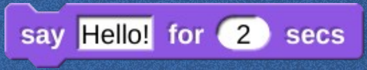
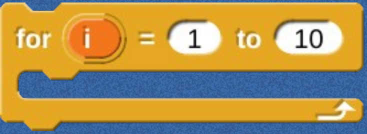
Snap4Arduino

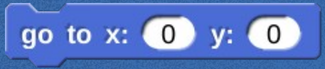


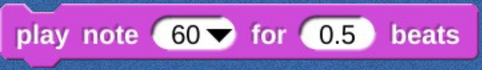
Snap4Arduino at 南华独中



第一节

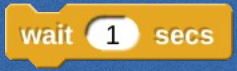
图块编程 Snap*!* 简介



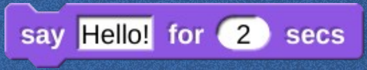


Session 1

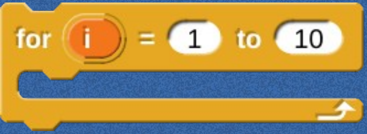
Introduction to Visual Programming Snap*!*



Snap4Arduino

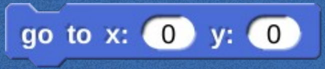


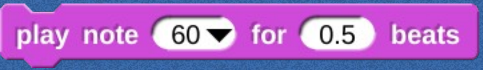
Snap4Arduino at 南华独中



第二节

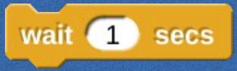
图块编程 Snap*!* + Arduino 结合的基础



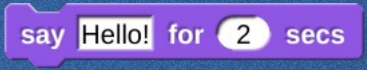


Session 2

Basic Functions of Snap*!* + Arduino



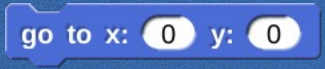
Snap4Arduino

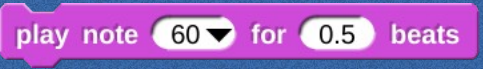


Snap4Arduino at 南华独中

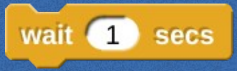
第三节

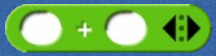
结合图块编程 Snap*!* 与 Arduino 集成模块





Session 3
Use Arduino Modules with Snap*!*





图块编程 Snap! 简介

Snap*!* 是一种可视化编程或者图块编程

可视化编程是一种基本的技术，它允许通过拖拽代码构建块或者其他视觉线索，而不是手动编写基于文本的代码。如此一来，复杂又抽象的编程语言就变得容易理解。

Snap*!* 是一种可视化编程语言，允许学生创建自己的交互式故事、游戏和动画。当学生设计 Snap*!* 项目时，他们学会创造性地思考、系统地推理和协同工作

Snap*!* is visual programming or block programming

Visual programming is a fundamental technique that allows complex and abstract programming languages to be made easier to understand by dragging code building blocks or other visual cues, rather than manually writing text-based code.

Snap*!* is a visual programming language that allows students to create their own interactive stories, games and animations. As students design **Snap*!*** projects, they learn to think creatively, reason systematically, and work collaboratively

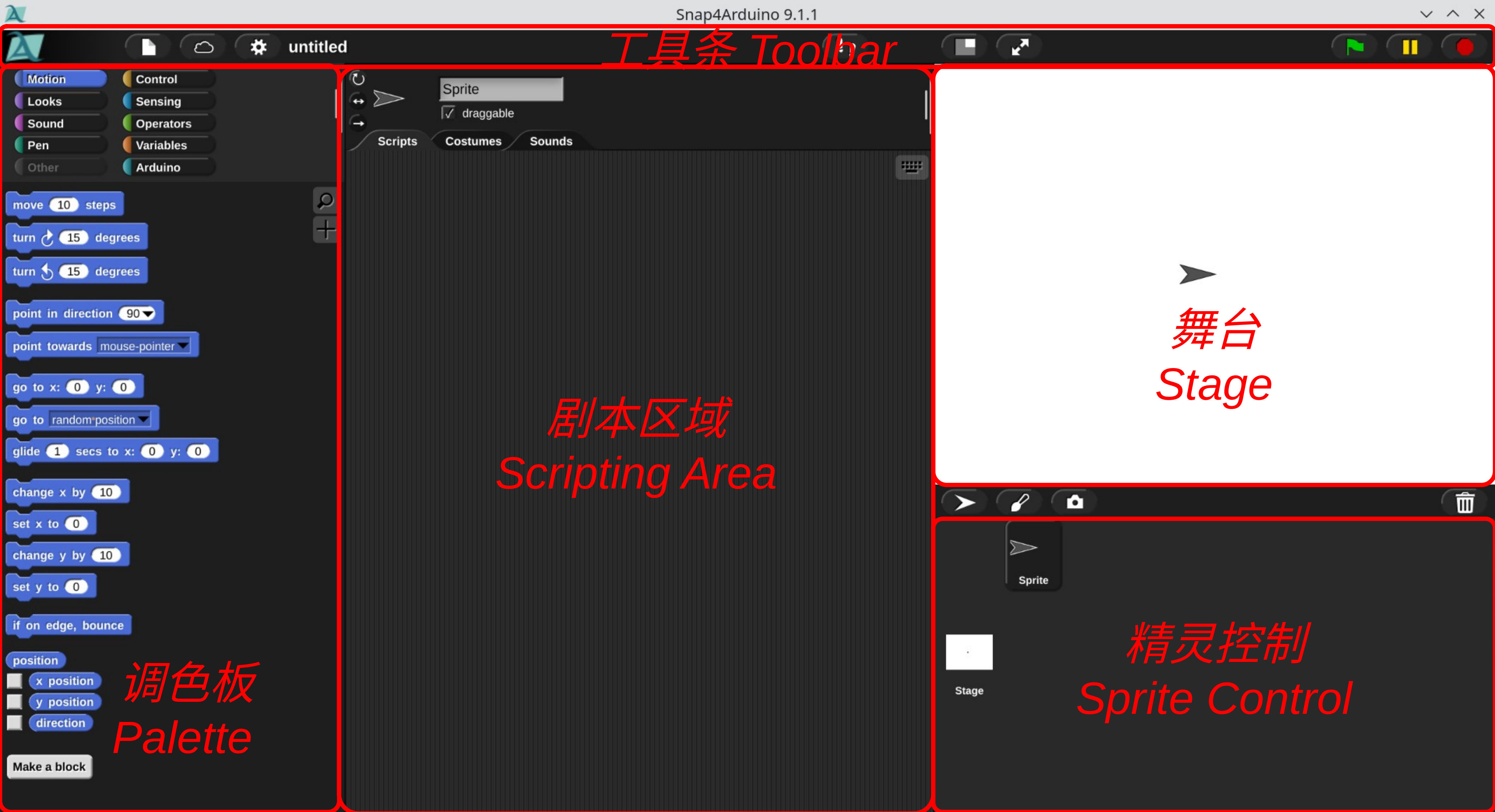
图块编程 Snap! 简介

- **Snap4Arduino** 是一个集成开发环境
- **Snap4Arduino** is an Integrate Developement Environment **(IDE)**
  - 可以从以下网址下载
  - Can be downloaded from

    https://snap4arduino.rocks/
- **Snap! Reference Manual**

  https://snap.berkeley.edu/snap/help/SnapManual.pdf

可视化编程 (Snap) 简介 – Snap4Arduino IDE 集成开发环境

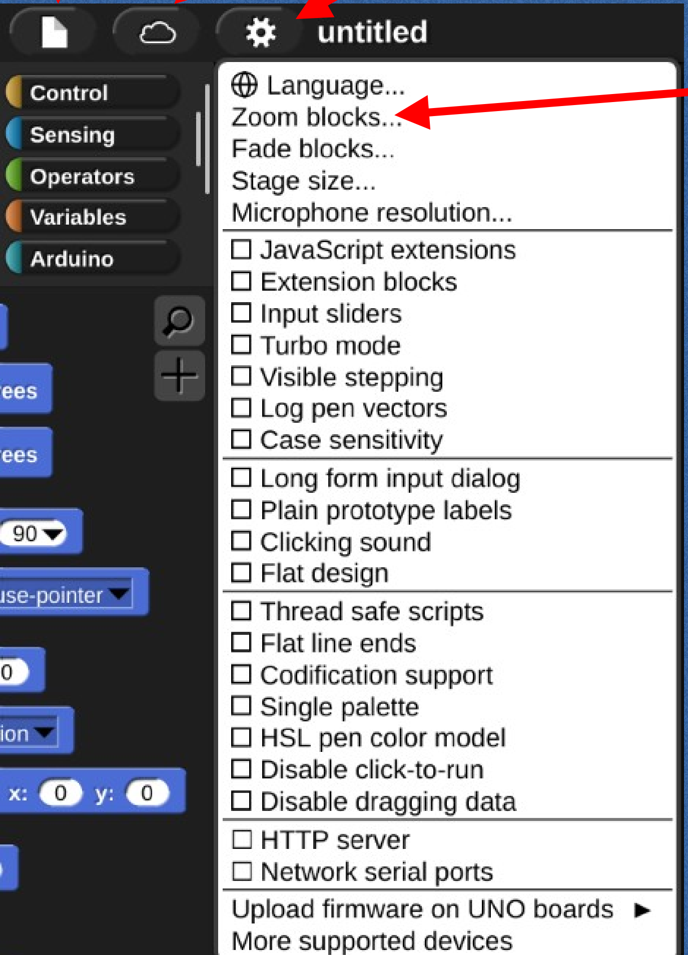


图块编程 Snap! 简介

文件
File

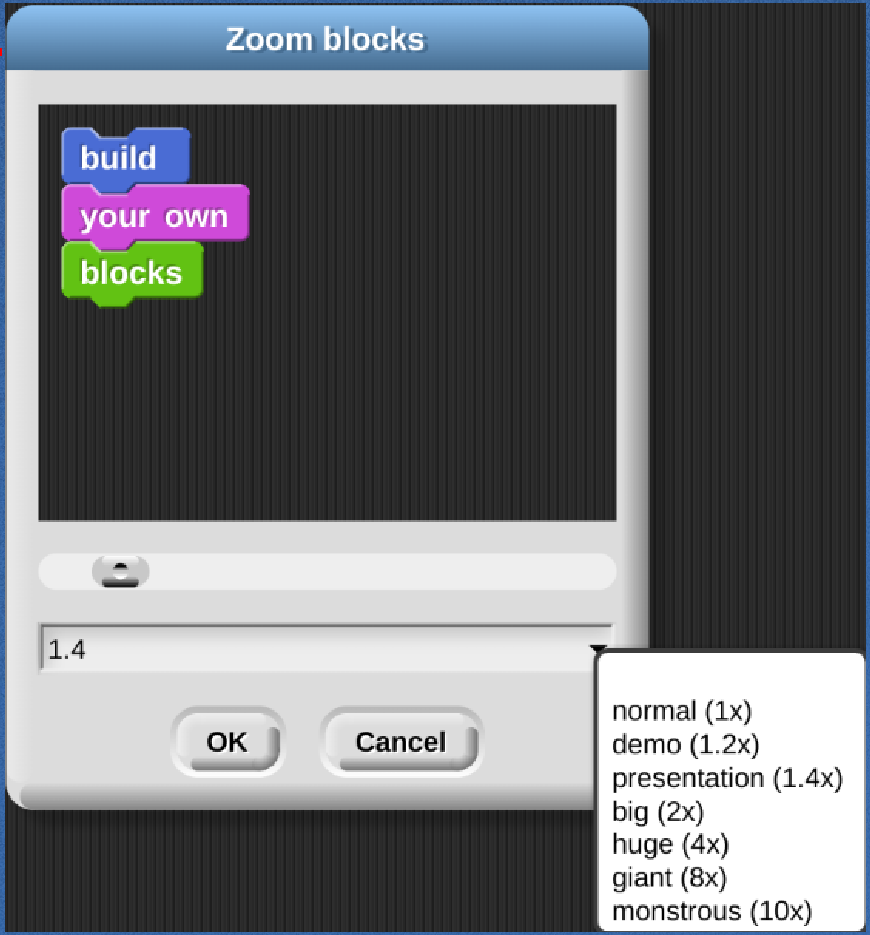
云网络
Cloud

设置
Settings

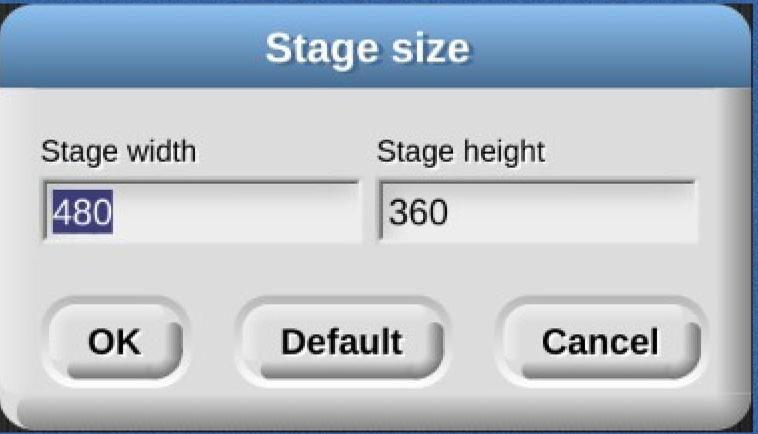


放大区块以方
便用户使用
例如用于演示

Enlarge the
blocks for ease
of user
e.g. for
presentation



图块编程 Snap! 简介



Stage size

Stage width: 480

Stage height: 360

舞台尺寸

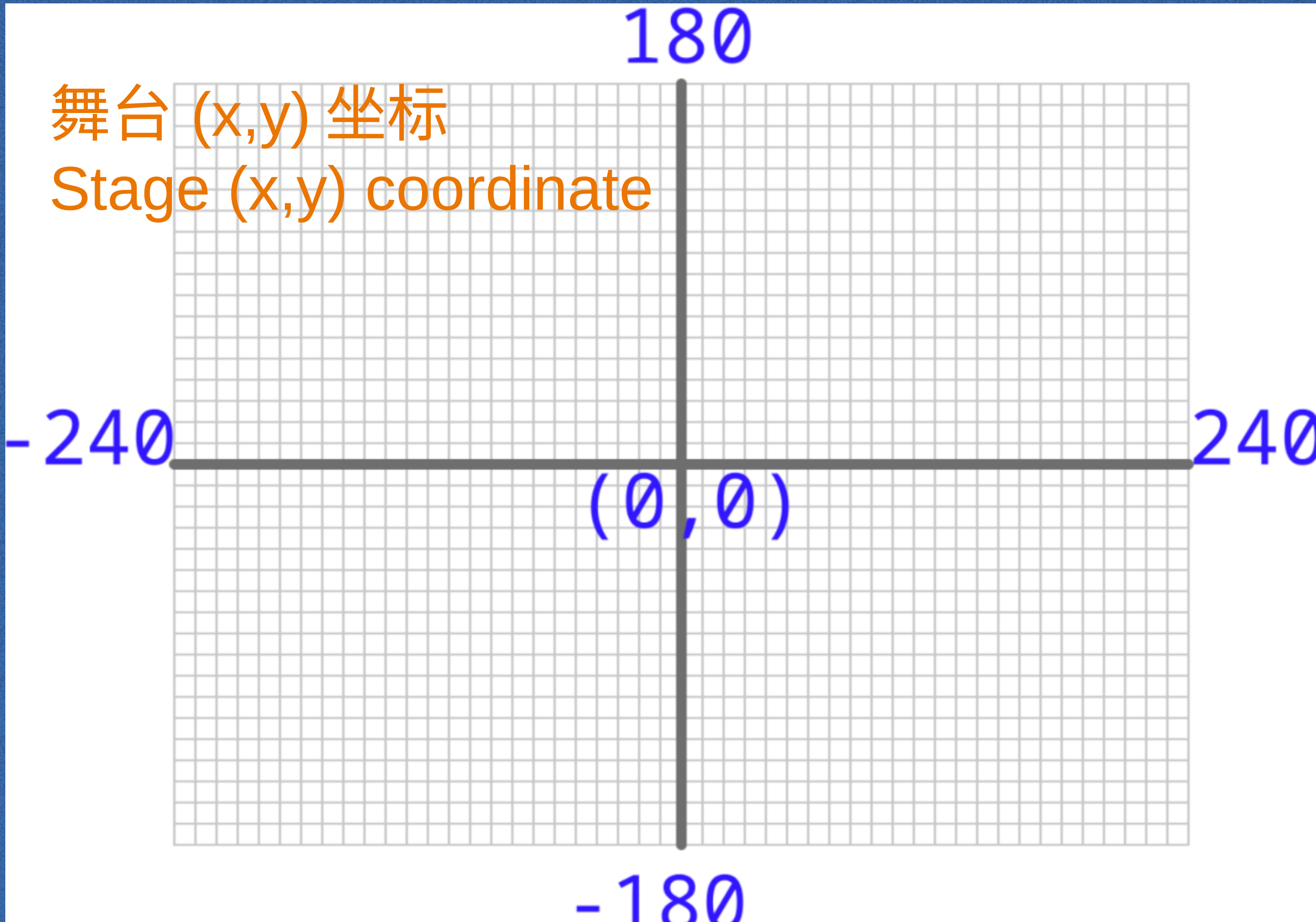
默认高度和宽度

480 x 360

Stage Size

Default Height and Width

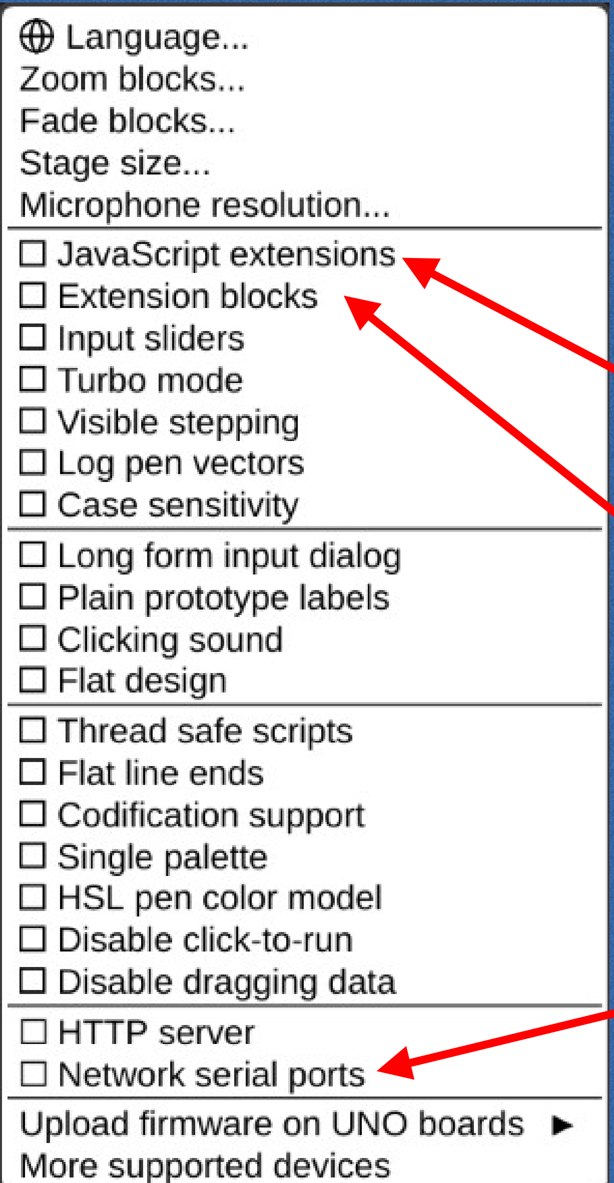
480 x 360



舞台 (x,y) 坐标

Stage (x,y) coordinate

图块编程 Snap! 简介



Language...
Zoom blocks...
Fade blocks...
Stage size...
Microphone resolution...

☐ JavaScript extensions
☐ Extension blocks
☐ Input sliders
☐ Turbo mode
☐ Visible stepping
☐ Log pen vectors
☐ Case sensitivity

☐ Long form input dialog
☐ Plain prototype labels
☐ Clicking sound
☐ Flat design

☐ Thread safe scripts
☐ Flat line ends
☐ Codification support
☐ Single palette
☐ HSL pen color model
☐ Disable click-to-run
☐ Disable dragging data

☐ HTTP server
☐ Network serial ports

Upload firmware on UNO boards ▶
More supported devices

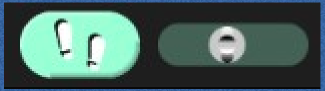
一些常用的设置

Some commonly Use Settings

- JavaScript 扩展
  JavaScript extensions
- 扩展块
  Extension blocks
- 网络串行端口
  Network serial ports

图块编程 Snap! 简介

可见的单步调试代码
Visible Stepping



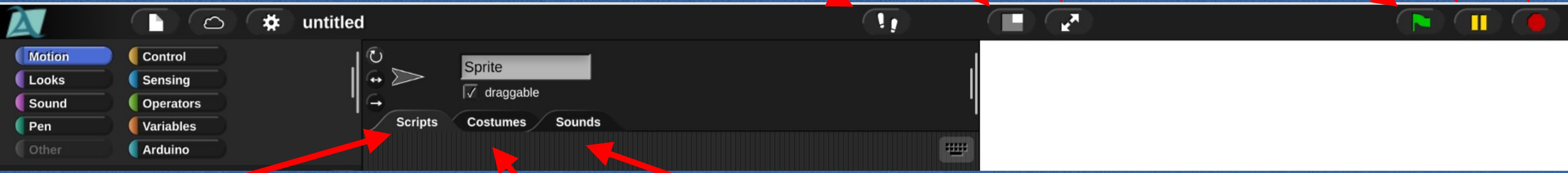
切换
Toggle

全屏
Full Screen

执行
Run

暂停
Pause

停止
Stop



剧本

剧本区域用于编辑图块编程

Scripts

Scripts area is used for editing visual programming blocks

服装

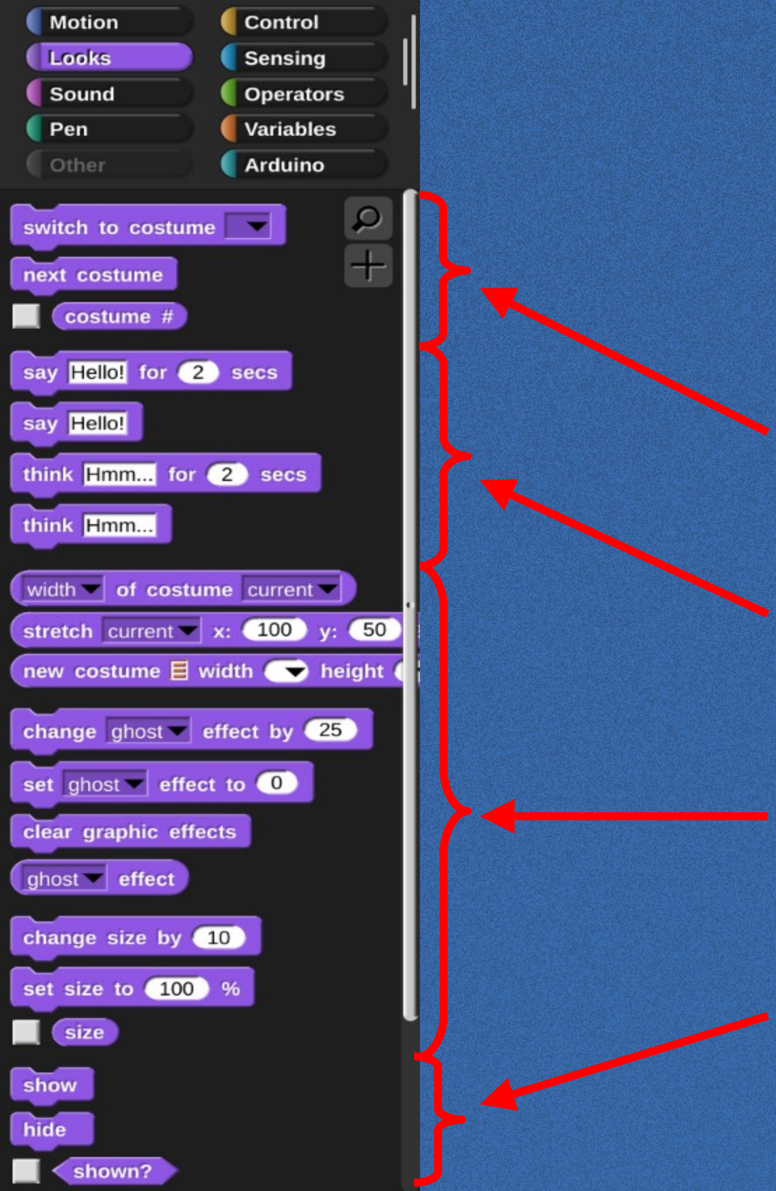
Costumes

声音

Sounds

图块编程 Snap! 简介

外观组控制精灵的外观
looks group controls the looks of the sprite

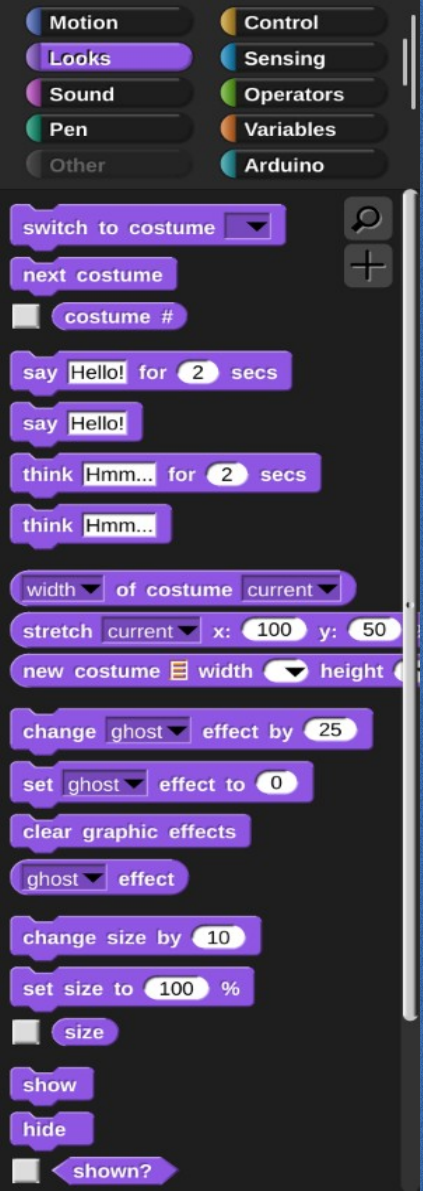


控制精灵的外观
change costume of sprite

让精灵在舞台上显示文字
make sprite display text on stage

改变精灵外观的大小和效果
change size and effect on sprite

显示或隐藏精灵
show or hide sprite

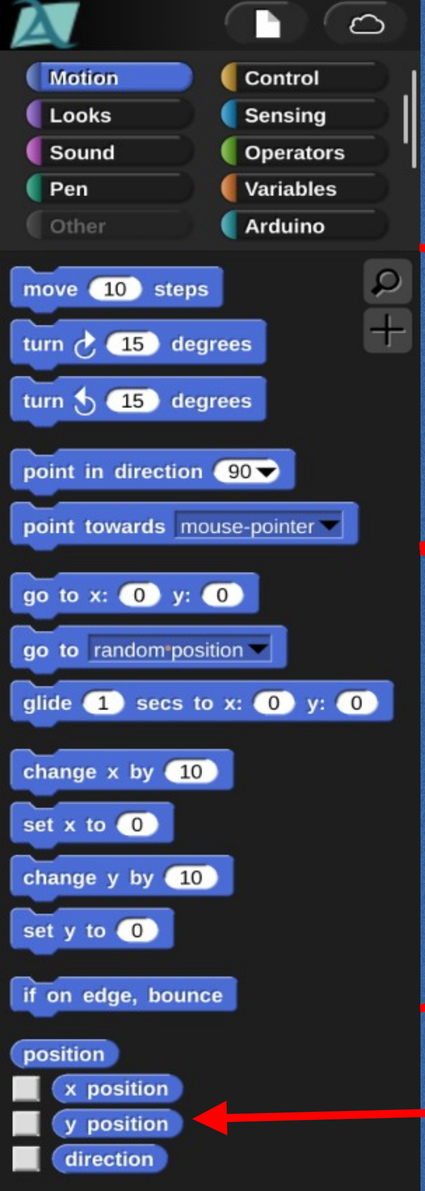


图块编程 Snap*!* 简介

按照以下示例操作
Follow thru the following examples

- 1_1_Intro_to_Looks_group.xml
  - 图块的作用
  - Effects of blocks
- 1_2_Looks_group_Costumes.xml
  - 更换服装
  - Change costumes
- 1_3_Looks_group_Stage_Background.xml
  - 更换舞台背景
  - Change stage background

图块编程 Snap! 简介

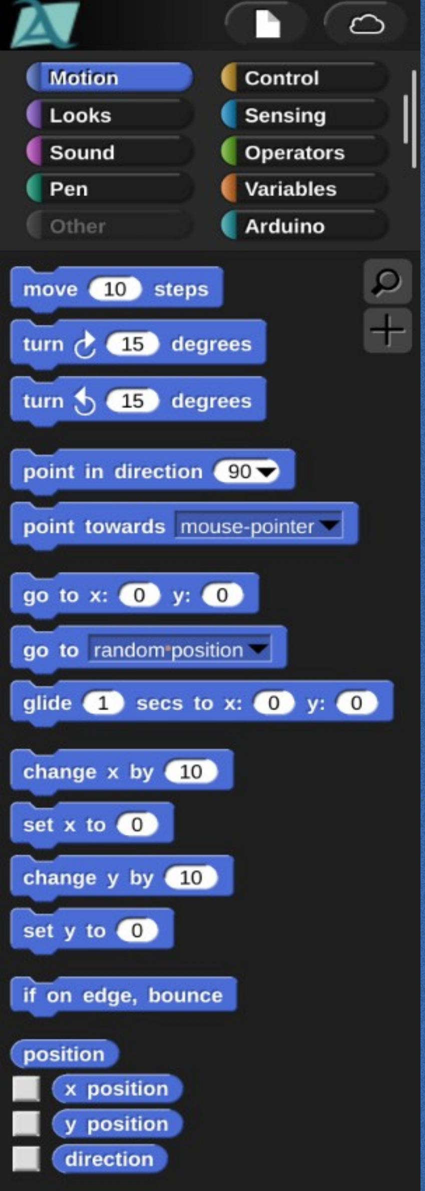


动作组运动组控制精灵的运动和位置
motion group controls the movement and position of the sprite

控制精灵的方向
controls orientation of sprite

控制精灵的位置
controls orientation of sprite

显示精灵位置精灵的（x,y）和方向
Display (x,y) position of sprite



图块编程 Snap! 简介

按照以下示例操作

Follow thru the following examples

- 2_1_Intro_to_Motion_group.xml
  - 图块的作用
  - Effects of blocks

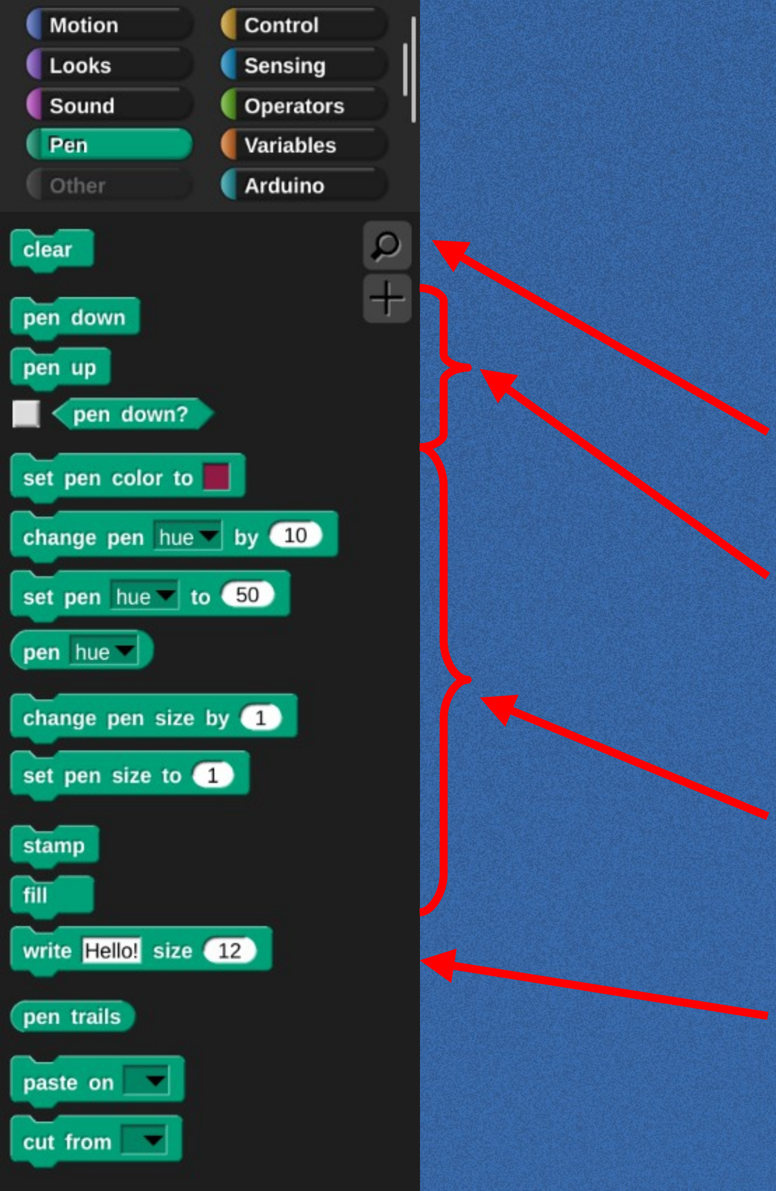
- 2_2_Motion_group_X_Y_position.xml
  - 探索 X-Y 坐标
  - Explore the X-Y coordinate

- 2_3_Motion_group_Car_Edge_Bounce.xml
  - 汽车从边缘弹开
  - Car bounce away from edge

图块编程 Snap*!* 简介

笔组在舞台上绘画

pen group draws on the stage



```
clear
pen down
pen up
pen down?
set pen color to
change pen hue by 10
set pen hue to 50
pen hue
change pen size by 1
set pen size to 1
stamp
fill
write Hello! size 12
pen trails
paste on
cut from
```

清除舞台

clear stage

控制笔书写的开启或关闭

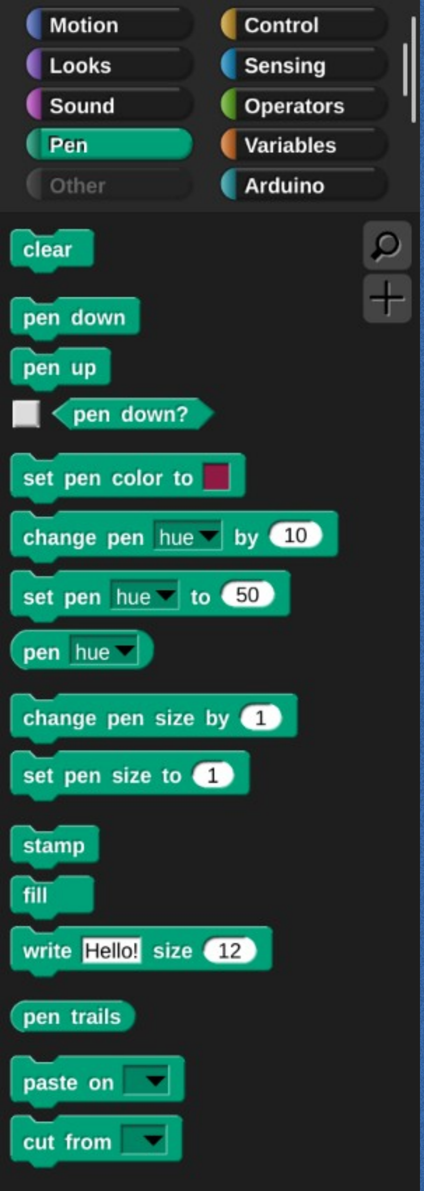
control pen writing on or off

改变笔书写的大小和颜色

change size and effect on sprite

在舞台上书写文字

write text on stage



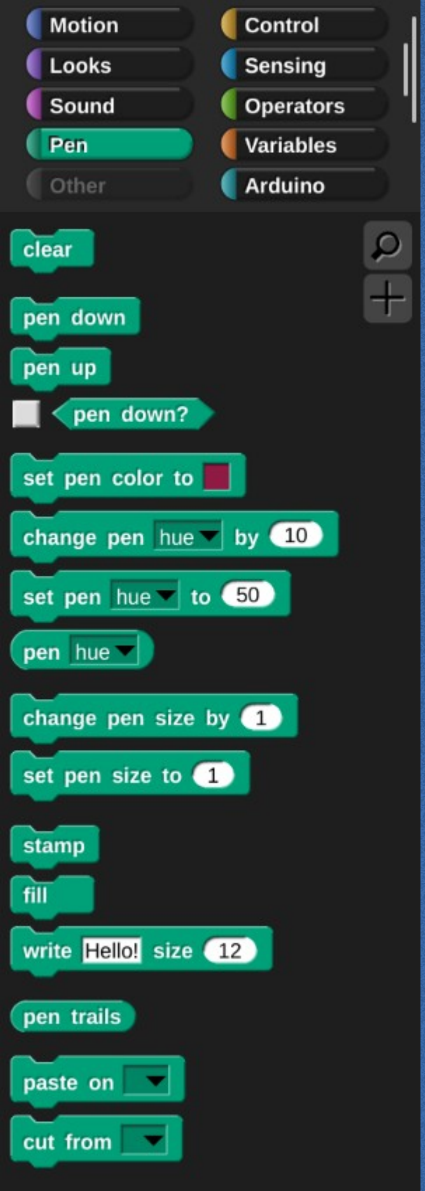
图块编程 Snap! 简介

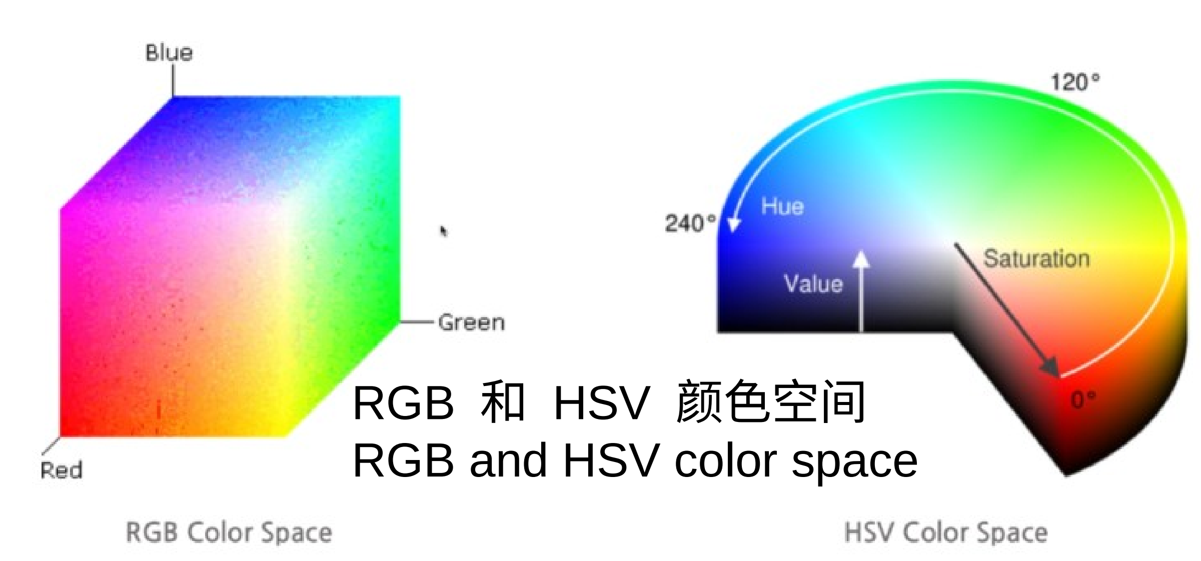
按照以下示例操作

Follow thru the following examples

- 3_1_Intro_to_Pen_group.xml
  - 图块的作用
  - Effects of blocks
- 3_2_Pen_group_Stair_and_Rectangle.xml
  - 绘制楼梯和长方形
  - Draw Stair and Rectangle
- 3_3_Pen_Color_Square.xml
  - 绘制彩色正方形
  - Draw Multiple Rectangles in colors

图块编程 Snap! 简介





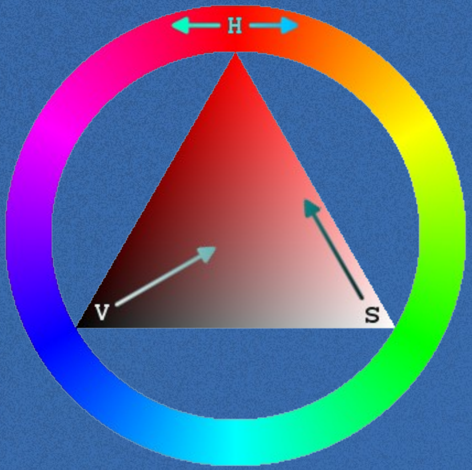
RGB 和 HSV 颜色空间
RGB and HSV color space

色轮使用 HSV 颜色空间

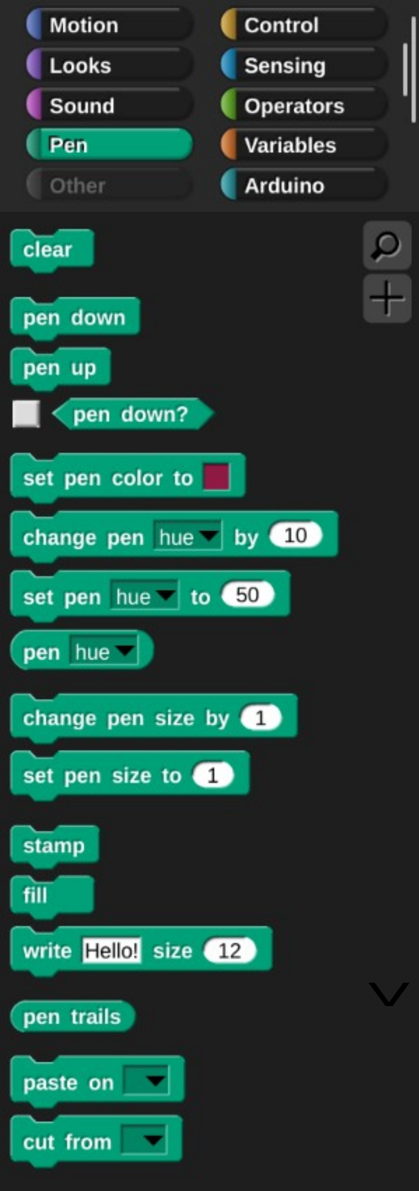
S 饱和度 = 1

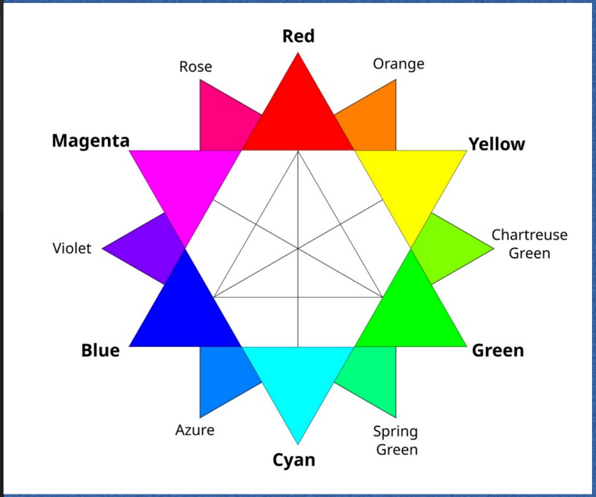
V 值 = 1

Color Wheel use HSV color space with
Saturation = 1
Value = 1



图块编程 Snap! 简介





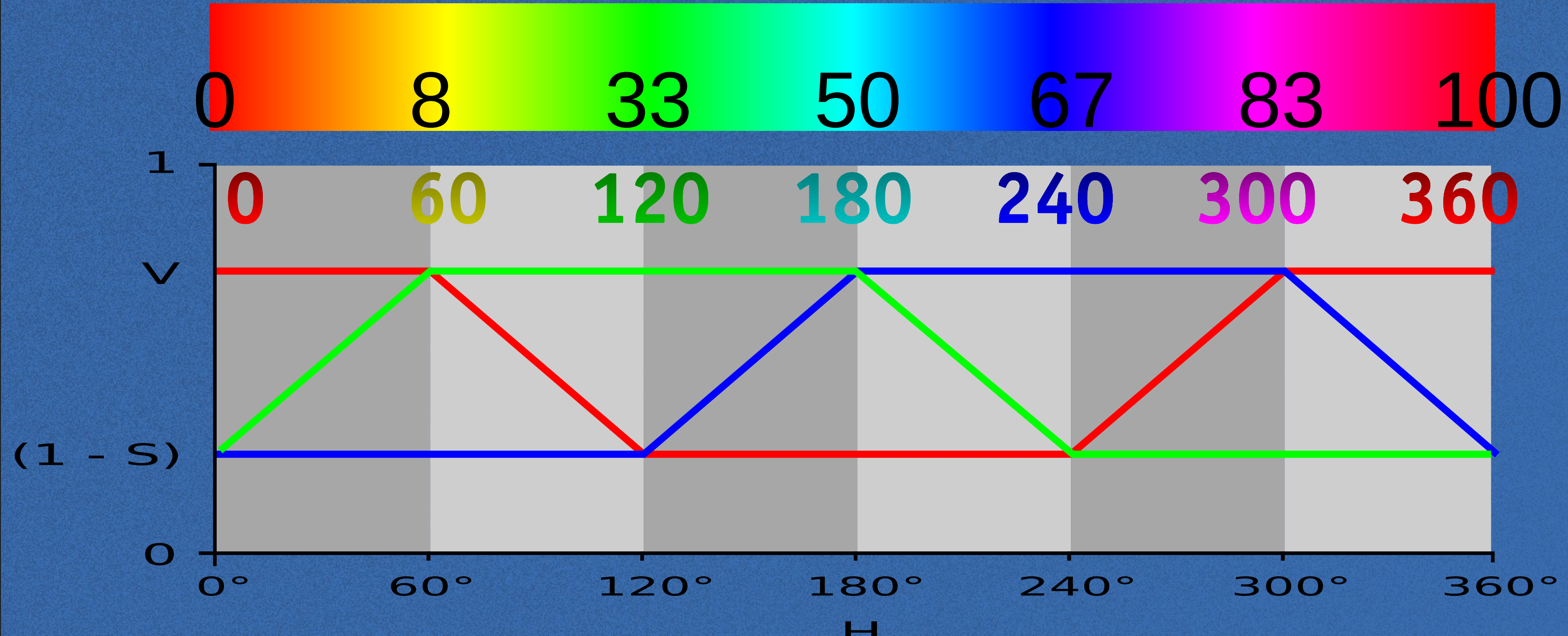
色调使用 0 到 100

从色轮中选择 0 到 360 度之间的颜色

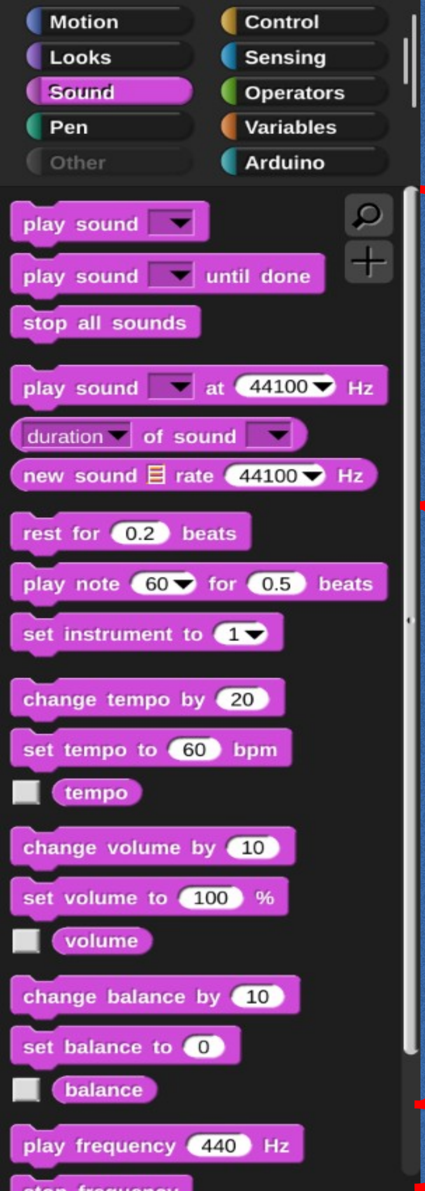
Hue use 0 to 100

to select color between 0 to 360 degree

from color wheel



图块编程 Snap! 简介



声音组可以播放各种音符和乐器

sound group can play various notes and instruments

播放录制的声音

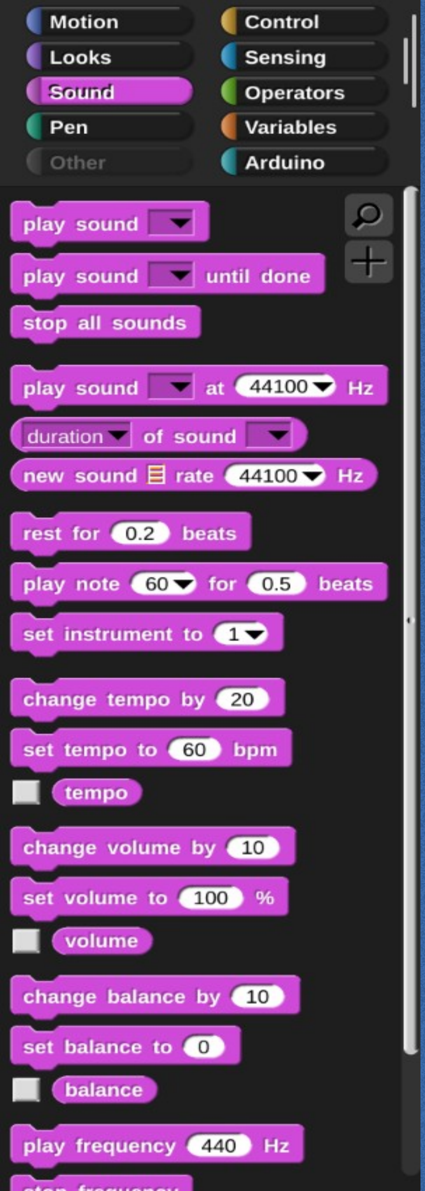
playback of recorded sound

使用不同的乐器演奏音符

play notes using different instrument

连续播放单一频率和停止

play a single frequency continuously and stop



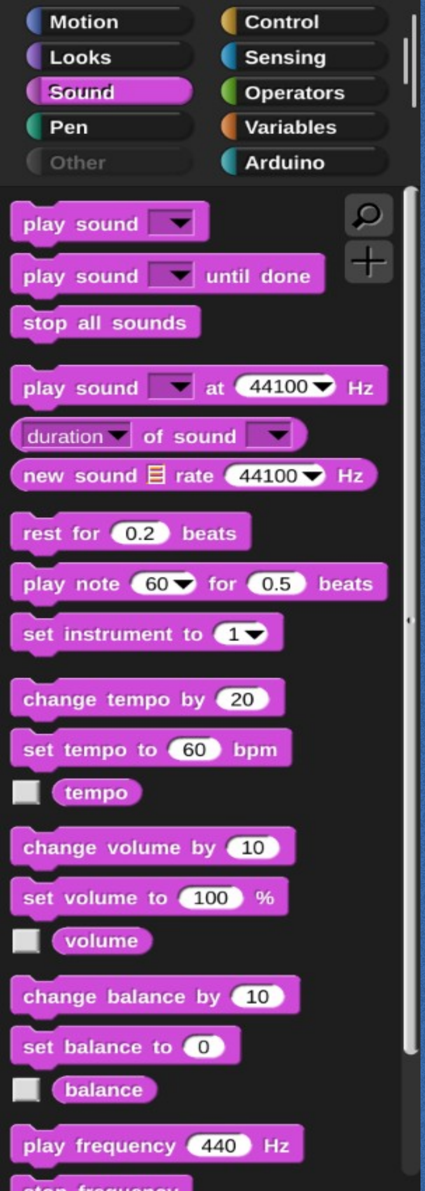
图块编程 Snap*!* 简介

可从互联网获取的资源
Resource availabe from Internet

SoundScope
https://maketolearn.org/soundscope/
SoundScope is a sound analysis and synthesis tool used for visualization of acoustic waveforms and synthesis of tones to generate sound.

TuneScope
https://tunescope.org/
TuneScope combines SoundScope with Snap!, an educational programming language. TuneScope is used to create digital music using the joint capabilities of these two tools.

TuneScope Book.pdf
https://www.learntechlib.org/primary/p/221758/
对声音组的解释非常详细
has very detailed explanation on Sound group



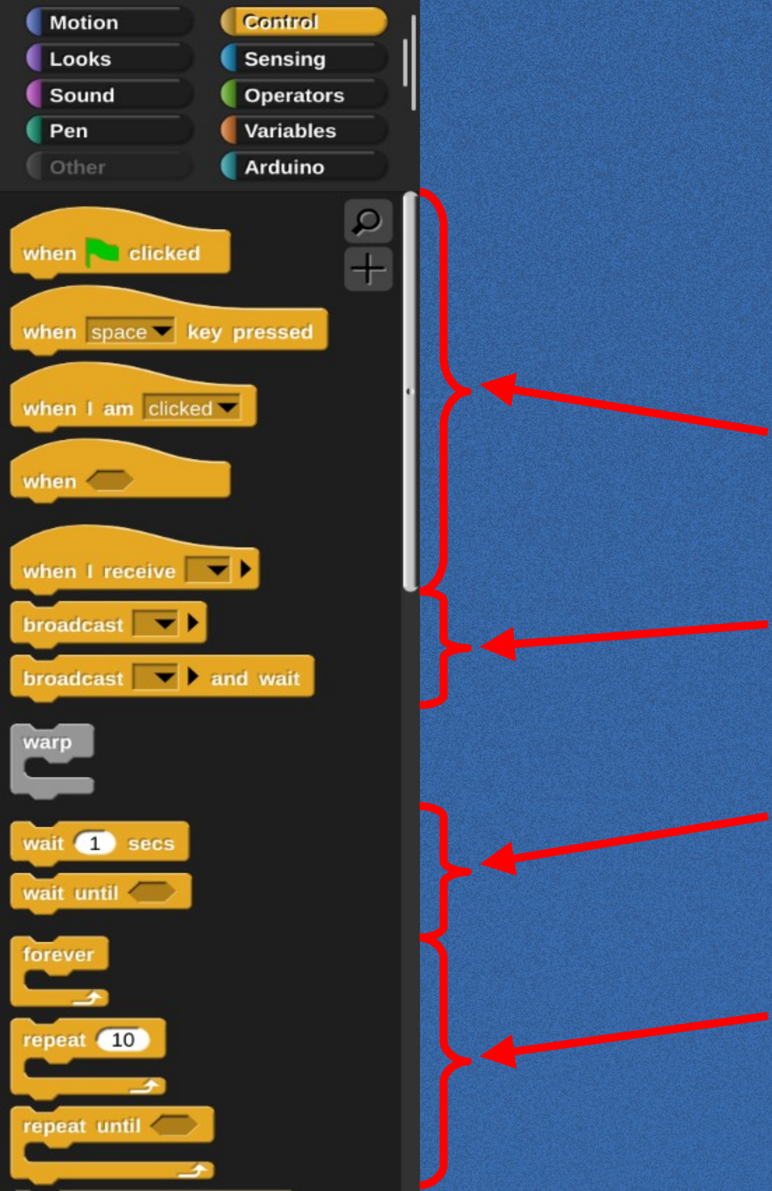
图块编程 Snap*!* 简介

按照以下示例操作

Follow thru the following examples

- 4_1_Intro_to_Sound_group.xml
  - 图块的作用
  - Effects of blocks
- 4_2_Play_a_Tune.xml
  - 演奏一小段曲调
  - Play a short tune

图块编程 Snap! 简介



控制组控制程序的流程 #1

control group controls the flow of the program

各种启动条件

Various start conditions

广播信息

Broadcast message

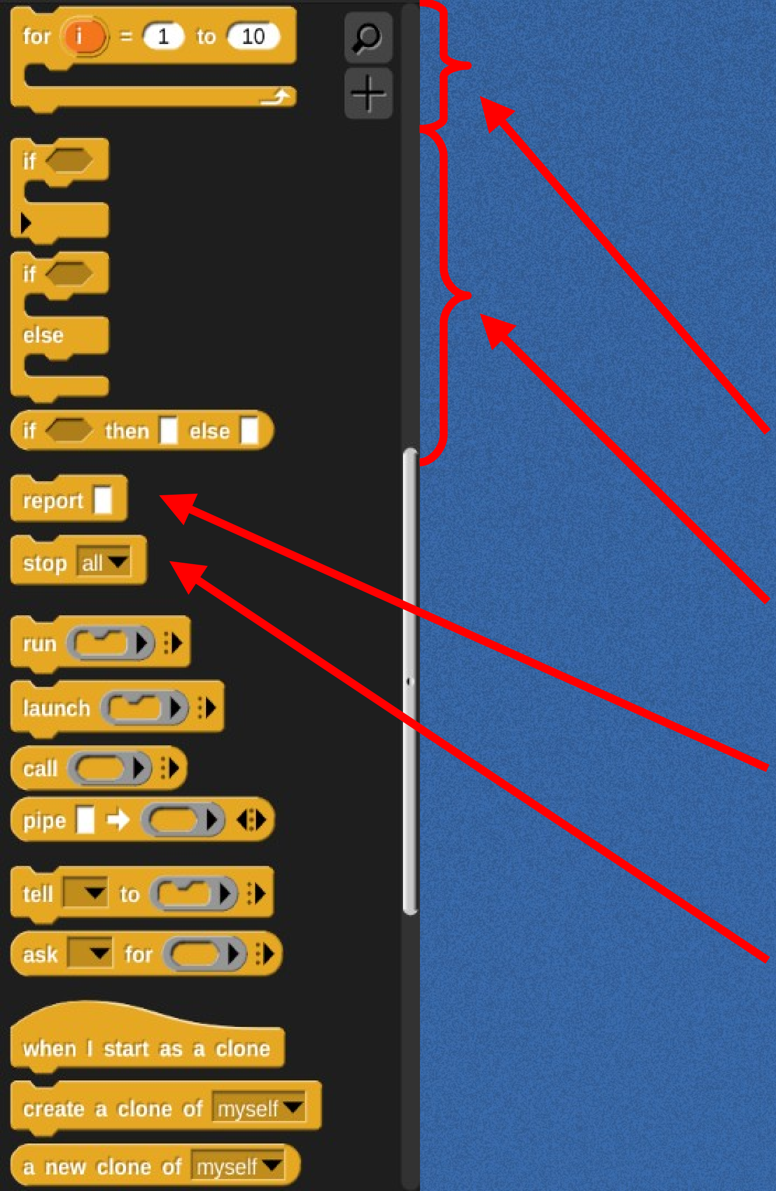
等待时间或条件

wait for time or condition

重复直到条件满足

repeat loop till condition fulfill

图块编程 Snap! 简介



控制组控制程序的流程 #2

control group controls the flow of the program

循环多次

loop for multiple of times

决定条件是或否，然后 .....

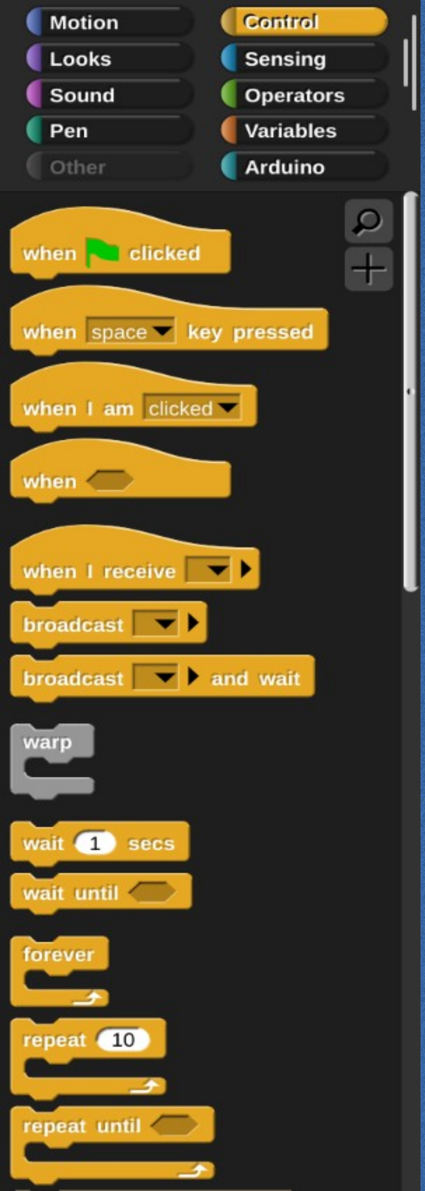
decide if else, then….

将值报告给其他进程

report values to other process

停止所有进程

stop all process



图块编程 Snap*!* 简介

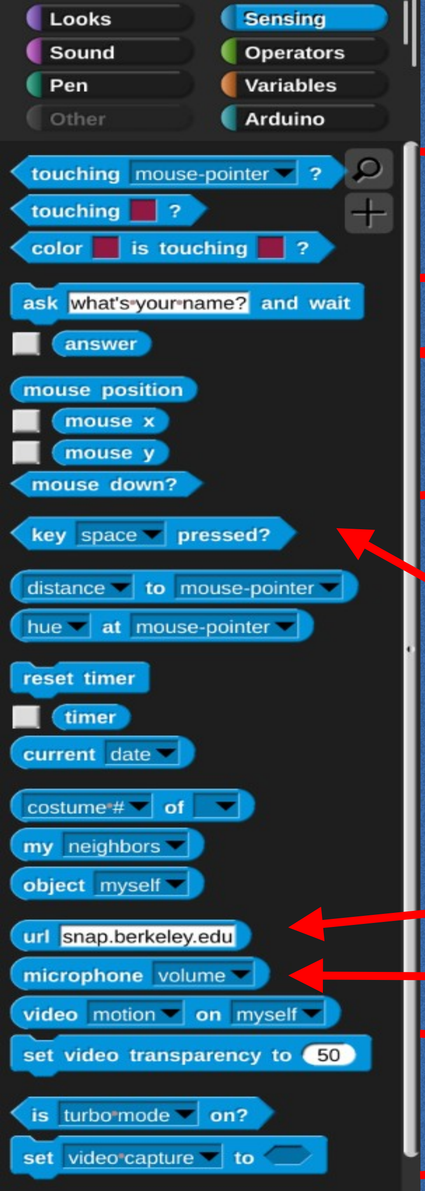
按照以下示例操作
Follow thru the following examples

- 5_1_Intro_to_Control_group.xml
  - 图块的作用
  - Effects of blocks
- 5_2_Control_group_brickwall.xml
  - 画一堵砖墙
  - Draw brickwall

图块编程 Snap! 简介

传感组连接各种输入，例如键盘、鼠标、视频、麦克风、网络

sensing group connects with various inputs e.g. keyboard, mouse,video,mic,web



触摸感应
touch sensing

用户输入
user input

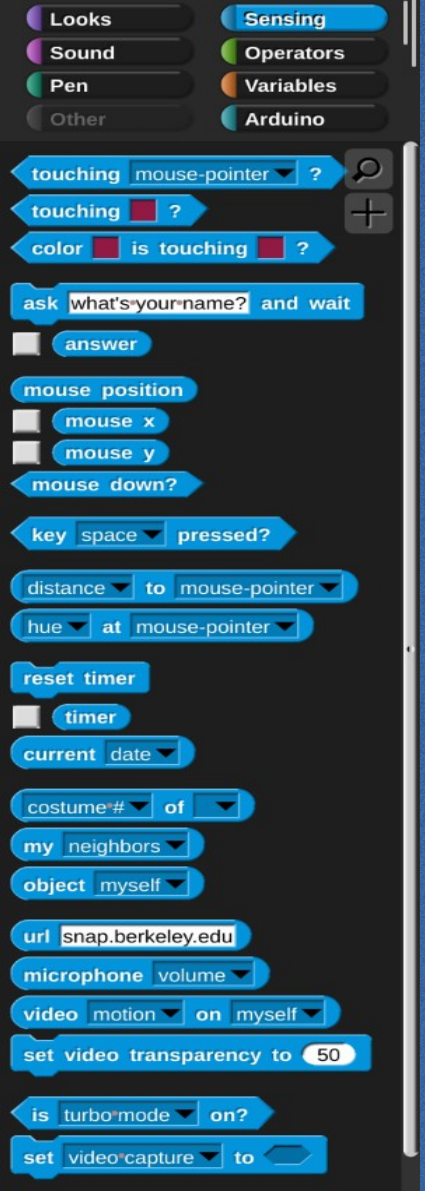
鼠标输入和位置
mouse input and position

键盘输入 keyboard entry

网络访问 web access

麦克风输入 microphone input

视频捕获 video capture



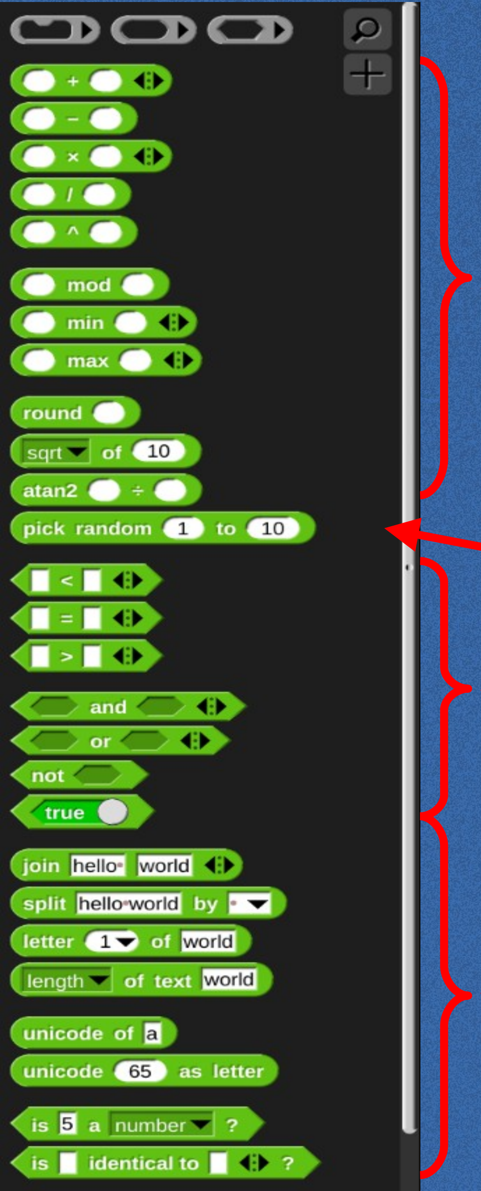
图块编程 Snap! 简介

按照以下示例操作

Follow thru the following examples

- 6_1_Intro_to_Sensing_group.xml
  - 图块的作用
  - Effects of blocks
- 6_2_Sensing_group_touch_color.xml
  - 通过 Sprite 进行颜色触摸匹配选定的颜色
  - Color touch by Sprite match selected color
- 6_3_Sensing_group_user_input.xml
  - 用户输入键盘 / 鼠标 / http / 视频
  - User inputs keyboard / mouse / http / video

图块编程 Snap! 简介



操作员组对变量进行更改和比较

operators group make changes and make comparison on variables

各种数学运算

Various maths operations

随机数生成器

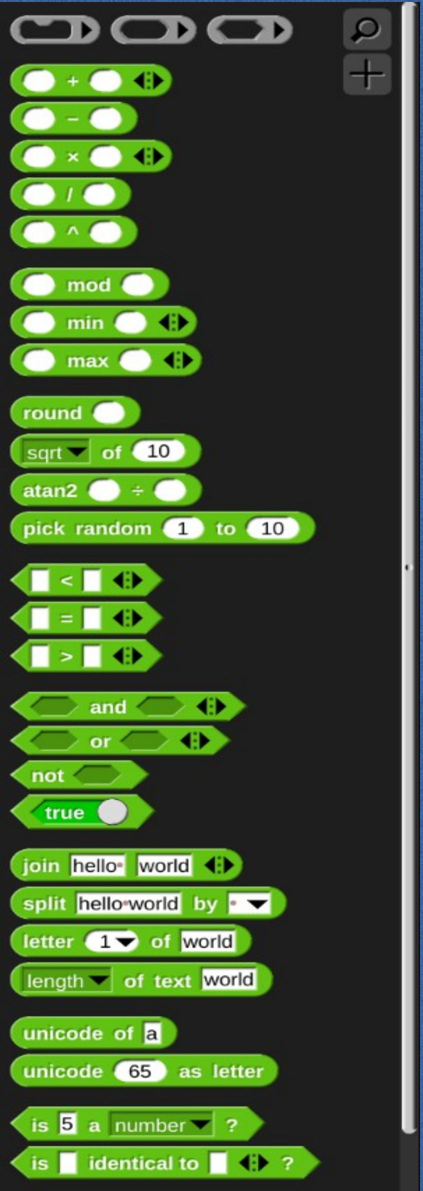
random number generator

各种比较运算

various comparison operations

文本和字符操作

text and character operations

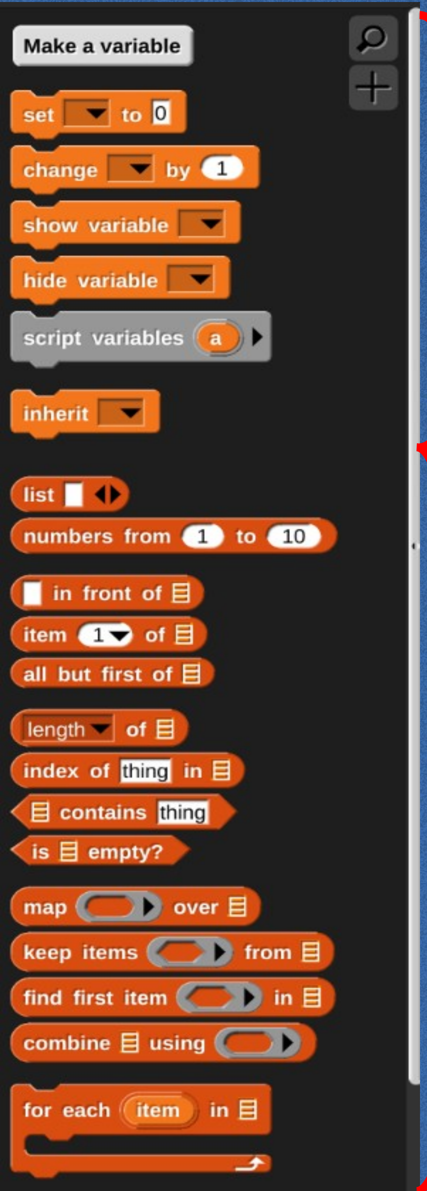


图块编程 Snap! 简介

按照以下示例操作
Follow thru the following examples

- 7_1_Intro_to_Operators_group.xml
  - 图块的作用
  - Effects of blocks
- 7_2_Operators_group_Bumpy_Cat.xml
  - 颠簸的猫从边缘弹开
  - bumpy cat bounce away from edge

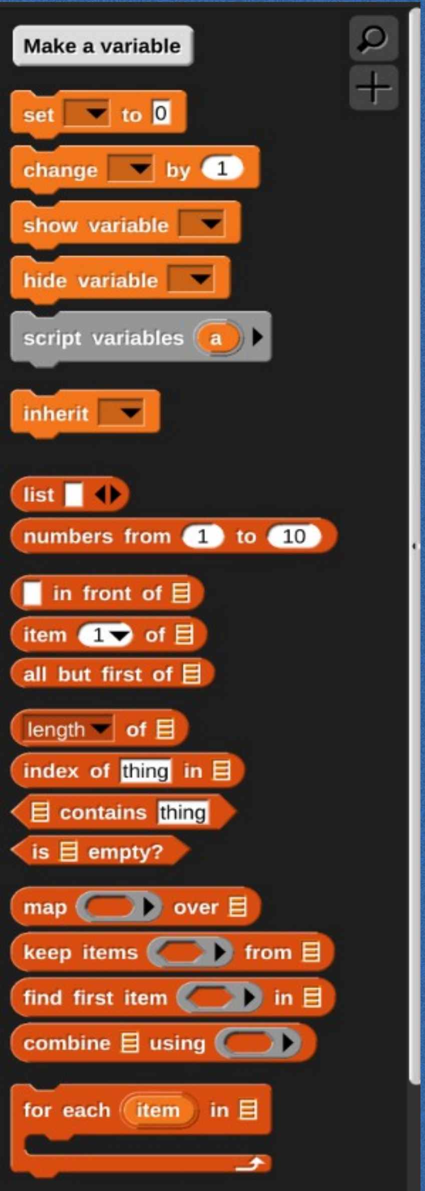
图块编程 Snap! 简介



变量组创建和操作变量
variables group
creates and manipulate variables

变量的定义、设置、更改
Variable define, set and changes

列表的定义、设置、更改
List define, set and changes



图块编程 Snap! 简介

按照以下示例操作
Follow thru the following examples

- 8_1_Intro_to_Variables_group.xml
  - 图块的作用
  - Effects of blocks
- 8_2_Variables_group_donut.xml
  - 画一个甜甜圈
  - Draw a donut ring

图块编程 Snap! 简介

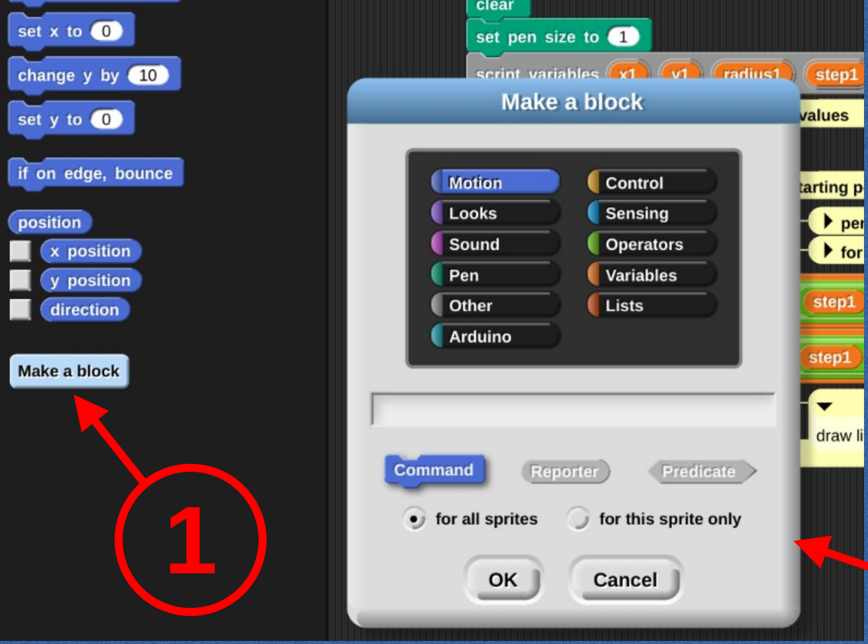
自定义图块

Custom Blocks

- 使用自定义图块将多个图块重新组合成一个新图块

  它简化了图块组的重复使用，也简化了对程序的理解
- use custom blocks to groups multiple blocks into a new block

  This makes it simple to reuse groups of blocks and also to understand the program
- 9_1_Custom_Blocks_draw_a_circle.xml
- 9_2_Custom_Blocks_draw_a_donut.xml

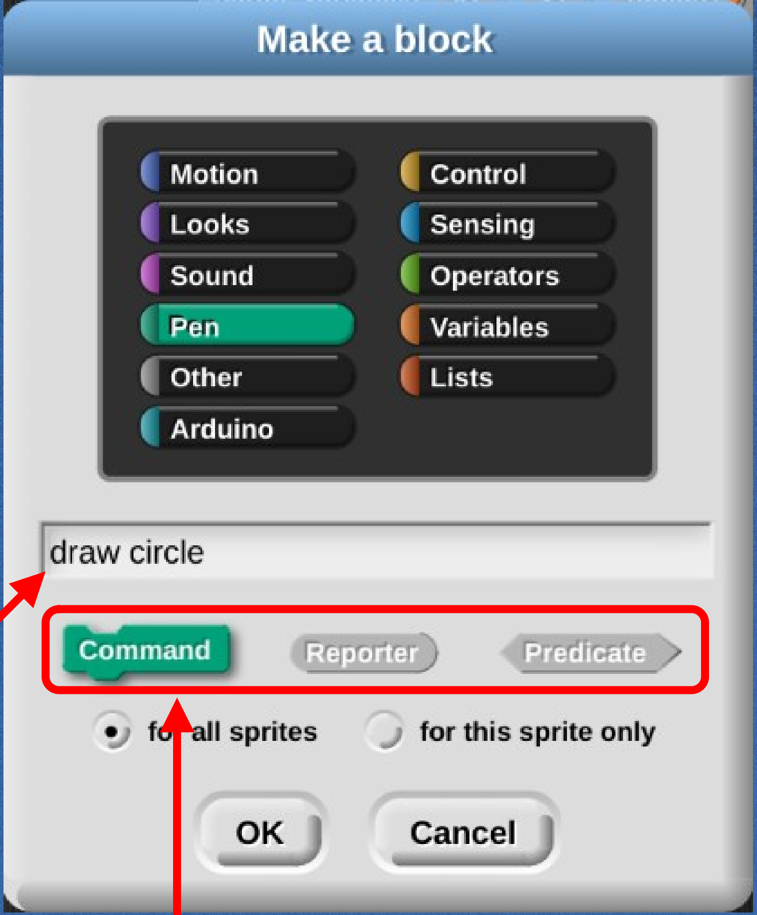


● for all sprites ○ for this sprite only

1 点击“制作区块”开始
Click on “Make a block” to start

2 将出现“制作区块”对话框
A “Make a block” dialog will appear

3 填写我们自定义区块的名称
Fill in name of our custom block “draw circle”



draw circle

● for all sprites ○ for this sprite only

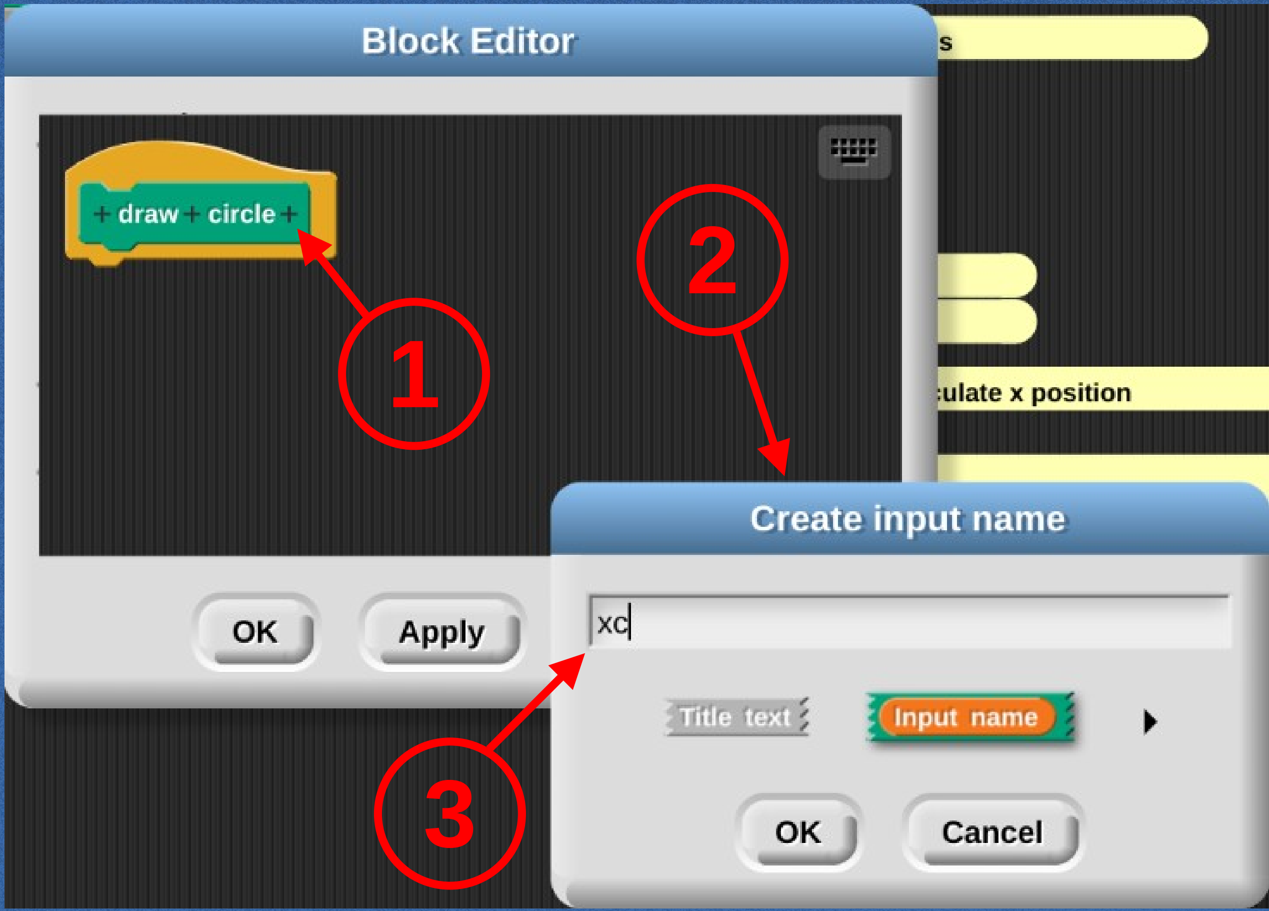
可以选择 Can choose between

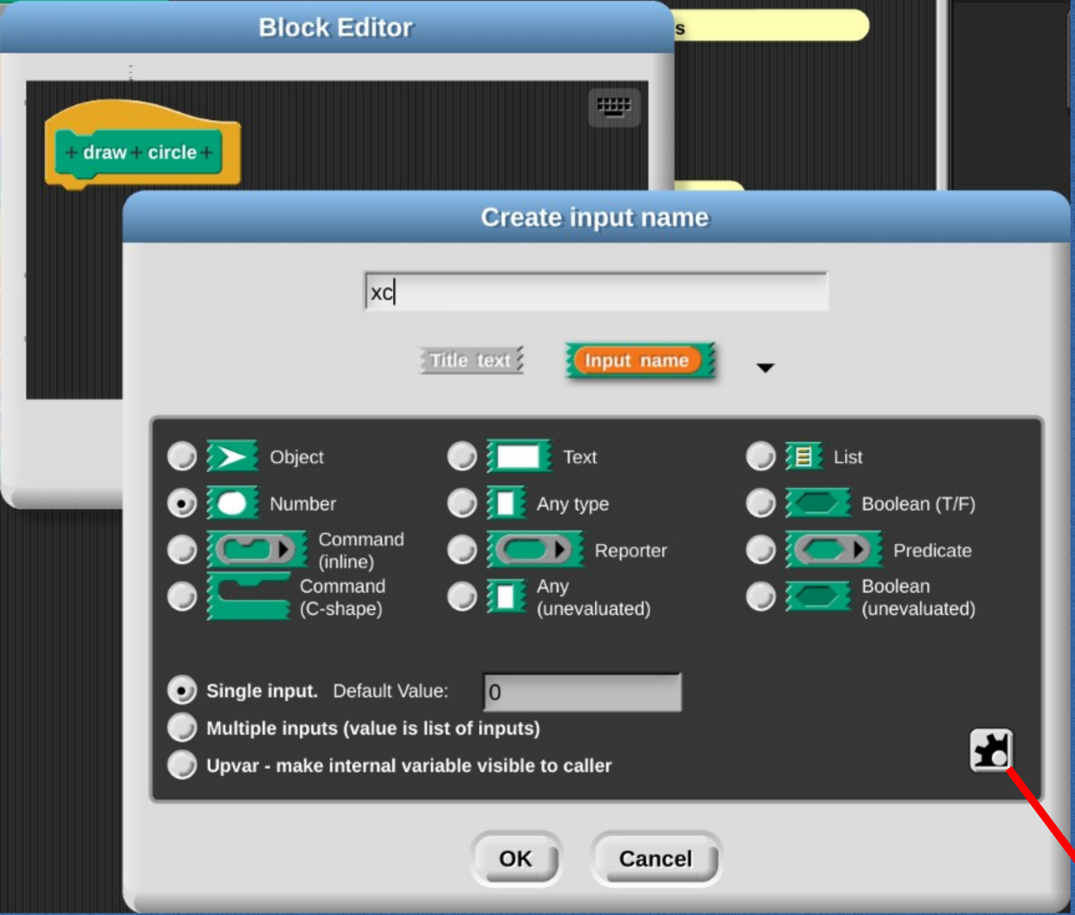
- 命令 Command
- 报告器 Reporter

1 点击 “ +” 添加输入
click on the “+” to add an input

2 将出现 “ Create input name” 对话框
A “Create input name” dialog will appear

3 填写 “ xc” 作为我们的变量名
Fill in “xc” as our variable name



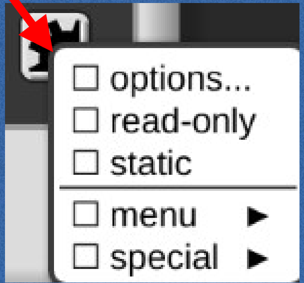


Input name: xc

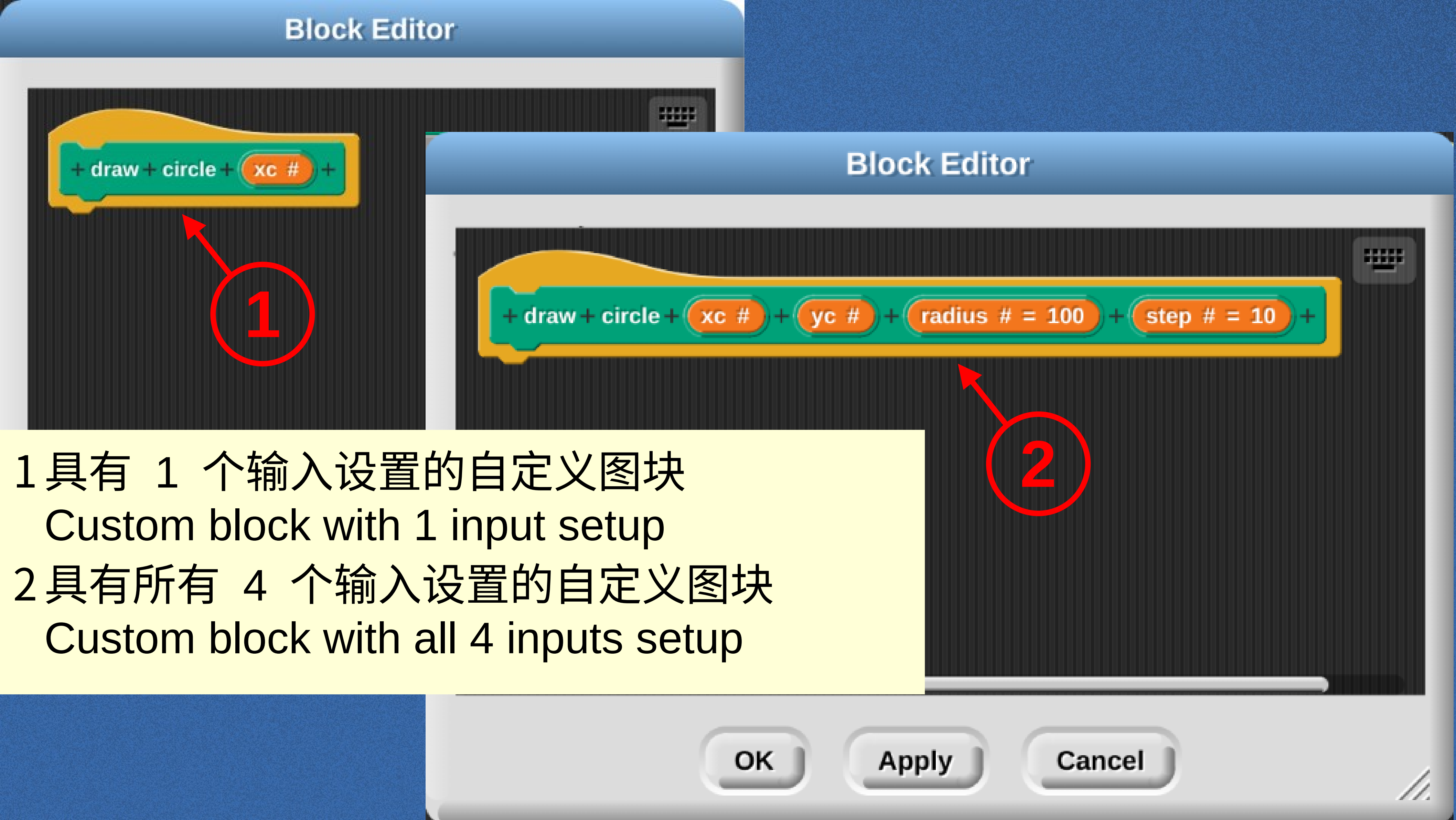
● Number

● Single input. Default Value: 0

- 将出现一个用于设置输入类型的新对话框
  A new dialog to set the type of input will appear
- 在这种情况下，我们可以将其设置为数字
  In this case we can set it as number
- 默认值为 “ 0”
  And use a default value of “0”

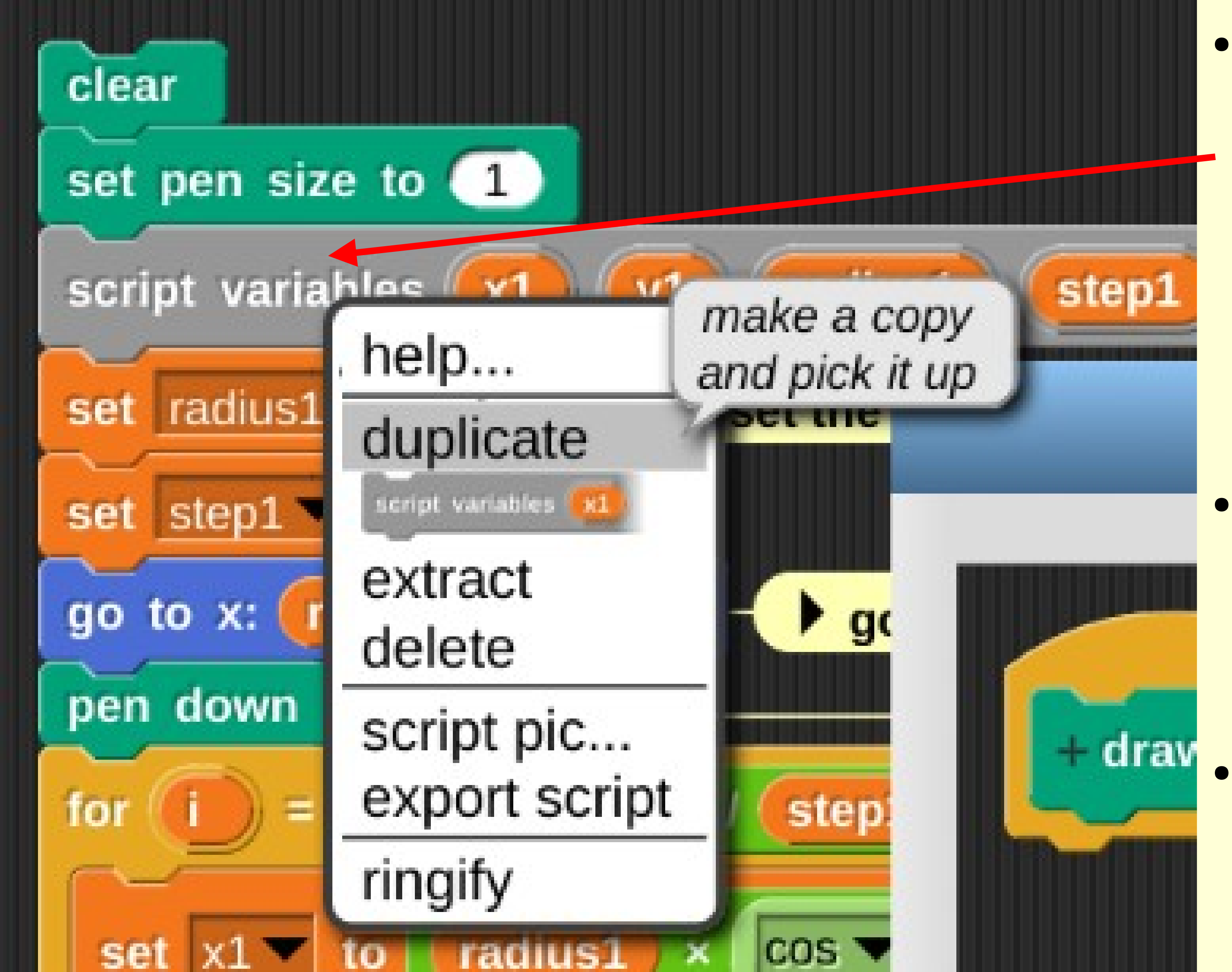


更多输入设置
More settings for input

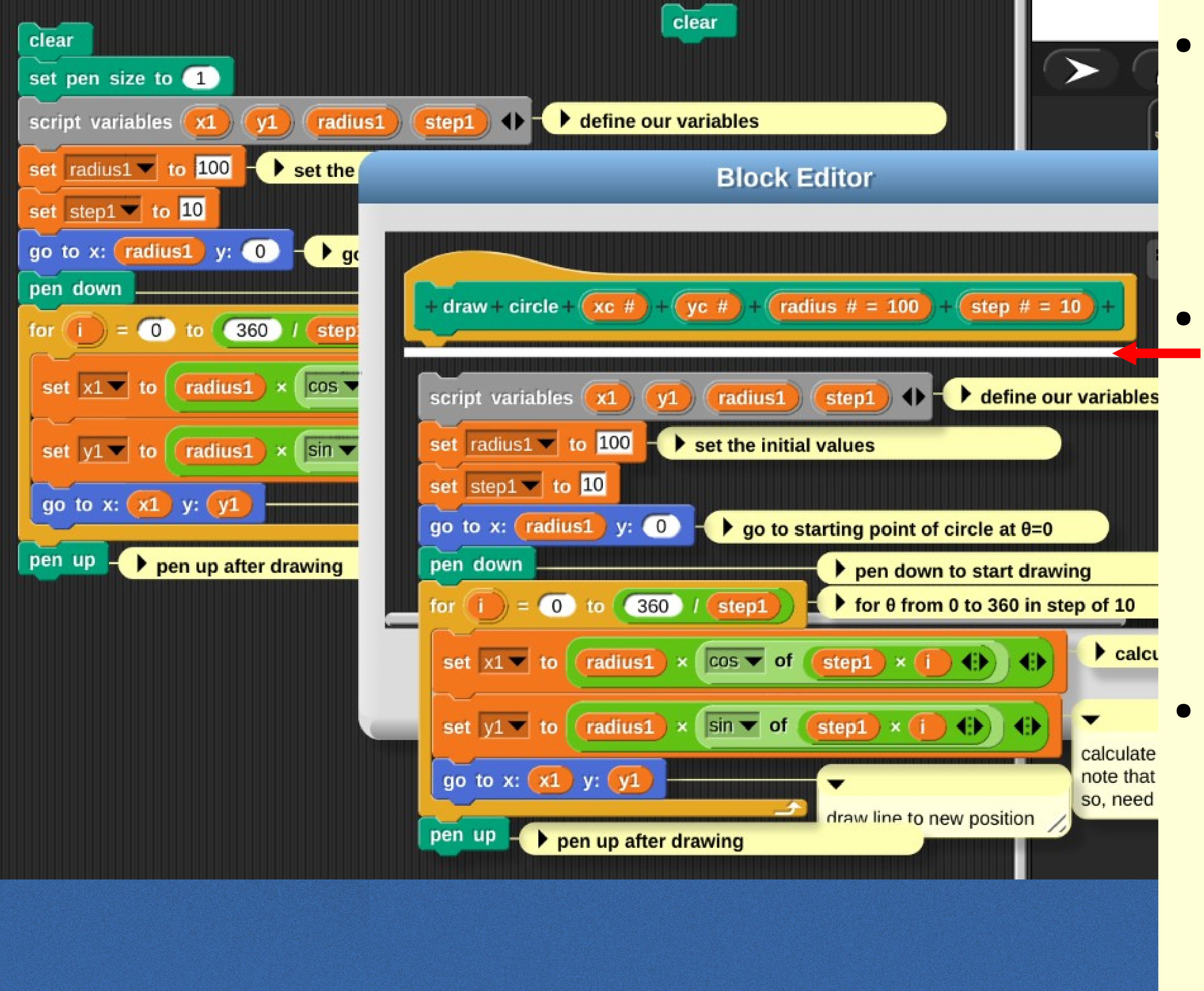


1 具有 1 个输入设置的自定义图块
Custom block with 1 input setup

2 具有所有 4 个输入设置的自定义图块
Custom block with all 4 inputs setup



- 右键单击我们想要复制到自定义块的块的开头
  Right Click at the start of the block we want to copy to our custom block
- 在本例中，它在这里
  In this case, it is here
- 选择“复制”
  Select “duplicate”

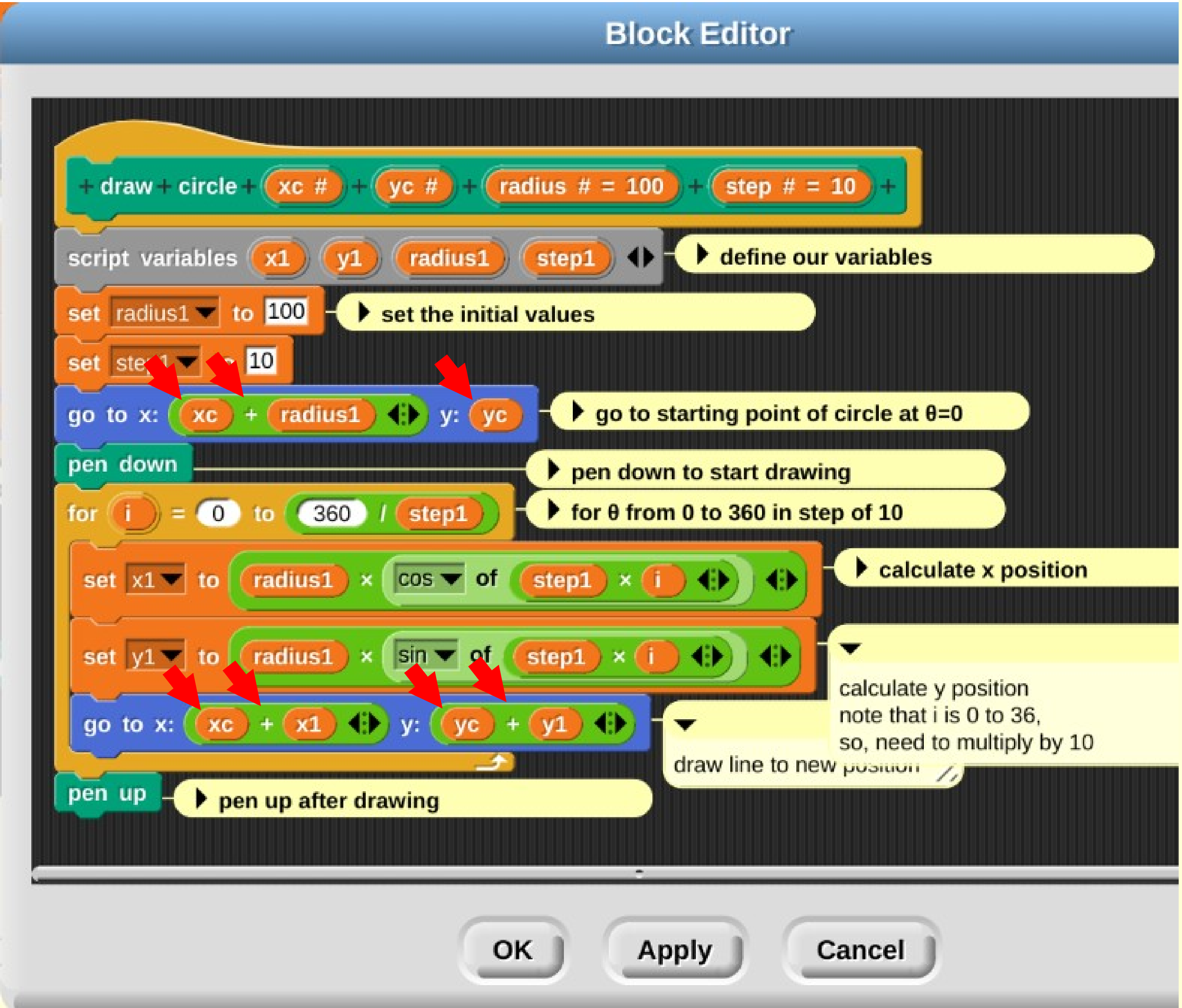


```
clear
set pen size to 1
script variables x1 y1 radius1 step1    define our variables
set radius1 to 100    set the
set step1 to 10
go to x: radius1 y: 0    go
pen down
for i = 0 to 360 / step
    set x1 to radius1 × cos
    set y1 to radius1 × sin
    go to x: x1 y: y1
pen up    pen up after drawing
```

```
clear
```

```
draw circle xc # yc # radius # = 100 step # = 10
script variables x1 y1 radius1 step1    define our variables
set radius1 to 100    set the initial values
set step1 to 10
go to x: radius1 y: 0    go to starting point of circle at θ=0
pen down    pen down to start drawing
for i = 0 to 360 / step1    for θ from 0 to 360 in step of 10
    set x1 to radius1 × cos of step1 × i    calcu
    set y1 to radius1 × sin of step1 × i    calculate
                                            note that
                                            so, need
    go to x: x1 y: y1    draw line to new position
pen up    pen up after drawing
```

- 将其移动到自定义图块标题下方
  Move it to below the custom block header
- 标题方下将出现一条白线，表示已准备好捕捉
  A white line will appear to indicate ready snap below the header
- 将其释放 Release it



```
draw circle (xc #) (yc #) (radius # = 100) (step # = 10)
script variables x1 y1 radius1 step1
set radius1 to 100
set step1 to 10
go to x: (xc + radius1) y: yc
pen down
for i = 0 to (360 / step1)
    set x1 to (radius1 × (cos of (step1 × i)))
    set y1 to (radius1 × (sin of (step1 × i)))
    go to x: (xc + x1) y: (yc + y1)
pen up
```

define our variables

set the initial values

go to starting point of circle at θ=0

pen down to start drawing

for θ from 0 to 360 in step of 10

calculate x position

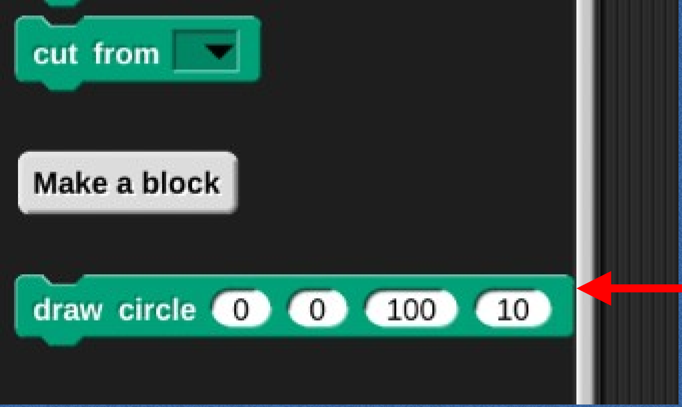
calculate y position
note that i is 0 to 36,
so, need to multiply by 10

draw line to new position

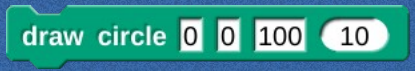
pen up after drawing

- 需要进行一些更改，以便我们的输入变量能够对程序块产生影
need to make some changes so that our input variables can have effect on the program block

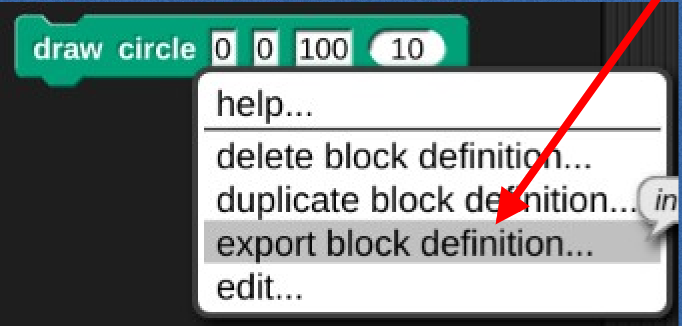
图块编程 Snap! 简介



- 可以在笔组下寻找新的自定义图块 Can look for the new custom block under Pen group



- 可以正常使用新的“画圆”积木 Can use the new “draw circle” block as normal


draw circle 0 0 100 10
help...
delete block definition...
duplicate block definition...
export block definition...
edit...

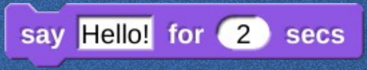
- 如果我们想在其他程序工作表中重复使用它，我们需要先导出块定义，然后导入到其他工作表中
In order to reuse it in other program worksheet, we need to export the block definition first, and import into other worksheet

图块编程 Snap*!* 简介

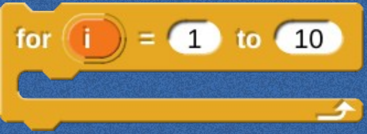
- 文件夹中还有更多示例

  There more a few more examples in the folder
- 10_1_Pen_group_fun_pivot_rotation.xml
- 10_2_Pen_group_fun_color_pivot_rotation.xml
- 10_3_Pen_group_draw_on_stage_using_mouse.xml
- 10_4_Pen_group_kaleidoscope.xml
- 10_5_Operators_group_Animated_Bat_catch_Dog.xml
- 10_6_list_music_score.xml

Snap4Arduino

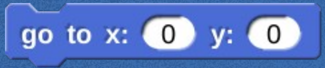


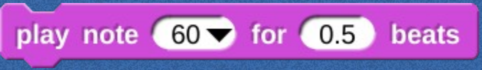
Snap4Arduino at 南华独中



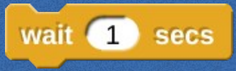
第一节

图块编程 Snap*!* 简介结束！





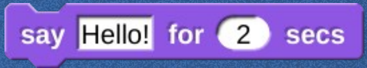
Session 1
End of Introduction to Snap*!*

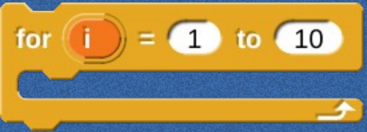


https://github.com/tomoto-my/Nan-Hwa-Snap4Arduino-Training

Snap4Arduino

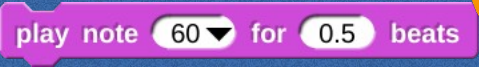
Snap4Arduino at 南华独中





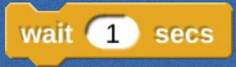
第一节

图块编程 Snap*!* 简介



Session 1

Introduction to Visual Programming Snap*!*



https://github.com/tomoto-my/
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