# RC.CODE.SCRATCH

## 1 Basic information

### 1.1 Competition content

A. he competition will comprehensively test the contestants' technical implementation ability based on Scratch software programming language, encourage innovation, cultivate practical skills, and problem-solving abilities.
B. The competition are participated by individuals.
C. The competition items are set with objective questions and programming questions.
D. All groups in the competition participate in answering questions on the designated platform using a computer.
E. The duration of each competition is 90 minutes.

### 1.2 Group setting

| Programming event | programming language | Group division | Age requirement |
|---|---|---|---|
| graphical programming | Scratch | Scratch - A | ≤9 years old |
| | Scratch | Scratch - B | ≤12 years old |

### 1.3 Competition topic

| Group | Single Choice Question | Programming Questions | Competition time |
|---|---|---|---|
| Scratch - A | 5 questions totaling 300 points | 5 questions, totaling 300 points | 90 Min |
| Scratch - B | 5 questions totaling 300 points | 5 questions, totaling 300 points | 90 Min |

## 2 Rules and scores

### 2.1 Competition rules

A. A. The competition requires contestants to use coding methods on the designated platform to complete the designated questions. During the answering process, it is prohibited to cut out the compiler or open other software and web pages. Otherwise, it will be considered cheating and the score will be cancelled.

B. Each contestant has only one chance to challenge, and those who fail to log in to the designated platform within the specified time will be considered as giving up the challenge.
C. In the preparation stage, contestants must complete the answer preparation according to the designated platform's prescribed steps and independently operate to enter the formal answer.
D. During the competition period, contestants are not allowed to leave the computer answering area.
E. During the competition period, contestants are not allowed to plagiarize others, cheat, or directly contact other contestants' computers. If there is a violation, the contestant will receive 0 points.
F. During the competition process, one is not allowed to seek help from others, interfere with other contestants' preparation and answering questions, or damage public equipment.
G. During the competition period, no communication software may be opened on the computer. Any violation will result in 0 points for the contestant.
H. During the competition period, contestants are not allowed to use communication, photography electronic devices such as mobile phones, phone watches, and external storage devices. Any violation will result in disqualification from the competition.
I. The interpretation of these rules belongs to the RC Organizing Committee.

### 2.2 Competition score

According to the completion status of the questions, as well as the comprehensive evaluation of completion degree and time, the more questions completed, the higher the completion degree, and the shorter the time, the higher the score of the contestants.

## 3 Equipment requirements

A. Bring your own computer, computer operating system: Mac OS, Windows 10 or above operating system; The browser should use Google Chrome (version 69.0 or above), Firefox, Internet Explorer 11 or above, and Chrome is recommended.
B. Bring your own smartphone.

## 4 Outline requirements

### 4.1 Scratch – A requirements

A. The use of graphical programming software:
   a. The function and use of the stage area.
   b. The functions and usage of the role list area.

c. The functions and usage of the functional area.
d. The functions and usage of the script editing area

B. The use of basic functional modules:
   a. Motion module: character translation, character rotation, control of motion direction, rebound when encountering edges, coordinate related building blocks.
   b. Appearance module: Common building blocks for character description, character color, character size, display, hiding, etc.
   c. Event module: Common building blocks such as running clicks, character clicks, and keyboard presses.
   d. Detection module: Touch the mouse/color/stage, press the commonly used building blocks on the keyboard.
   e. Arithmetic module: arithmetic operators, relational operators, logical operators, and other product blocks.
   f. Audio Module: Record audio, control volume, trim audio, set playback duration and effects, stop.

C. Cloning of Characters and Broadcasting Blocks.

D. The use of variable modules
   a. Create custom variables.
   b. The use of custom variables.

E. The use of brush module
   a. Building block modules such as stamps, brushes, brush attributes, etc
   b. Draw basic geometric shapes.

F. Basic structure of the program
   a. Sequential structure.
   b. Branch structure: If so, if so, otherwise.
   c. Loop structure: finite loop, infinite loop.

## 4.2 Scratch – B requirements

A. The use of graphical programming software:
   a. The function and use of the stage area.
   b. The functions and usage of the role list area.
   c. The functions and usage of the functional area.
   d. The functions and usage of the script editing area

B. The use of basic function modules:
   a. Motion module: character translation, rotation, control of movement direction, rebound on edge, etc., understand the plane rectangular coordinate system and the representation and use of coordinates, and use coordinates to determine the position of the character.

b. Appearance module: Common building blocks for character description, character color, character size, display, hiding, etc.
c. Event module: Common building blocks such as running clicks, character clicks, and keyboard presses.
d. Detection module: Touch the mouse/color/stage, press the commonly used building blocks on the keyboard.
e. Arithmetic module: arithmetic operators, relational operators, logical operators, random number processing, character processing, and other product blocks.
f. Audio Module: Record audio, control volume, trim audio, set playback duration and effects, stop.

C. Cloning of Characters and Broadcasting Blocks.
D. The use of variable modules:
   a. Create custom variables.
   b. The use of custom variables.
   c. Variable scope.
E. The use of brush module:
   a. Building block modules such as stamps, brushes, brush attributes, etc
   b. Draw basic geometric shapes.
   c. Color Control (Brightness, Saturation, Contrast), etc.
F. Basic structure of the program
   a. Sequential structure.
   b. Branch structure: If so, if so, otherwise., multi-branch structure.
   c. Loop structure: finite loop, infinite loop, nested loop structure.
   d. Function Definition and Call: Create different types of functions, set parameters, return values.
   e. Complex Use of Loops: Nested loops, recursive calls.
G. List module:
   a. List creation.
   b. Data storage.
   c. Data deletion.
   d. Data extraction.
   e. Finding Maximum/Minimum Values, Averages, etc.

# 5 RC.CODE.Scratch Sample question example

## 【Scratch - A 】Sample question example

### 一、Multiple choice questions (20 points each)

**1、Click the button below ( ) to draw characters.**


A、Options A

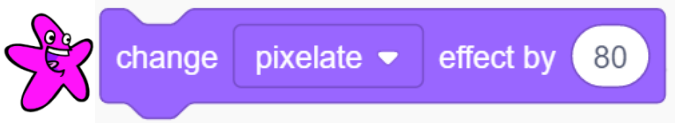
B、Options B

C、Options C

D、Options D

**Answer C**

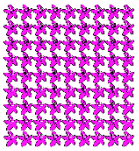
**2、After the blocks in the figure below are executed, the character will produce the following effects ( )**




A、 

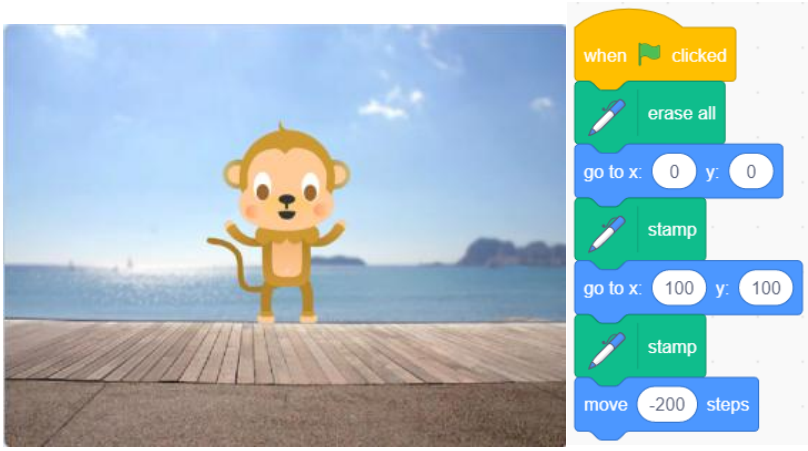
B、 

C、 

D、 

**Answer C**

**3、After executing the code below, you can see ( ) little monkeys**




A、0

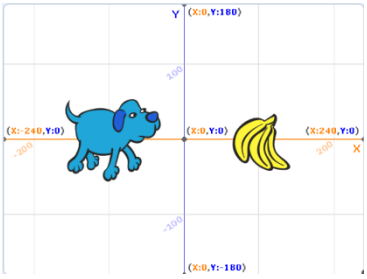
B、1

C、2

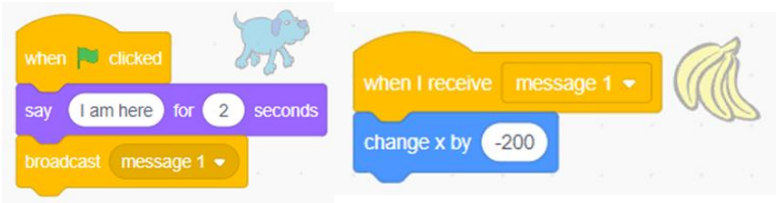
D、3

**Answer D**

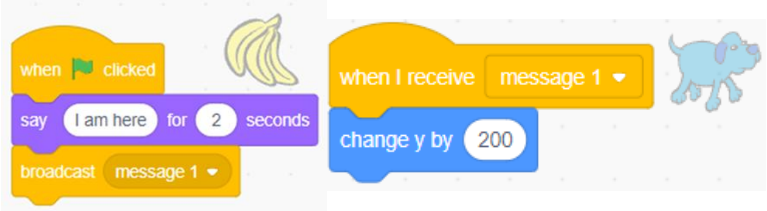
**4、The following code can make the dog move to the banana（ ）**



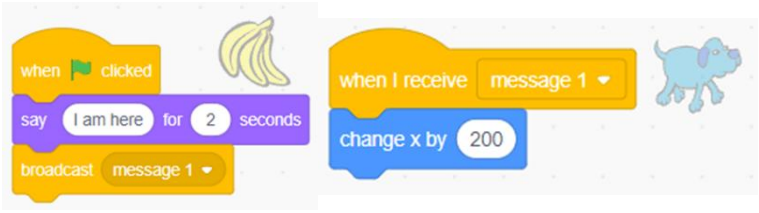
A、



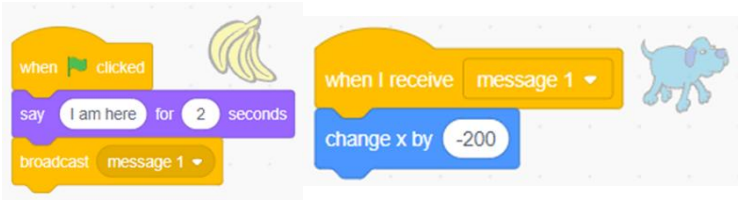

B、



C、



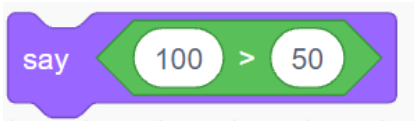

D、



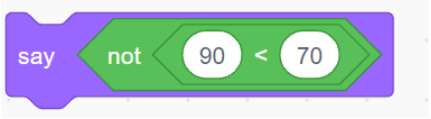

**Answer C**

**5、After the following modules are executed, the false result that is（ ）**

A、

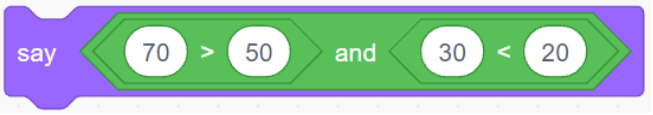



B、




C、

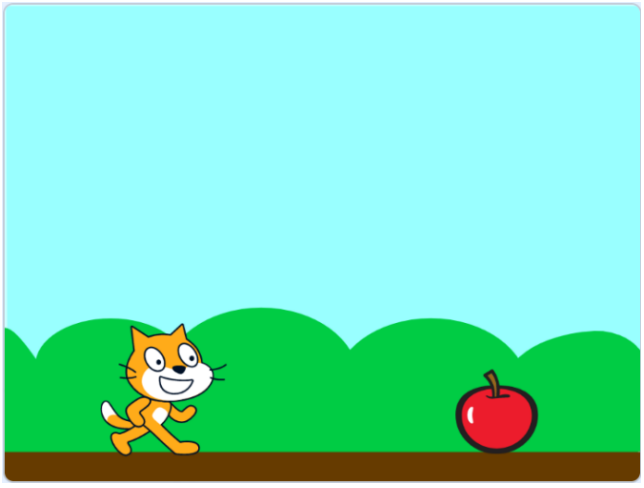

D、




**Answer D**

## 二、Programming questions (total score 300 points)

**1、Kitten eating apple（40 points）**



***Programming Implementation:***

1) Click the green flag, the cat and the apple appear on the stage;

2) Wait for 1 second, the cat moves to the apple;

3) When the cat touches the apple, the apple disappears.

***Scoring Criteria:***

*10 points: Complete programming implementation 1);*

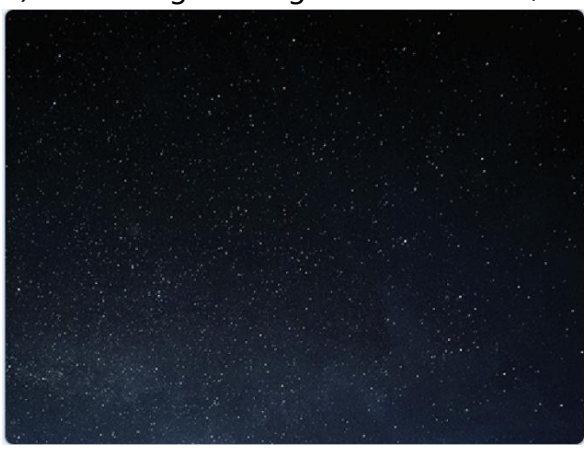
*15 points: Complete programming implementation 2);*

*15 points: Complete programming implementation 3).*

**2、Stars in the sky (40 points)**

***Programming Implementation:***

1) Click the green flag as shown below;



2) Click the stage with the mouse and a star will appear at the position of the mouse pointer.

3) After completing 2) request 5 times, the program ends.

***Scoring Criteria:***

*10 points：Complete programming implementation 1）;*

*15 points：Complete programming implementation 2）;*

*15 points：Complete programming implementation 3）。*

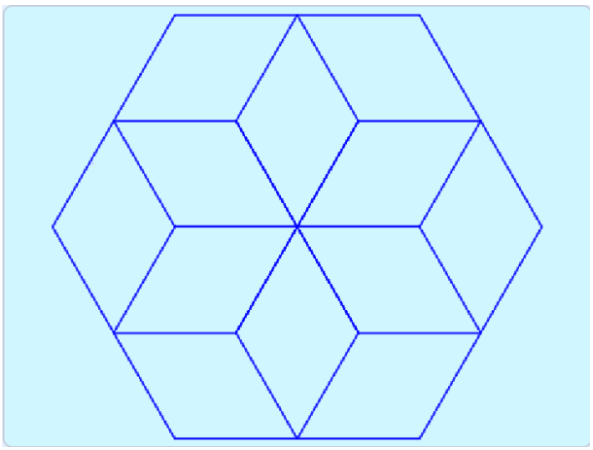
**3、Combination graphics（50 points)**

***Programming Implementation:***

1）Click the green flag to draw a complete regular hexagon;

2）The brush color is blue and the thickness is unlimited;

3）Wait for 1 second and draw the complete graph, as shown below.



***Scoring Criteria:***

*15 points：Complete programming implementation 1）;*

*15 points：Complete programming implementation 2）;*

*20 points：Complete programming implementation 3）。*

**4、Comparison of results（70 points)**

***Programming Implementation:***

1）Click the green flag and enter the math score, Chinese score of the kitten and the math score, Chinese score of the puppy in turn;


2) After the input is completed, the party with the higher total score says: "Victory!" for 1 second, and the other party says: "Keep up the good work!" for 1 second. If the total scores are the same, both say: "Draw!" for 1 second;

3) Click on any character and the character will tell you his total score.

***Scoring Criteria:***

*10 points: Complete programming implementation 1);*

*40 points: Complete programming implementation 2);*

*20 points: Complete programming implementation 3).*

**5、Odd and even numbers (100 points)**

***Programming Implementation:***

1) Click the green flag, and the little penguin will say a random integer between 1 and 1000 for 1 second;

2) The little penguin says how many odd and even numbers there are in each digit of the random integer;

3) Press the space bar, and the program can be executed repeatedly.

*Scoring Criteria:*

*20 points: Complete programming implementation 1);*

*35 points: Complete programming implementation 2) How many odd numbers are there?;*

*35 points: Complete programming implementation 2) How many even numbers are there?;*

*10 points: Complete programming implementation 3)。*

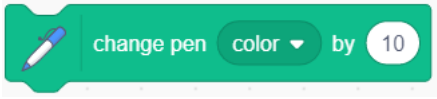
## 【Scratch - B 】Sample question example

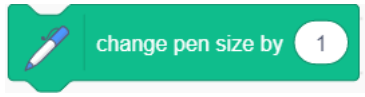
### 一、Multiple choice questions (20 points each)

**1. After executing the following ( ) blocks, you can change the thickness of the brush.**

A、 

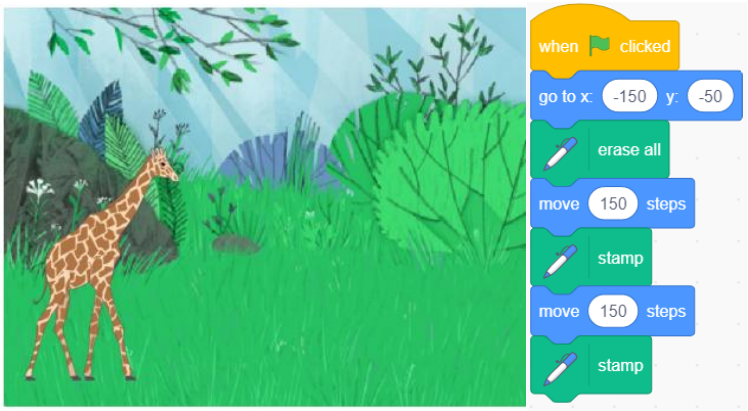

B、 


C、 


D、 


**Answer D**

**2、After executing the code below, you can see ( ) giraffes.**




A、0

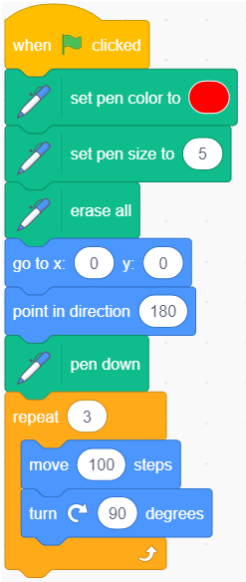
B、1

C、2

D、3

**Answer C**

**3、After the code below is executed, the ( ) graphic is drawn.**




A、 

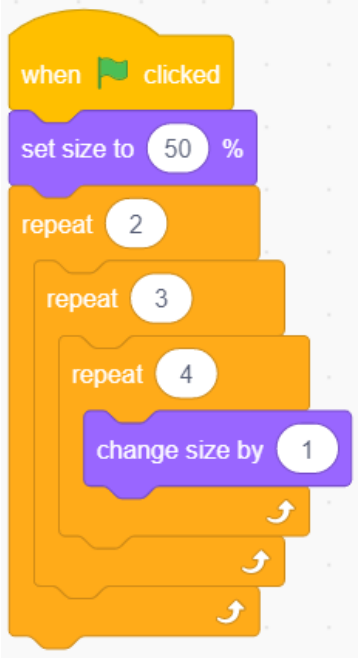
B、 

C、 

D、 

**Answer A**

**4、The initial size of the bear is 50. After executing the following program, how much bigger does the bear become? ( )**




A、9

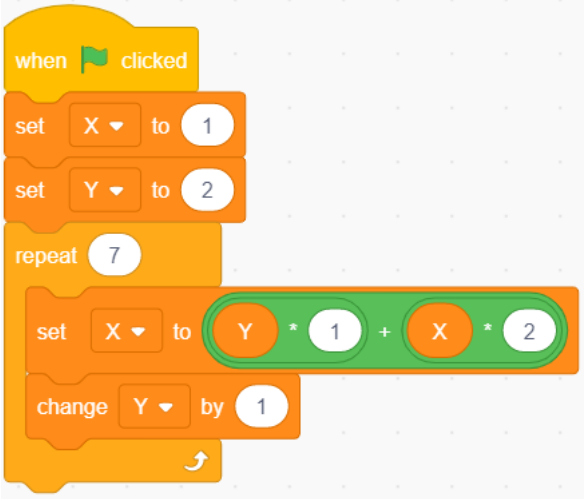
B、59

C、24

D、74

**Answer C**

**5、After the following program is executed, the result of X is ( )**




A、26

B、57

C、120

D、502

**Answer D**

## 二、Programming questions (total score 300 points)

### 1、Move（40 points)

***Programming Implementation:***

1）Click the green flag and a motorcycle will appear in the lower right corner of the stage;

2）Press the space bar and the motorcycle will continue to move to the left;

3）The program ends when the left edge of the stage is reached.

***Scoring Criteria:***

*10 points：Complete programming implementation 1）;*

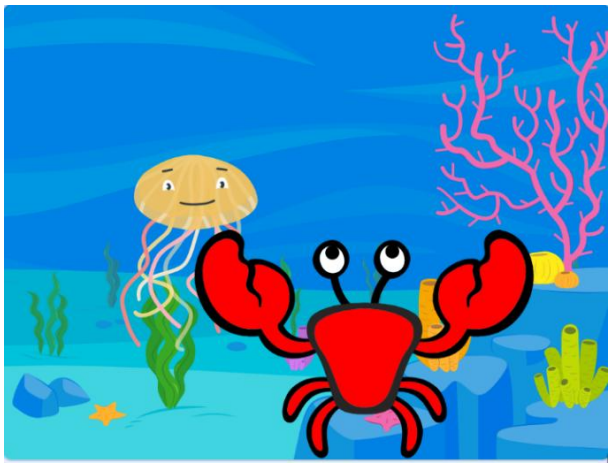
*15 points：Complete programming implementation 2）;*

*15 points：Complete programming implementation 3）。*

### 2、Question 2: Undersea roaming（40 points)

***Programming Implementation:***

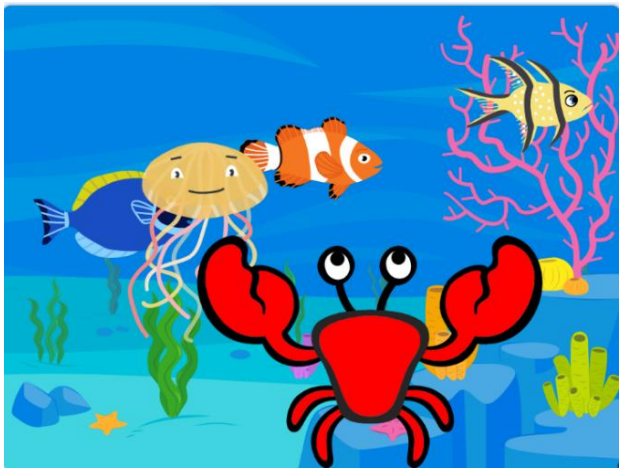
1）Click the green flag, and the crab and jellyfish will appear as shown below (from big to small: crab > jellyfish, from front to back: crab, jellyfish);



2）The crab is size 200, at the very bottom of the stage, and is stationary;

3）The jellyfish size is 100, the initial direction is 45, it keeps moving in the stage, and bounces off the edge;

4）After waiting for 1 second, a small fish (random shape) will appear at a random position in the upper left area of the stage every 1 second. The small fish will move to the right and disappear after reaching the right edge of the stage (from big to small: jellyfish > small fish, from front to back: jellyfish, small fish).



***Scoring Criteria:***

*5 points：Complete programming implementation 1）;*

*5 points：Complete programming implementation 2）;*

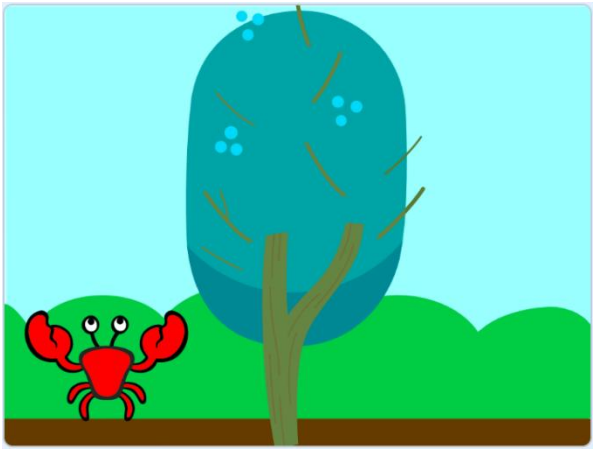
*10 points：Complete programming implementation 3）;*

*20 points：Complete programming implementation 4）.*

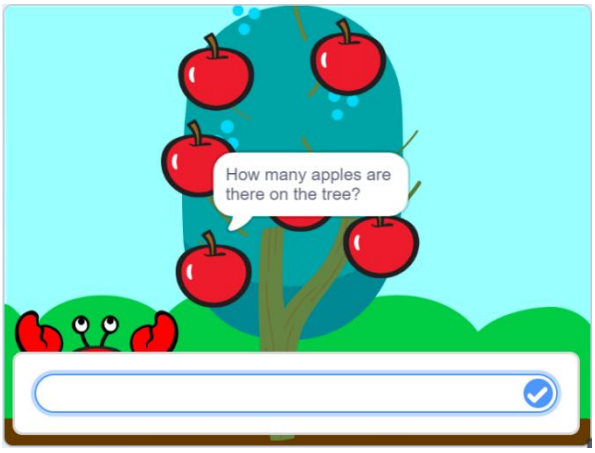
**3、Counting Apples（50 points)**

***Programming Implementation:***

1）Click the green flag as shown below;



2）Wait for 1 second, 1-9 apples will appear randomly on the apple tree. The little crab asks how many apples there are on the tree?




3）输入正确的个数后，小螃蟹会说:“正确”1 秒，否则会说:“错误”1 秒；
4）按下空格键，程序可重复执行。

***Scoring Criteria:***

*10 points: Complete programming implementation 1);*

*10 points: Complete programming implementation 2);*

*20 points: Complete programming implementation 3);*

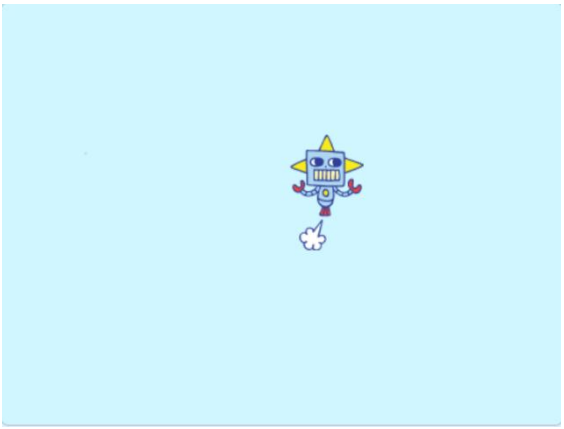
*10 points: Complete programming implementation 4).*

**4、Mobile Robots (70 points)**

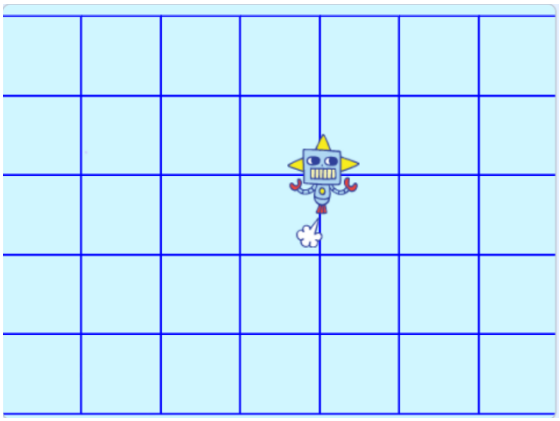
***Programming Implementation:***

1）Click the green flag and a robot will appear in the center of the stage, as

shown below;



2) After waiting for 1 second, the robot draws a 6×8 blue grid pattern on the stage;



3) After drawing, the robot returns to the initial position and asks: "Enter command (up, down, left, right)";
4) Enter a command (1 or more), the robot will move to the next intersection in sequence according to the command;
5) After the robot has completed the whole process according to the command, it will ask again: "Enter command (up, down, left, right)" and repeat the programming to achieve 4);
6) If you enter anything other than "up, down, left, right", the robot will not move and say "invalid" for 1 second;
7) When the robot exceeds the grid boundary, it will say "out of range", and then the program ends.

***Scoring Criteria:***

*10 points: Complete programming implementation 1);*

*10 points: Complete programming implementation 2);*

*10 points: Complete programming implementation 3);*

*10 points: Complete programming implementation 4);*

*10 points: Complete programming implementation 5);*

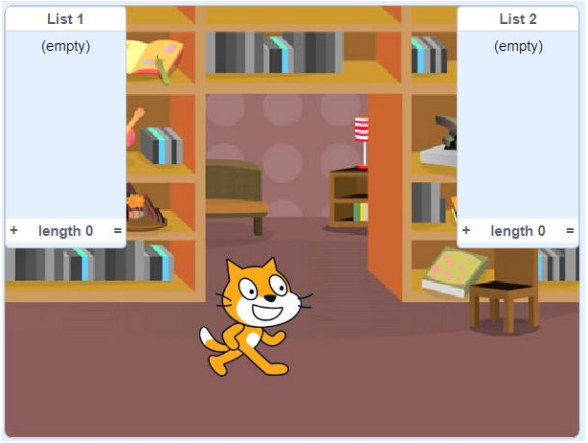
*10 points: Complete programming implementation 6);*

*10 points: Complete programming implementation 7).*

**5、Height Issues (100 points)**

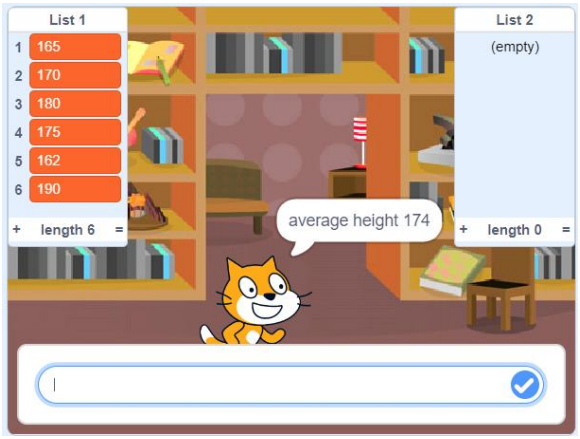
***Programming Implementation:***

1) Click the green flag, and the characters and background will be as shown (list 1 and list 2 are empty);




2) After waiting for 1 second, randomly generate 6 non-repeating integers (160≤ integer≤220) in List 1, representing the heights of the 6 students;


3) After waiting for 1 second, the kitten says the average height of the 6 classmates for 1 second (average height: rounded to the nearest integer);




4) Automatically fill in List 2 with the data in List 1 that are greater than the average height (arranged in order from largest to smallest).

***Scoring Criteria:***

*10 points: Complete programming implementation 1);*

*20 points: Complete programming implementation 2);*

*35 points: Complete programming implementation 3);*

*35 points: Complete programming implementation 4).*