Name:_____Date:_____ Partner: _____

Game Changineer (https://gc.ece.vt.edu/)

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I. Setting

Recall that the Setting of a game plan describes (1) the characters involved in the game and how many of them, (2) which character the player controls, and (3) the characters' initial positions. Describing all characters involved helps the computer understand and plan ahead. For a game to be interesting, the player usually controls some specific character in the game, although the player need not control any character. Finally, the initial position and speed of the characters are optional. If none are described, the computer will place them randomly in the playing area.

1. On the right hand of the screen, type in “practice” for the title, and your name. In the idea/plan box type “There are 30 carrots. They are scattered.” Then click the grey execute button beneath the text box and click the turquoise on the button on the left to play the game.
2. Click the execute button again, and the play button once more and see how the carrots are in different places each time you play the game because they are randomly scattered.
3. Now change the text to say “There are 30 carrots. They are scattered near the top”. Notice how you can dictate where the characters will show up on the screen.
4. How would you describe 10 foxes on the top half and 5 rabbits in the bottom half of the area?

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II. Spacing the setting

5. Now change the text to say “There are twenty carrots. The carrots are spread 5 by 4 in the area.” Notice the even spacing. (Remember rows are first and columns are second.)

6. How would you describe the scenario where 30 rabbits are placed in an orderly fashion in the bottom half of the area?

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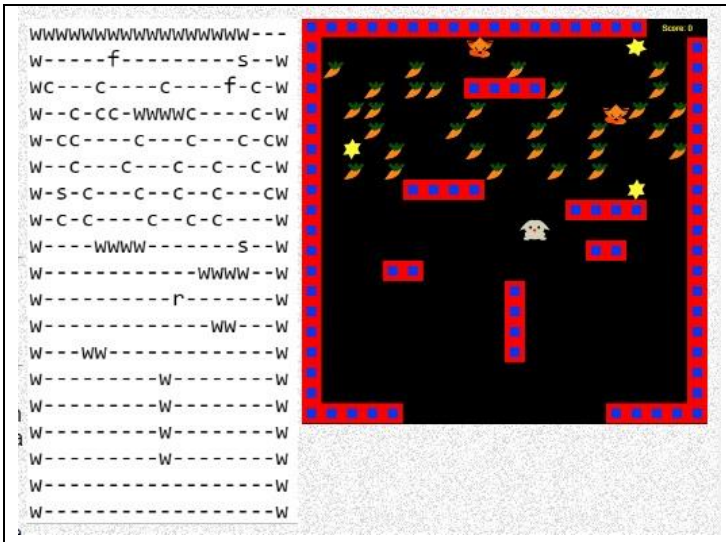
III. Describing the Settings Map



In addition to placing the characters with text, you can also place them using a map. The canvas is a 600 pixel by 600 pixel area. The map divides the canvas into 20 by 20 blocks, each of which is 30-pixel by 30-pixel squares. Each of our characters is roughly that size.
For example, consider the map shown on the right and its corresponding canvas next to it. The initial positions of carrots, rabbit, foxes, and spinstars are explicitly specified in the map and they are drawn on the canvas according to the grid positions. (Both foxes have moved a bit from their initial position when the image is taken)
Each character is represented by a letter. **For example, 'r' for rabbit, 's' for spinstar, etc. '-' is used to represent blank spaces. Note that you can also place walls (w) in your map.**

7. Try placing different characters in the map textbox on the main website, then click "Run" near the bottom of that page to generate the code for your game plan. If there are no typos and everything is understood, click the button at the bottom to see your code in action! **Draw your map in the space below.**

IV. Character Control

You have the option to specify who the player controls.
For example:

- The player controls the rabbit with the keyboard.
- The player controls the rabbit with the mouse.

This specifies that the player will control a single rabbit. All other characters will be controlled by the computer as non-player characters (NPCs).
In addition, if you wish to control the character with the mouse, you must specify "with the mouse" in the sentence. By default, the control is with the keyboard. Therefore, when we declare that the player controls the rabbit with the mouse, you can still control the rabbit with keyboard as well.

Note that the player can control only one character. In other words, if there is more than one instance of the rabbit, it will not accept that the player controls the multiple rabbits.

8. Type "There are twenty carrots scattered in the playing area. There is one rabbit. The player controls the rabbit with the mouse." Into the idea/plan box and press execute.
9. Type "There is one panda. You control the panda with the arrow keys. When the left arrow is pressed, the panda moves to the left. When the right arrow is pressed, the panda moves to the right. When the down arrow is pressed, the panda moves down. When the up arrow is pressed, the panda moves up." Into the idea/plan box and press execute.
   Notice the two differences in how to move a character.
10. Type "There are two rabbits. The player controls the rabbit." Into the idea/plan box. Why is there an error?

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11. Example 2: "There are twenty carrots scattered in the playing area. There is one rabbit. The player controls the rabbit with the keyboard. There are two foxes. The foxes start out moving in a random direction. When a fox reaches a border, it reverses direction. When a fox sees the rabbit, it chases the rabbit. When up arrow is pressed, the rabbit moves up. When down arrow is pressed, the rabbit moves down. When right arrow is pressed, the rabbit moves right."
    How would you make the rabbit eat the carrot? How would you make the rabbit go left?

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12. Example 3: "There is one fox and one rabbit. The fox is controlled by the keyboard. The rabbit wanders around. When W is pressed, the fox moves up. When S is pressed, the fox moves down. When A is pressed, the fox moves left. When D is pressed, the fox moves right. When a fox reaches a border, it wraps around. When a fox and a rabbit collide, the fox eats the rabbit."
    How would you make the rabbit flee the fox when it sees the fox?

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V. Non-Player Character (NPC) Movement and Speed

Unconditional Sentences	Conditional Sentences
• The foxes move east. • The foxes start out moving east. • The foxes wander around.	• When a fox sees a rabbit, the fox chases the rabbit. • When a fox sees a rabbit, the fox flees the rabbit. • When a rabbit sees a fox, the rabbit moves down. • The rabbit moves up when it sees a fox.

We can also change the speed at which a character is moving. The default for a non-player character is *1 pixel per frame*. That is, in our 600x600 canvas, **it will travel all the way across from left to right in about 12 seconds**, given 50 frames per second.

13. If we specify "The fox wanders around at 2 pixels per frame." how long would it take to go from one side of the screen to the other? _____seconds.

VI. Border Control

There are a few things a character can do when it reaches a border, such as: • Reverse direction • Enter from the other side • Die	To specify each of the above, using the example of a fox, we have • When a fox reaches a border, it reverses direction. • When a fox reaches a border, it wraps around. • When a fox reaches a border, it dies.

14. Type this into the idea/plan box: "There is one rabbit. The rabbit moves east. When the rabbit reaches a border, it reverses direction." Write new instructions that make the rabbit move left/west.

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VII. Collision

Try typing in the following into the textbox on GameChangineer, then click "Run" near the bottom of that page to generate the code for your game plan. If there are no typos and everything is understood, click the button at the bottom to see your code in action!

"There are twenty carrots scattered in the playing area. There is one rabbit. The player controls the rabbit with the mouse. There are two foxes. The foxes start out moving in a random direction. When a fox reaches a border, it reverses direction. When a rabbit collides with a carrot, the rabbit eats the carrot."

15. What would you type to make the rabbit die when it collides with a fox?

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VIII. Character Control

Keyboard control is relatively straight-forward. When describing control, always use a conditional statement. The following gives a couple of examples. • When the up arrow is pressed, the rabbit moves up. • When the left arrow is pressed, the rabbit moves left.	**Using the mouse to control** requires two steps. First, recall that we must declare that the mouse is used to control in the Setting. "The rabbit is controlled by the mouse." Next, we can say either of the following. • When mouse moves, the horizontal position of the rabbit is determined. • When mouse moves, the position of the rabbit is determined.

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"There are twenty carrots scattered in the playing area. There is one rabbit. The player controls the rabbit with the keyboard. There are two foxes. The foxes start out moving in a random direction. When a fox reaches a border, it reverses direction. When a fox sees the rabbit, it chases the rabbit. When up arrow is pressed, the rabbit moves up. When down arrow is pressed, the rabbit moves down. When right arrow is pressed, the rabbit moves right."

16. How would you make the rabbit eat the carrot? How would you make the rabbit go left?

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IX. Bullets

Any character in your game can shoot bullets, provided that instructions are given. Note: **<u>Only the keyboard can be used to make the controlled player shoot</u>**. *Mouse movements and clicks cannot make the player character shoot.* In the following examples, we assume the player controls the pointer: • When spacebar is pressed, the pointer shoots up. • When the right arrow is pressed, the pointer shoots right.	The non-player characters (NPCs) can also shoot: • When an alien is directly above the pointer, the alien shoots down. • When an alien senses the pointer, the alien shoots at the pointer. • *Note that NPCs cannot shoot as frequently or as fast as the player character. This is done to prevent the game from becoming impossible to play/win.* What happens when a character is shot? We must describe that as well. • When an alien is shot, it explodes. • When the fox is shot, it freezes for 5 seconds. *Note that "is shot" is preferred over "collides with" between a character and a bullet.*

Try typing in the following into the textbox on GameChangineer, then click "Run" near the bottom of that page to generate the code for your game plan. If there are no typos and everything is understood, click the button at the bottom to see your code in action!

"There is a spinstar at the bottom of the canvas. The spinstar is controlled by the mouse. When Z is pressed, the spinstar shoots up. There are 13 aliens scattered around the top half. The aliens move towards the spinstar. When an alien is shot, the alien dies. When an alien collides with the spinstar, the game is over."

17. What would you add to make the spinstars shoot bullets at you?

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X. Scoring

Scoring is easy. Simply describe how the score increases by any event. The following gives a couple of examples. • When an alien is shot, score increases. • When a rabbit eats a carrot, score increases by 2 points. *You can choose where the score is displayed on the canvas by using the map textbox. Use '=' to denote the position of the score.*	You might also want to describe conditions for the game to be over. For example: • When the score is at least 20 points, you win. • When the pointer is shot, the game is over.

Type this into the box: "There are twenty carrots scattered near the top in the playing area. There is one pointer placed near the bottom of the area. The player controls the pointer with the keyboard. When right arrow is pressed, the pointer moves right. When left arrow is pressed, the pointer moves left. When spacebar is pressed, the pointer shoots up. When a carrot is shot, it explodes."

18. How would you add score keeping?

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19. How would you change the game plan so that the game ends when all carrots have been shot? There are multiple ways to do this.

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XI. Create your own game!

Click on the sample video games and the community showcase and play some other games. Then brainstorm and create your own unique game. Save your game in Game Changineer. If it works, copy and paste the text and send it to **nickcornwell@mcps.org**.

XII. Tips

1. Do not write run-on sentences.
2. You can have no more than 99 instances of any character.
3. You cannot launch or add new characters during the game. You can change their color however.
4. Default controls are the keyboard. You must specify if you want the mouse to control something.
5. There are no 2-player games. The player can only control ONE character.
6. The maximum rate of speed that you can set is 10 pixels per frame.
7. The order of the sentence structure matters!