



Scratch Programming

Lesson 2-6

Car Race Game II

Presented by Advaspire Team



Review - Game Development



A game development team includes these roles or disciplines:

- Designer
- Artist
- Programmer
- Level designer
- Sound engineer
- Tester
- High concept
- Pitch

Review - Earn Money from a Game



How game developer make money:

- **Sell the game** on a platform (Playstore, App Store, Steam, Epicgame, etc.)
- Provide **upgraded perks options** inside a free game (top up to buy costume, weapon, etc.)
- Collaborate with others to sell **advertisement**.



Review - Car Race Game's concept & setup

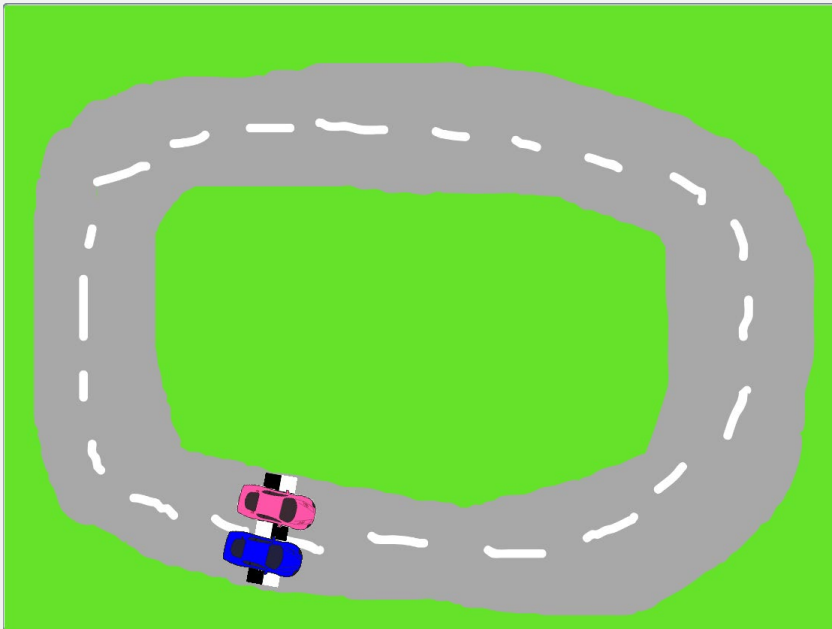


Concept:

1. This game can be played by either 1 or 2 players.
2. It has different map to choose before the race starts.
3. The first person reaches the finish line wins.
4. We will use a timer to calculate time used to complete the race.
5. 3 seconds countdown timer before starts.



Mission 2-5 – Car Race Game

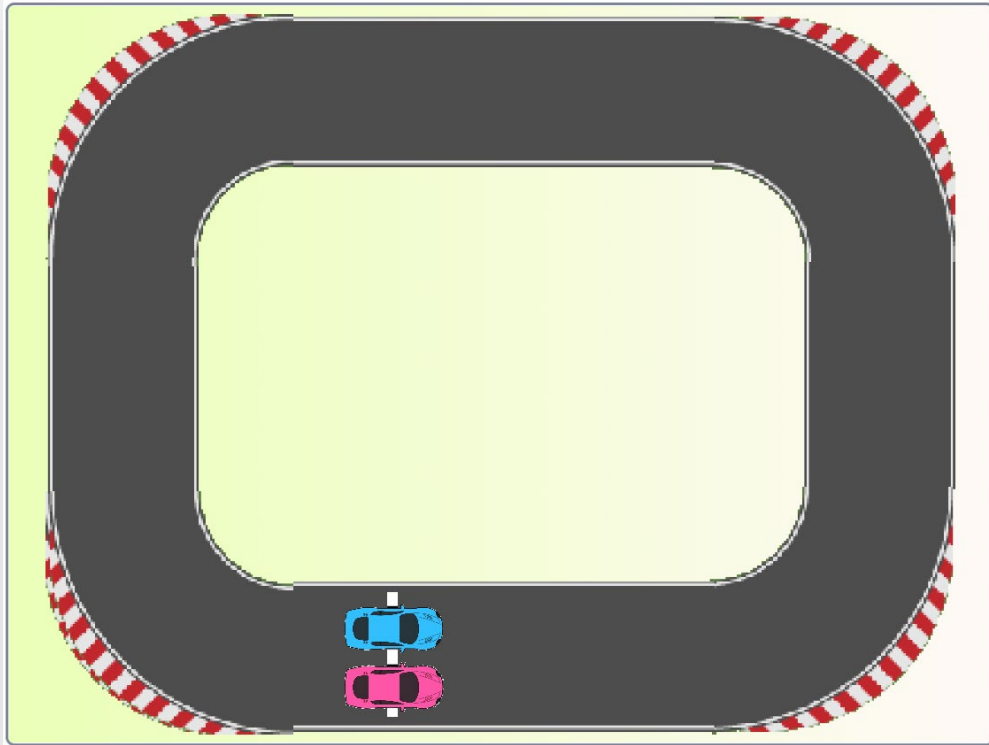


Today mission is to program your cars so that it can be controlled (up-down-left-right) by P1 and (w-s-a-d) by P2.

Think a way that can count the lap finished by the car. (some player will play cheat that straight move backward to complete the lap, so you need to think of a way to prevent this happen.



Car Race Game – Setup Sprites and Backdrops



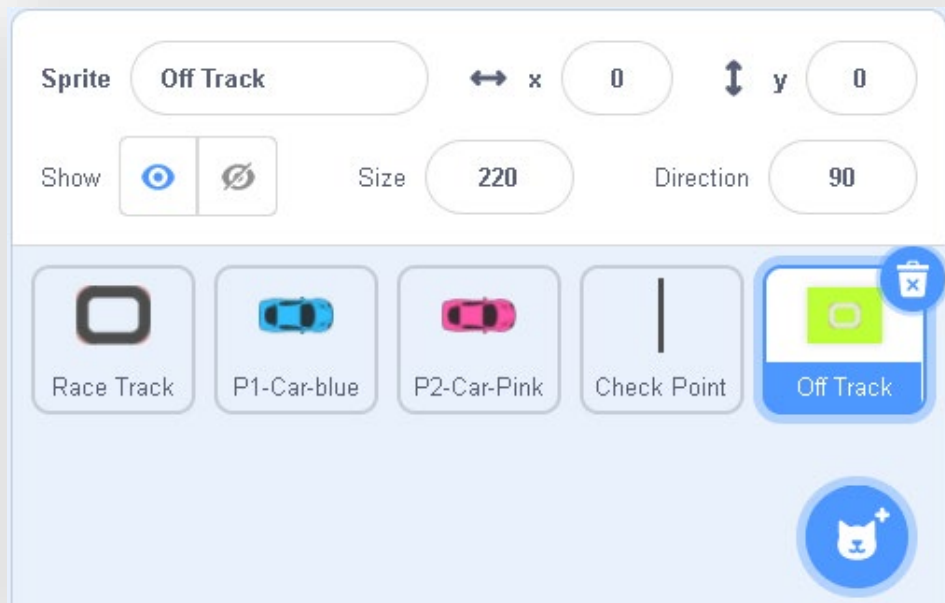
I downloaded a road track tiles to draw my road track for car to run on, and I made it as a sprite, not backdrop.

Then I downloaded car sprite from google image there and import these 2 cars (you will need to do some clean up for the image in costume there) into my stage.

Then I draw a start/finish line and make it as a sprite.



Car Race Game – Setup Sprites and Backdrops



Then I made a Off-road track from the Race Track (just copy from race track but remove the track colour).

This is to check if the car is running on the track or off the track, therefore I called it “Off Track” Sprite.

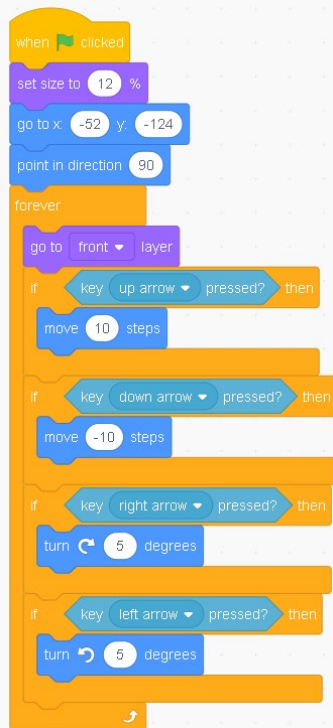
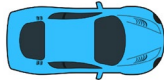
My finished line is called “Check Point”.

P2 Car can be duplicated from P1 Car after you have given a confirmed script for P1 Car.



Car Race Game – Car Script

Script:

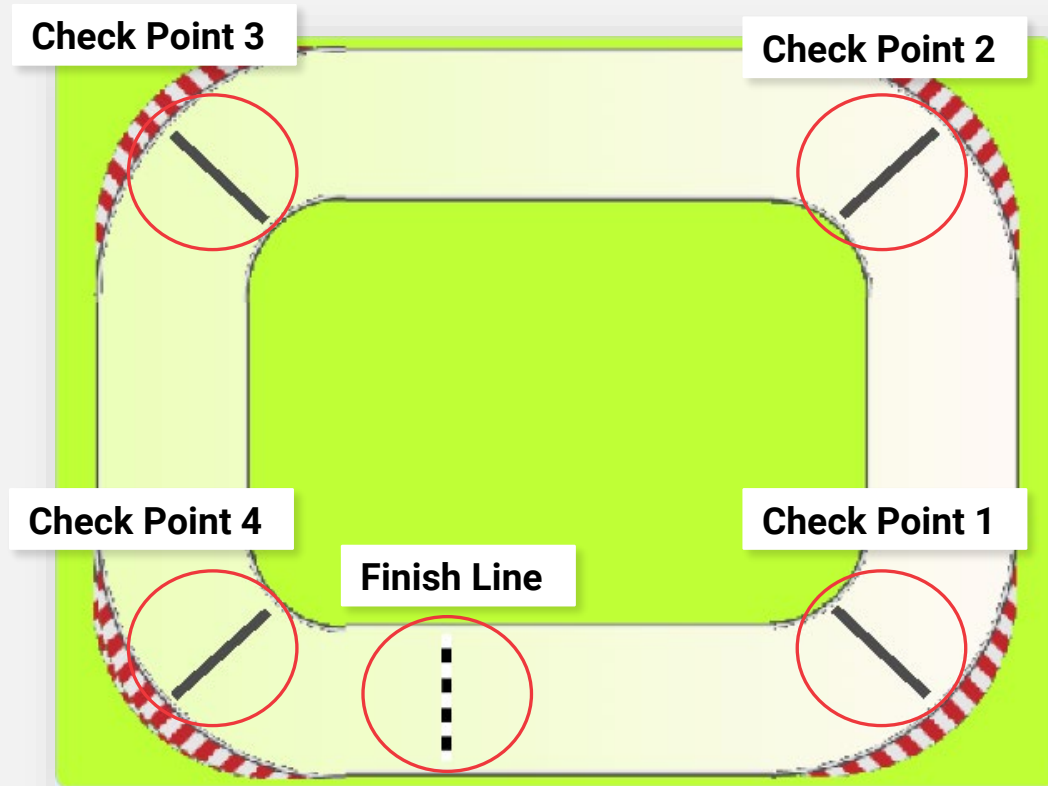


The control key is quite straight forward, just make like followings:

1. <Up> Move 10 steps
2. <Down> Move -10 steps
3. <Right> Turn Clockwise 5 degrees
4. <Left> Turn Counter-clockwise 5 degrees

Remember also make the car always go to front layer.

Check Points setup



Inside the “Check point” Sprite, I have 5 costumes including 1 finish line & 4 check points (same color as road track).

Then I use clone function to clone them to different corners on the track. (As the color is same as road track, so I have hidden the car and road track as shown at the left).

The purpose of setting up these checkpoints is to make sure the car follow track and don't use shortcut.



Car Race Game – Check Point Script

Script:

```
when clicked
hide
go to x: -53 y: -137
point in direction: 90
switch costume to: Finish Line
create clone of: myself
go to x: 156 y: -115
point in direction: 43
switch costume to: Check Point 1
create clone of: myself
go to x: 160 y: 115
point in direction: 138
switch costume to: Check Point 2
create clone of: myself
go to x: -162 y: 113
point in direction: 43
switch costume to: Check Point 3
create clone of: myself
go to x: -161 y: -116
point in direction: 138
switch costume to: Check Point 4
create clone of: myself
```

```
when I start as a clone
go to front layer
show
```

Then setup these clones to the positions accordingly.

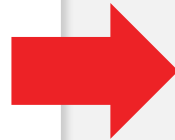
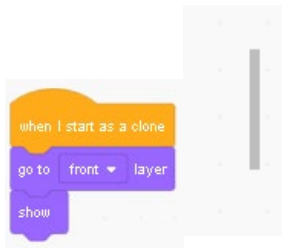
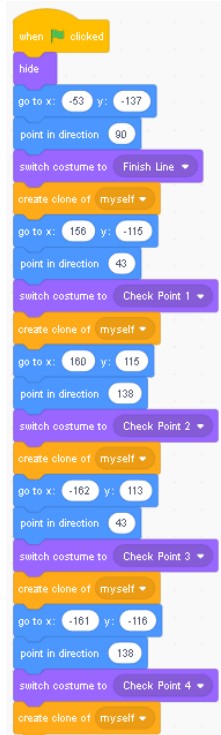
Remember to switch the costume of the checkpoints accordingly, this will be use for lap tracking later.

You can use make block in this script to simplify the create clone process.

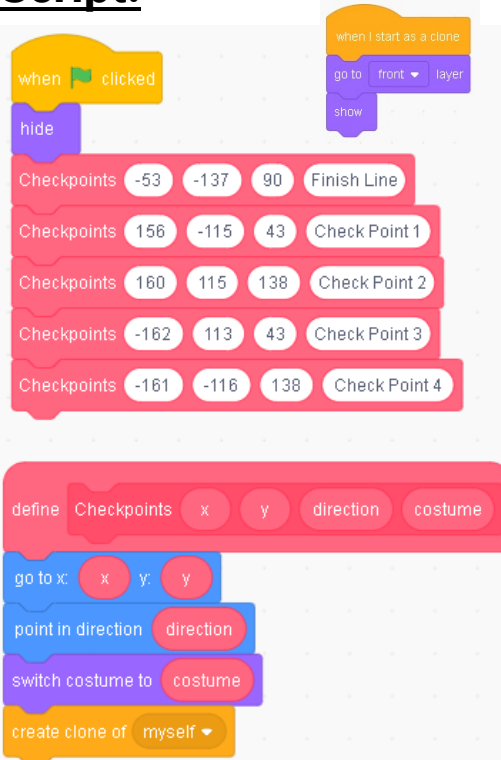


Check Point Script (with Make Block)

Script:



Script:

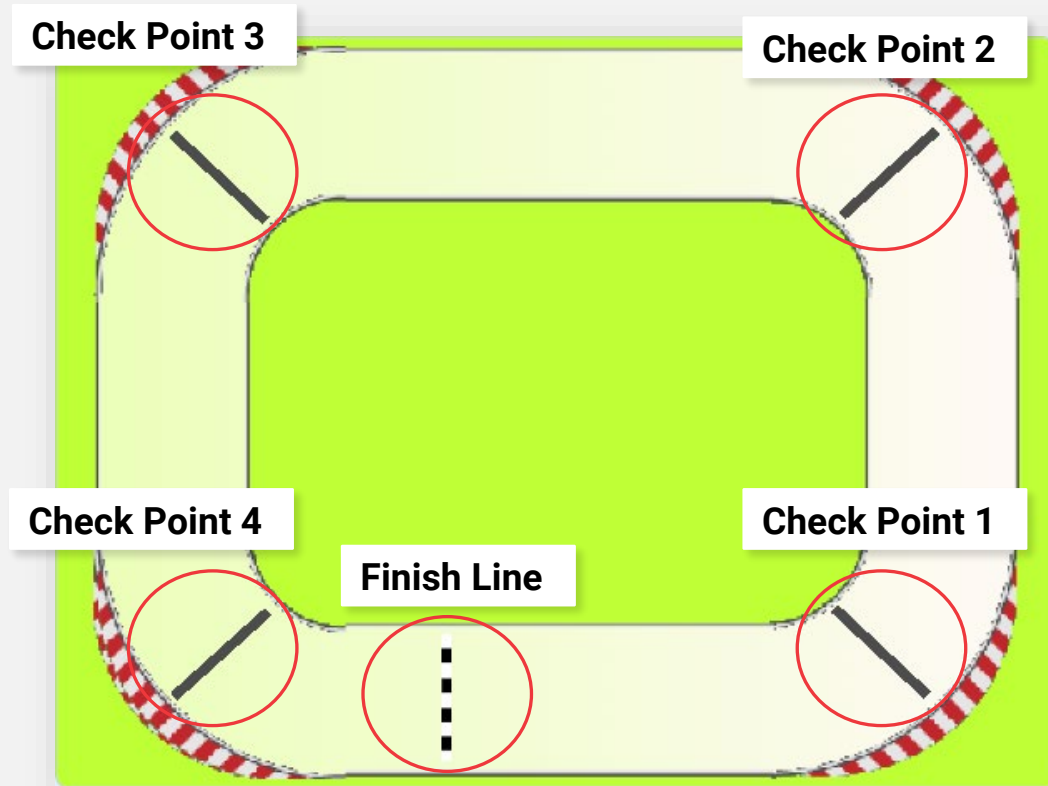


You can easily setup your position using make block.

I define this customized block as “Checkpoints” with x, y, direction, costume as inputs.



Checkpoint checking mechanism



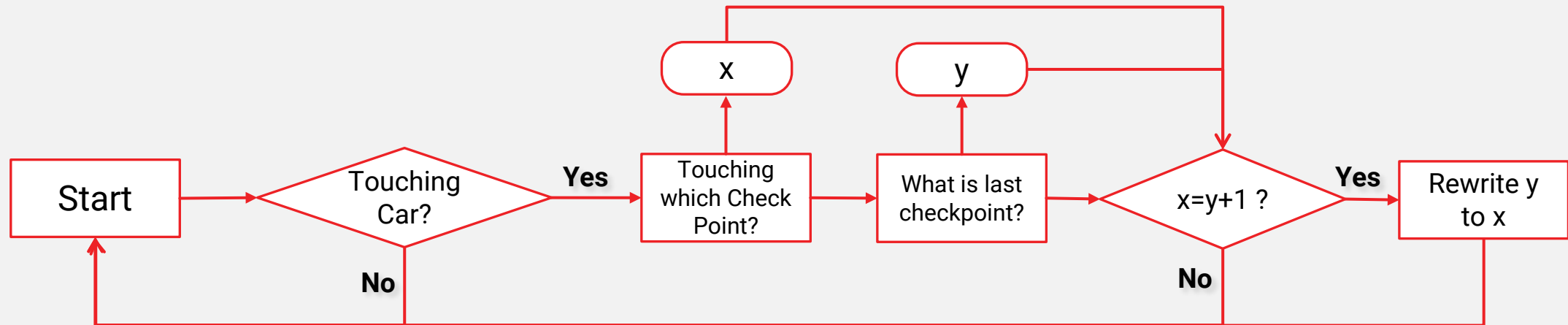
We need to confirm the car to pass by the checkpoint one by one, it cannot straight go to Check Point 2 without passing Check Point 1.

So 3 conditions to pass in order to make the check point count:

- 1. Car must touch the Check Point.**
- 2. Which check point is the car touching.**
- 3. In order to check on next Check Point, the car must touch previous Check Point first.**



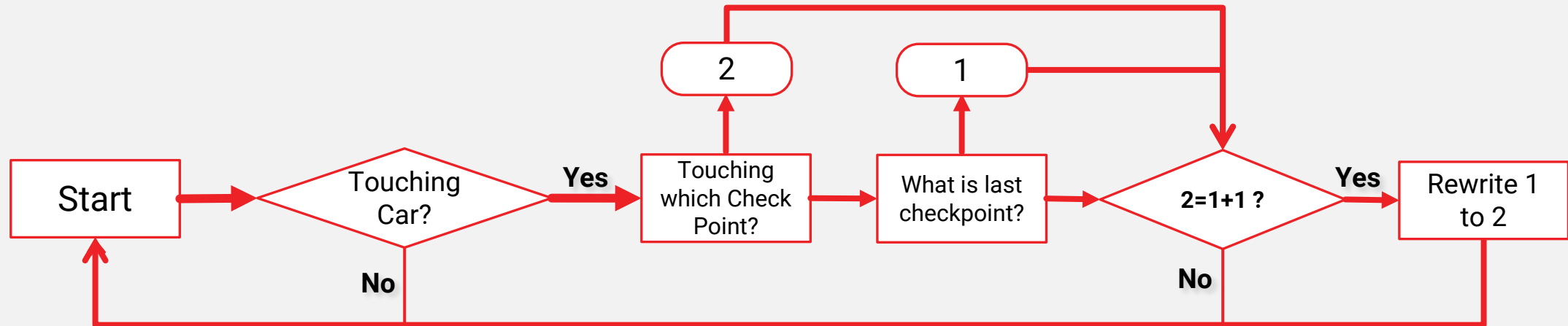
Checkpoint checking mechanism



This is the mechanism flow we need to check if the checkpoint should be counted and recorded.



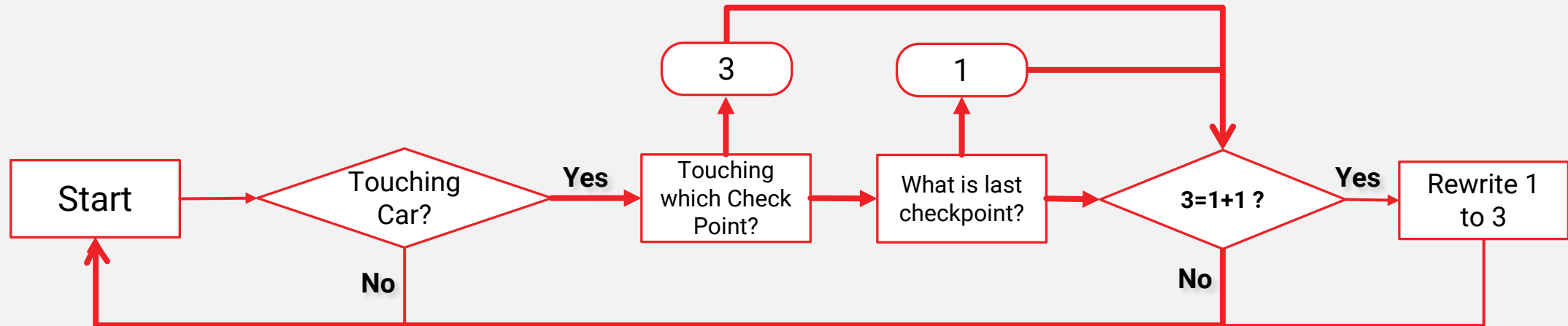
Checkpoint checking mechanism - test



If all conditions are fulfilled, then it will rewrite the last checkpoint to the newest checkpoint, this means that the checkpoint is progressing if the car is following the track.



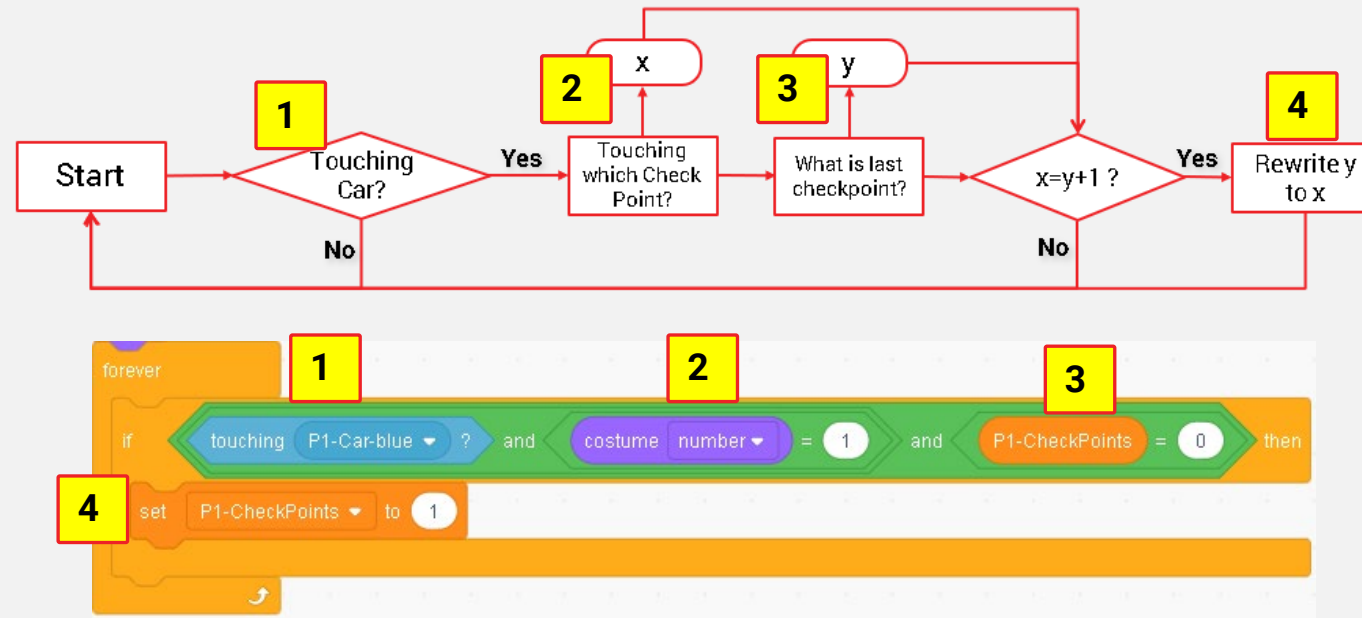
Checkpoint checking mechanism - test



If the player is going to skip the check point 2, and straight go to checkpoint 3 after running through checkpoint 1, then it won't rewrite the last checkpoint.



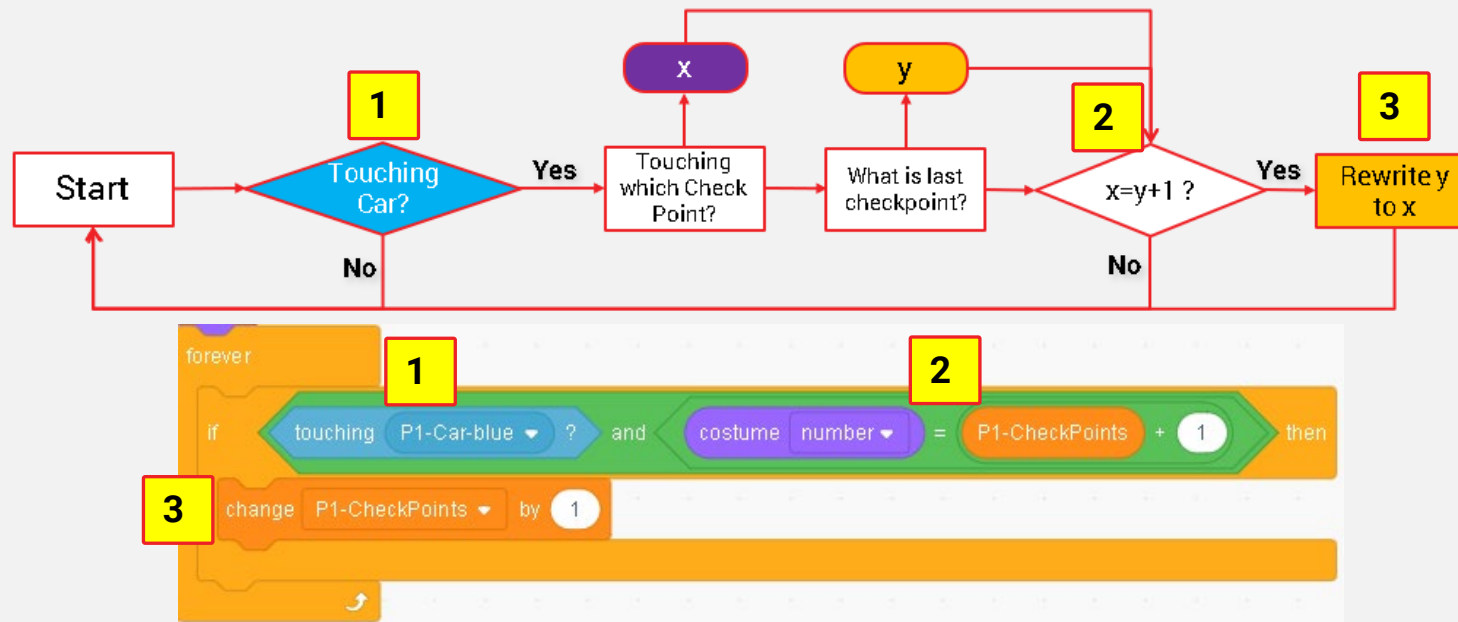
Script - Checkpoint checking mechanism



Let's put this mechanism into our script.
We will need a variable called "CheckPoints", as we have 2 players, I will rename it to "P1-CheckPoints".



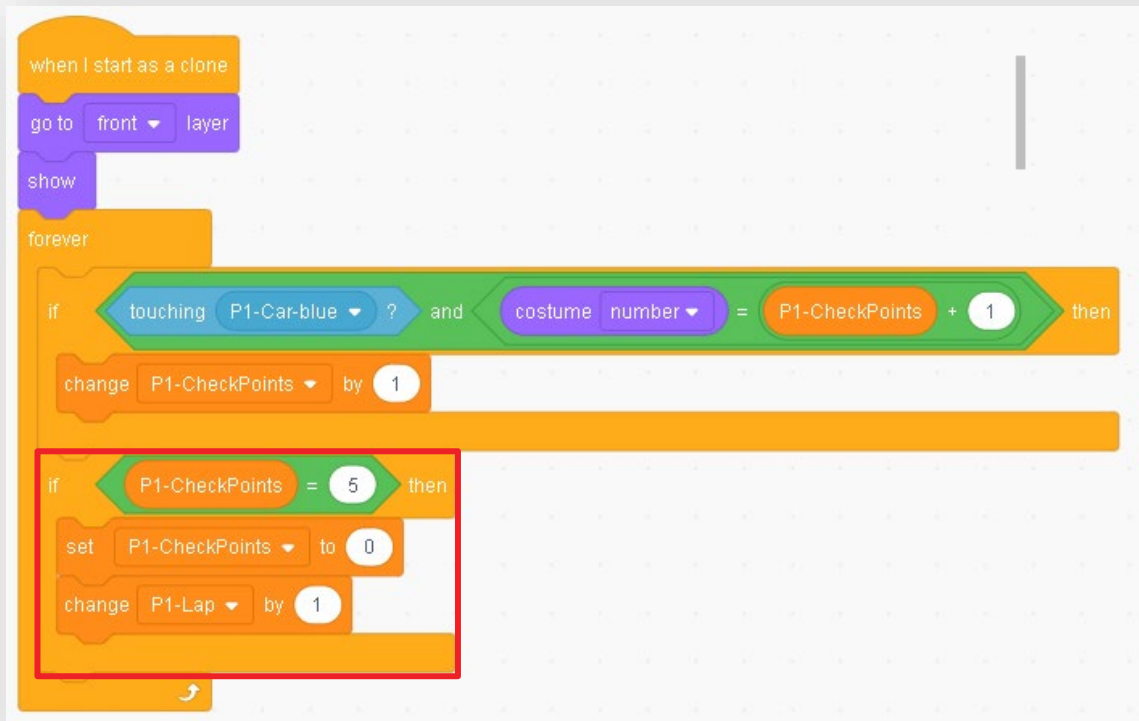
Script – A more effective way



And actually we can simplify the equation to be like above structure.



Script – 5 checkpoints = 1 Lap



If your code doesn't work properly, you should check back if your costume number is tallied with your check point (finish line to be the 5th costume).

Once the car did 5 check points (finish line to be the last), it will set the P1-CheckPoints back to 0, and increase Lap (New variable) by 1.



Script – Checkpoint Full

Script:

when clicked

- hide
- Checkpoints -53 -137 90 Finish Line
- Checkpoints 156 -115 43 Check Point 1
- Checkpoints 180 115 138 Check Point 2
- Checkpoints -162 113 43 Check Point 3
- Checkpoints -161 -116 138 Check Point 4

define Checkpoints x y direction costume

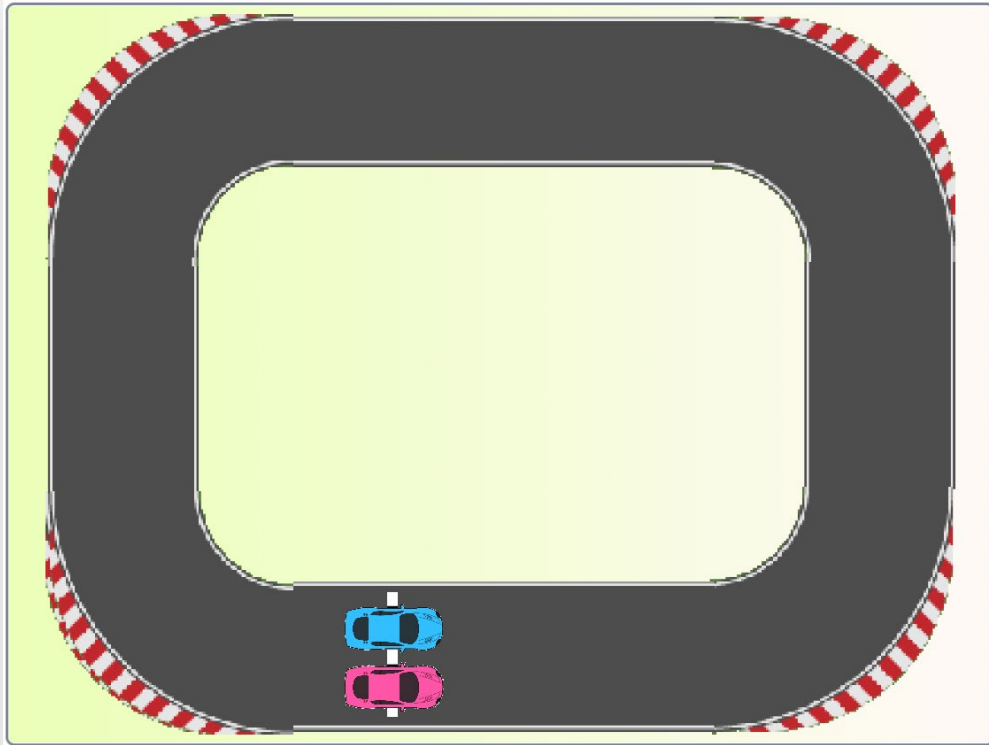
- go to x: x y: y
- point in direction direction
- switch costume to costume
- create clone of myself

when I start as a clone

- go to front layer
- show
- forever loop:
 - if touching P1-Car-blue ? and costume number = P1-CheckPoints + 1 then
 - change P1-CheckPoints by 1
 - if P1-CheckPoints = 5 then
 - set P1-CheckPoints to 0
 - change P1-Lap by 1



Car Race Game – Run & Play

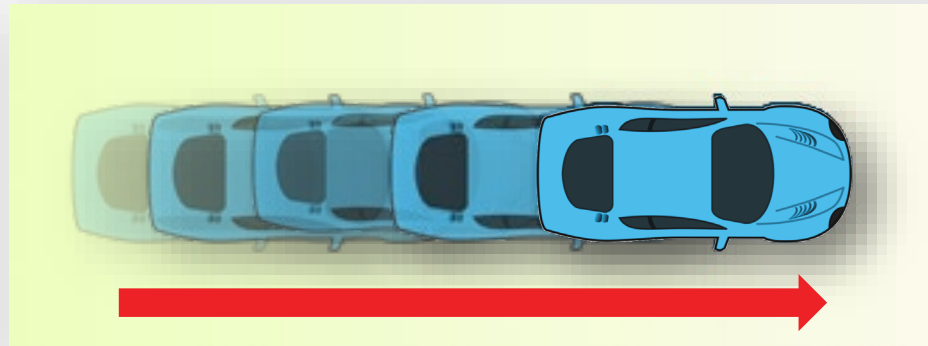


Now you can run and play the game.

Try and see if the checkpoint mechanism works, it can help to count the lap done in the game.



Car Race Game – Add Some Physics



In real world, our car has acceleration.

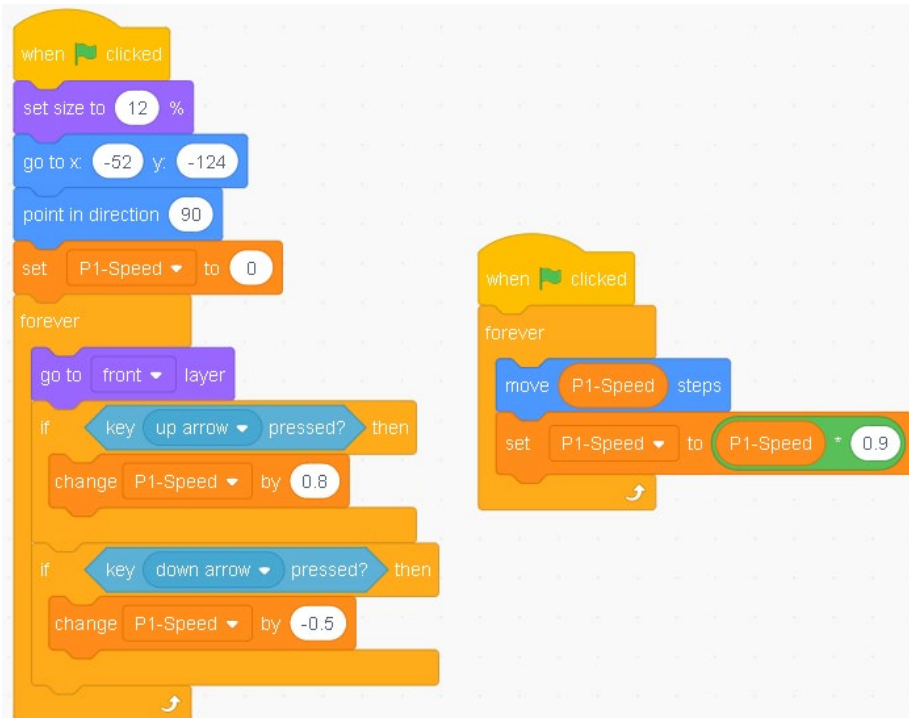
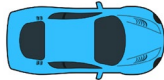
***Acceleration means the increase of speed.**

But we don't have acceleration for our car now. So when we press up, it will move based on the number we put in move __ steps.



Car Race Game – Advance Motion Control

Script:



We will set up a variable call Speed (“P1-Speed” as we have 2 players in the game), and our buttons will only control the value of the speed without moving the car.

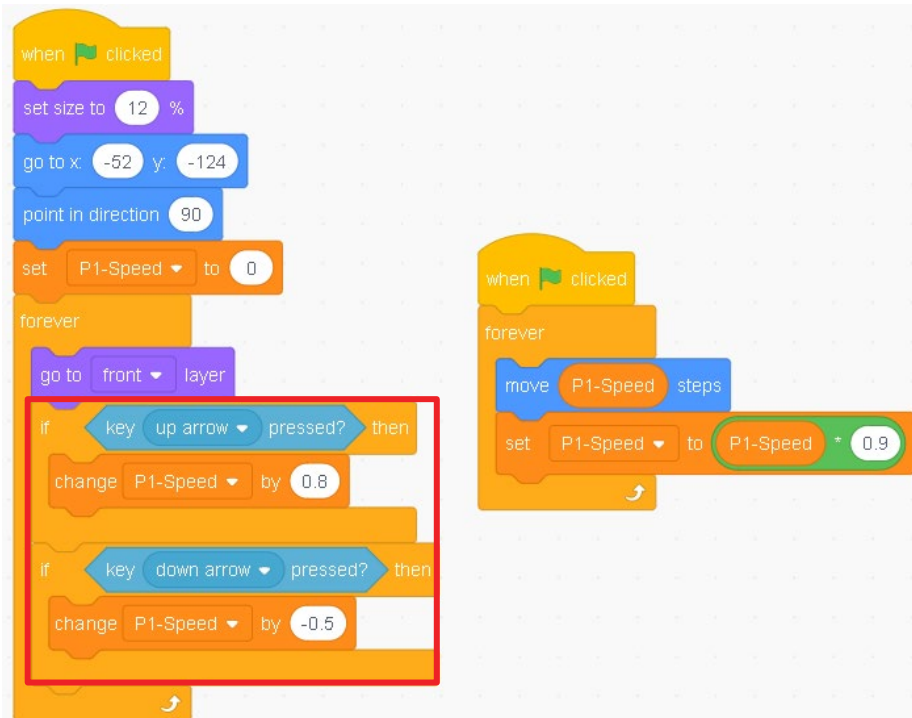
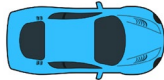
Then we make the car to follow the speed variable to move.

We also need to make sure if we do not press <up> button, the speed will keep decreasing until back to zero.



Car Race Game – Advance Motion Control

Script:

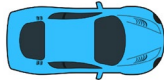


In the control there, when we hold down the <up> button (pressing <up>), it will keep increasing the value of “P1-Speed” by 0.8, and when you show this variable and run the program, you will see the variable will change very fast as you press <up> (increase) or <down> (decrease).



Car Race Game – Advance Motion Control

Script:



```
when green flag clicked
  set size to 12 %
  go to x: -52 y: -124
  point in direction 90
  set P1-Speed to 0
  forever
    go to front layer
    if key up arrow pressed? then
      change P1-Speed by 0.8
    if key down arrow pressed? then
      change P1-Speed by -0.5
  forever

when green flag clicked
  forever
    move P1-Speed steps
    set P1-Speed to P1-Speed * 0.9
```

If you didn't make the car to move with "P1-Speed", it totally won't move.

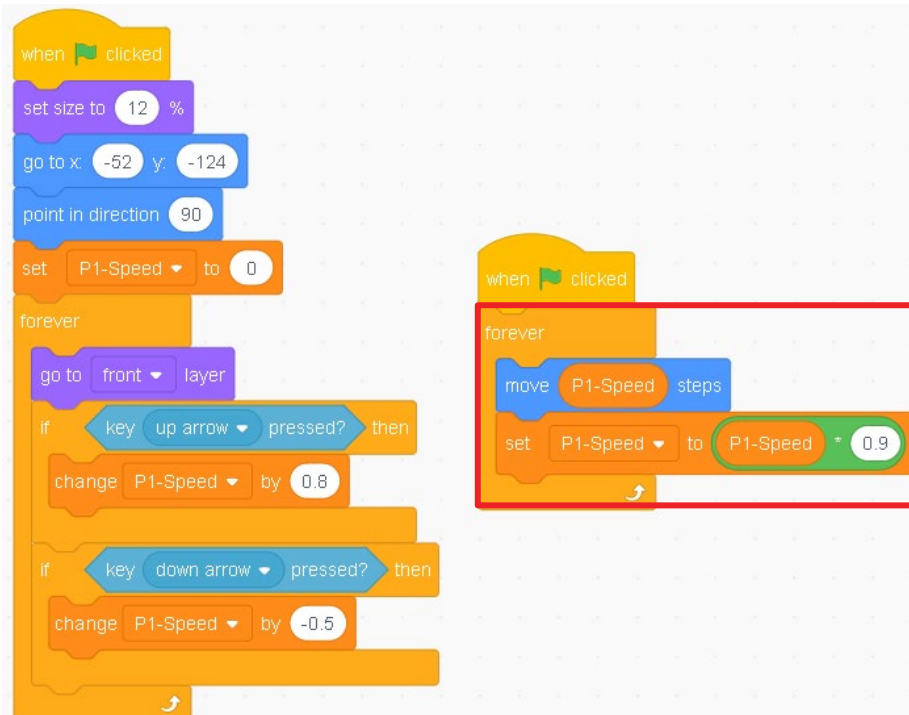
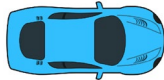
By putting a move "P1-Speed" into a forever loop, we can make the car move itself, whenever the P1-Speed is not zero, the car will move.

But once we press <up> for a while then let go, the P1-Speed won't decrease until you press <down>.



Car Race Game – Advance Motion Control

Script:



Therefore, we will make the value of P1-Speed keeps depleting (10%) in every loop until it reaches zero.

In very slow motion, when your P1-Speed is at 10 initially, then you release the <up> button, it will go:

1st loop: become 9 (-10% from 10)
2nd loop: become 8.1 (-10% from 9)
3rd loop: become 7.29 (-10% from 8.1)
4th loop: become 6.56 (-10% from 7.29)

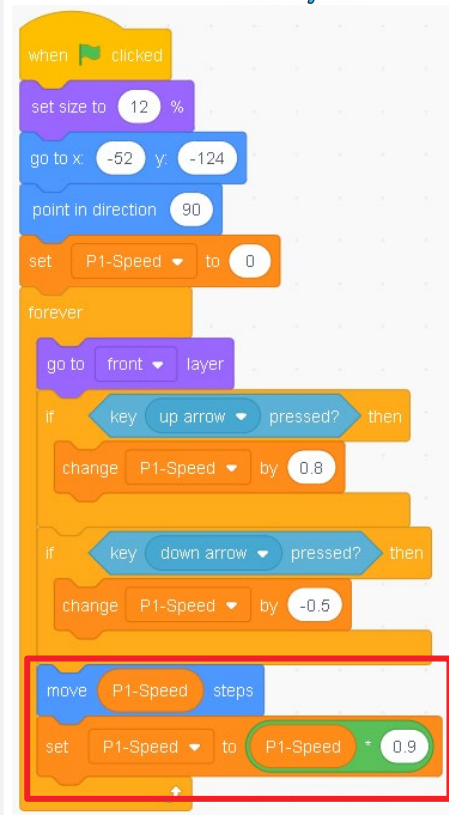
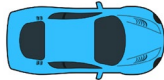


nth loop: until reaches 0



Car Race Game – Advance Motion Control

Script:



We can put them into the same loop after the if-statement.

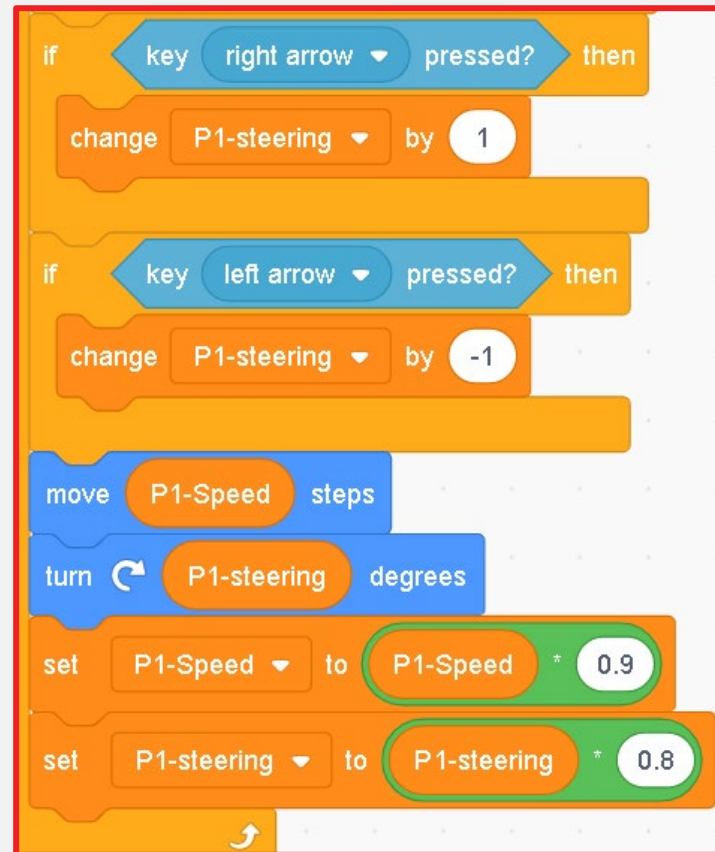
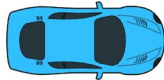
***Does matter if the if-statement is True or False, it will still execute the command after that.**

So in this it will execute the same way as you split the forever loop.



Car Race Game – Same for Turning

Script:



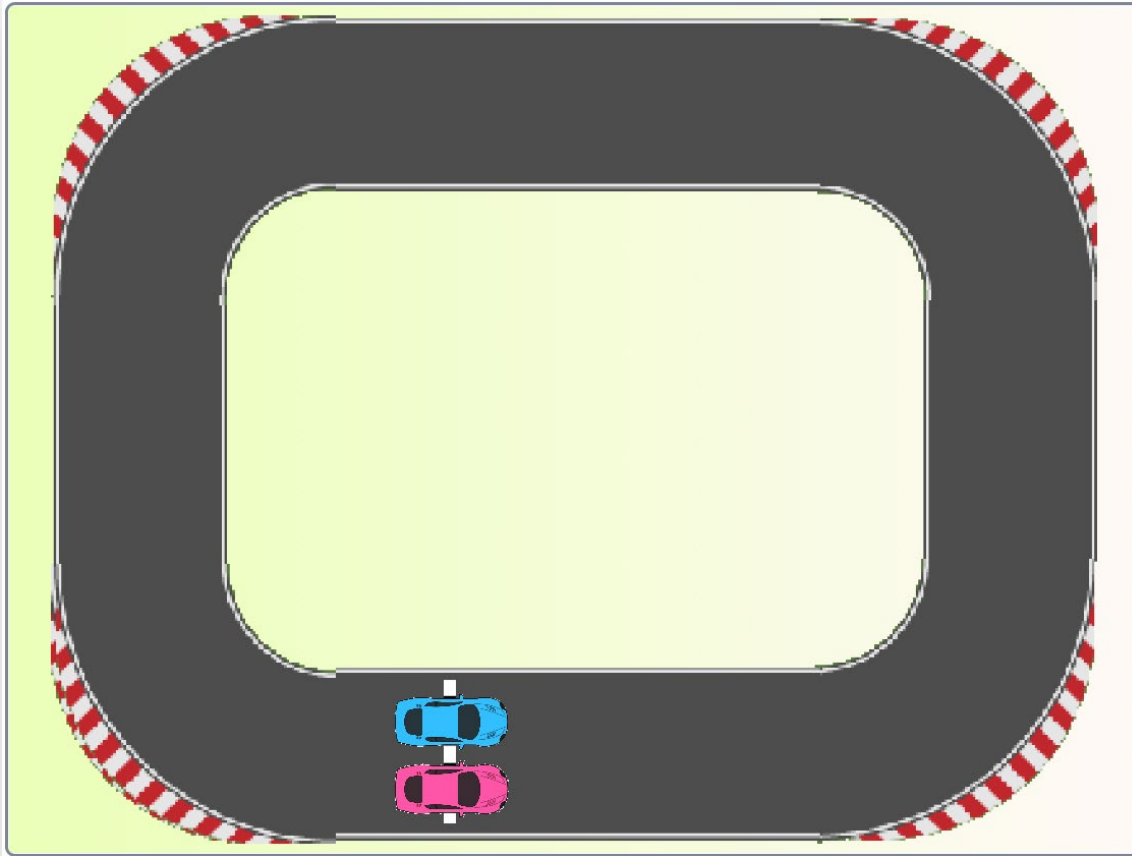
I will add a variable call steering to turn the car.

As we only increase or decrease the value of steering, we will only use “turn clockwise for — degrees”.

In future we will often use value to determine direction (negative means opposite direction).



Run your Game and test it



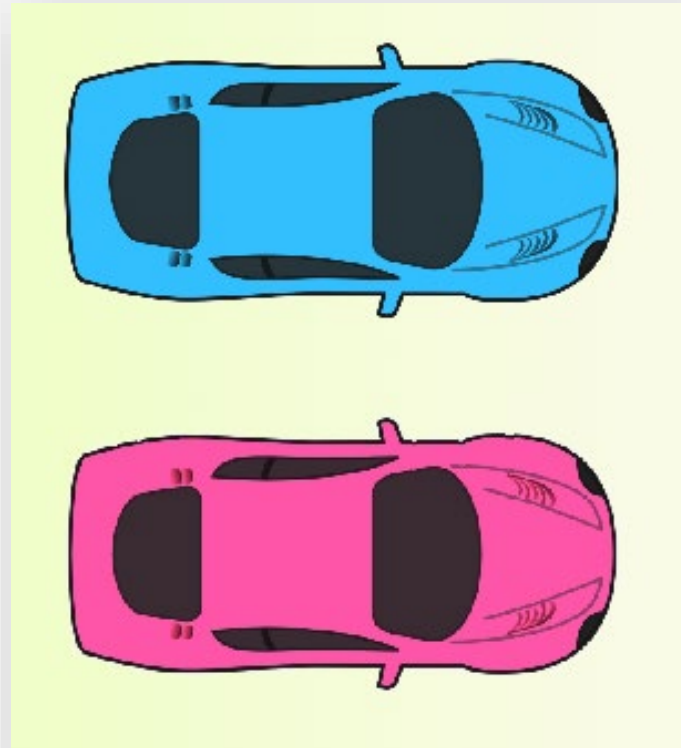
Now run your game and test it and feel the different in the control.

Previously we learnt how to do smooth motion control, now is the advance version.

And you will feel the momentum of the car when you control it.



Script your P2 car – Advance Motion Control



Now you can duplicate your car for P2.

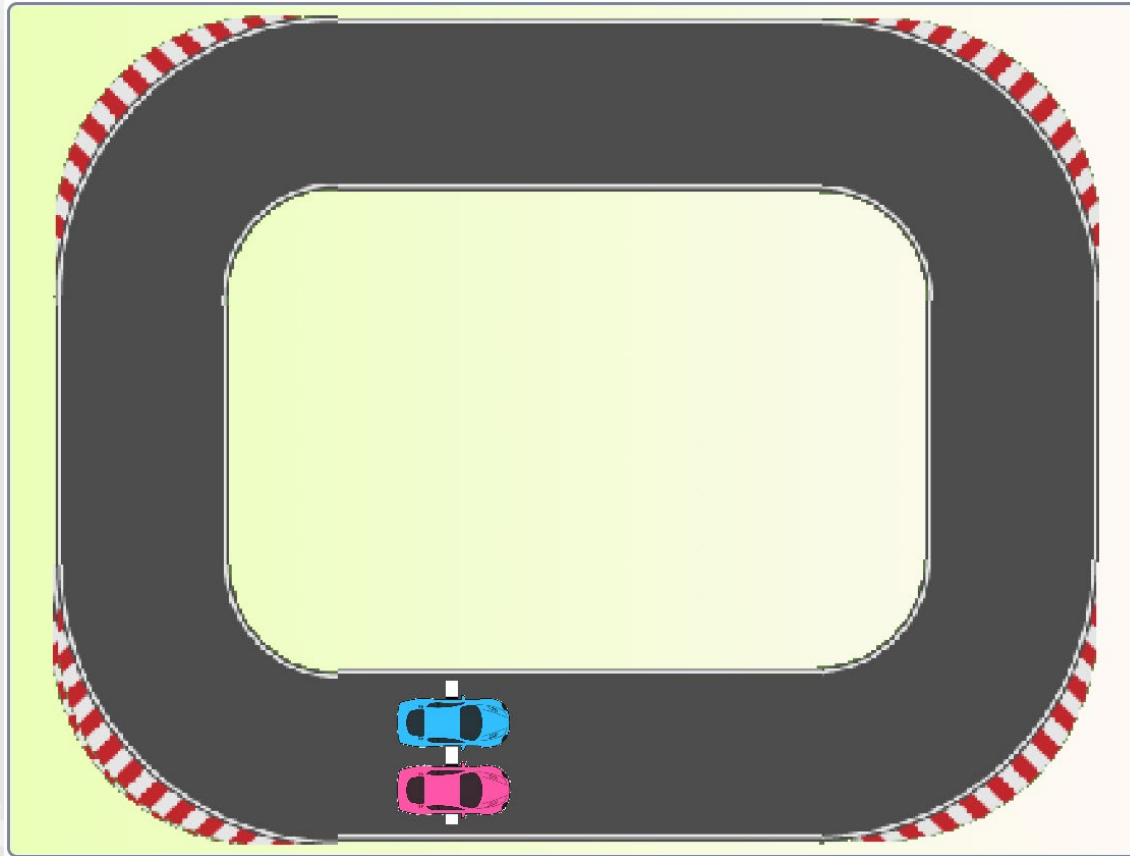
Please be aware of each variable, you have to create a new speed and steering variable for P2, you can name it as “P2-Speed” & “P2-Steering”.

**Remember to set the checkpoint mechanism for the P2 also.*



ASSIGNMENT *for*

Lesson 2-6



L2-6 – Mission

We don't want the car to restart to the starting position when moving off-track. Instead, I want the car to move slower when it moving on off-track.

And when it move back to the track, the speed will become normal again.

Please also prepare different maps (at least 3 maps) for next lesson.



You can direct message your teacher and ask your question through [Slack Robotene Community](#) or arrange a [One-to-One Consultation](#) with your teacher.



Any Questions?



Thank you :)