

LESSON 6 MAKE A GAME - PIN-WALL!

Lesson Overview

Students will practice and be familiar with IR modules, and through the combination of software and hardware to make remote pin-wall game.

Lesson Target

1. Learn the knowledge of coding block clone, variable data, repeat until..., and coordinate system in WeeeCode software.
2. Practice the ability of finding out problem and solving problem during coding.

Lesson Tag

GRAD LEVEL	SUBJECTS	DIFFICULTY	DURATION	GROUP
Elementary, middle	STEAM, computer science physical	Beginner	180 mins	2 student

Supplies

Robot	Accessories	Other Material	Tools Used
WeeeBot Kit	USB cable IR remote control	PC with WeeeCode software USB port required;	

Lesson Outline

INTRO: Show the picture of pin-wall game, or let students play the pin-wall game. Lead students summarize objects in this game and functions. Introduce about coding block clone, variable data, repeat until..., and coordinate system knowledge to students. (60 mins)

CREATE: Create a IR remote control pin-wall game. (70 mins)

PLAY: Each group tests, then records learnings from their invention. Students explore how their invention works, plus the coding concepts behind it. (30 mins)

REMIX: Students will customize and enhance their inventions to create pin-wall game. (20 mins)

Routine

1. INTRODUCE PIN-WALL GAME AND SUMMARIZE FOR EACH OBJECT.

Objects in pin-wall game

Show picture of pin-wall game to students, or let students plan pin-wall game, and then share and summarize the function of each object.

Ball	1. Will rebound when it touched brick or wall.
	2. Will score when it touched brick.
	3. Game over if it drops under board.
Board	Move the board to catch the ball
Brick	Will disappear if a ball touched it.

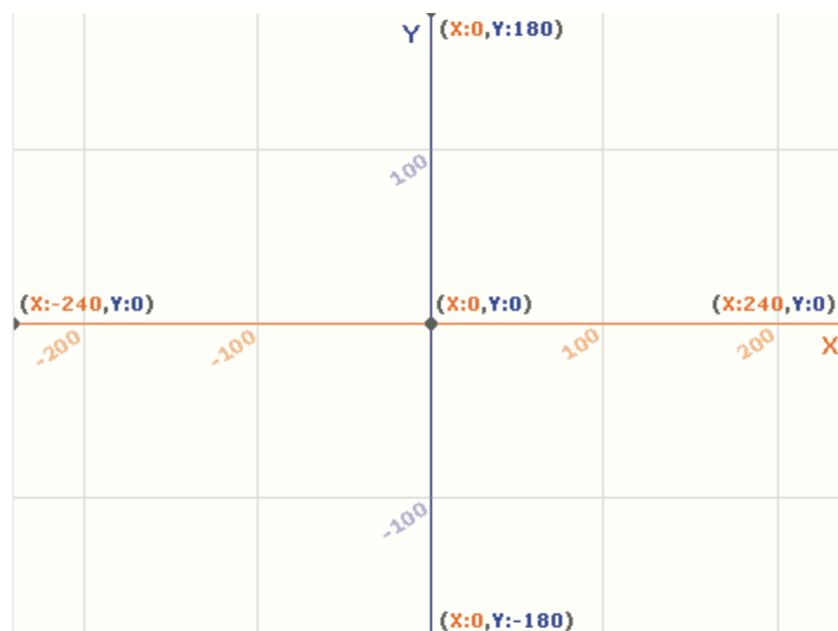
2. SOFTWARE INTRODUCTION

Coordinate system

In WeeeCode software, character's position in stage is shown in coordinate system. Click "Add Backdrop" in the low right corner, select "xy-grid", and then the stage will show a coordinate system consist of x-axis and y-axis. The point where axes intersect is origin, show as (X:0, Y:0), means x-axis is 0 and y-axis is 0.

The crosswise x-axis has 480 units from -240 to 240, the left side of origin is negative, the right side of origin is positive.

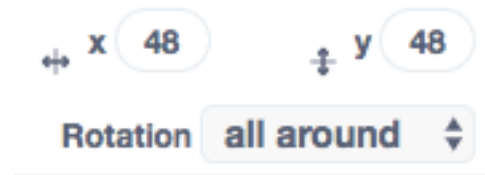
The lengthwise y-axis has 360 units from -180 to 180, above origin is positive, beneath origin is negative.



WEEEMAKE

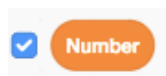
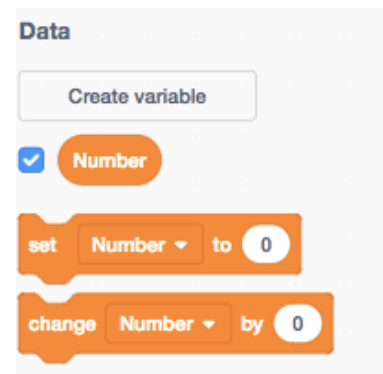
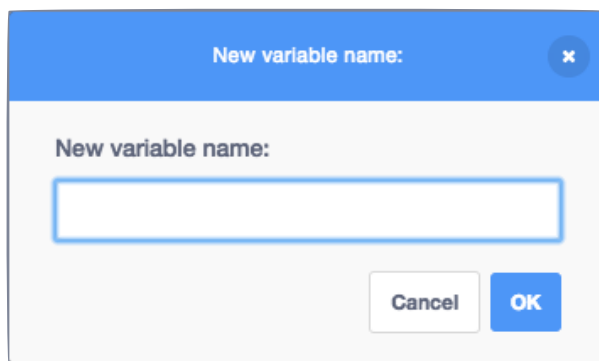
Tips:

1. Point random point and ask students answer the coordinate value.
2. We can see character's coordinate value in character zone.

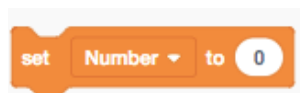


Variable data

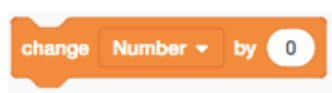
In category "Data", we can find "Create variable" block. Click it to create a variable data and name it, and then three blocks will appear as follow.



: Check on the small box and it will be displayed in stage zone, can be used to show score and life value.



: Set the initial value of this variable data. Generally we use this block to zero cleaning score in the beginning of game.



: Increase or decrease the variable data. Positive number means increase, negative number means decrease.



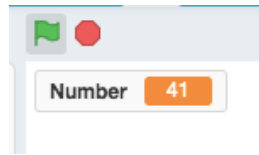
Exercise:

Build variable data "Number", and "Number" will increase 1 by every second.



WEEEMAKE

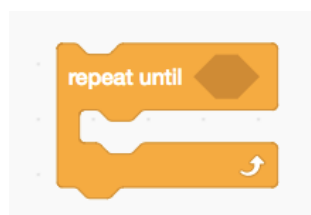
Result: check the variable data “Number” in coding block zone, it will show in stage zone and increase 1 by every second.



Tips: Variable data is like an unknown number in equation.

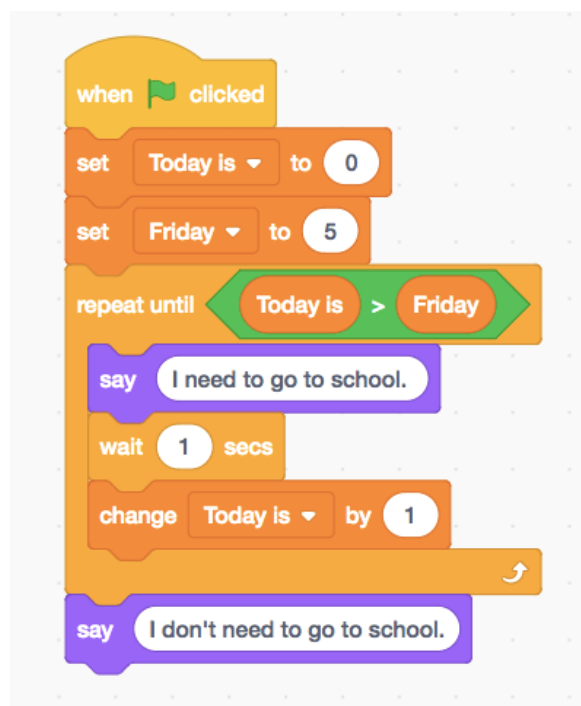
Block “repeat until...”

Coding block “repeat until...” is in control category. This block is another type of loop structure. It's function is to repeat executing until the condition in decision box is true, and then get out of loop.



Exercise:

Step one: create two variable data, name as “Today is” and “Friday”.
Step two: write below codes, observe the result.



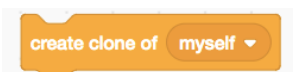
Result: run program and you will see stage zone show today is 1~6. If the value of “today is” is 1~5, which is equal or less than 5, the condition in decision box is false, then “I need to go to school”; if the value of “today is” is 6, which is greater than 5, the condition in decision box is true, then “I don’t need to go to school”.



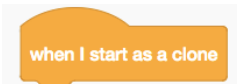
Block “Clone”

In game you always need many same character, they are all the same except location, such as bullet, fireworks, stars, etc. It's too complicated for us to code for every same character, so we can use “Clone” block in WeeeCode software to duplicate the character. However, the cloned character is not a new one, just a clone which have the same properties.

In WeeeCode, there are 3 blocks using clone function. Fine below blocks in control category:



: clone a character.



: As a start event, when the character is cloned, execute following code.

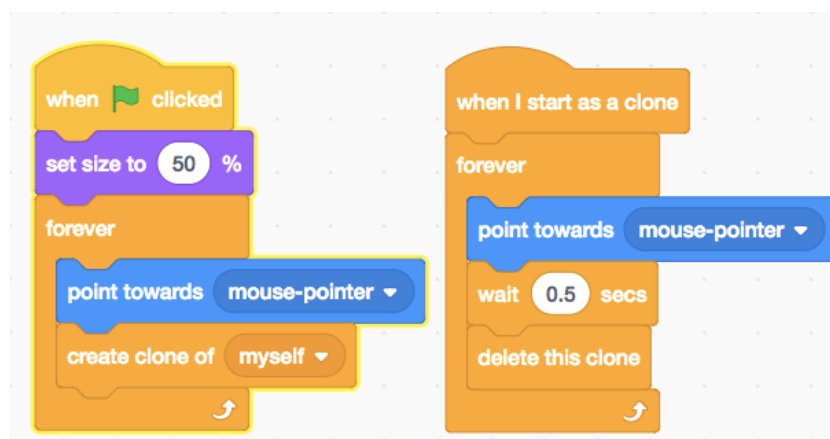


: run this code to delete the cloned character. Always work together with the second code.

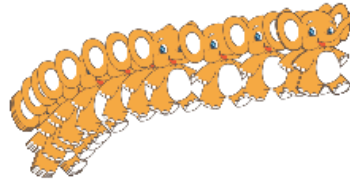


Exercise:

Write below codes, observes the result.



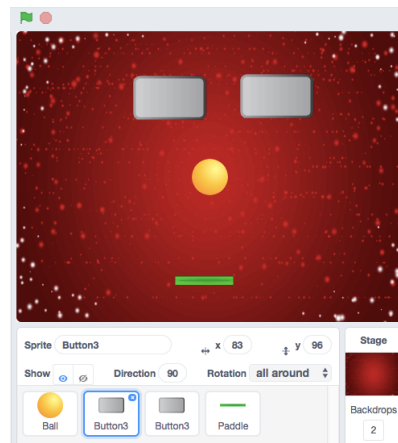
Result: Click to run program, click and hold the character in stage zone and move mouse-pointer, you will see the father character moving with mouse-pointer and producing clones, those clones will follow mouse-pointer, the previous clones will be deleted in 0.5s.



3. WRITE CODE FOR PIN-WALL GAME

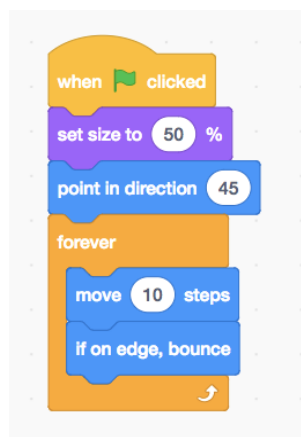
Set backdrop and script

1. Delete the default script “Elephant”, click “Add backdrop” and select “sparkling” as background. (or you can choose other backdrop).
2. Click “Add Script”, add “ball”, “button3”, “button3”, “paddle”.
3. Rename 2 scripts “button3” to “Brick 1”, “Brick 2”.



Code for scripts “ball” and “paddle”

1. Reduce the size of script, and code for this script.



Result: script “ball” will move in four direction, 45° (up right), -45° (up left), -135° (low left), 135° (low right).

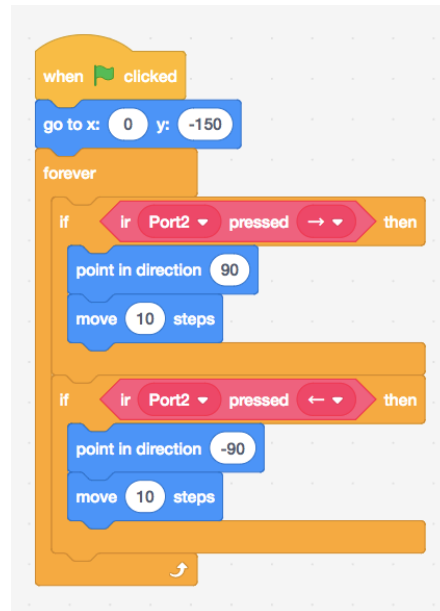
Tips:

- a. If “point in direction” block missed, script “ball” will move back and forth in horizontal, because the default property of character is point towards right with 90°.

WEEEMAKE

b. Above codes are included in script “ball”.

2. Set the initial position of script “paddle” to the bottom of stage, and make IR remote control be able to move the paddle.



Result: script “paddle” will follow the IR remote control command, when you press button “→” the script “paddle” will move 10 steps towards right, when you press button “←” the script “paddle” will move 10 steps towards left.

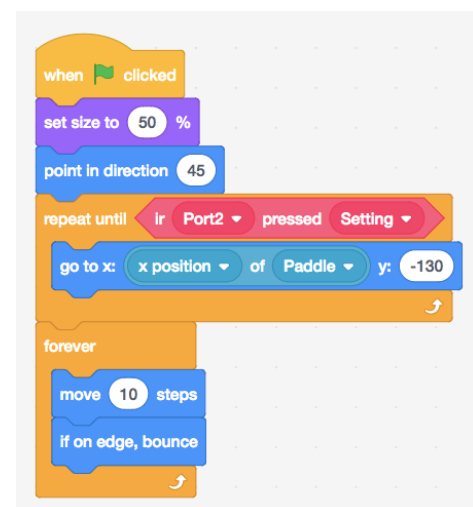
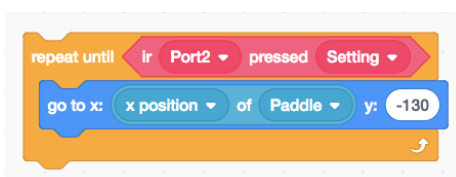
Tips:

- A. Make sure robot is in online coding model.
- B. The horizontal movement of paddle can be achieved by block “change x by ...” as well.
- C. Moving speed can be modified.
- D. This program should be write on script “Paddle”.

3. Write code to launching script “ball”.

In pin-wall game, “ball” will follow “paddle” before launch. When button “ok” is pressed, “ball” will be launched to hit “brick”s.

Write code for script “ball” as below picture to achieve the function, and then revise the program of “ball” like picture in the right.



Tips:

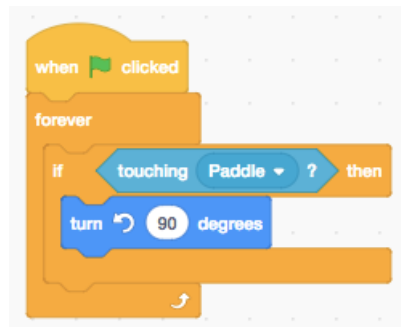
- a. We set the value of y-axis to -130 instead of -150, so the “ball” will be above “paddle”, not in the middle.

WEEEMAKE

b. "Setting" stands for button "ok".

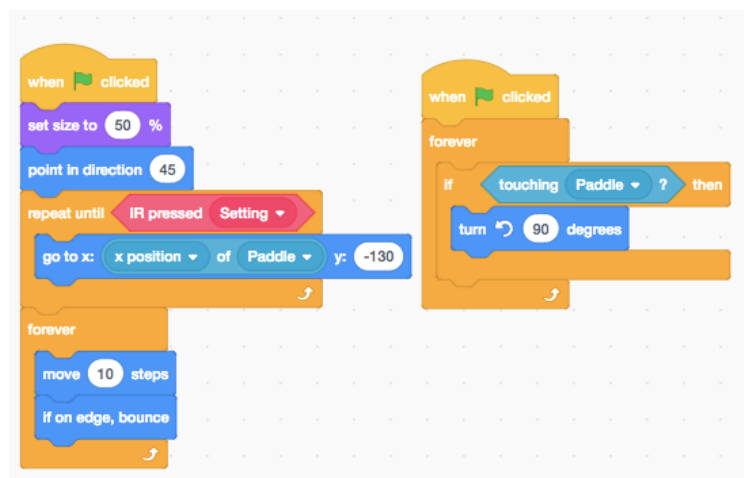
4. Write code to make "paddle" bounce "ball"

When game starts, if the "ball" touch "paddle" then turn left (90°) or right (-90°). It should be repeated forever. Result: (for example, turn left) when "ball" move from up left to low right and touch "paddle", the "paddle" will bounce "ball" to move towards up right, the animation is very smoothly; when "ball" move from up right to low left and be bounced to up left, the animation will be a little stuck because of the 90° rotation, but won't influence game.



Tips: Set "turn 90°" is to make "ball" turn a certain angle after been touched, and be bounced in right angle.

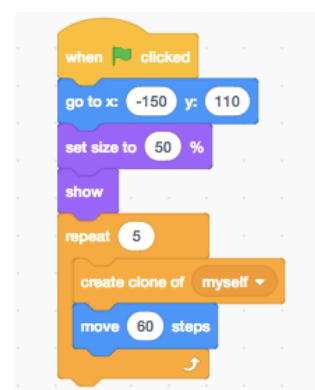
Above coding finished, and the whole program of "ball" is as below picture.



Code for script "Brick"

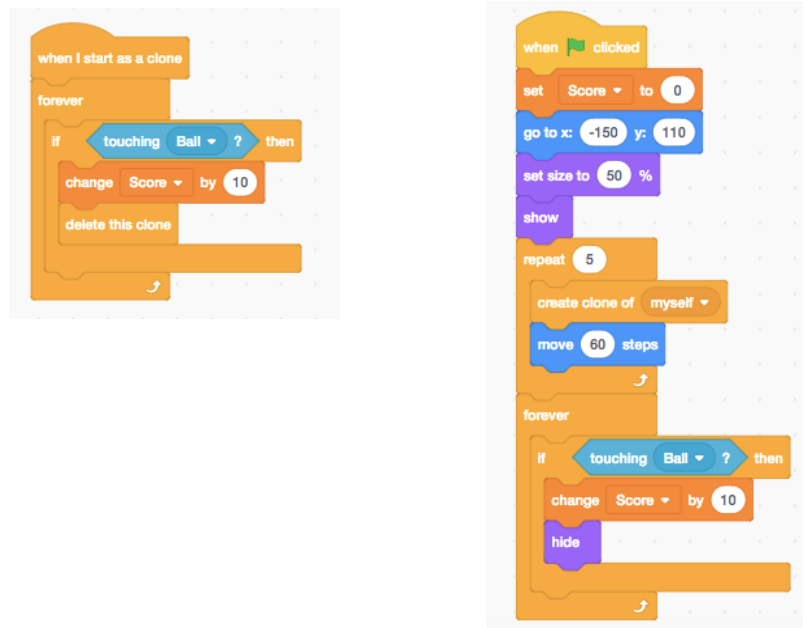
1. Set the initial position and size of "brick 1". There are 10 bricks in this game, we will use "clone" codes to clone other bricks. When game starts, repeat 5 times of cloning itself. Move 60 steps after each clone. See codes in the right.

Stage will looks like below.



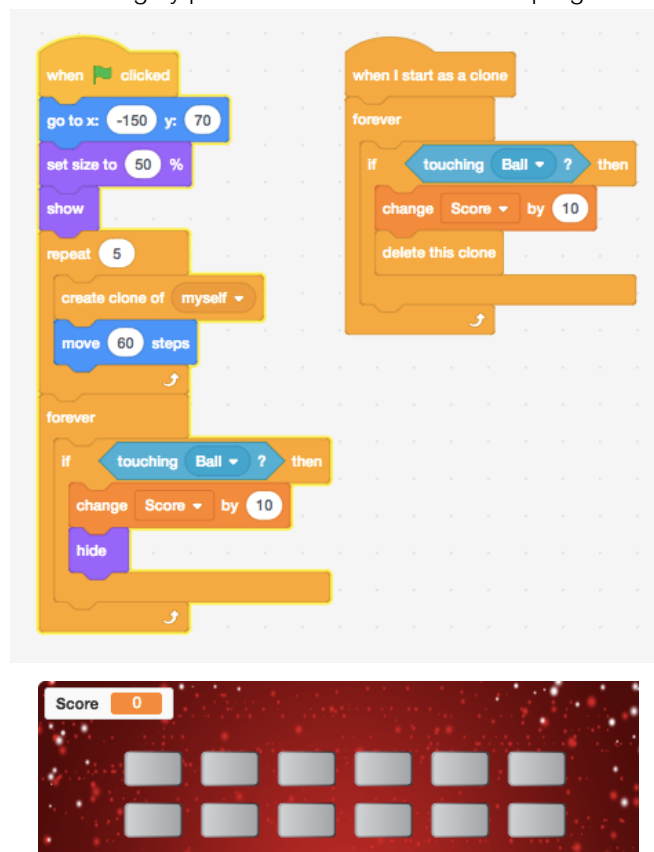
WEEEMAKE

2. Add animation and score setting for “brick 1”: in pin-wall game, when “ball” touch “brick 1”, “brick 1” will be disappeared, and player get score. We use variable data to show score.



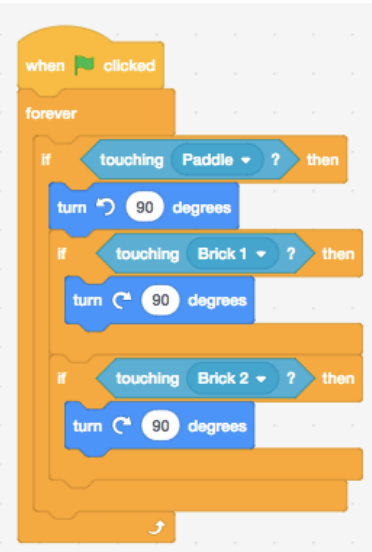
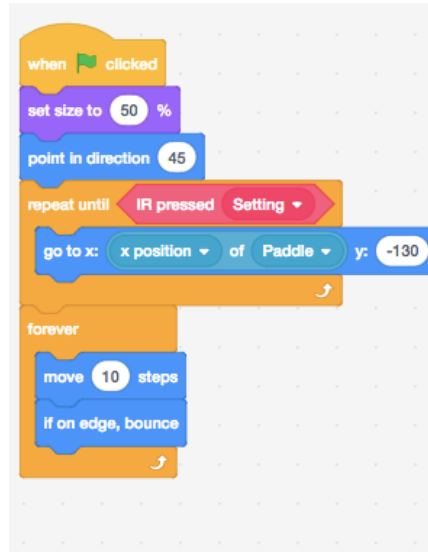
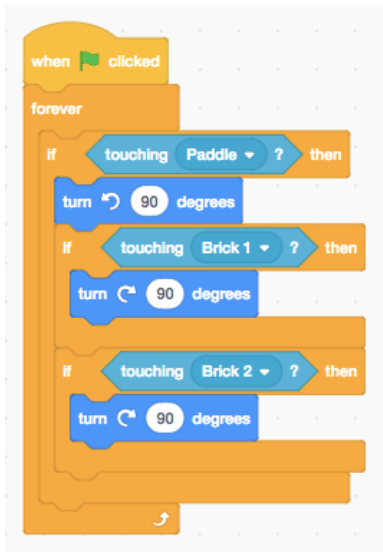
Result: when “ball” touch the original “brick 1”, player will get 10 points and the “brick 1” will be hide; when “ball” touch the clone of “brick 1”, player will get 10 points and clone will be deleted.

3. Increase the quantity of bricks. 5 bricks seem not enough, let's start a new line of with “brick 2”. The code is same as “brick 1”, please change y position to 70. See the whole program of “brick 2” and stage below.



WEEEMAKE

4. Write code to make “brick” bounce “ball” as below, and the whole program of “ball”.



Sample Program

4. REMIX



Exercise:

Increase a variable data of “Life”, make an end with “win” or “lose”.

1. Create variable data “life”, set initial value of “life” to 2. If “paddle” fail to catch “ball”, the “ball” fell to the bottom of stage, “life” will reduce 1.
2. Add music for bounce.
3. Add a result for game: 12 bricks in total, each brick stands for 10 points. If player get 120 points, the player win. The initial value of “life” is 2, if “life” became “0”, the player lose.

Sample Program