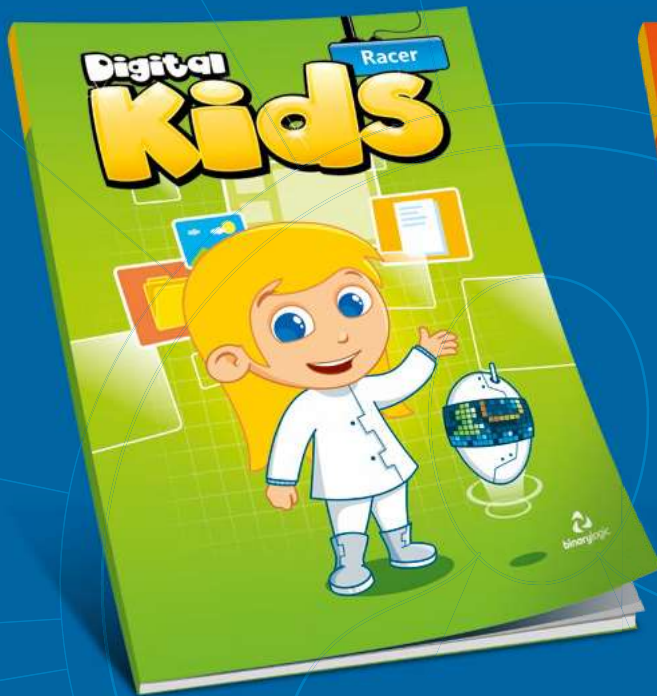


# Welcome to Digital Kids

Grade 3-6

Key features and sample pages



discover more at [binarylogic.net](http://binarylogic.net)

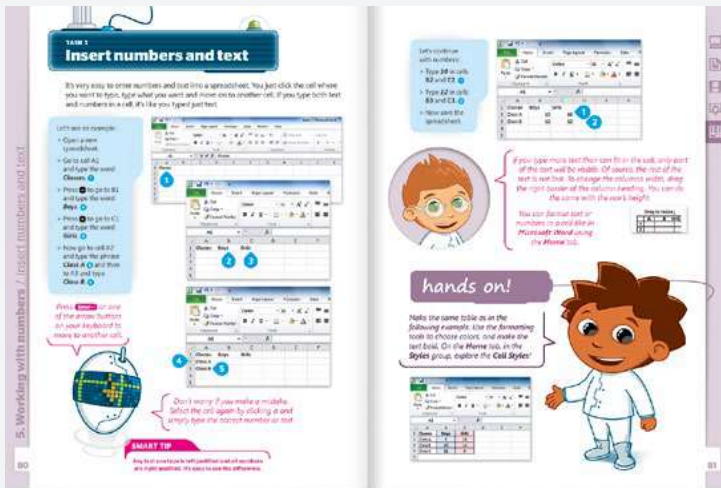
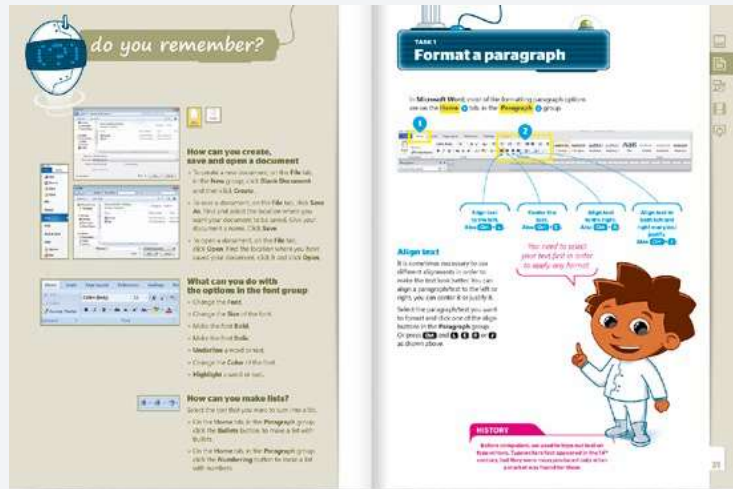
# Key Features

An innovative approach to teaching Computing and ICT written by a team of educators.

*Follows latest Computing and ICT teaching standards & requirements.*

Each book has four or five modules. Each module provides a range of tasks and activities that help students to develop their Computing and ICT skills and allow teachers to monitor the students' progress.

The "do you remember?" section focuses on important points which students need to revise.



*Clear learning objectives and functional skills.*

Clear explanations and illustrative contemporary examples.

The activities are based on school subjects taught in each grade.

*Project-based learning*

The group-work activity consolidates skills previously taught and encourages students' collaboration. Most group-work activities are cross-curricular.

*New content continually updated according to changes in technology.*

Students learn how to work with many different platforms and tools. The "Other platforms" section at the end of each module shows some of the available alternatives. The online video tutorials guide the students through each task. New vocabulary is organized in related topics.



# 4. My wired world

Computing and ICT - Sample Pages  
**DIGITAL KIDS RACER** MODULE 4

**3**  
GRADE



It's time to explore the fantastic new world of the Internet, so pack your backpack and let's go! You are going to see what the Internet is and how you can search for information. You are going to find out how you can expand your knowledge through wikis. Careful though, every society (virtual or not) has rules that you must follow! These rules set your behavior, but above all the rules protect you and keep you safe.

## Learning objectives

In this module you will learn:

- > how to search the web for information.
- > how to use online encyclopedias.
- > the rules you must follow when you use the Internet.
- > how to protect yourself and your computer from the dangers of the Internet.

## Skills

After this module you will be able to:

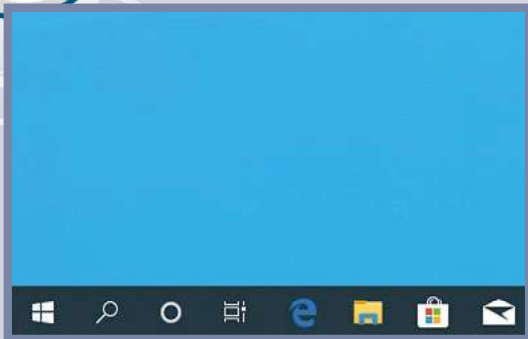
- > use search engines.
- > search wikis for information.
- > be polite online.
- > protect yourself and your computer from viruses and unknown dangers of the web.

## Tools

- > Microsoft Edge
- > Google search engine
- > Google Chrome
- > Mozilla Firefox



# do you remember?



## What a browser is and how to use one?

- > Click **Microsoft Edge** on the task bar.
- > **Microsoft Edge** will open.

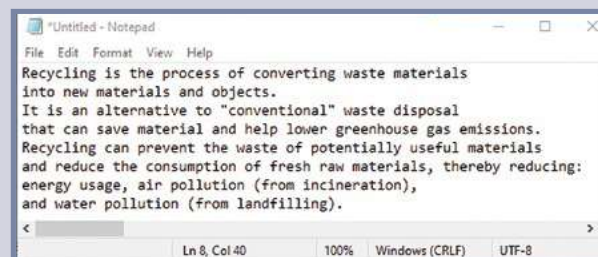


## How to open a web page:

- > On the **Address bar**, type the address of a webpage.
- > Press **Enter** ↵.
- > The webpage will appear on your browser.

## How to copy text from the web:

- > Select your text.
- > Right-click it and click **Copy**.
- > Open **Notepad**.
- > Right-click on an empty space and click **Paste**.



## TASK 1

# Search for anything

## Accessing the Internet

The Internet is like a huge library because accessing the Internet is very simple and cheap, you can visit any website or search for and find any information you want easily and quickly. All you need is a program which is called a web browser, a computer and a phone line with an Internet connection.

Some examples of web browsers are **Microsoft Edge**, **Google Chrome**, **Opera**, **Safari** and **Mozilla Firefox**. You can find **Microsoft Edge** on all computers with **Microsoft Windows** installed.

How to open a **web browser**:

- > Click the **Start** button.
- > Scroll down the sidebar with the applications and click **Microsoft Edge**.
- > In the **address bar**, type the address of the website you want to visit **1** and press **Enter ↵**.



Another way to start a web browser is to click the program's icon on the taskbar.



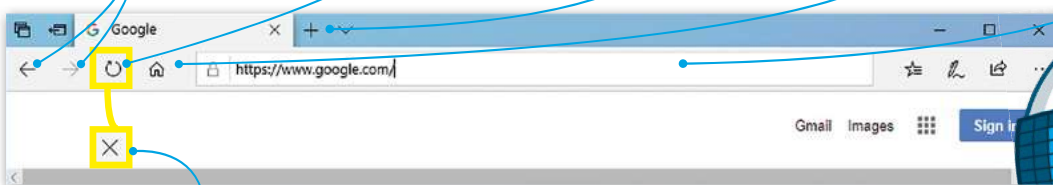
Use the **Back** and **Forward** buttons to go back to the previous web page or next respectively.

Reload the current web page with the **Refresh** button.

Use the **New Tab** button to view more than one web page in one window.

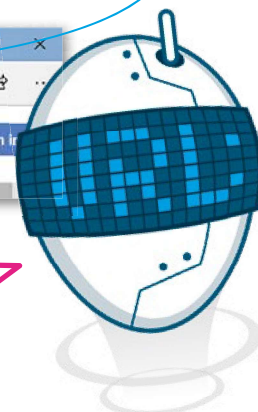
Return to the web browser's home page with the **Home** button.

Use the **Address bar** to type the address of a website.



Use the **Stop** button to cancel loading the web page.

The web address is also called **Uniform Resource Locator (URL)**.



# Searching on the Internet

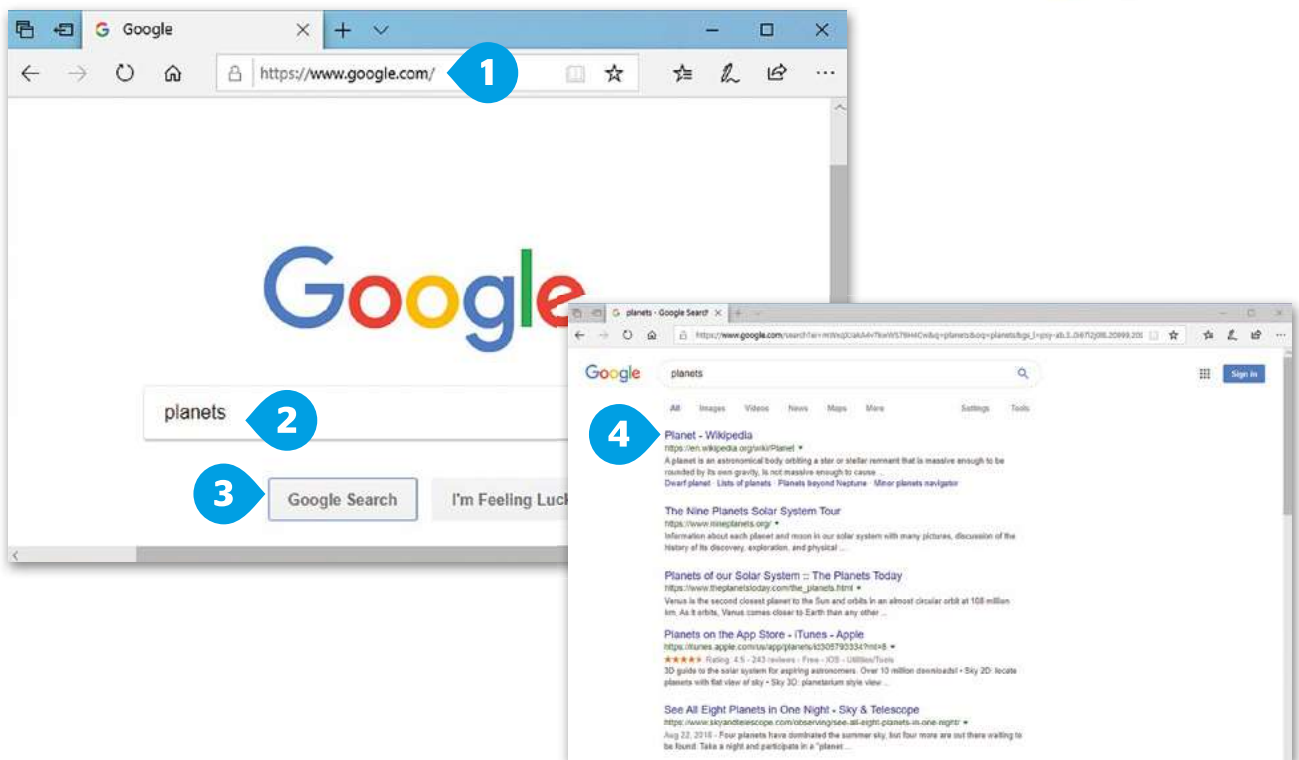
Instead of visiting a specific website, you can use a search engine which can help you find exactly what you are looking for.

To use a **search engine**:

- > Open a web browser and visit a search engine like **Google** ([www.google.com](http://www.google.com)). **1**
- > Type a word or phrase related to the information you are looking for e.g. planets. **2**
- > Click the **Google Search** button. **3**
- > A list of **results** will appear on your screen. **4**  
Click the one that looks the most useful.



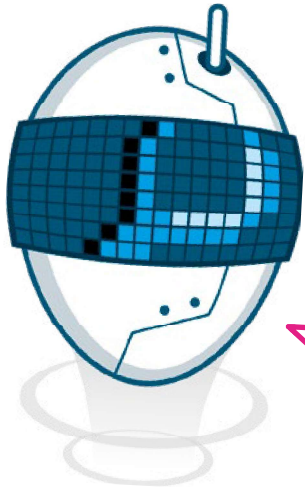
*The most common search engines are [www.google.com](http://www.google.com) and [www.bing.com](http://www.bing.com).*



## HISTORY

In the address bar, “http” automatically appears before the web address. This means Hypertext Transfer Protocol (HTTP) and it is the foundation of data communication for the World Wide Web.

The result of a search can be dozens or even thousands of web pages, so the list of results can be many pages long.



*A search engine helps you to find information, images, videos and news.*



**Choose a page for more results.**

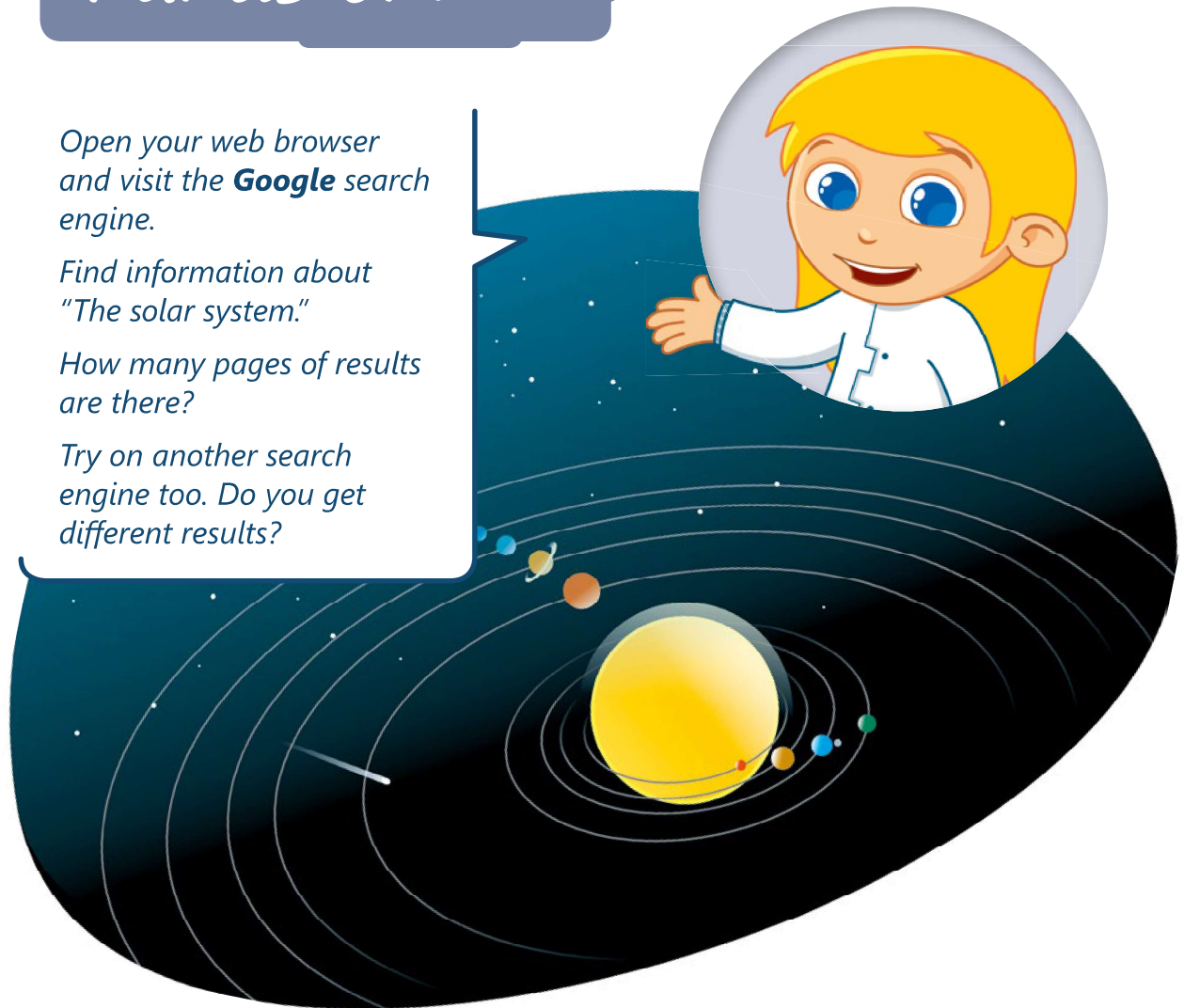
## hands on!

Open your web browser and visit the **Google** search engine.

Find information about "The solar system."

How many pages of results are there?

Try on another search engine too. Do you get different results?





## TASK 2

# Knowledge treasure sites

## Virtual libraries and dictionaries

The Internet offers you the opportunity to search for and find information on any subject. There are some websites which are like virtual encyclopedias and dictionaries and you can access them for free.

Some examples of **Wikis** are:

**Wikipedia** → encyclopedia

**Wiktionary** → dictionary and thesaurus

**Wikisource** → library

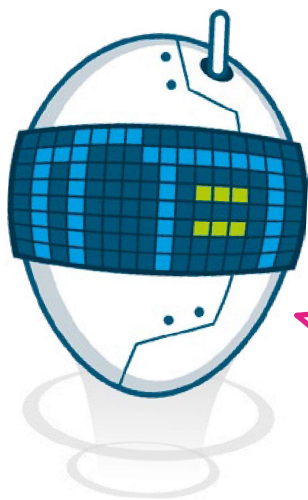
**Wikinews** → news site

**Wikibooks** → texts and manuals bank

**Wikispecies** → species directory

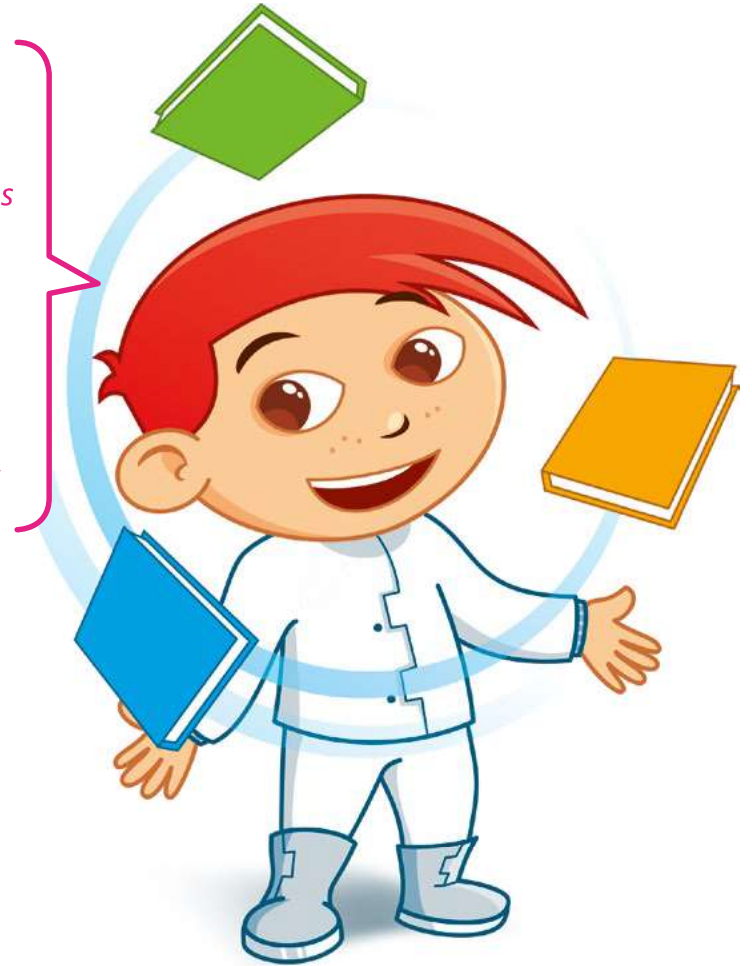
**Wikiversity** → learning materials bank

You can also add to, modify or delete a wiki's content via a web browser.



*Wiki: a type of website written by a lot of experts, from the Hawaiian word wiki, meaning "quick". They are continuously updated and are available in many languages.*

Most wikis contain texts, images, clips and videos and also offer a search box that you can use to find what you are looking for.



The most popular wiki in the world is **Wikipedia**, the free encyclopedia. **Wikipedia** is very useful and easy to use.



To search in a **wiki**:

- > Open your browser and visit a **wiki** site e.g. **www.wikipedia.org**. 1
- > Type the word or phrase you need information about into the search box e.g. Recycling. 2
- > Click the **Search** icon. 3



### SMART TIP

There is a large number of hypertext links in each wiki. A hypertext link takes you to another web page for more information. Click the link, which is usually in blue and underlined.

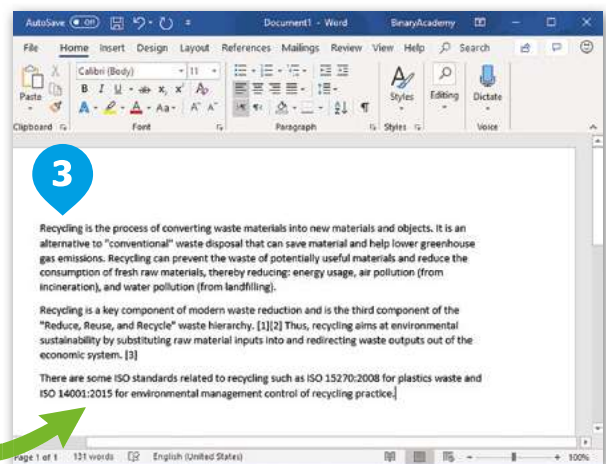
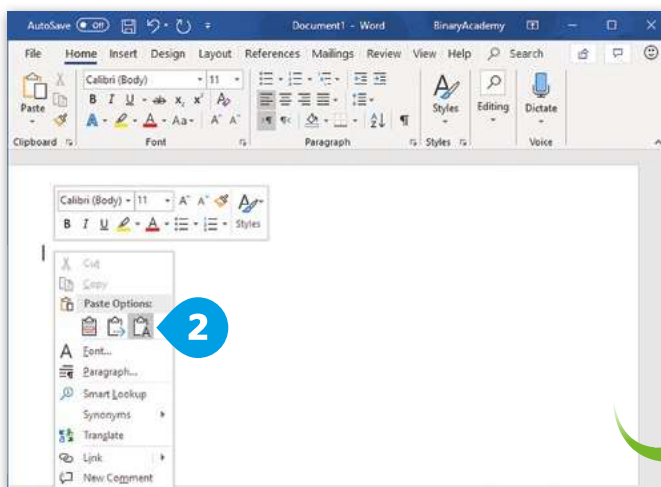


## Copy information

You can copy text from a wiki.

To copy and paste text:

- > Open your web browser, visit a wiki and find the text you want.
- > **Select** the text with your mouse, right-click on the selected text and click **Copy**. **1**
- > Open a text editor like **WordPad** or **Microsoft Word**, right-click and click **Paste**. **2**
- > The copied text is pasted into the Microsoft Word document, in the example. **3**



## HISTORY

**Jimmy Wales and Larry Sanger started Wikipedia in 2001. The name Wikipedia is a portmanteau of wiki and encyclopedia.**

## Respect the work of others

It's not right to copy and use text or images from the Internet without the permission of the people who created them. If you uploaded a project on the Internet and someone used it as if it were their own, would you like it? Of course not. If you want to borrow something, always refer to the person who created it or mention the source from which it was taken.

For the copied text from wikipedia you have to add at the end:  
"Recycling." Wikipedia.Online.

# hands on!

Open your web browser and visit **Wikipedia**.

Find information about the Olympic Games.

Now answer these questions:

- > When and where did the first Olympic Games take place?
- > What was the prize that an athlete won at the first Olympic Games?



Now, using a wiki site, search and find information about a subject you are interested in, e.g. music, sports, comic books, etc.

Copy the most interesting content and paste it into a text editor.

Save this file using a name of your choice.



### TASK 3

## Be polite

### Be nice!

The Internet is not only a source of information, but also a tool with which you can communicate with people all over the world. But you must be polite online, just like you are in real life.

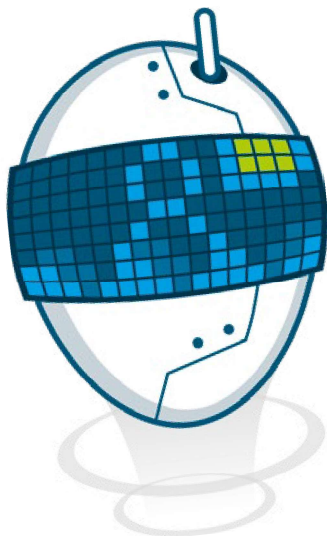
There is a list of rules for proper behavior on the Internet and it's called Netiquette. Netiquette describes the culture of the Internet, for example what is proper to post or send, and how you should present yourself.

*The Golden Rule of Netiquette:  
do unto others online as you  
would have done to you.*



### Communication manners

You must be careful and polite when you communicate via instant messaging, email, blogs and in chat rooms. Don't talk to people that you don't know. Your parents have told you never to talk to strangers. Use this advice on the Internet, too.

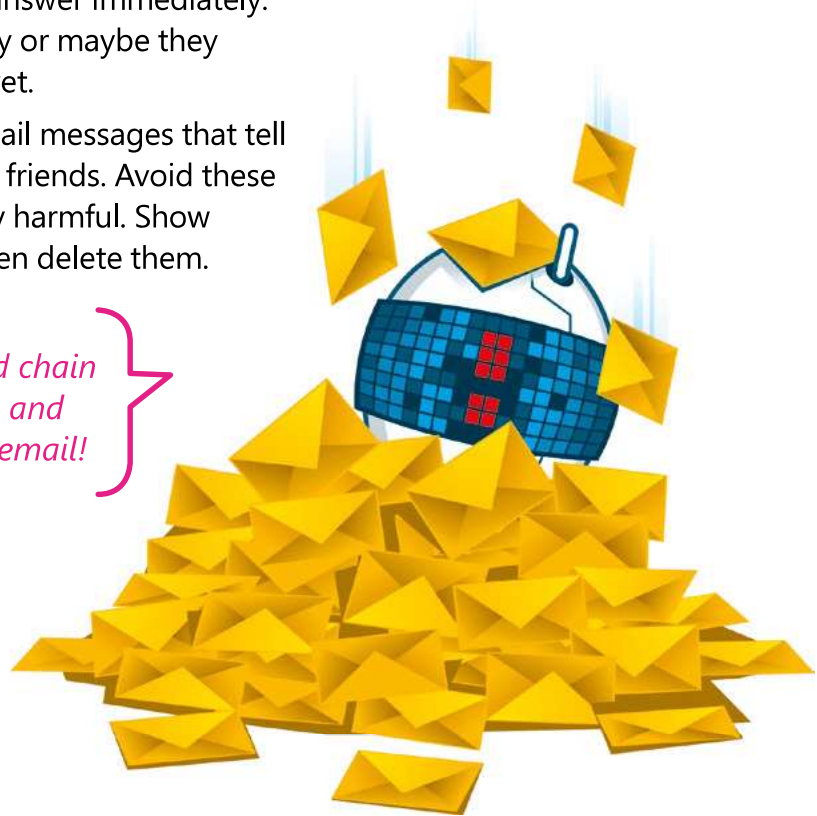


*Today, many schools and  
universities around the  
world teach their students  
about moral and responsible  
behavior on the Internet.*

## Using email

- > Check your email messages for spelling mistakes and always use a subject title.
- > Don't worry if people don't answer immediately. Be patient! They may be busy or maybe they haven't read your message yet.
- > Don't forward or reply to email messages that tell you to forward them to your friends. Avoid these messages! They can be really harmful. Show them to your parents and then delete them.

*Never send chain e-letters and spam via email!*



## Using blogs

- > Your messages must be brief.
- > Follow the rules of the blog creator.
- > Don't get involved in arguments and don't blame anyone!
- > Never use bad language and you should give your opinion clearly.
- > Always listen to others.
- > If a friend needs help with a website, give as much information as possible.



*Be polite in every aspect of your life. Politeness is a virtue not merely something that you have to do.*



## Using chat rooms

Use emoticons to show your mood.

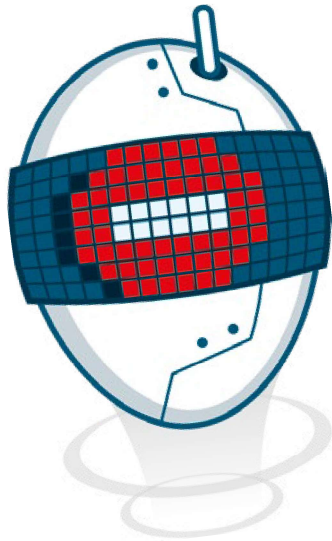
People with whom you communicate online may live across the globe and their culture, language and humor may be really different from yours.

So, be very careful when you use humor, sarcasm and slang.

Always say goodbye and make sure that your friend is also leaving before closing the chat. This is important when you are communicating with someone a long way away.



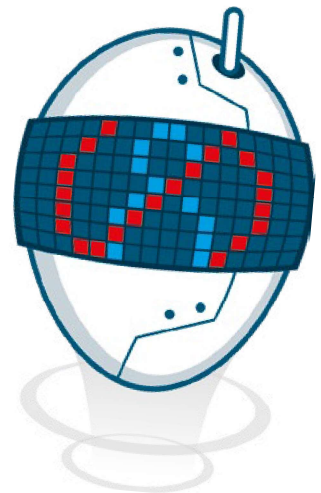
*When someone makes a spelling mistake or asks a silly question, be kind. If it's a minor mistake, it's better not to say anything about it. If you need to say something, point it out politely and in private.*



*Keep in mind that anyone can read your posts in a chat room, even your teachers. So, avoid sending messages using inappropriate language. You should not send heated messages ("flames"), even if you are provoked. Also, you shouldn't share any information that you wouldn't share with a stranger.*

Don't give any personal information to people that you don't know, especially if someone asks for your age, phone number or address. If someone does, stop talking to them at once and tell your parents.

*Keep in mind that the administrator of a blog or a chat room may "ban" you from writing if you are not polite.*



# hands on!

1. An email message doesn't need to have a subject title.

Yes

No

2. When someone makes a spelling mistake, point it out in public.

Yes

No

3. When you chat with a person, it is not necessary to know his age.

Yes

No

4. If you feel angry, use emoticons.

Yes

No

5. It is very important to respect the copyright of information you find on the Internet.

Yes

No

6. Only be polite to people who are close to your age.

Yes

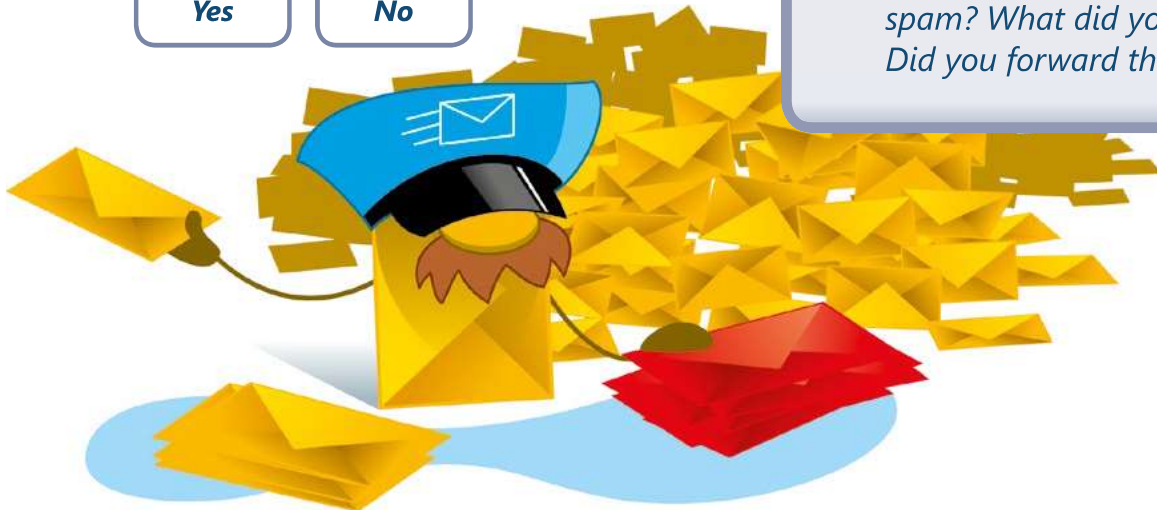
No

Read the sentences and color **Yes/No**.



Answer the questions:

- What would you do if someone blamed you in a chat room?
- Have you ever received chain email messages or spam? What did you do? Did you forward them?





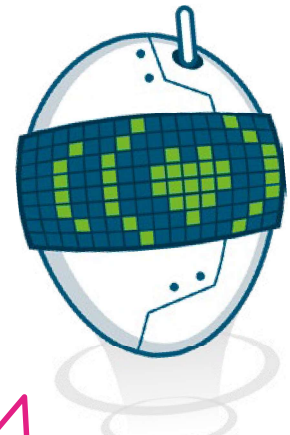
#### TASK 4

## Safety online

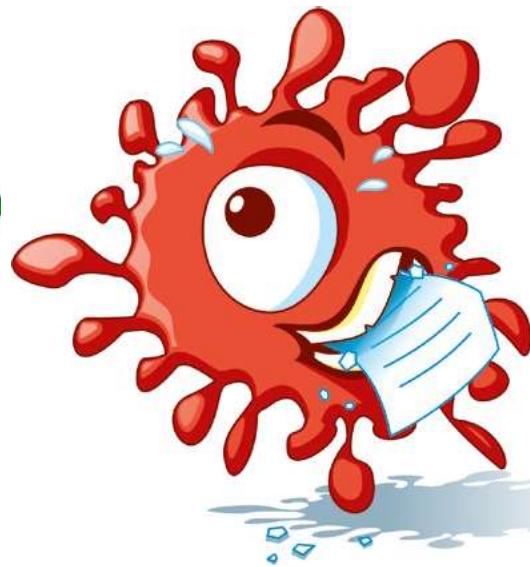
The Internet is a source of information, but it can also be a source of many risks if you don't know what you are doing. Like in real life, there are a lot of dangers that you must avoid.

The main problem on the Internet is viruses. A virus is a program that gets into your computer and tries to harm it. Your computer gets "sick," like you get sick when you are not careful and don't listen to your parents. A virus may try to delete files or steal personal information.

The most important weapon that helps protect your computer is an antivirus program, which stops viruses. An antivirus program must always be updated because new viruses appear every day.



*An antivirus program protects your computer. What should you do to protect yourself?*



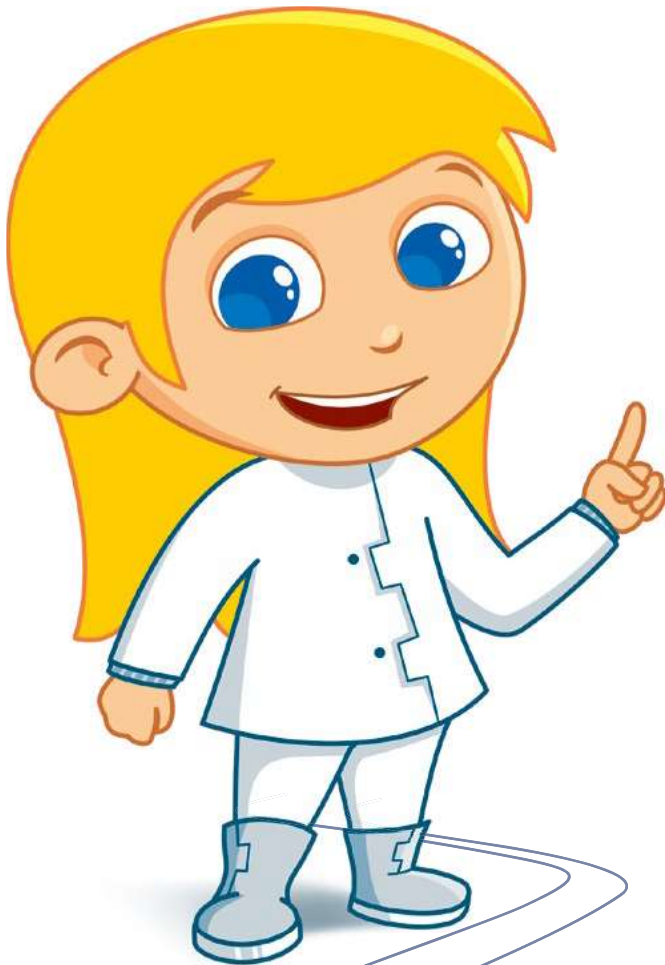
Never chat with strangers and never arrange to meet them. People you don't know may want to harm you in real life.

Always use a nickname and never give any personal information about your real name, last name, address or age.

Listen to your parents about the risks of the Internet, which pages you can visit and for how long you can use the Internet for.

# hands on!

Color the correct answer!



What program would you use to protect your computer from risks?

A video editor.

An antivirus.

A text editor.

In a chat room which question should you not answer?

Which is your favorite band?

Where do you live?

What time is it?

If you receive a message from someone you don't know:

Delete the mail without reading it first.

Read the mail and then delete it.

Read the mail and then answer.



## Other platforms

### Google Chrome

Another popular browser that you can use for web surfing is **Google Chrome**. It's free and you can download it from the Internet.



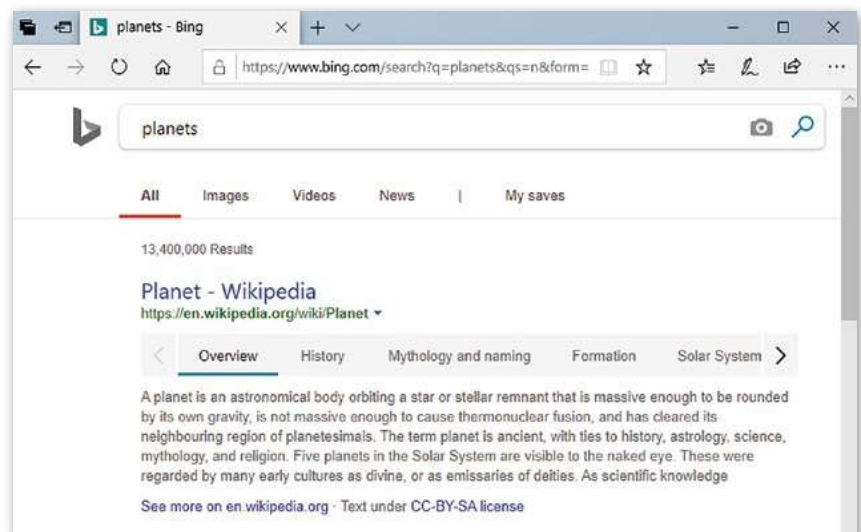
### Mozilla Firefox

All browsers keep more or less the same interface so that can use the one you like without any trouble.



### Bing search engine

One of the best search engines is **Bing**. Type **www.bing.com** to start searching.



# wrap up

**Now you have learned how to:**

- > use search engines to find information.
- > use wikis to search for any subject you want to learn about.
- > behave on the Internet just like in real life.
- > protect yourself from the dangers of the Internet.

## group work

Knowledge is power. It's time to put the Internet into practice. Form teams and search the web to find information about your favorite monuments. Gather as much information as you can and write about them.



## GLOSSARY

address bar

chat room

safety

wiki

antivirus

copyright

search engine

web browser

blog

nickname

virtual libraries



# 6. Working with numbers

Computing and ICT - Sample Pages  
DIGITAL KIDS FLYER MODULE 6

4  
GRADE



When you want to make calculations with numbers, you can use a spreadsheet. Learn what a cell is and how you can use rows and columns in a spreadsheet. You can keep track of your grades at school or organize other information.

## Learning objectives

In this module you will learn:

- > what a spreadsheet is.
- > how to organize information and data using spreadsheets.
- > how to use spreadsheets for calculations.

## Skills

After this module you will be able to:

- > work with rows, columns and cells.
- > insert text and numbers in cells.
- > make calculations using spreadsheets.

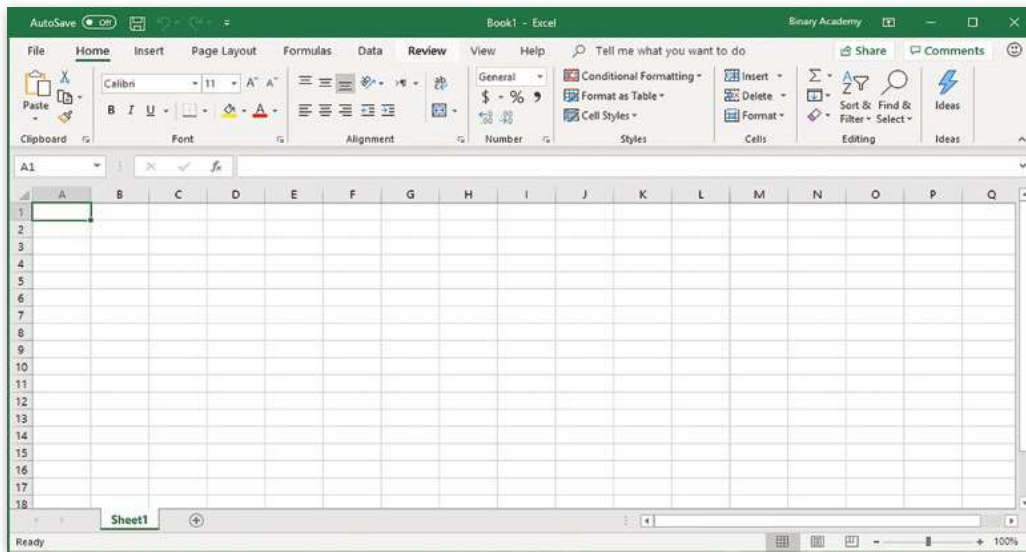
## Tools

- > Microsoft Excel
- > Apple Numbers
- > Documents to Go for Google Android
- > LibreOffice Calc

## TASK 1

# What is a spreadsheet?

In the past, people used to make calculations on paper by hand, and they used to make mistakes quite often. Then calculators came along and minimized mistakes. However, it was very difficult and time-consuming to deal with large amounts of information, especially for businesses. Today, thanks to spreadsheets, all these are problems of the past. But what is a spreadsheet? Let's start **Microsoft Excel**. It's a spreadsheet program.



A **spreadsheet** is a computer program that imitates a paper worksheet. It's like a large sheet of paper with lots of small boxes. People and businesses use spreadsheets mainly for organizing information, and the computer does the rest, fast and accurately. Spreadsheets also help analyze information and produce graphs and pie-charts. This is very useful.

	A	B	C	D	E	F	G	H	I
1									
2		Names	Monday	Tuesday	Wednesday	Thursday	Friday	Hours	
3		Stella	2	3	2	3	2	12	
4		Tom	2	3	3	2	2	12	
5		Kim	3	2	2	3	2	12	
6		Marco	2	3	3	2	2	12	
7		Lisa	3	3	2	3	2	13	
8		Alex	2	2	3	2	2	11	
9									
10									

This is an example of a spreadsheet. On a spreadsheet, you can enter numbers but also text. All this information is called data. Here you can see names of students, days of the week, the hours these students study and the total (sum) of the hours they study during the five weekdays. e.g. Stella studies for 2 hours on Monday, for 3 hours on Tuesday, etc. Stella studies for 12 hours on weekdays.

## HISTORY

The first spreadsheet program for computers was VisiCalc. It was created by Dan Bricklin and Bob Frankston in 1979 and it is the first program that turned the microcomputer from a hobby into a serious business tool.

# hands on!

Which professionals do you think use spreadsheets? Match and then check the answers!



**Teacher**

YES NO

**Singer**

YES NO

**Businessman**

YES NO

**Actor**

YES NO

**Accountant**

YES NO

**Student**

YES NO

**Painter**

YES NO

**Scientist**

YES NO

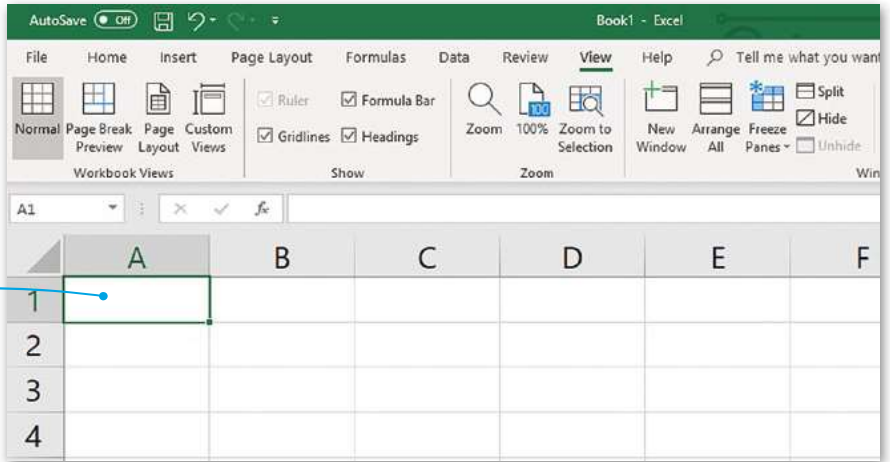




## TASK 2

# Row - Column - Cell

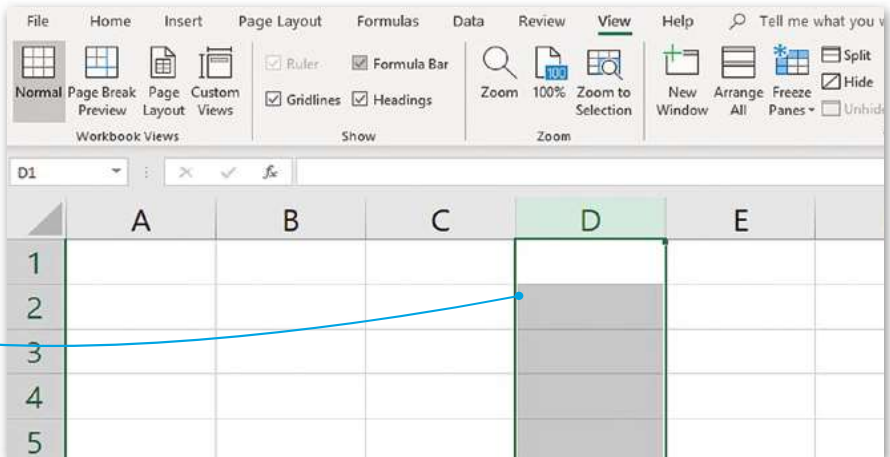
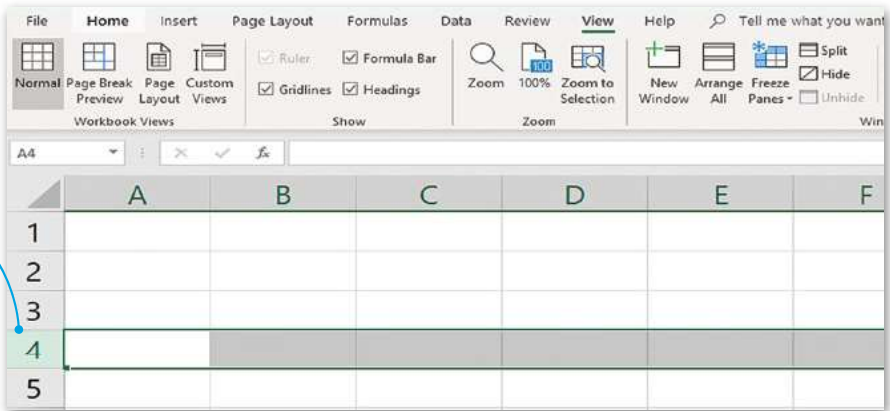
A spreadsheet is a grid with **cells** in **rows** and **columns**. We enter data in these cells. Open a new spreadsheet and let's take a closer look.



This is a cell.

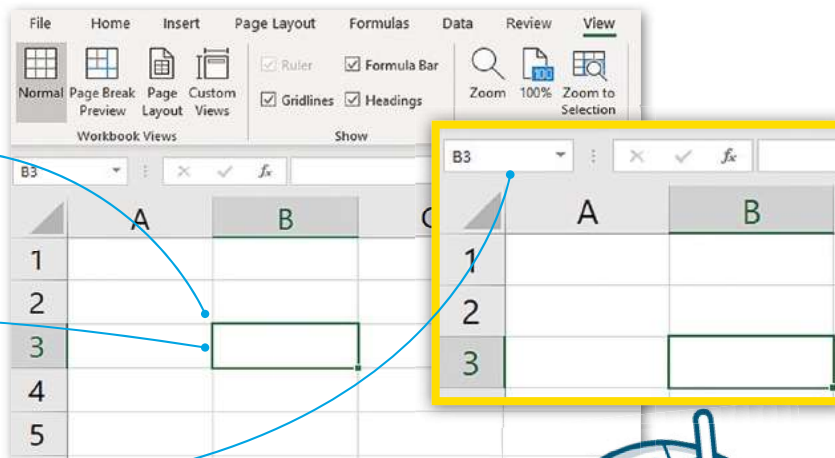
This is a row.  
Each row has a number (1,2,...) on the left-hand side. These numbers are the names of the rows.

This is a column.  
Each column has a capital letter (A, B, ...) at the top. These letters are the names of the columns.



### SMART TIP

Do you play chess? Spreadsheet cells have the same names as squares on the chess board!

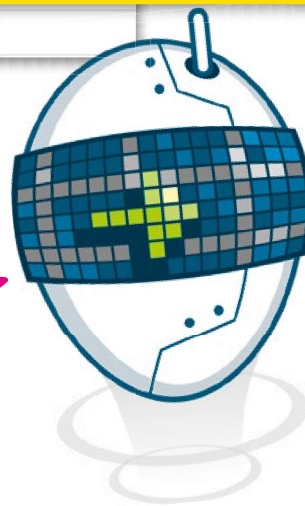


Each cell has a unique name, consisting of the column letter and the row number (e.g. B3).

When you click a cell, it becomes active and its border gets thicker.

You can always see the name of the active cell in the top left corner of the spreadsheet.

You can move from one cell to another with the arrow buttons on your keyboard. Press **↑** to move one cell up. Press **→** to move one cell to the right.



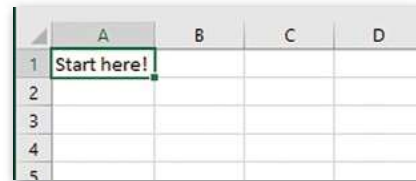
## hands on!



### Find the treasure!

Follow the instructions. Move with the arrow buttons on your keyboard and find the cell with the hidden treasure!

1. Move one cell to the right.
2. Move two cells down.
3. Move one cell to the right.
4. Move two cells up.
5. Move one cell to the right.
6. Move three cells down.
7. Move one cell down.
8. Move two cells to the left.
9. Move one cell up.
10. Move one cell to the left.



### Where is the treasure?

Write the name of the cell:

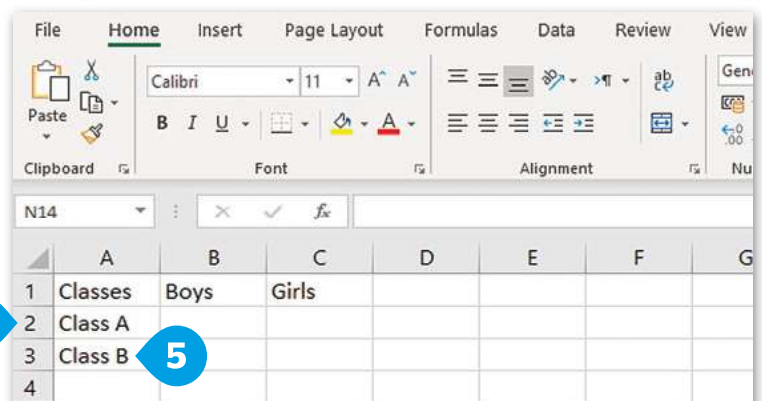
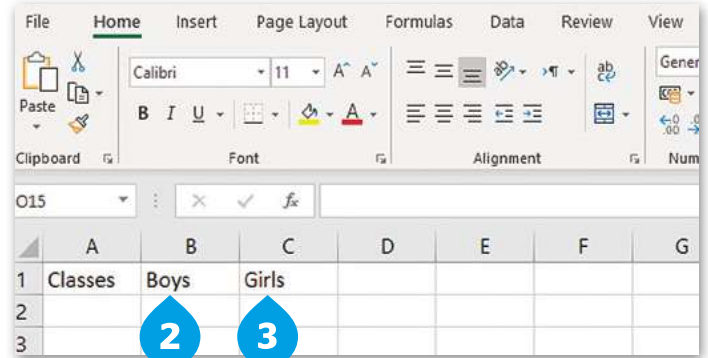
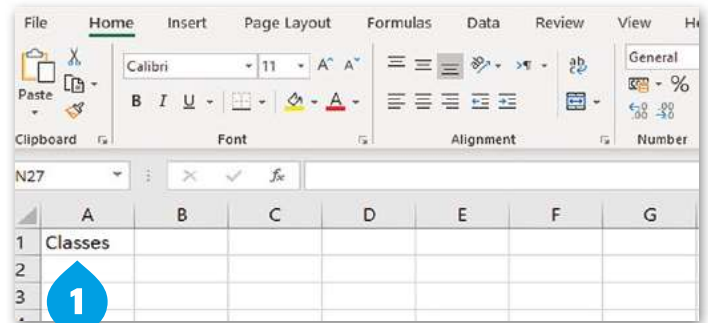
### TASK 3

# Insert numbers and text

It's very easy to enter numbers and text into a spreadsheet. You just click the cell where you want to type, type what you want and move on to another cell. If you type both text and numbers in a cell, the program treats it the same as text.

Let's see an example:

- > Open a new spreadsheet.
- > Go to cell A1 and type the word **Classes**. 1
- > Press **→** to go to B1 and type the word **Boys**. 2
- > Press **→** to go to C1 and type the word **Girls**. 3
- > Now go to cell A2 and type the phrase **Class A** 4 and then to A3 and type **Class B**. 5



Press **Enter** or one of the arrow buttons on your keyboard to move to another cell.



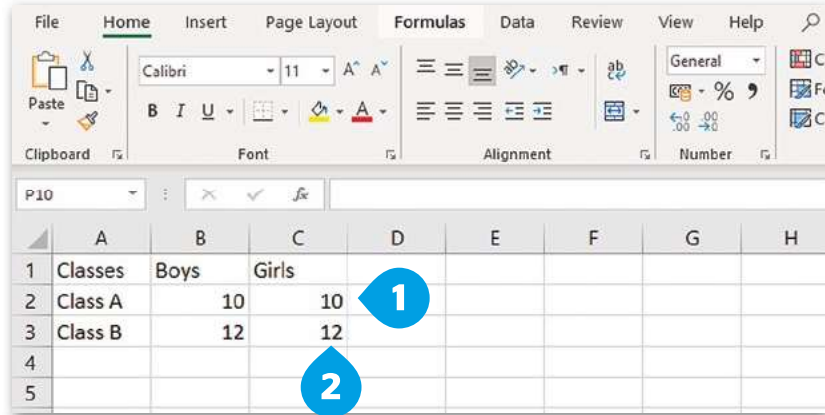
Don't worry if you make a mistake. Select the cell again by clicking it and simply type the correct number or text.

### SMART TIP

Any text you type is left-justified and all numbers are right-justified. It's easy to see the difference.

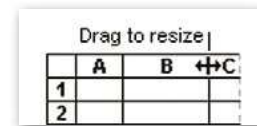
Let's continue with numbers:

- > Type **10** in cells **B2** and **C2**. **1**
- > Type **12** in cells **B3** and **C3**. **2**
- > Now save the spreadsheet.



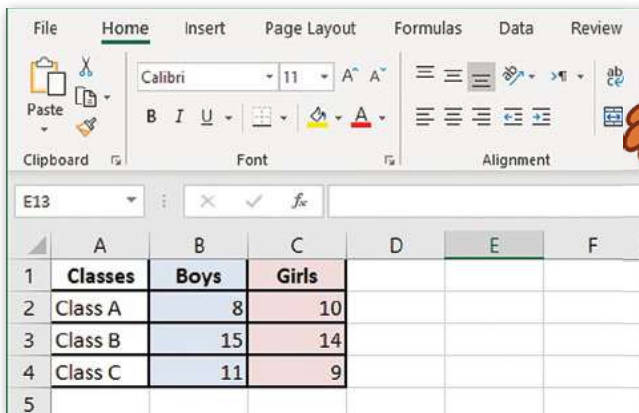
If you type more text than can fit in the cell, only part of the text will be visible. Of course, the rest of the text is not lost. To change the column width, drag the right border of the column heading. You can do the same with the row height.

You can format text or numbers in a cell like in **Microsoft Word** using the **Home** tab.



## hands on!

Make the same table as in the following example. Use the formatting tools to choose colors, and make the text bold. On the **Home** tab, in the **Styles** group, explore the **Cell Styles**!



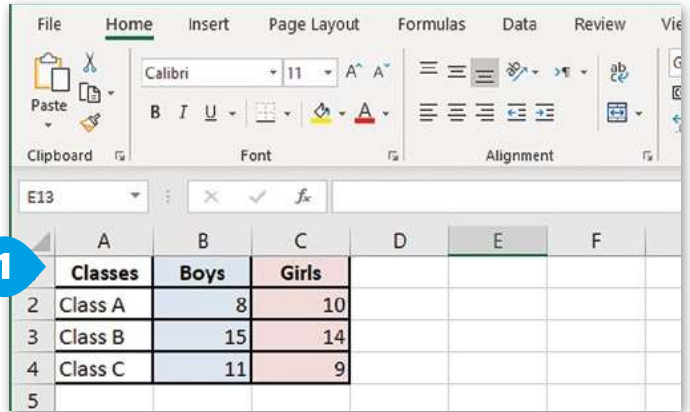
## TASK 4

# Simple calculations

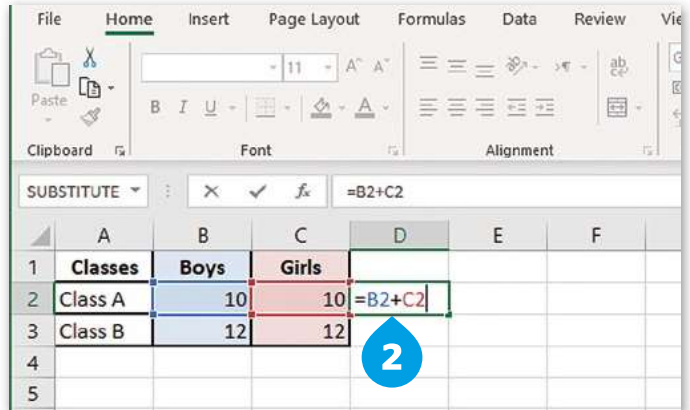
Now it's time to see how you can make simple calculations. You can add, subtract, multiply or divide numbers.

Let's add numbers:

- > Find and open the spreadsheet you created in the previous task. 1
- > How can we find how many boys and girls there are in Class A? Go to cell **D2**, type **=B2+C2** and press **Enter ↵**. 2



	A	B	C	D	E	F
1	Classes	Boys	Girls			
2	Class A	8	10			
3	Class B	15	14			
4	Class C	11	9			
5						



	A	B	C	D	E	F
1	Classes	Boys	Girls			
2	Class A	10	10	=B2+C2		
3	Class B	12	12	22		
4						
5						




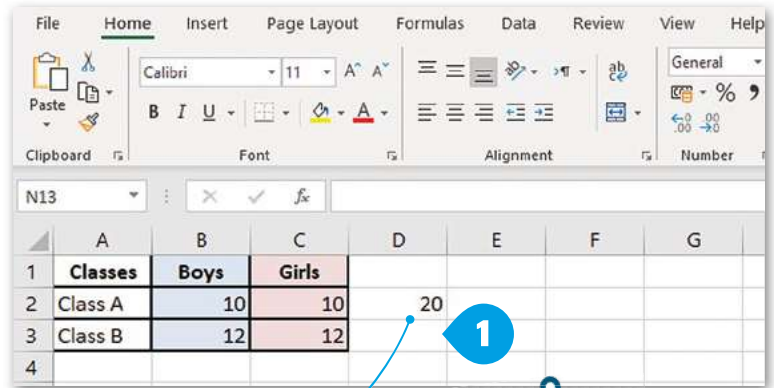
Now change the numbers in cells B2 or C2 and see how cell D2 changes. The amazing thing with a spreadsheet is that when you have a sheet with calculations, you can change the numbers and the results of the formulas, change automatically in a split second!

### SMART TIP

- You can use the following symbols for other calculations:
- > the **minus sign (-)** to subtract numbers, for example **=B2-C2**
  - > the **asterisk (\*)** to multiply numbers, for example **=B2\*C2**
  - > the **slash (/)** to divide numbers, for example **=B2/C2**

To finish your calculations:

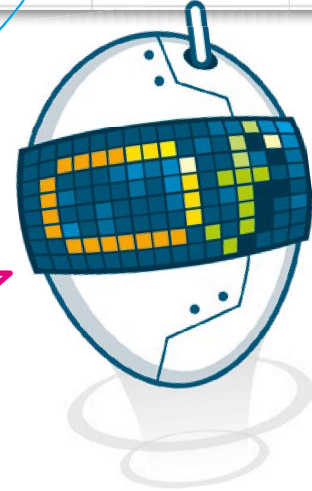
- > Click cell **D3**  and calculate again **=B3+C3**. The number 24 should appear in cell **D3**.



The result/sum of the addition is 20 and will appear in cell D2. The calculation you typed (**=B2+C2**) is a formula.

The formula always stays "behind" the result in the same cell. You can see the formula next to the name of the cell on the **Formula Bar**.

Click on the **Formula Bar** to change it or select the cell and press **F2** on your keyboard.



## hands on!



Your school is organizing two field trips. **Class A** will attend one field trip and **Class B** the other. The cost of each field trip is different. Create the spreadsheet below with all the information about the field trips. Then look at the questions and make calculations to complete the empty cells.

How many students are there in **Class B**?

How much money will all the students of **Class A** pay for their field trip?

How much money will all the students of **Class B** pay for their field trip?

	A	B	C	D	E	F
1	Classes	Boys	Girls	Number of Students	Cost	Sum of Money
2	Class A	10	10	20	\$30	
3	Class B	12	12		\$40	
4	Sum					

How many boys are there in **Classes A and B**?

How many girls are there in **Classes A and B**?

How many students are there in **Classes A and B**?

How much money will all the students of **Classes A and B** pay for their field trips?

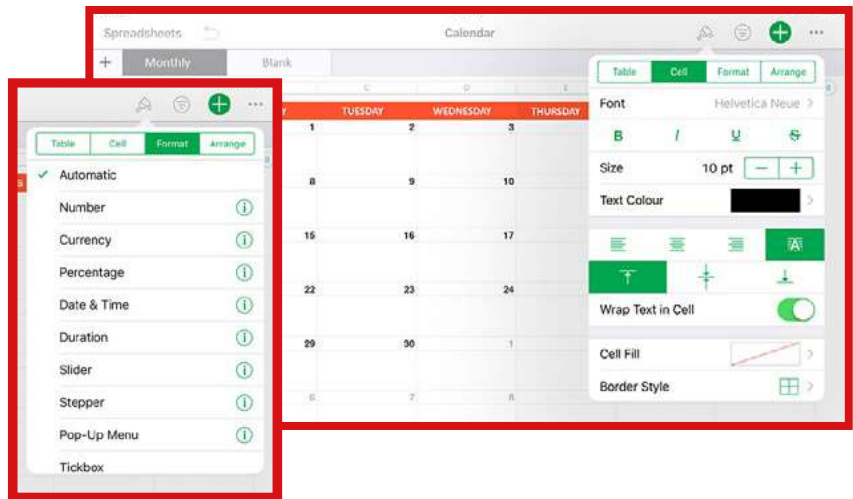


# Other platforms

## Apple Numbers for iPad and iPhone

**Apple Numbers** is simple spreadsheet program for **Apple iPad** and **iPhone**. It looks like **Microsoft Excel** and covers all the basic operations.

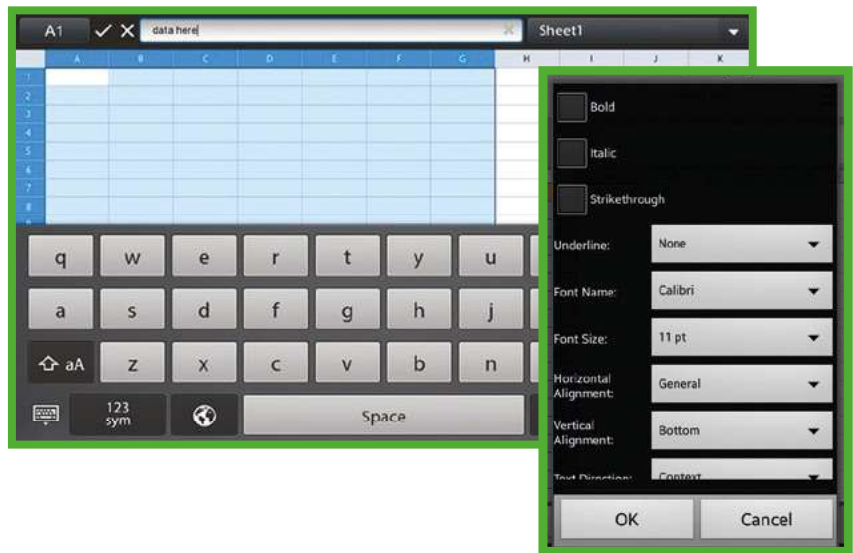
Tap on the **Format** button. You see the basic formatting options. Tap **Text** if you want to apply basic text formatting.



## Docs To Go for Google Android

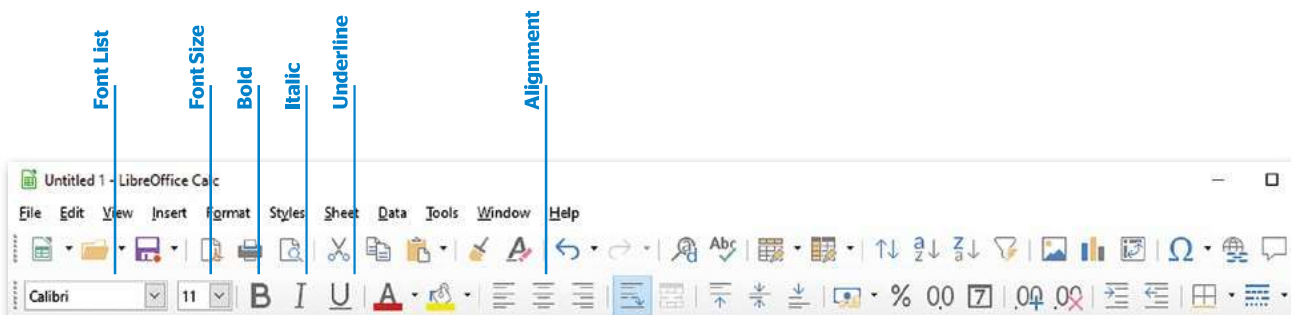
**Sheet To Go** is a spreadsheet program for **Google Android** devices and other platforms as well. It has the same menus as all programs in the **Docs To Go** suite.

Tap on the **Format** button. Here you can do basic formatting of the text or numbers in a specific cell.



## LibreOffice

**LibreOffice Calc** is free and you can download it from the Internet. It is very similar to **Microsoft Excel**.



# wrap up

Now you have learned how to:

- > create a spreadsheet.
- > organize information.
- > use rows, columns and cells.
- > enter text and numbers.
- > make simple calculations.



## group work

In groups, choose a continent.

Find the countries of this particular continent and the population of each country.

Enter this information in a spreadsheet.

What's the population of the continent you have chosen?

Which continent has the largest population?



## GLOSSARY

active cell

column

grid

calculation

formula

row

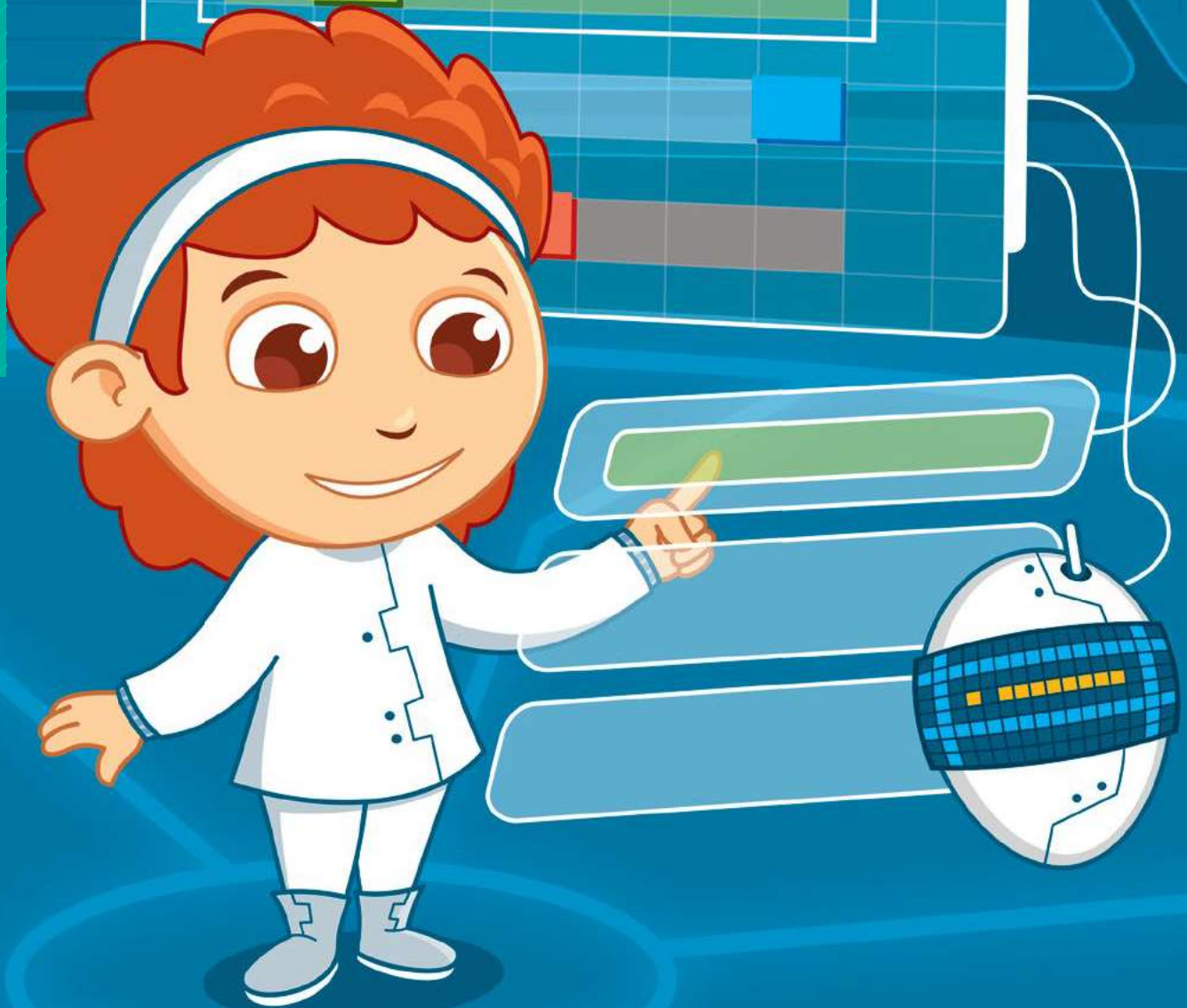
cell

formula bar

spreadsheet



# 6. Collecting information



This module will give you a general idea about collecting and organizing information. You will explore data, records and databases and find out why they are so important in our everyday life.

## Learning Objectives

In this module you will learn:

- > how to gather data of the same type.
- > what a database is.
- > how to organize your information in a database.
- > what a record is.
- > how to manage your data using sorting and selecting tools.
- > how to print your database.

## Skills

After this module you will be able to:

- > categorize different types of data.
- > create your own database table.
- > recognize a record.
- > select records from a database table.
- > sort your database table.
- > print your results.

## Tools

- > Microsoft Excel

## TASK 1

# Gather data

Do you know exactly what data is? **Data** can be any kind of information around us! **Information** is something that people can learn, know about, or understand.

Let's explore some different types of data:

- > *The leaves of a tree are green.*
- > *Kim's eyes are blue.*
- > *A car has 4 wheels.*
- > *Today is Sunday.*
- > *Anna's favorite food is spaghetti.*

When a set of data is gathered, it can provide organized information about something more specific!

For example, a school gathers data about its students and creates an organized set of information. Before there were computers, these types of data were often kept in file cabinets.



In the past, there was usually one card for each student.

**Name:** Lisa

**Home address:** 36 Cambridge Court

**Telephone:** 212 500 2020

**Email:** lisa@digital-kids.com

**Date of birth:** May 17<sup>th</sup>

On a student's card, you can see information such as the student's name, home address, telephone, e-mail and date of birth.

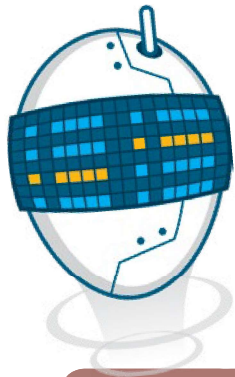
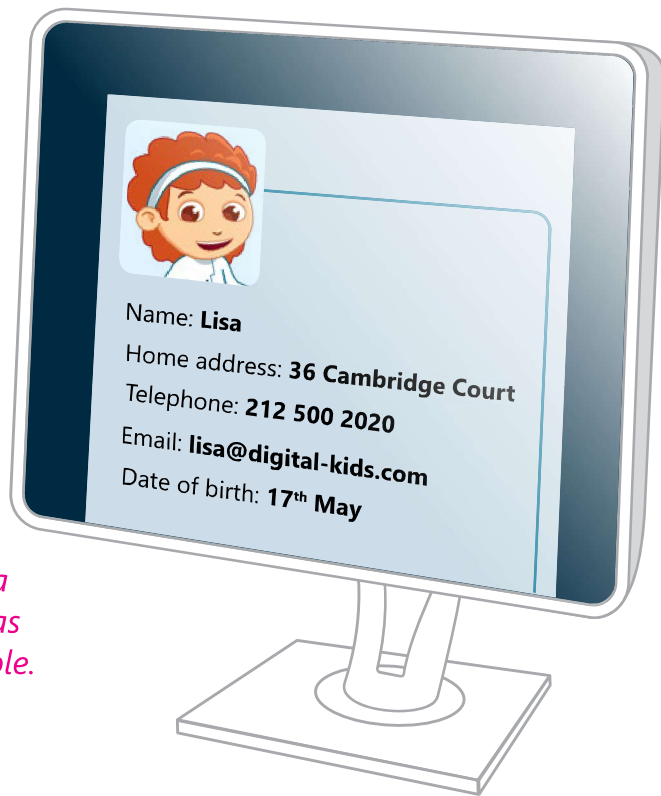
## HISTORY

People who use computers often use the words "information" and "data" in the same way. In the 1970s, computer scientists gave a new meaning to these words. "Data" means information that has not been checked. "Information" means data that has been checked and can be trusted.

A collection of data on a computer is called a **database**.

Today, school data is no longer stored in huge file cabinets.

Instead, every school has an electronic database with all its students' "cards." The database is stored on a computer and is only a few megabytes in size. Each card looks the same as it did in the past, but now it is on the screen of a computer.



*Each item of data should be stored as few times as possible.*

## hands on!

*Now let's work with animals...*

*Using these animal cards, collect data for three of your favorite animals. Compare your cards with the animal cards of your classmates.*



Name: .....

Lives in: .....

Color: .....

Legs: .....

Top speed: .....

Weight: .....

Name: .....

Lives in: .....

Color: .....

Legs: .....

Top speed: .....

Weight: .....

Name: .....

Lives in: .....

Color: .....

Legs: .....

Top speed: .....

Weight: .....



## TASK 2

# Introduction to databases

A **database** is a system for organizing data. It is a collection of raw data that can be changed, sorted, and quickly searched to show detailed information about something more particular. You can use database programs to manage electronic databases. A very simple example of a database is an electronic address book which can include information about thousands of people.

### Teachers

### Students

Name	Home Address	Phone Number	Email Address
Kim	22 Alfred Drive	212 500 4412	kim@digital-kids.com
Marco	44 Woodrow Way	212 500 4321	marco@digital-kids.com
Lisa	36 Cambridge Court	212 500 2020	lisa@digital-kids.com
Alex	202 Newport Lane	212 500 5162	alex@digital-kids.com

**A table without legs.** In computer lingo, a database **table** is a small database of similar items. A database is organized into one or more tables.

For example, a school database might have one table for its students' information and another table for its teachers' information.

Lisa	36 Cambridge Court	212 500 2020	lisa@digital-kids.com
------	--------------------	--------------	-----------------------

**A record without music.** A **record** in a database table is an item of information with some characteristics.

For the address book database, a record has characteristics like: name, home address, telephone number and email address.

## HISTORY

Edgar F. "Ted" Codd was an English computer scientist who invented the relational model for database management in 1970 while working for IBM. His theory is the basis for relational databases and data management.

**A field without grass.** Every characteristic, or piece of information, is called a **field**. A field has a name and some data.

In the address book database, each record has four fields:



# hands on!

An address book database looks like this:

Address Book

Name	Home Address	Phone Number	Email Address
Kim	22 Alfred Drive	212 500 4412	kim@digital-kids.com
Marco	44 Woodrow Way	212 500 4321	marco@digital-kids.com
Lisa	36 Cambridge Court	212 500 2020	lisa@digital-kids.com
Alex	202 Newport Lane	212 500 5162	alex@digital-kids.com



Now create an animal database with the data you collected.

o Animal database

	Name	Lives in	Color	Legs	Top speed	Weight
1						
2						
3						



### TASK 3

# Create a database

Now it's time to create your own database.

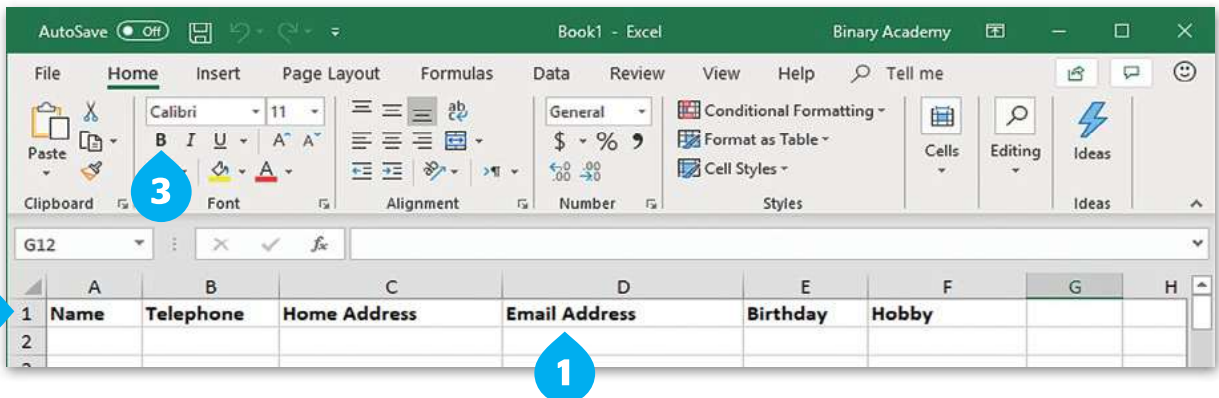
The first thing you have to do is decide what kind of information you want to include. Think of the characteristics you want to collect for each record and give them a title or a field name.

Although there are various programs for database management, you can use **Microsoft Excel** to create your database table in a very simple way!

Let's create an address book database for your friends' information.

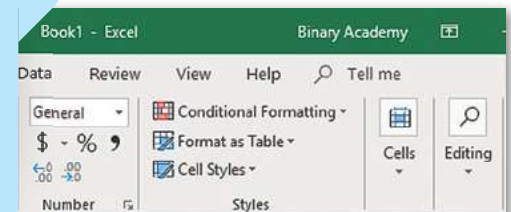
The field names are:

**Name, Telephone, Home Address, Email Address, Birthday, Hobby.**

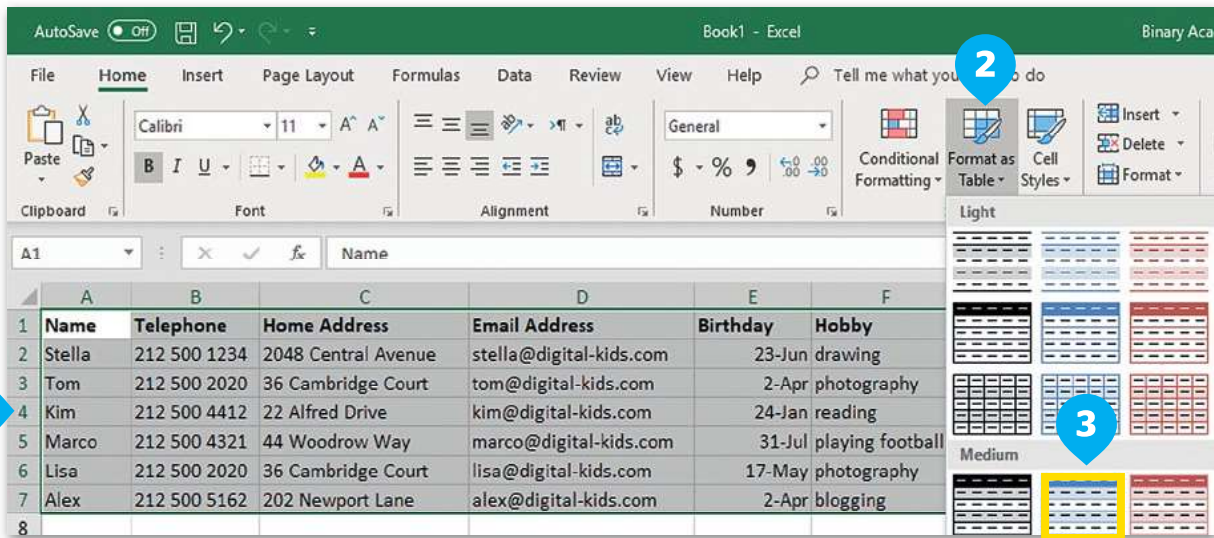


To create a table:

- > Open an empty spreadsheet.
- > Type the database field names horizontally in different cells (from A1 to F1). **1**
- > Select the whole row by clicking the row number. **2**
- > Click the **Bold** button **3** to make the titles stand out.
- > Now add one record for each of your friends. Every record must have information about the six different fields. **4**

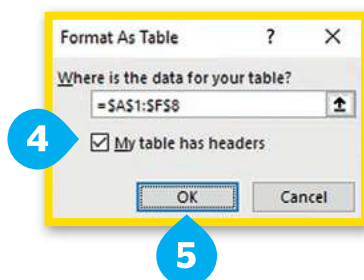


	A	B	C	D	E	F	G	H
1	<b>Name</b>	<b>Telephone</b>	<b>Home Address</b>	<b>Email Address</b>	<b>Birthday</b>	<b>Hobby</b>		
2	Stella	212 500 1234	2048 Central Avenue	stella@digital-kids.com	23-Jun	drawing		
3	Tom	212 500 2020	36 Cambridge Court	tom@digital-kids.com	2-Apr	photography		
4	Kim	212 500 4412	22 Alfred Drive	kim@digital-kids.com	24-Jan	reading		
5	Marco	212 500 4321	44 Woodrow Way	marco@digital-kids.com	31-Jul	playing football		
6	Lisa	212 500 2020	36 Cambridge Court	lisa@digital-kids.com	17-May	photography		
7	Alex	212 500 5162	202 Newport Lane	alex@digital-kids.com	2-Apr	blogging		
8								



Now that your database information is ready, format it with a style of your choice to make **Microsoft Excel** understand it's a table of data.

- > Select your table cells from A1 to F7. **1**
- > On the **Home** tab, in the **Styles** group, click **Format as Table**. **2**
- > Select a style you like! Let's choose one from the **Medium** group. **3**
- > In the **Format As Table** window, select **My table has headers**. **4**
- > Click **OK**. **5**
- > Voilà! Your table has a new style and the program knows that the titles are field headers. **6**



**6**

	A	B	C	D	E	F	G	H	I
1	Name	Telephone	Home Address	Email Address	Birthday	Hobby			
2	Stella	212 500 1234	2048 Central Avenue	stella@digital-kids.com	23 June	drawing			
3	Tom	212 500 2020	36 Cambridge Court	tom@digital-kids.com	2 April	photography			
4	Kim	212 500 4412	22 Alfred Drive	kim@digital-kids.com	24 January	reading			
5	Marco	212 500 4321	44 Woodrow Way	marco@digital-kids.com	31 July	playing football			
6	Lisa	212 500 2020	36 Cambridge Court	lisa@digital-kids.com	17 May	photography			
7	Alex	212 500 5162	202 Newport Lane	alex@digital-kids.com	2 April	blogging			
8									
9									
10									

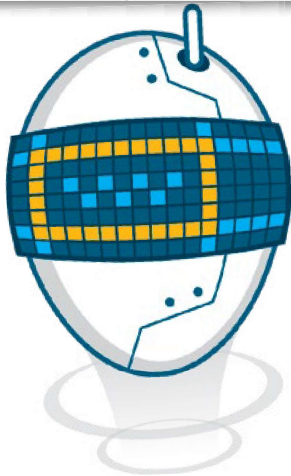
### SMART TIP

All the information in a database must relate to the same topic. You cannot have irrelevant information in the same database. For example, you cannot have information about sports in an animal database!





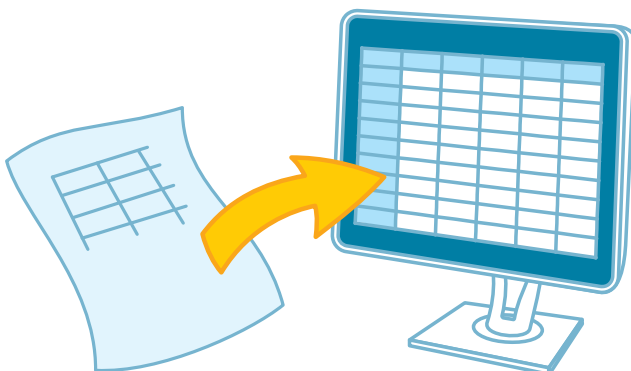
	A	B	C	D	E	F	G
1	Name	Telephone	Home Address	Email Address	Birthday	Hobby	
2	Stella	212 500 1234	2048 Central Avenue	stella@digital-kids.com	23-Jun	drawing	
3	Tom	212 500 2020	36 Cambridge Court	tom@digital-kids.com	2-Apr	photography	
4	Kim	212 500 4412	22 Alfred Drive	kim@digital-kids.com	24-Jan	reading	
5	Marco	212 500 4321	44 Woodrow Way	marco@digital-kids.com	31-Jul	playing football	
6	Lisa	212 500 2020	36 Cambridge Court	lisa@digital-kids.com	17-May	photography	
7	Alex	212 500 5162	202 Newport Lane	alex@digital-kids.com	2-Apr	blogging	
8	George						
9							



*Bz...If you want to add one more friend later, you can simply start typing the new information on the first empty row under the data and **Microsoft Excel** will recognize it as a new record! ...Bz.....Bz*

*hands on!*

*Remember the data of the animals that you collected? Try adding them to **Microsoft Excel** and putting more information. Then try to collect data for more animals and add it to your database.*



#### TASK 4

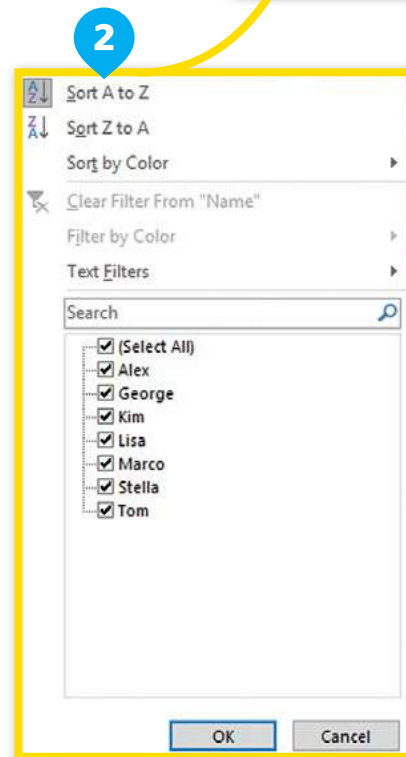
# Sort and print

If there is a lot of information (a lot of records) in your database, it's a good idea to **sort** your information because it will be easier to find. You can put the data in alphabetical order for text fields or start from the smallest to the largest (and vice versa) for numbers.

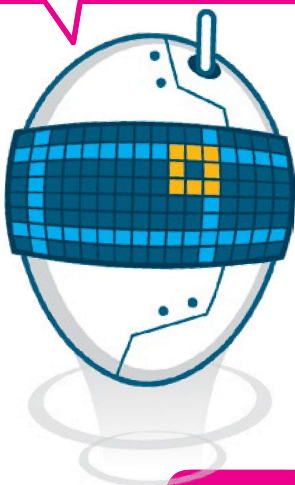
To sort your data:

- > Click the down arrow, **1** for example, on the **Name** header.
- > Click **Sort A to Z** **2** to sort the table records alphabetically.
- > All records will automatically change position in the table and will now be sorted based on the **Name** field. The arrow button **3** of the field header will also change to show that the table is displayed in a specific order.

	A	B	
1	Name	telephone	Ho
2	Alex	212 500 5162	202
3	Kim	212 500 4412	22
4	Lisa	212 500 2020	36
5	Marco	212 500 4321	44
6	Stella	212 500 1234	204
7	Tom	212 500 2020	36



*Bz...Try to sort the database table using other fields, like Telephone or Hobby and see what happens. Bz...*



	A	B	C	D	E	F
1	Name	Telephone	Home Address	Email Address	Birthday	Hobby
2	Alex	212 500 5162	202 Newport Lane	alex@digital-kids.com	2 April	blogging
3	Kim	212 500 4412	22 Alfred Drive	kim@digital-kids.com	24 January	reading
4	Lisa	212 500 2020	36 Cambridge Court	lisa@digital-kids.com	17 May	photography
5	Marco	212 500 4321	44 Woodrow Way	marco@digital-kids.com	31 July	playing football
6	Stella	212 500 1234	2048 Central Avenue	stella@digital-kids.com	23 June	drawing
7	Tom	212 500 2020	36 Cambridge Court	tom@digital-kids.com	2 April	photography

#### SMART TIP

Sorting is a very good method to organize your data in any program that supports it. It's much easier to find information if it is in a certain order, rather than appearing randomly.



You can also choose to display only specific records:

- > Click the arrow button **1** next to a field header, for example, **Name**.
- > Select only the names you want to display. **2**
- > This is called filtering. You have just applied a filter to your database table based on the content of one field. **3**

	A	B	
1	Name	Telephone	Home
2	Alex	212 500 5162	202 N
3	Kim	212 500 4412	22 Alf
4	Lisa	212 500 2020	36 Ca
5	Marco	212 500 4321	44 We
6	Stella	212 500 1234	2048
7	Tom	212 500 2020	36 Ca

	A	B	C	D	E	F
1	Name	Telephone	Home Address	Email Address	Birthday	Hobby
2	Alex	212 500 5162	202 Newport Lane	alex@digital-kids.com	2 April	blogging
3	Kim	212 500 4412	22 Alfred Drive	kim@digital-kids.com	24 January	reading
6	Stella	212 500 1234	2048 Central Avenue	stella@digital-kids.com	23 June	drawing
8						
9						
10						

The rest of the records are not deleted. They are still there, but are not displayed.

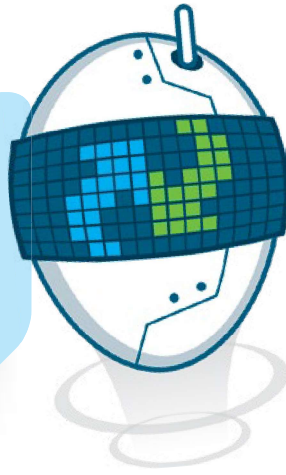
You can **Select All** records by using the same steps and everything will be displayed as it was before.

Alphabetical order is a way to sort a list. It is done by following the standard order of letters in the English alphabet (A to Z).



Now let's print your table!

- > Click **File**.
- > Click **Print**. **1**
- > Check the preview of the page and when you are ready, just click **Print!** **2**



Try to use as little paper as possible when you print. Use the clean back of used sheets for draft printing. And, of course, use recycling bins. Paper comes from trees and trees provide us with oxygen. Protect the environment!

Name	Telephone	Home Address	Email Address	Birthday
Alice	212.500.3152	322 Newpark Lane	alice@digital.kids.com	2 April
Kim	212.500.4432	22 Ashrod Drive	kim@digital.kids.com	24 January
Uka	212.500.2020	88 Cambridge Court	uka@digital.kids.com	17 May
Marcia	212.500.4331	48 Greenwood Way	marc@digital.kids.com	11 July
Abigail	212.500.1234	2048 Central Avenue	abigail@digital.kids.com	23 June
Tom	212.500.2020	88 Cambridge Court	tom@digital.kids.com	2 April

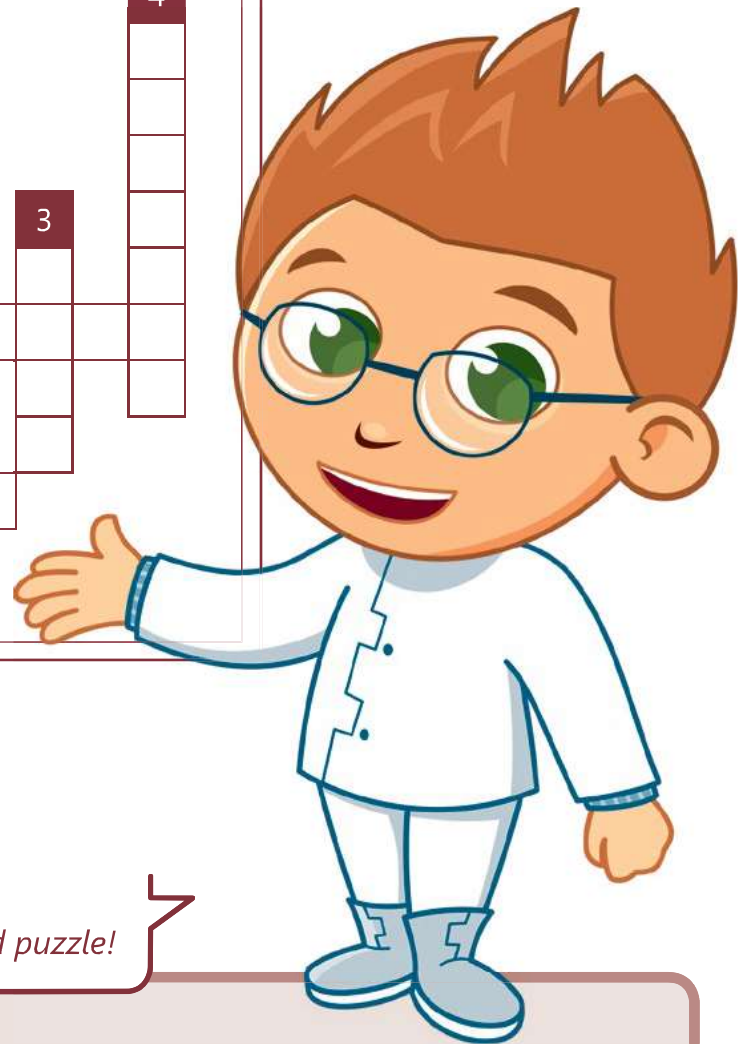
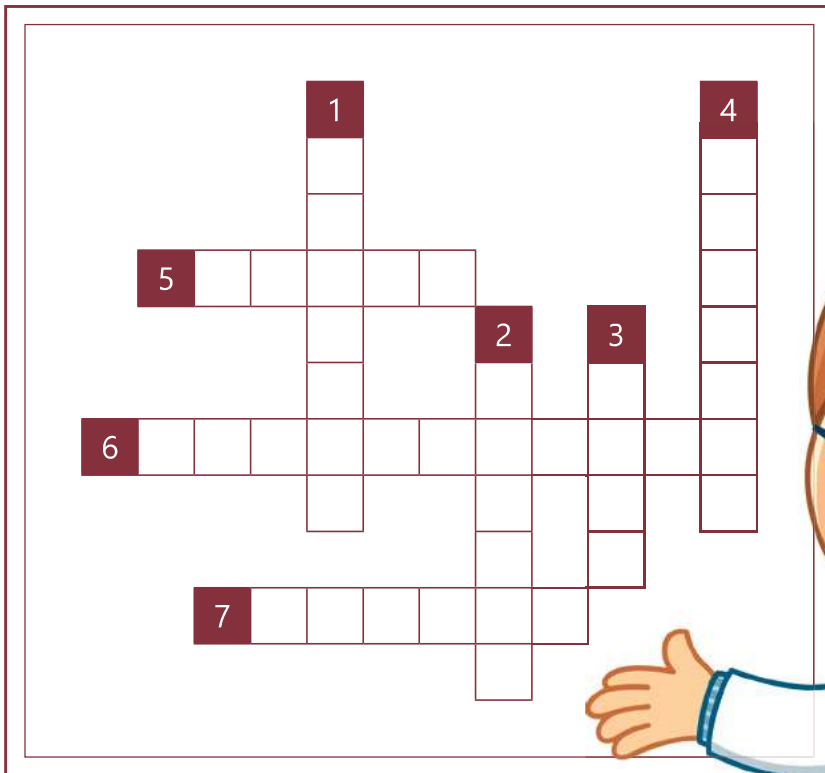
Check the number of pages! If the number is larger than 1, your table is split over more than one page!

In case your table doesn't fit correctly on a sheet of paper, click **Portrait Orientation** and click **Landscape Orientation**.

If the table still doesn't fit, click **No Scaling** and select **Fit All Columns on One Page**.



hands on!



Solve the crossword puzzle!

1. The device that prints your files.
2. Collect data.
3. When you want to open the print menu, you click this button.
4. You change it when you want to fit your table to one paper.
5. It's the button that you click when you want to send your data to the printer.
6. We use it when we want to print the sheet vertically or horizontally.
7. When we want to print the same file 20 times, we have 20 of these.

# wrap up

Now you have learned how to:

- > collect different types of data.
- > create a database table with **Microsoft Excel**.
- > set the headers of your table.
- > sort your records.
- > print the selected results.



## group work

Form teams to create two different databases. One team will collect information about animals and sort the database table by their name. The other team will collect information about flowers and sort the database table by their color.

Remember the steps! First, find the characteristics of your subject and use them as headers, then start collecting information!

## GLOSSARY

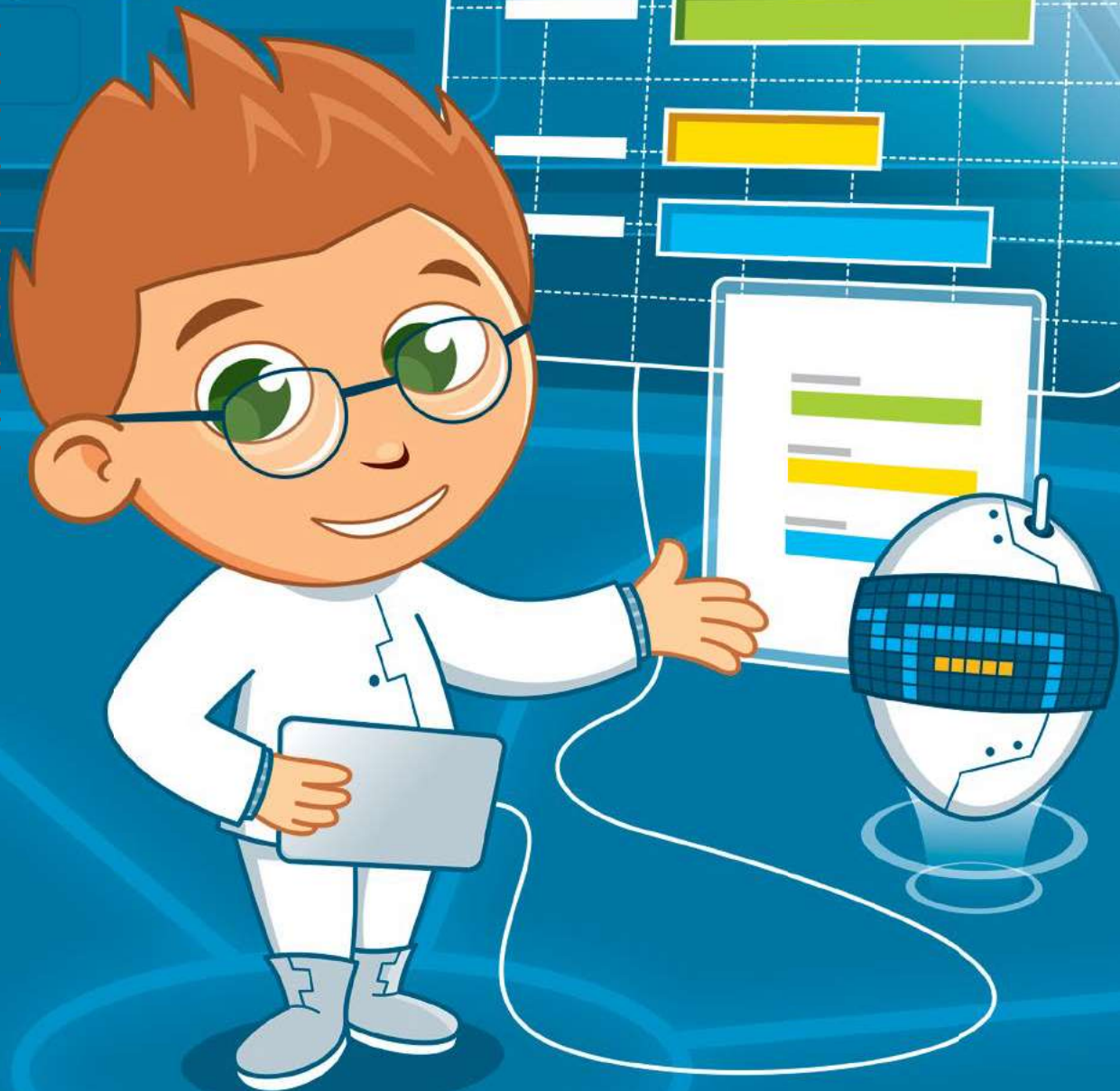
alphabetical  
order  
data

database  
field  
filter

header  
information  
raw data

record  
sort  
table

# 5. Programming the computer



A computer can do a lot of things through programs. But you can make it do exactly what you want if you know how to give it the right instructions. Let's put on the developer's hat and start designing and coding your own programs!

## Learning objectives

In this module you will learn:

- > what a program is.
- > what an algorithm and a flowchart are.
- > how to design a program.
- > how to describe a solution to a problem.
- > how to write the correct code for this solution.

## Skills

After this module, you will be able to:

- > draw a flowchart.
- > create an algorithm.
- > work with variables.
- > give simple commands.
- > use special symbols in programming.
- > use conditions and loops.

## Tools

- > Scratch
- > Microsoft MakeCode
- > Tynker
- > Microsoft Small Basic



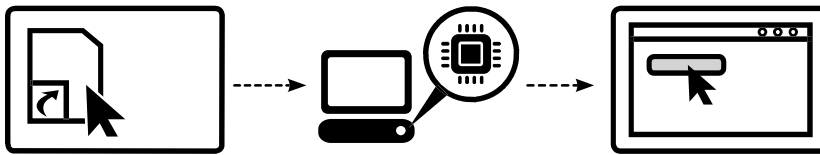
## TASK 1

# Introduction to programming

## 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

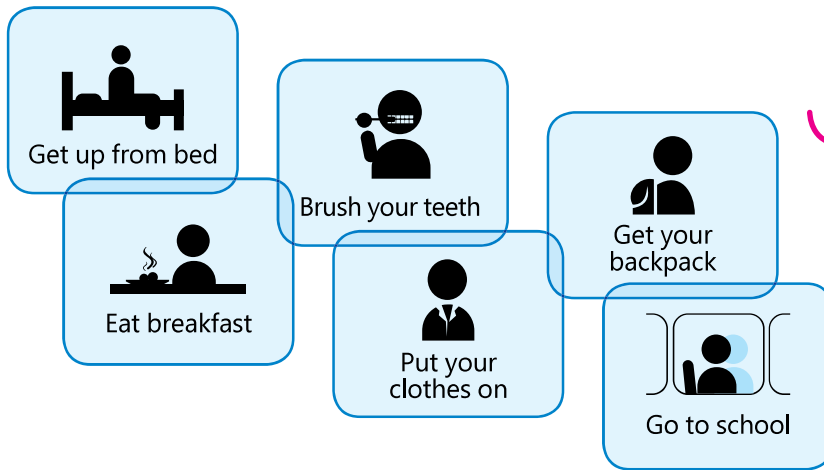


### Ruby

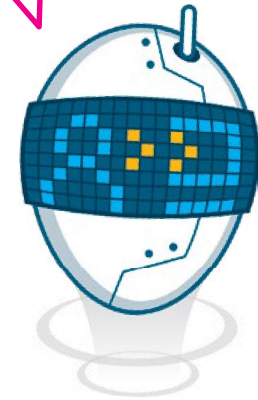
```
# Hello World in Ruby
puts "Hello World!"
```

## 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.



*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

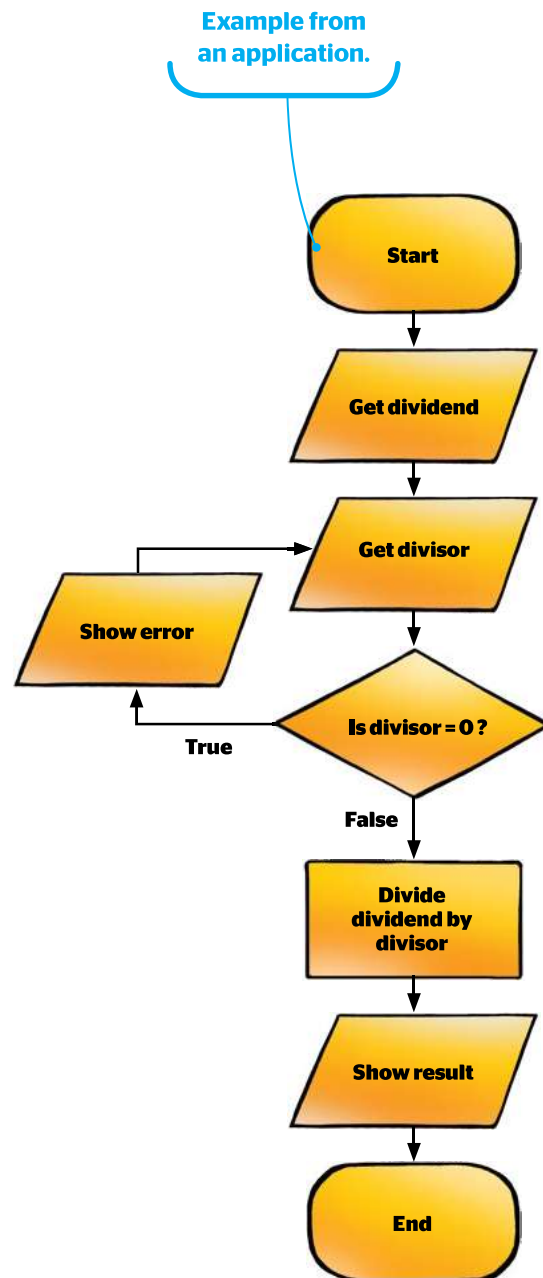
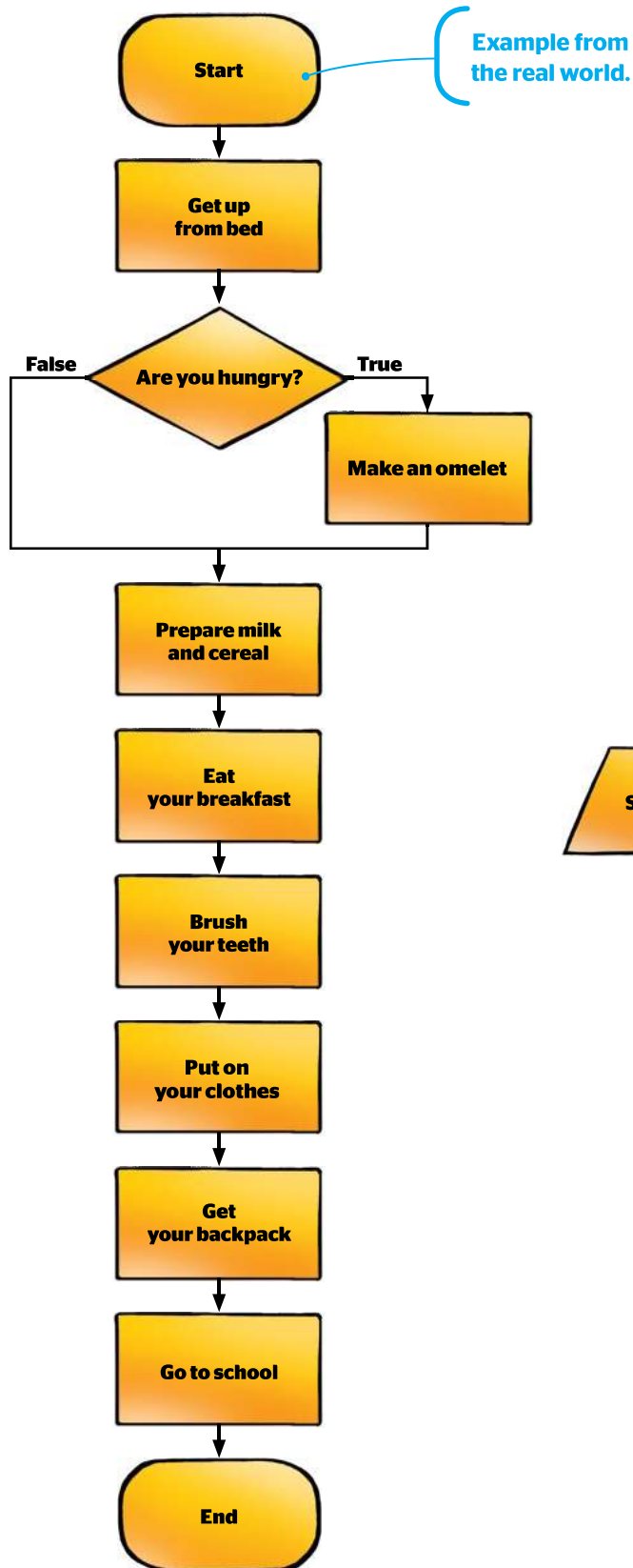
**Algorithm comes from Algoritmi, the Latin form of the name of the famous Persian mathematician, Muhammad ibn Musa al-Khwarizmi. His work in mathematics, geography and astronomy advanced the subject of algebra and trigonometry.**



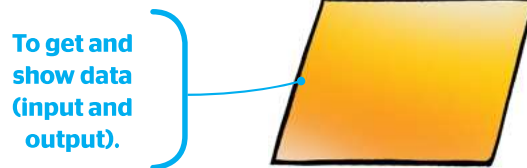
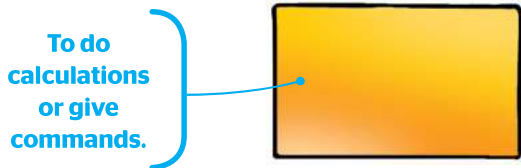
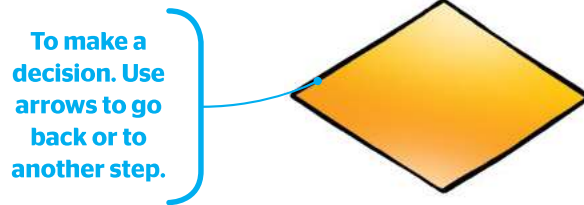
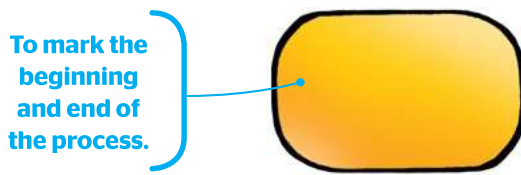
## Flowchart

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.

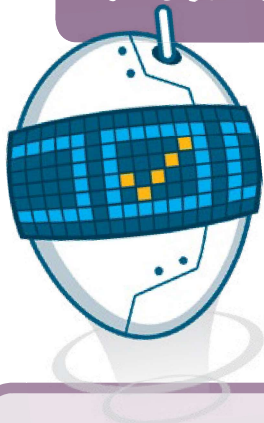
You can use flowcharts to describe your thoughts about how to solve a problem with the computer before you actually start writing the program.



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.



hands on!



Are the following sentences **true** or **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

**True**  **False**

**True**  **False**

**True**  **False**

**True**  **False**

**True**  **False**

**True**  **False**

**True**  **False**

**True**  **False**



## TASK 2

# How to design a program

### Understand the problem

Before you start designing a program, you have to understand the problem you want to solve.

For example, let's say that you want to calculate someone's age. First, you have to think about the steps that you have to make to solve this "problem." You need the current year and the year of birth of the person. Check that the year of birth is not larger than the current year. Subtract the year of birth from the current year and the result of the subtraction is the person's age.

### Create the algorithm

If you write down the small steps needed for the solution of a problem in plain English, you get an algorithm:

- > Get the current year.
- > Ask for the year of birth.
- > Check that the year of birth is not larger than the current year.
- > Subtract the year of birth from the current year.
- > The result is the person's age.
- > Show the person's age.



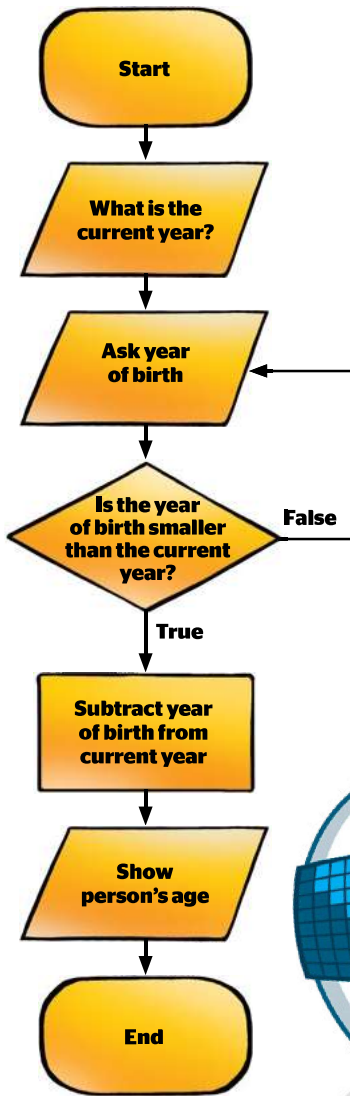
### HISTORY

**Ada Lovelace was the first programmer in history. She "wrote" some programs for Charles Babbage's mechanical computer in 1843. Unfortunately, she didn't know if they were correct, because the machine was never finished! Her work was published in 1953.**

## Draw the flowchart

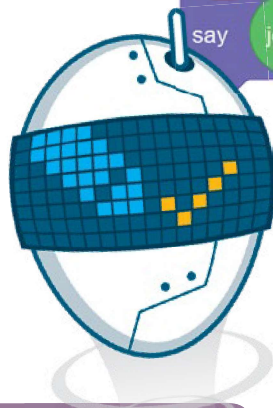
To create a flowchart you need to analyze the steps of the algorithm.

For the age calculation process, the flowchart looks like this:



## Write the program

Now, if you convert the steps into a programming language, you have your first program! The program you use to solve this problem in Scratch is this. You will soon learn how you can write each instruction.

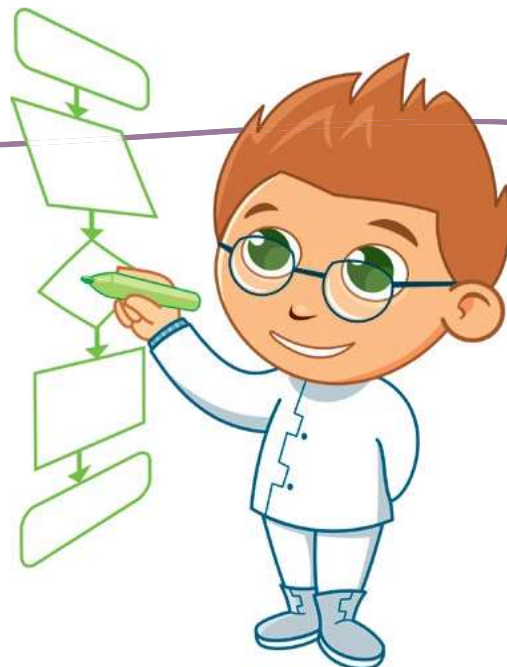


An extra step was used to "validate" data, in other words to check that the numbers you use were correct.

## hands on!

You want to set up a presentation in your class. What things do you have to take care of?

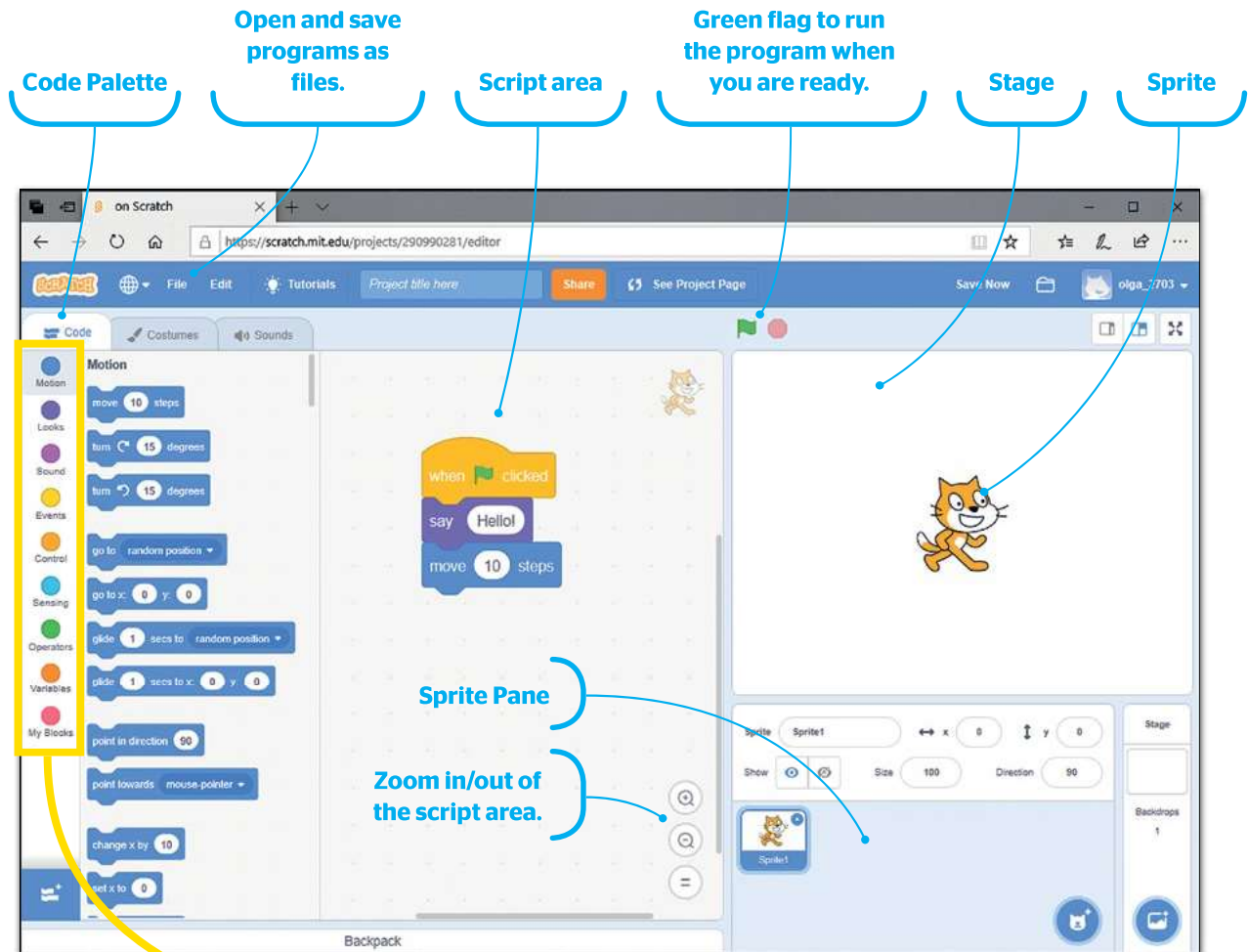
Create the algorithm and draw the flowchart. Think of all the possible preparations you have to make. Include any decisions you have to make and how these decisions will change your actions.



### TASK 3

# Variables and commands

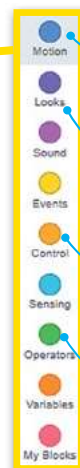
Everything that you will do in this task will be in **Scratch**. Scratch is a graphical programming language that lets you control the actions and interactions among different media. Scratch is much easier than in traditional programming languages: to create a script, you simply snap together graphical blocks, like LEGO® bricks or puzzle pieces.



## Block Palette

Commands in Scratch are called blocks. You can find them in the Code tab. You drag and drop them into the script area to create your project. There are 9 categories of blocks in the block palette. Each of them, is color coded and is used to perform specific tasks in a program.

You can also add more block categories as extensions.



Control a sprite's movement.

Changes a sprite's looks.

Control scripts.

Perform math calculations.

## Variables

To make calculations and display results, you use variables. A variable is like a nickname for something the computer must remember. To store different types of data, there are two main categories of variables: numbers and text. Text variables are also called strings. And no, they don't make sounds, like violins...

Numbers (numeric variables):

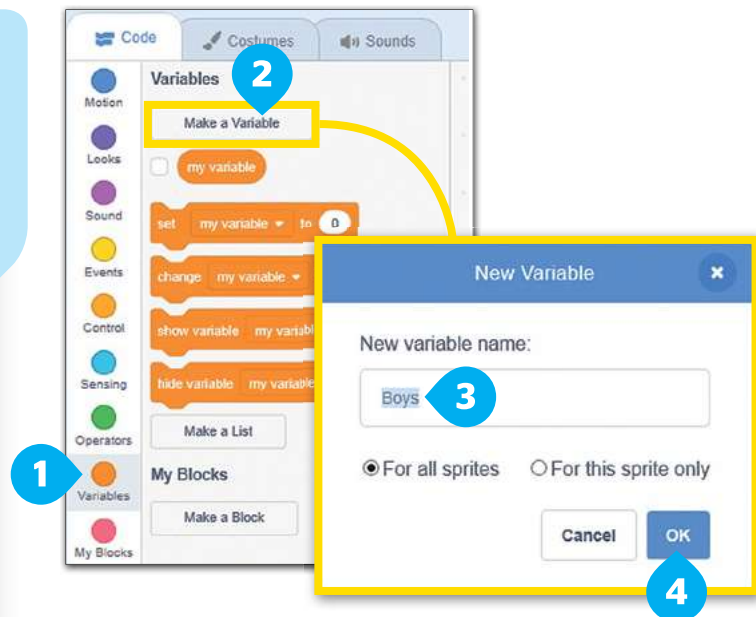


Text (string variables):



To create a variable:

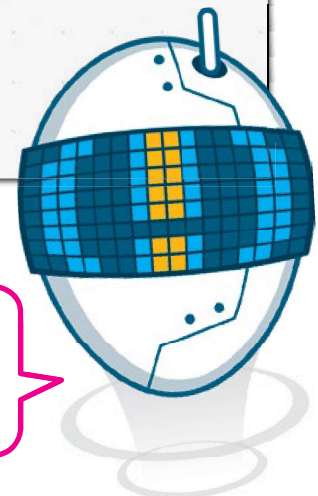
- > In the block palette, click **Variables**. **1**
- > Click **Make a Variable**. **2**
- > The **New Variable** window opens. Type a name for the variable, e.g. Boys. **3**
- > Click **OK**. **4** A new variable will be created. **5**
- > Click, hold and drop the **set (Boys) to (0)** block into the script area and give a specific value to the variable. **6**
- > To display the value of the variable on the stage, click the **checkbox**. **7**



The block **set (Boys) to (10)** means that you take the number 10 and assign it to the variable "Boys". You can also use this block to calculate anything on the right side of the "to" and then assign the result to the left side. For example:



*Always use variable names that are easy to remember. For example, for the number of the students in your class, use a variable such as "ClassStudents" and for the name of your teacher, use "TeacherName."*

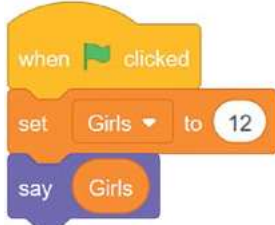




## Say

The simplest command you can give in Scratch is to make a sprite say something on the stage. For example, you have set the variable "Girls" to the number 12. Let's display this variable.

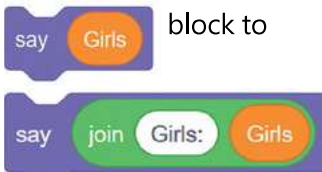
Create the script:



Run your script by clicking the green flag. In this way, you can display anything you want on the stage.



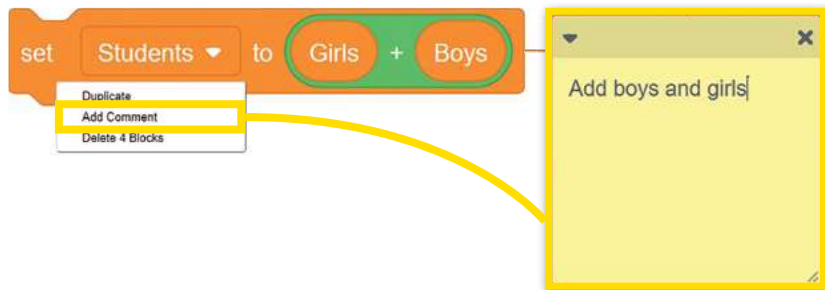
To make the information more clear, change the



Can you see the difference? Now it's better!

## Comments

You can add comments in your script by right-clicking a block and clicking add comment. You can write whatever you want in the comment area without affecting the program.

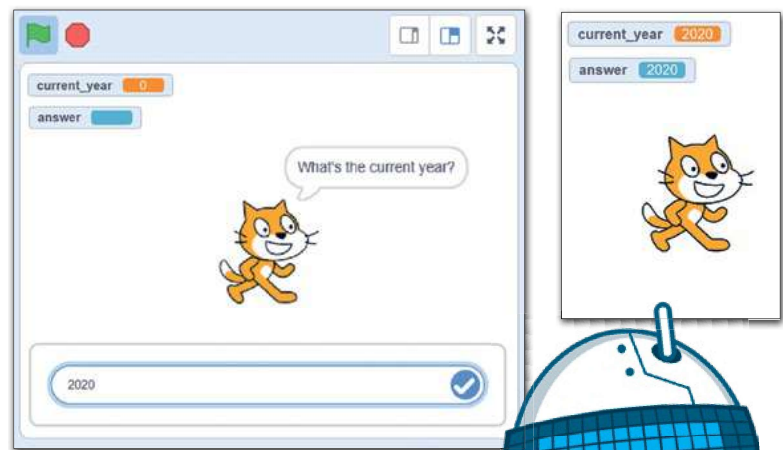


## Input

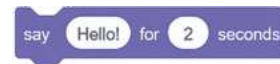
So far, you've learned how to assign values to the variables in the program. Usually, you want to get this information from the person that will use the program. For example, in the age calculation program, you ask for the person's age. When you run the following program, the **ask ( ) and wait** block makes an input box. Then, the **answer** block gets what you type and assigns it to the variable "current\_year".



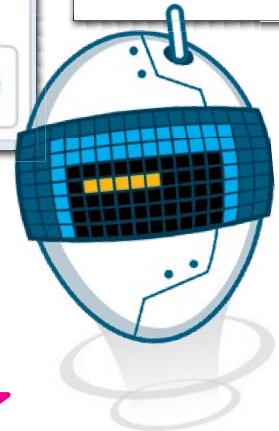
Run the script and in the text box below the stage, type in **2020** and press **Enter ↵**.



*If you want to display a message for longer on the stage, just use the block*



*instead of* say Hello! .



### SMART TIP

**In programming, there are usually many ways of doing the same thing. Sometimes one way makes more sense than other ways. The choice is left to the programmer!**

# hands on!



Think of names for these variables:

Price of milk

Price of cereal

Number of bottles of milk

Number of boxes of cereal

Total cost of milk

Total cost of cereal

Total amount to pay

Can you guess what these variables are for?

*CarTopSpeed*

*CarPrice*

*CarInsuranceCost*

*PetrolLiterPrice*

*MathGradeSemesterA*

*MathFinalGrade*

*FinalAverageGrade*



## TASK 4

# Conditions and loops

## Calculations with numbers

You can also use Scratch to do any kind of calculation: addition, subtraction, multiplication, division, etc. The rules that you have learned in **Microsoft Excel** for the use of parentheses apply here, too. But in Scratch each block is worked out separately. So, to calculate the numerical expression  $5 * (8 - 2)$ , you need to insert the minus block  $8 - 2$  into the multiplication block  $5 * \text{$

Now, let's convert a temperature from degrees Fahrenheit to degrees Celsius. Make the script:

```
when clicked
say Temperature converter for 2 seconds
ask Fahrenheit and wait
set fahrenheit to answer
set celsius to 5 * fahrenheit - 32 / 9
say join Celsius: celsius
```

Use the blocks from the Operators Blocks Palette for more calculations.

In this calculation line, the subtraction is calculated first. The multiplication and the division follow.



## Working with strings

You can join two or more strings and create a larger one using the block **join ( ) ( )**. You can use string variables or direct text, for example:

```
set surname to Smith
set fullname to join John surname
```

This gives JohnSmith.

```
fullname to join John surname
```

If you had:

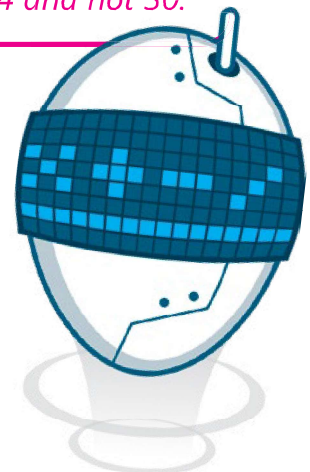
```
set name to John
set surname to Smith
```

the correct way to join them would be:

```
set fullname to join name join surname
```

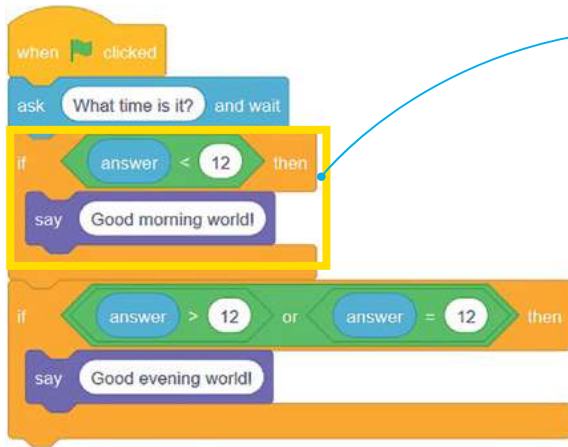
Remember to add an extra space when you join two text variables, if you want them to appear separated.

Multiplication and division are calculated before addition and subtraction. This means that  $4 + 2 * 5$  gives you 14 and not 30.



## Conditions

Everybody usually starts programming by saying "Hello world!" but let's try to say "Good morning!" or "Good evening!" according to the current time. Create this script and run it:



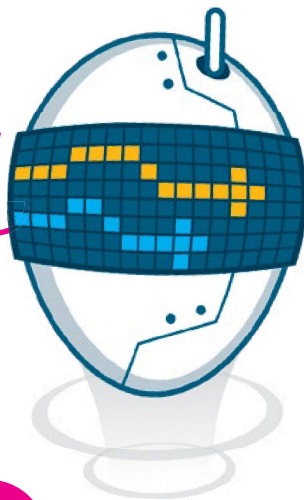
This block has two new words: **if**, and **then**. The word **if** is followed by a condition, in this case **answer < 12**. The computer compares the data in **answer** with the condition and if the number is smaller than 12, it executes the commands in the **if** branch. This is called a conditional execution.

In this example, there are two conditions: (answer < 12) and (answer >= 12). However, there is no need for the second condition (answer >= 12), so you can change the script to make it look like this:



The word **else** means "otherwise" and makes the program shorter.

*The indentation after **if** and **else** makes the program easier to read and understand.*



## Conditional operators

When writing conditions, you can use conditional operators, to compare values and take action depending on the result. The result of a conditional check can be either **true** or **false**.

Here is a list with some common conditional operators:

Blocks	Meaning
	Equal to
	More than
	Less Than

For example, if you use `set grade to 70`

the condition `grade > 80` returns **false**.

Now, if you use `set grade to 60` can you guess what the condition `grade < 60` returns?

### SMART TIP

**Pair programming is a technique where two programmers work together at one computer. One writes the code, while the other checks each line of the code as it is typed in. You have to switch roles frequently so that everybody is happy. Enjoy fast and accurate programming!**



## Loops

Let's make the sprite count from 1 to 5.

```

when green flag clicked
  set i to 1
  say i
  change i by 1
  say i
  change i by 1
  say i
  change i by 1
  say i
  change i by 1
  say i
  
```

Now, use the block **repeat ( )** and see what happens. Instead of using the same commands again and again you can repeat them by putting them inside a **repeat ( )** block. The number you give in the repeat block is the number of repetitions of the commands in the repeat block.

```

when green flag clicked
  set i to 1
  repeat 5
    say i
    change i by 1
  
```

Is it too fast?  
Can you show each number for 1 second?

You can change the value of a variable by a positive or a negative value.

Try this:

```

when green flag clicked
  set i to 5
  repeat 5
    say i for 2 seconds
    change i by -1
  
```

In the **repeat ( )** block loop, you specify how many times the commands have to be executed. But sometimes you don't know how many repetitions are needed. In such cases, you use the **repeat until ( )** loop, which runs until the given condition is true. Create the following:

```

when green flag clicked
  set i to 1
  repeat until i >= 10
    say i
    change i by 1
  
```

All the commands in the **repeat until ( )** block will run as long as the variable is greater than or equal to 1.

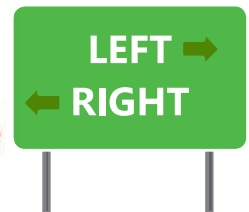
## Checking for bugs

There are two types of errors: errors in typing the commands and variables (syntax errors), which are usually easy to find, and logical errors. Scratch helps you avoid all syntax errors.

A logical error is a mistake that you may have in the design of the program, an incorrect sequence of commands or the use of incorrect variables. Everything looks fine, but the results are wrong. That's why developers have to be extra careful when they are creating a program.



logical error



## HISTORY

The first computer bug was an actual moth caught in an electromechanical relay of a computer at Harvard University in 1947. Admiral Grace Hopper, a woman pioneer in computer science, made a remark using the term "debugging" the system and the word is still used today.

# hands on!



1. Do the following calculations:

$$24 / 2 * 3 =$$

$$3 + 4 * 5 =$$

$$(3 + 4) * 5 =$$

$$10 - 8 / 2 =$$

$$(10 - 8) / 2 =$$

2. Find the value of the variable "e" at the end of the program:

```

when clicked
  set a to 20
  set b to 10
  set c to (a + b) / 3
  set d to (a - b) / 2
  set e to 2 * c + d
  say e for 2 seconds
  
```

4. Read the program and find the four bugs!

```

when clicked
  ask Type a number: and wait
  set number1 to answer
  ask Type another number: and wait
  set number2 to answer
  ask Type 1 to add the two numbers or 2 to multiply them: and wait
  set calc to answer
  repeat until calc = 1 or calc = 2
    say Wrong choice! Please, try again. for 3 seconds
    ask Type 1 to add the two numbers or 2 to multiply them: and wait
    set result to answer
  if calc = 1 then
    set result to number1 * number2
    say join Addition: result
  else
    set result to number1 - number2
    say join Multiplication: result
  
```

3. Finish the program that checks for the correct password:

```

when clicked
  set my password to 123456
  ask What's the password: and wait
  set password to answer
  repeat until password = my password
    say Wrong! for 2 seconds
    ask What's the password: and wait
    set password to answer
  say Congratulations!
  
```



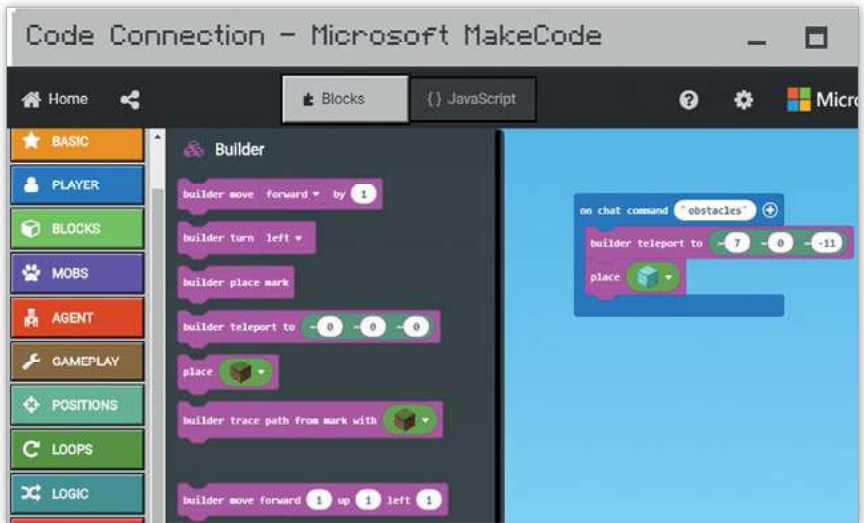
Four empty boxes with dashed lines below them, intended for students to write down the bugs found in the code above.



# Other platforms

## Microsoft MakeCode

**Microsoft MakeCode** is a free, open source platform to create projects for everything from robotics to Minecraft. It provides a block editor, similar to Scratch, and also a JavaScript editor for more advanced users. There's a simulator space (where the code runs) and a code-block editing space where different elements of code are combined.



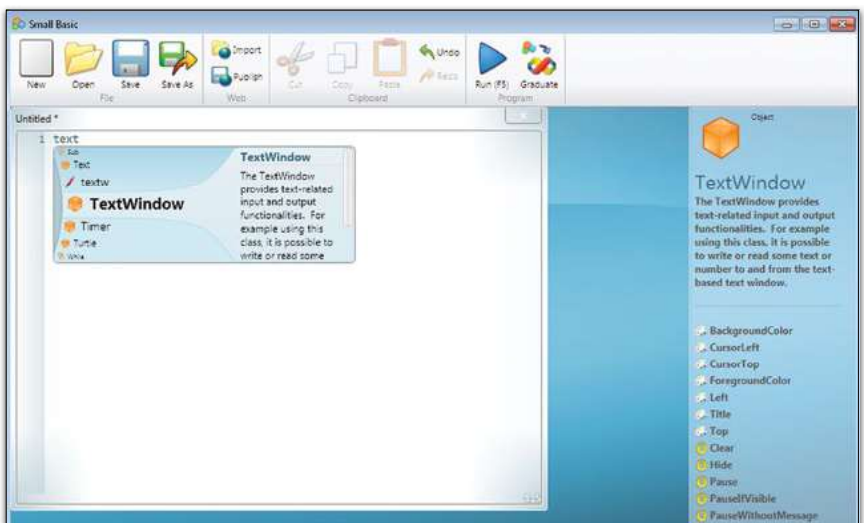
## Tynker

**Tynker** uses visual blocks of code, similar in concept to Scratch, to teach students the concepts of programming. Students can create their own projects, collaborate with others, and share with the online Tynker community. Clever integration with platforms like Minecraft, LEGO® WeDo, and Parrot Mambo drones makes Tynker even more fun.



## Microsoft Small Basic

**Microsoft Small Basic** is a programming language designed to make programming extremely easy and fun for beginners. It has a very friendly environment that allows you to do interesting things such as making everyday calculations and drawing cool shapes and graphics.



# wrap up

Now you have learned how to:

- > create an algorithm.
- > draw a flowchart.
- > describe solution steps in pseudo-code.
- > design a program.
- > describe a solution to a problem.
- > work with variables.
- > give simple commands.
- > use special symbols in programming.
- > use conditions and loops.



## group work

A calculator is a portable device used to perform calculations, ranging from basic arithmetic to complex mathematics. You are going to create a program that works like a simple arithmetic calculator. Give your own opinion as well.  
Work in teams!



## GLOSSARY

algorithm

bug

calculations

command

condition

connector

diagram

input

logical error

loop

operations

output

program

programming language

string

syntax error

variable

