

You can work in groups of up to three people. Work at the tables first by doing a rough copy with pencil and then use the computer to create the final version of the flow chart – both copies must be handed in. The flowchart symbols and guidelines are on the back of the page.

1. You are tasked with programming a code to convert either Fahrenheit-to-Celsius or Celsius-to-Fahrenheit. Create the flowchart for this program with the following conditions:

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- The user selects which conversion is taking place.
- The user inputs a temperature and the program outputs the conversion.
- The program asks the user if there are more conversions.

2. While making a role playing video game you are tasked with programming a battle between the hero and the final boss. Create the flowchart for this program with the following conditions:

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- The hero and boss have a set number of hit points that decrease when attacked and increase with heal spells. The program ends when either the hero's or boss' hit points reach zero (or less).
- Player acts first and can choose attack or heal.
- The Boss acts second and has the same choices.
- Attacks and heal spells are not the same each time (in RPGs they are subject to a random number being generated between set values).
- Bonus (5 possible marks)
  - i. Incorporate the possibility of a critical hit (usually three times the damage). When attack is chosen it will be a critical hit if a random number is chosen between a certain range of values (for example, if a character has a 5% chance; a critical will happen if a random number chosen between 1 and 100 falls between 1 and 5).
  - ii. Incorporate a weapon choice for the hero and boss. Weapons could have different attacks and cause extra damage or a change in status (poison, cure, fire, etc.).

Flowcharts are made up of standard symbols. With these symbols, you can write any flowchart that you will ever need. In this lesson, we will look at the most common flowcharting symbols.

Symbol	Meaning	Description
	Process	This contains a description of what is being done. Use this symbol to indicate how the data will be processed. For example, use an expression.
	Input/Output	Use this to indicate input or output. The slanted shape of the I/O symbol gives you a clue to its meaning as the slash in the I/O slants the same way as the sides of the symbol.
	Decision	Use this when the program must make a decision.
	Flow connector	Use this when two paths in the flowchart merge. For example, after a decision, the two branches merge and the flow continues.
	Off page	Use this symbol when the flowchart continues to another page. Put the next page's number inside the symbol.
	Flow direction	These arrows connect every symbol in the flowchart and indicate the direction of the program flow.
	Terminal	A terminal symbol with the word Begin or Start written in it begins every flowchart. A terminal symbol with the word End or Finish written in it ends every flowchart.

Every programmer draws flowcharts differently. However, there are some specific rules that should always be followed. If you follow these rules faithfully, the flowcharts you write will always be readable by others.

- > **Rule #1:** Use standard flowchart symbols.
- > **Rule #2:** The flowchart's logic should generally flow from the top of the page to the bottom and from the left to the right.
- > **Rule #3:** The decision symbol is the only symbol that can have more than one exit point and it always has two exits.
- > **Rule #4:** A decision symbol should always ask a yes or no question.
- > **Rule #5:** Instructions inside the symbols should be clear, English descriptions, not programming language statements.