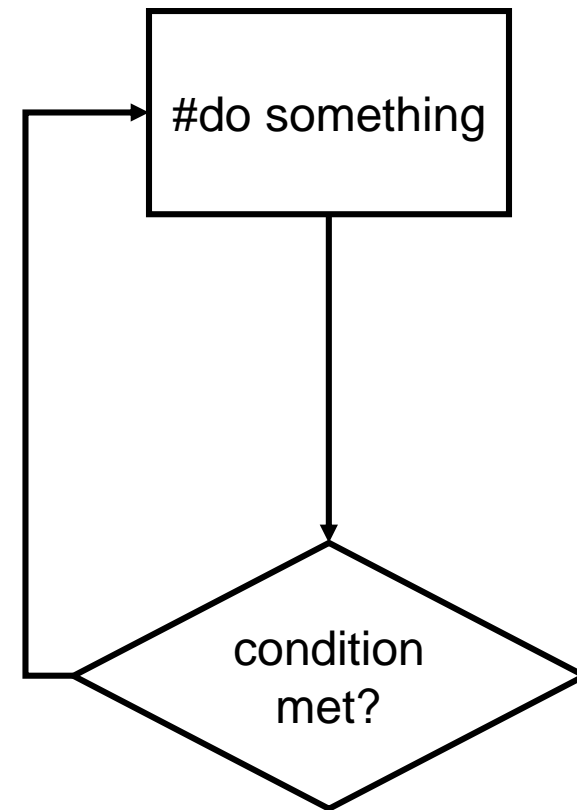
# Flowchart Loops

## Fixed Loop

```
        ┌──────────────────────┐
        │    #do something     │
        └──────────────────────┘
                   │
                   ▼
┌──────────────────┐      ◇ counter =
│   counter =      │◄─────   number of
│   counter + 1    │         loops?
└──────────────────┘
```

## Conditional Loop

```
        ┌──────────────────────┐
        │    #do something     │
        └──────────────────────┘
                   │
                   ▼
                  ◇ condition
                    met?
```

# Flowchart Example

Program Purpose

A class of 20 pupils is raising money for charity. For each pupil, the program will ask how much money they raised, validate that it is a value larger than 0, and then add the amount to the total. When there are no pupils left, the program should decide if the class has won a prize by raising more than £150, displaying a congratulations message if they have. The program will then display the total amount raised.

# Flowchart Example
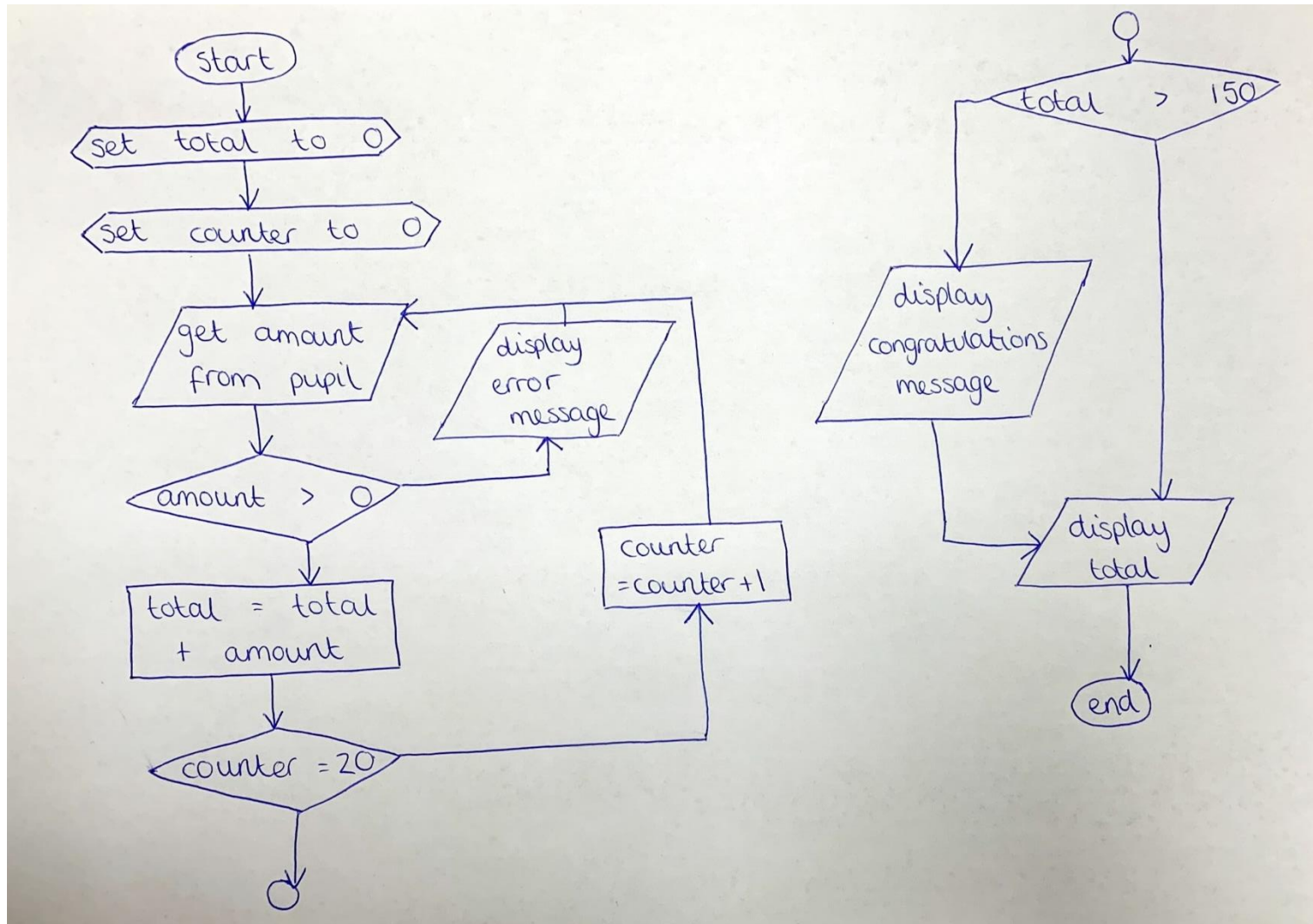
# Pre-Defined Functions in Flowcharts

Round score to 2
decimal places

Get length of
firstName

Set bonusBall to a
Random number
between 1 and 59