VCZ
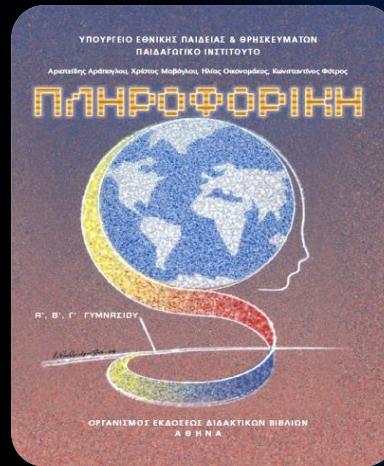
LOGO TURTLES

CHAPTER 3

TURTLES BASIC FEATURES

- In Micro Worlds EX programming environment **turtles** are prevalent. They can be used in order to design or decorate our page as well as be used as buttons or animation.

- Each turtle has a set of **attributes** that characterize it: *name*, *position*, *direction*, *pen width*, *pen color*, *shape*.

> **To make a turtle execute our commands, we should click on it.**

CREATE A TURTLE

- We select the **Turtle tool** in the Toolbar and then we click anywhere on the page to create the turtle.

- Then a new turtle appears. If we **right-click** on the turtle we can open its menu which contains a set of basic commands.
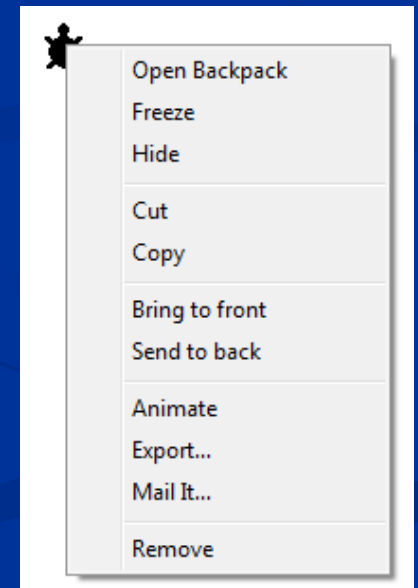
MOVE OR TURN TURTLES

- To **move** a turtle, we should drag it anywhere on the page.

- To **change** its **direction** we should change turtles heading by dragging its head.
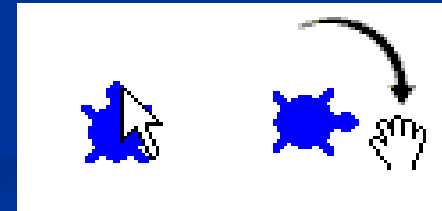
However, turning the turtle by dragging its head only works if the turtle has the **original "turtle" shape**.

ANIMATED TURTLES

- We can make a turtle start moving if we right-click on it and select **Animate** from its menu.

- An instruction is automatically inserted in the turtle's backpack to make the turtle move. Then the turtle starts moving to the direction it is oriented.

We can **click** again on the turtle to **stop** it or **restart** it.

We can also click the **Stop ALL** button in the Toolbar, or press the **Alt** button to pause it.

ANIMATED TURTLES

- To view the instruction that's causing the turtle to move, we **right-click** on the turtle and open its **backpack**.

- After that, we click on the **Rules** tab and check the instruction in the **OnClick** field. If we change the values after **forward** or **wait** and click elsewhere in the page we can see the effect.
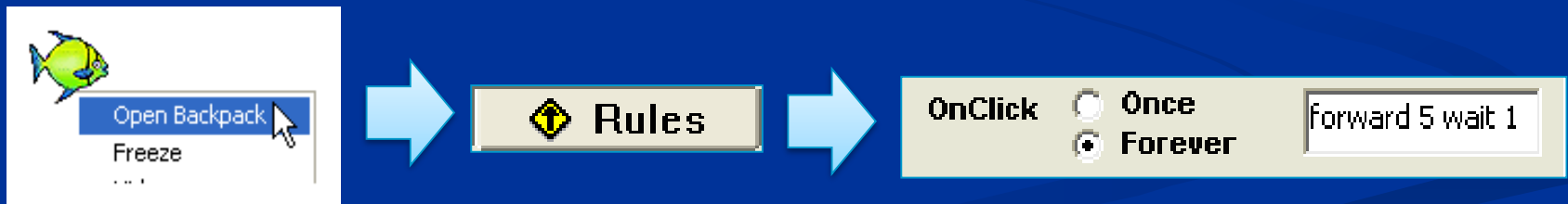
CHANGE SHAPE

- To change the turtle's shape we click on the **Painting/Clipart palette** button in the Toolbar to open the Painting/Clipart palette.

- Then, we choose one of the collections of shapes: **Singles** or **Sets**.

- We **click** on the **shape** of our choice in the Painting/Clipart palette and **click** exactly on the **turtle**
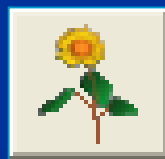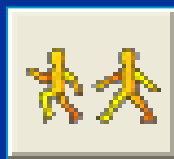
ORIGINAL SHAPE

- The original turtle shape turns to **show its heading** and **changes color** according to the pen color.

- To set the turtle back to the original turtle shape, we click on the **Turtle tool** in the Toolbar and then we click on the turtle whose shape we want to change.
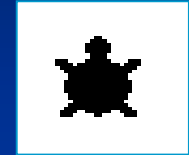
CHANGE SIZE

- There are 3 ways to change the turtle's size.

  - Enlarge or shrink the turtle using the magnifiers in the Toolbar. Select the **magnifier** and click on the turtle.

  - Use the command **setsize** and a number e.g. `setsize 80` (original size is 40 when max is 160).

  - Change the value in the **Size field** in the **State** tab of the Turtle's **backpack**.
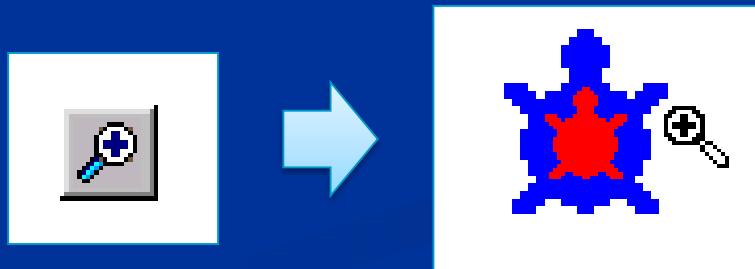
CHANGE STATE

- In the turtle's **backpack**, we can change its **size**, **position**, **shape**, **heading**, **pen state** and **visibility**.

- To make all these changes we **right-click** on the turtle to open its backpack and we click on the **State** tab.
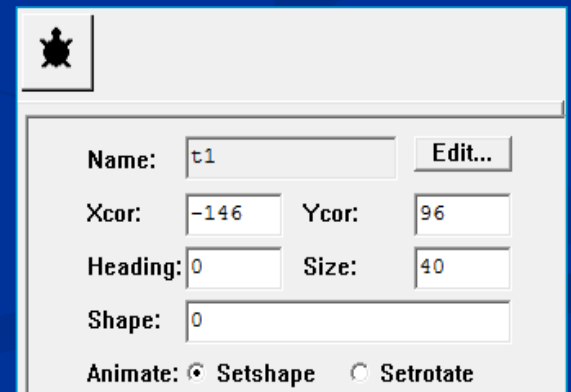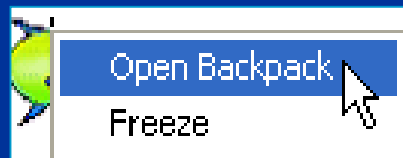
PEN COLOUR & PEN SIZE

- We click on the Painting/Clipart palette button in the Toolbar to open the **Painting palette**.

- Afterwards, we click on the **Painting tools** button and we select the **pencil**.

- We choose a **color** and select a **brush** (the size of the brush represents the pen size).

- Finally we **click on the turtle** with the pencil and the color of the turtle automatically changes
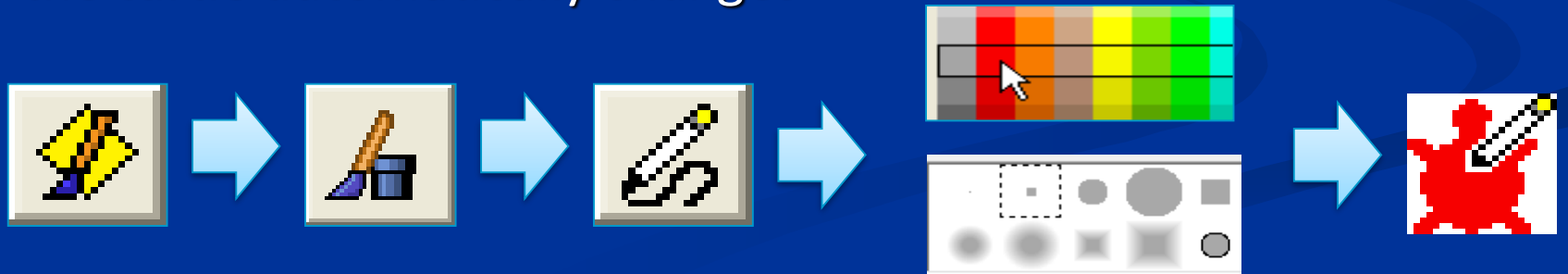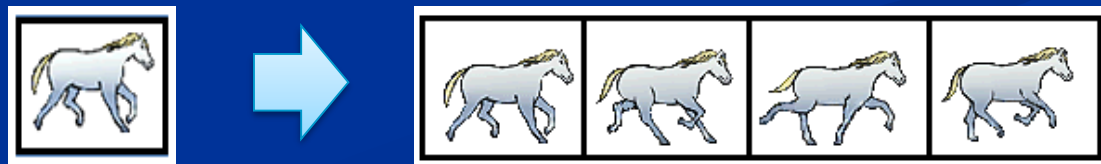
CHANGE SHAPE WHILE MOVING

- We click on the **Painting/Clipart palette** in the Toolbar.

- Then we click on the **Sets shapes** button.

- Some of the shapes come in sets of two, three, or four. We can use them to make more attractive animations.
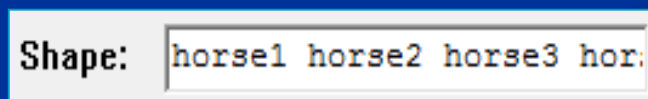

- For this reason, in the **Clipart library**, we select all the shapes of the set we wish to copy (e.g. the horses) using the **Shift** button

- While the shapes are selected in the Painting/Clipart palette, we **click on** the **turtle**. Copies of all shapes are placed in the backpack.

- If we open the turtle's **backpack** and click on the **State** tab we will see all the available shapes
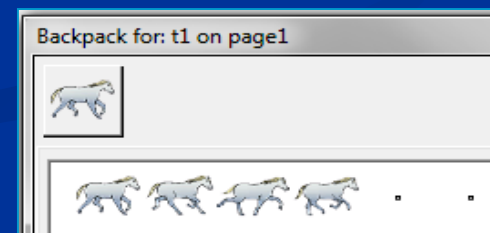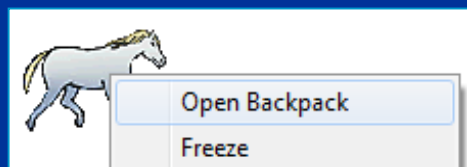
- The Shape field also shows the shape list:

CHANGE SHAPE WITHOUT MOVEMENT

- In the **Clipart library**, we select all the shapes of the set we wish to copy.

- We **click** on the **turtle**, so copies of all the shapes are placed in its backpack.

- Then, we click on the **Rules** Tab in its backpack and we change its commands by using **0** (zero) instead of **5** as input for **forward** in the **OnClick** field.

REMOVE TURTLES

- There are 3 ways to delete turtles:

    - We select the turtles by **dragging around** them, and then we press the **Delete** or the **Backspace** key.

    - We **right-click** on the turtle that we want to delete and we choose **Cut** or **Remove** from the pop-up menu.

    - We open the **Project** tab, we right-click on the turtle that we want to remove, and select **Remove** from the menu.
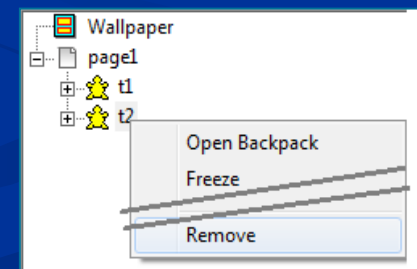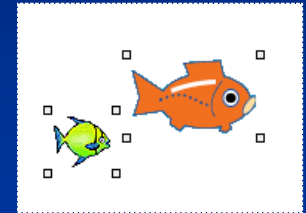
NEW TURTLES

- The turtles are numbered as they appear: **t1**, **t2**, and so on.

- We can use the **Turtle tool** to create several turtles.

- Then, we **right-click** on one of the turtles to open its **backpack**, we click on the **State** tab and then we click on **Edit**, beside its current name, we type a **new name** and click OK
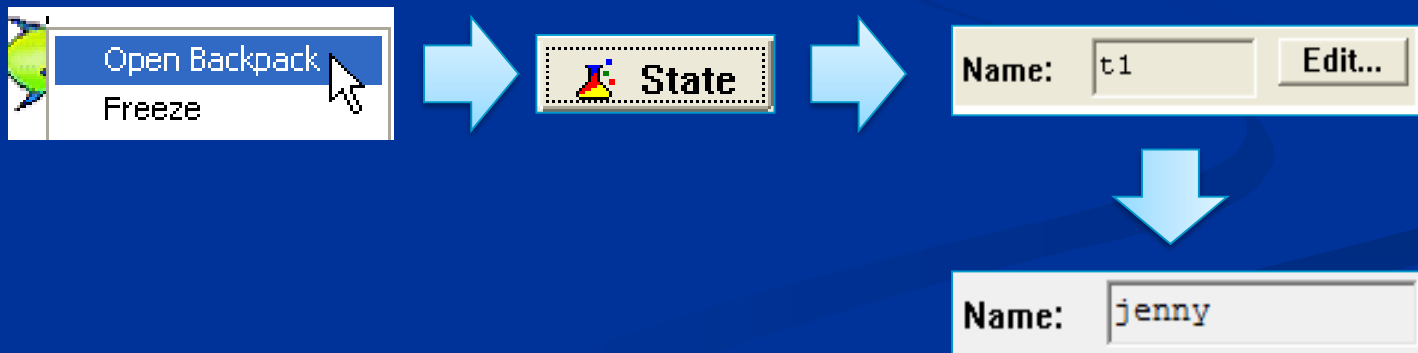
TALK TO A TURTLE

- If we have several turtles on our page, always **only one listens** to our commands.

  - The **last turtle** that **we clicked on**, unless we created another one.

  - The **last turtle** that **we created**, unless we talked to a turtle.

  - The **last turtle** that **we talked to**.

```
t1, fd 100
t2, rt 90
runner, fd 50
t1 bk 50
runner,
fd 50
```

First, we should use the name of one of the turtles and then we should give our commands.

We must not forget the comma.
In case we forget the comma, the system gives back an error message.

COLOR DETECTION

- A turtle can be programmed to react when it passes over a specific color.

- Turtles react to any color visible on the current page, including those from the Wallpaper.

- We click on the **Rules** Tab and under the words **OnColor** we choose the color to be detected.
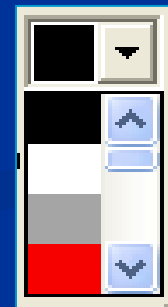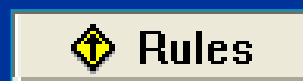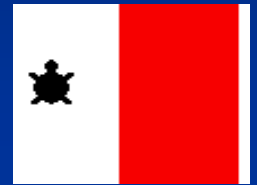
- In the field next to the color, we type an **instruction** such as:
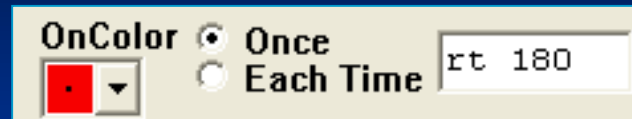
- This instruction makes the turtle turn right 180 degrees (bounce).

- We leave the mode to **Once**. A small dot appears on the color to indicate that the turtle is programmed to detect it.

- We **right-click** on the turtle and we choose **Animate** from the menu (when it detects the color it should bounce).
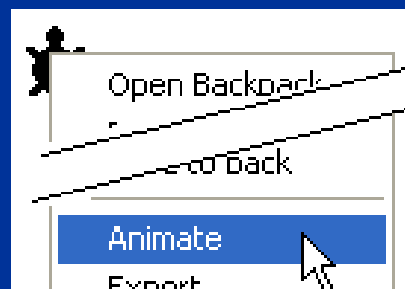
PROGRAM A COLOR

- We can also **program a color** so that any turtle reacts when "stepping on" that color.

- We **right-click** on the color on the page and choose **Edit color name** from the menu (color name depends on the color we chose e.g. red).

- In the **Turtle field**, we type an instruction to make the turtle bounce; we leave the mode to **Once** and click **OK**.

DETECT A COLISSION

- Turtles can be programmed to **react when they touch** (or **are touched** by) any other turtle.

- Both the "**active**" turtle (the one that is touching) and the "**passive**" turtle (the one that is touched) will react to the collision and do whatever they are instructed to do.

- TO do than, we click on the **Rules** Tab and in the **OnTouching** field, we type an instruction e.g. `bk 100`

Open Backpack
Freeze
➡ ◈ Rules ➡ OnTouching bk 100
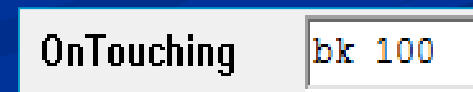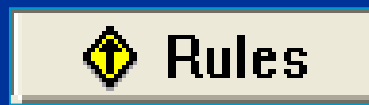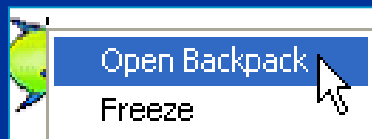
TIMER ACTIONS

- Turtles can be programmed to repeatedly run an instruction after a preset interval, based on a **clock** built into MicroWorlds.

- Inside the **Rules** Tab of turtle's backpack, there are 2 fields next to **OnTick**. The small one is the **delay**. The larger one is the **instruction**.

The number in the Delay field is in tenths of a second. 10 tenths equals one second.
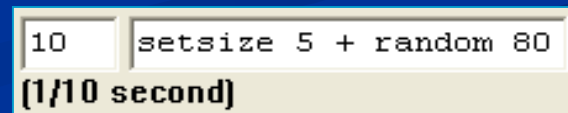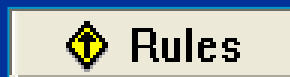
BROADCAST MESSAGES

- Turtles can be programmed to **broadcast specific messages** or to **react to** broadcasted messages.

- To make a turtle **broadcast a message**, we should use the **broadcast** command following by the name of message.

- To create a turtle who **reacts to a message** we should open its backpack and inside the **Rules** Tab we type the instruction (reaction) in the **OnMessage** field.

OnMessage	react

CHECK AN EVENT

- A turtle can check **if an event happens** all by itself.

- In case this event happens, it will do what we programmed it to do.

> **Example**: We program t1 so it "runs away" from t2. To do it, we open **t1's backpack**, we click on its **Rules** tab and right-click in the area below "**When this**" and choose **Add** from the menu. Inside **When dialog box** we type the appropriate instructions in the two fields:
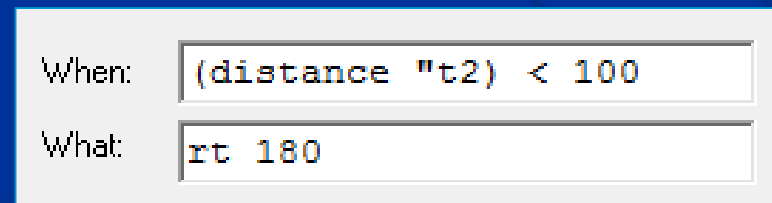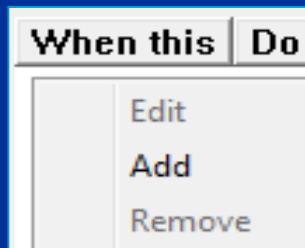
EXPORT TURTLES

- If we wish to use a turtle in a different project, we can easily **export** it and **import** it into another project.

- To **export a Turtle** we right-click on the turtle and choose **Export** from the menu.

- To **import the Turtle** into a different project, we choose **Import** and **Import turtle** in the File menu.