Online Teaching Resources

Digital Kids **Expert**

Samples of

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Syllabus

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What is a program?

You already know the difference between hardware and software, i.e. the computer and its programs that make electronics useful! But what is a program, really?

A computer program is a list of instructions stored as a file on the hard drive. When you run the program, the list of commands or instructions is read by the computer. Then the computer does what the program tells it to do.
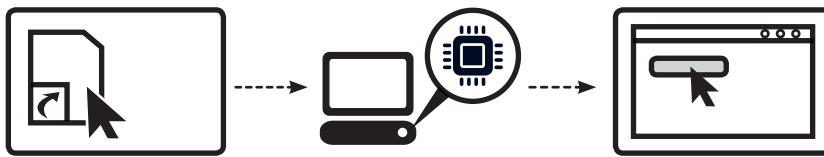
How do people write programs? How can someone write a drawing program or a game?

A program is written by a programmer. It is impossible to write a program in 0s and 1s, which is the language the computer can understand, so programmers write in a programming language. Once the program is written, the programmer uses tools to turn these instructions into the correct 0s and 1s.

A programming language uses words from the English language and special grammar and syntax that can describe instructions for the computer. Now you will learn Scratch, an easy programming language for beginners. Compare the instructions below, which all do the same thing, in various programming languages and Scratch.

ActionScript 3

```
// Hello World in ActionScript 3
var t:TextField=new TextField();
t.text="Hello World!";
addChild(t);
```

BASIC

```
10 REM Hello World in BASIC
20 PRINT "Hello World!"
```
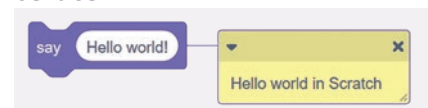
C Ansi

```
/* Hello World in C Ansi */
#include <stdio.h>
#include <stdlib.h>
int main(void)
{
  puts("Hello World!");
  return EXIT_SUCCESS;
}
```

C#

```
//Hello World in C#
class HelloWorld
{
    static void Main()
    {
System.Console.WriteLine("Hello, World!");
    }
}
```
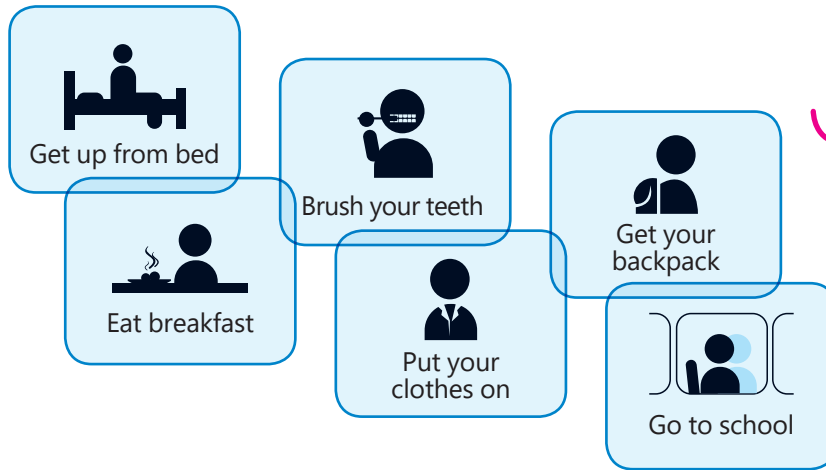
Scratch

Ruby

```
# Hello World in Ruby
puts "Hello World!"
```

Follow the instructions

We follow instructions in our everyday life for the simplest tasks. Sometimes you don't pay attention to the "instructions" you follow to get things done. For example, when you get up every morning, you follow a set of actions.

Get up from bed

Eat breakfast

Brush your teeth

Put your clothes on

Get your backpack

Go to school

The instructions in your life are not always clear and sometimes you have to decide by yourself what to do. However, computers cannot make decisions by themselves. They have to follow very specific instructions.

Algorithm

An **algorithm** is a step-by-step list of instructions that needs to be followed to solve a problem. These instructions must be simple enough so that each step can be done without thinking about it. But there are algorithms in the real world, too. For example, a recipe is like an algorithm. It tells you what ingredients are needed to make a specific dish and what steps you need to follow.

Computers only do what people tell them to do. If you give them wrong instructions, the result will also be wrong or the work will not be done.

Pizza Recipe

Ingredients:
Pizza dough, tomatoes, mushrooms, mozzarella cheese, chicken, salt and pepper

Instructions:
Spread the pizza dough on a pan.
Add the chopped tomatoes, sliced mushrooms, chicken and mozzarella.
Add salt and pepper to taste.
Place the pan into a hot oven and bake until the cheese bubbles and the dough is cooked.
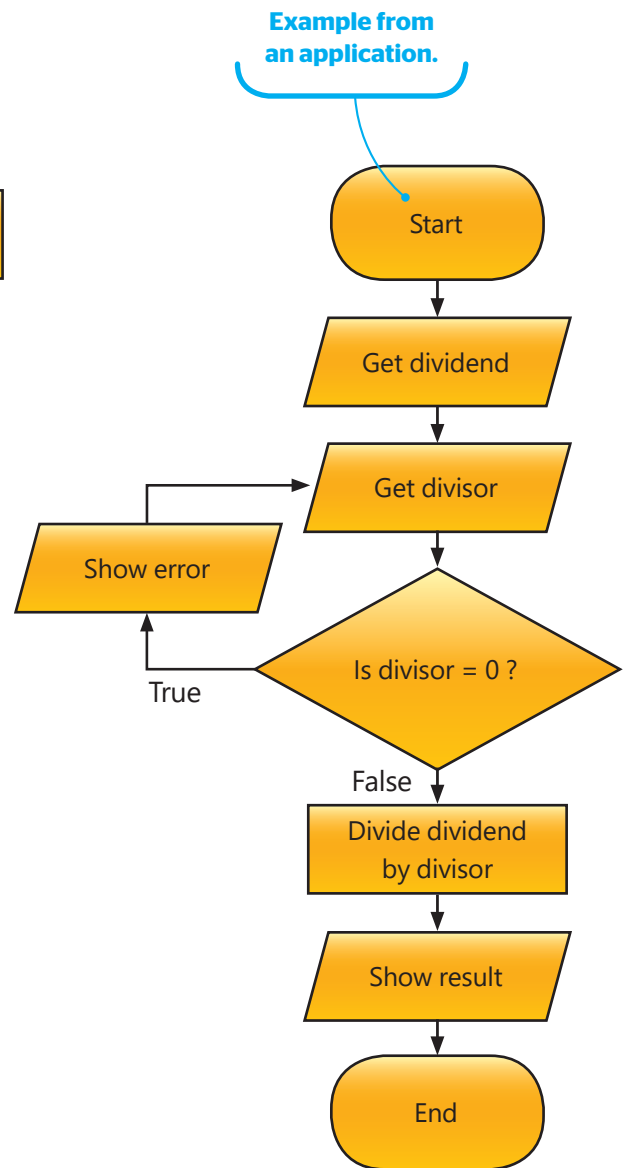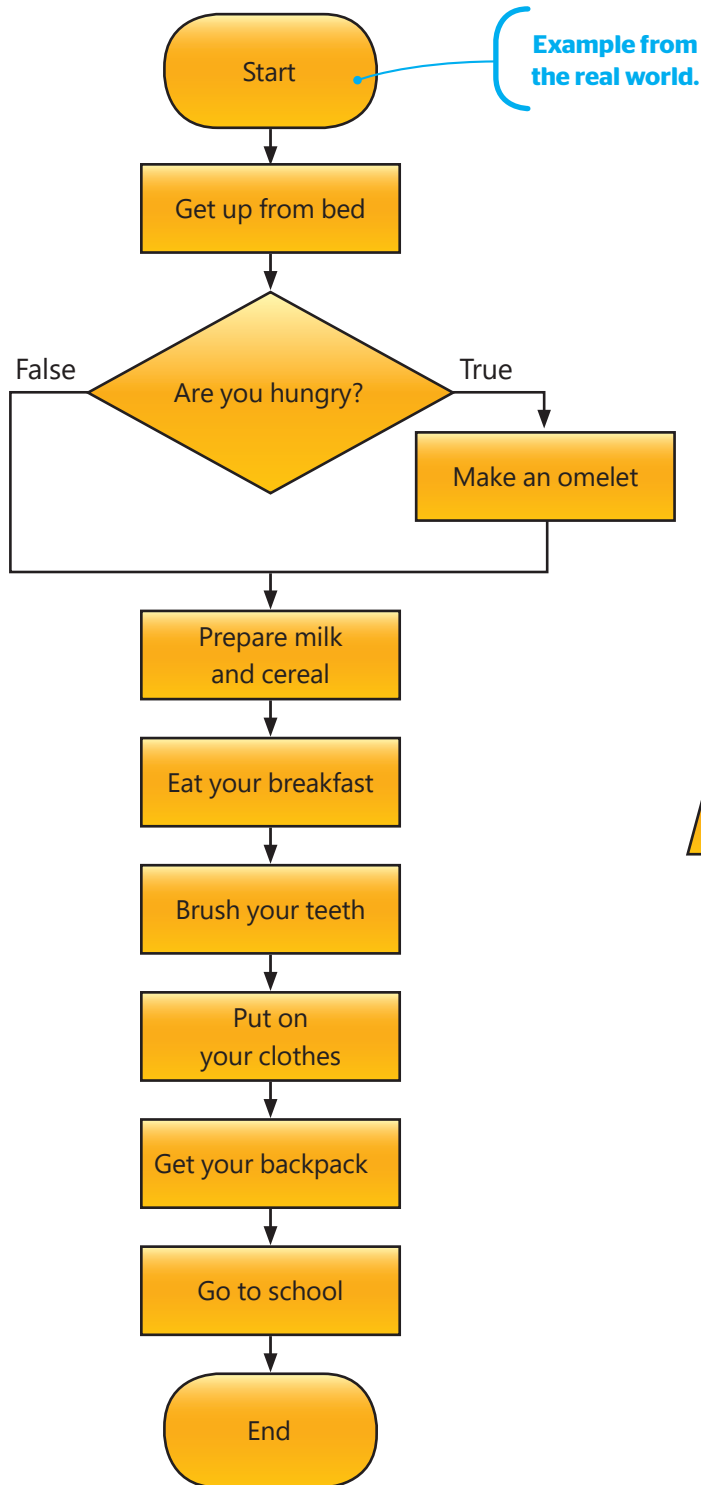
HISTORY

Algorithm comes from Algoritmi, the Latin form of the name of the famous Persian mathematician, Muhammad ibn Musa al-Khwarizmi. His work in mathematics, geography and astronomy advanced the subject of algebra and trigonometry.
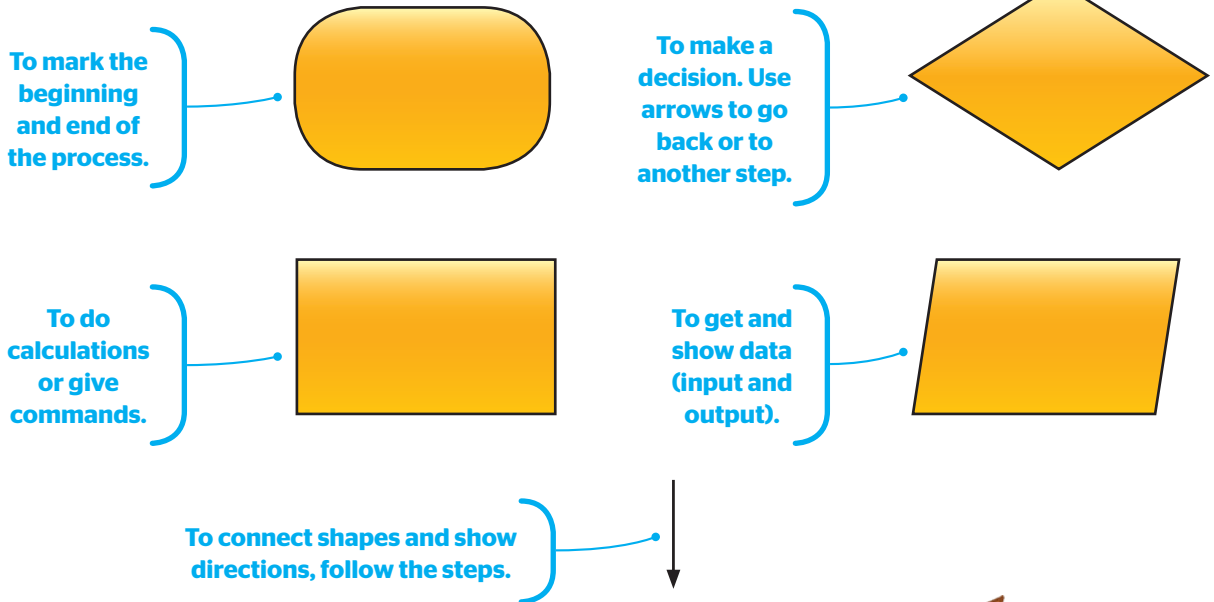
Flowchart

A flowchart is a diagram that represents an algorithm and shows its steps and their correct order. This diagram gives a clear step-by-step procedure to solve a problem.

You can use flowcharts to describe your thoughts about how to solve a problem with the computer before you actually start writing the program.

Example from the real world.

Start

Get up from bed

Are you hungry?

False

True

Make an omelet

Prepare milk and cereal

Eat your breakfast

Brush your teeth

Put on your clothes

Get your backpack

Go to school

End

Example from an application.

Start

Get dividend

Get divisor

Show error

True

Is divisor = 0 ?

False

Divide dividend by divisor

Show result

End

To describe the steps of an algorithm in a way closer to the computer's "logic", you draw the flowchart using 4 different types of boxes for the actions and using arrows to show their order.

To mark the beginning and end of the process.

To make a decision. Use arrows to go back or to another step.

To do calculations or give commands.

To get and show data (input and output).

To connect shapes and show directions, follow the steps.

hands on!

*Are the following sentences **true** or **false**?*

	True	False
1. *Algorithms only describe recipes.*	☐	☐
2. *Al-Khwarizmi was a programmer.*	☐	☐
3. *A flowchart shows the steps of a solution.*	☐	☐
4. *Computers can decide what to do by themselves.*	☐	☐
5. *English is a programming language.*	☐	☐
6. *Computers understand instructions as 0s and 1s.*	☐	☐
7. *A program is a list of instructions.*	☐	☐
8. *A programmer always makes a good pizza*	☐	☐