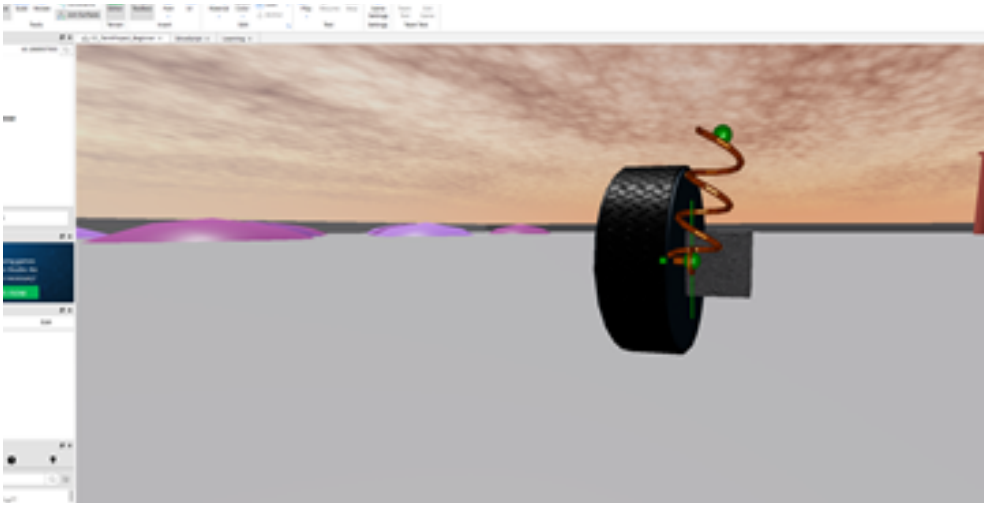
ROBLOX LESSON 5

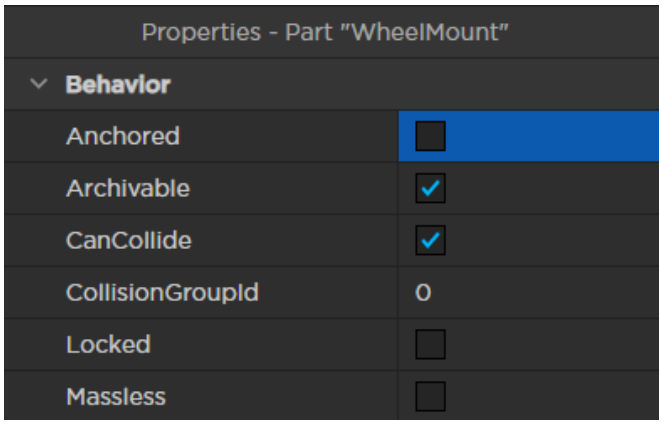
TERM PROJECT

TERM PROJECT: RACING GAME

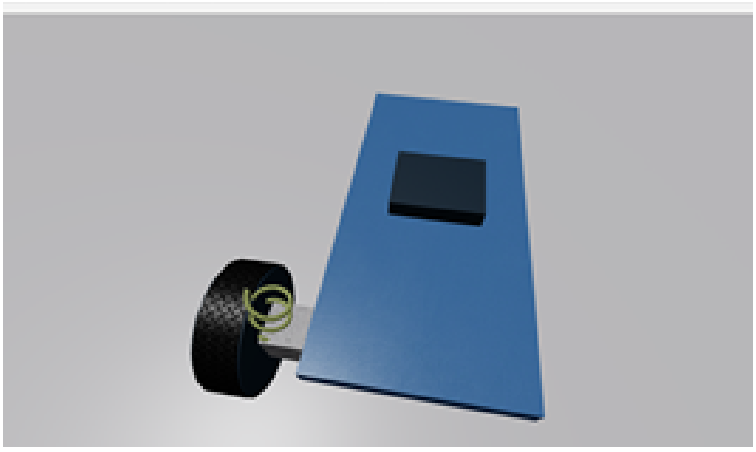
1. Continuing from last week, let's move the wheel module together using the move tool so our wheel is right next to the wheel mount.



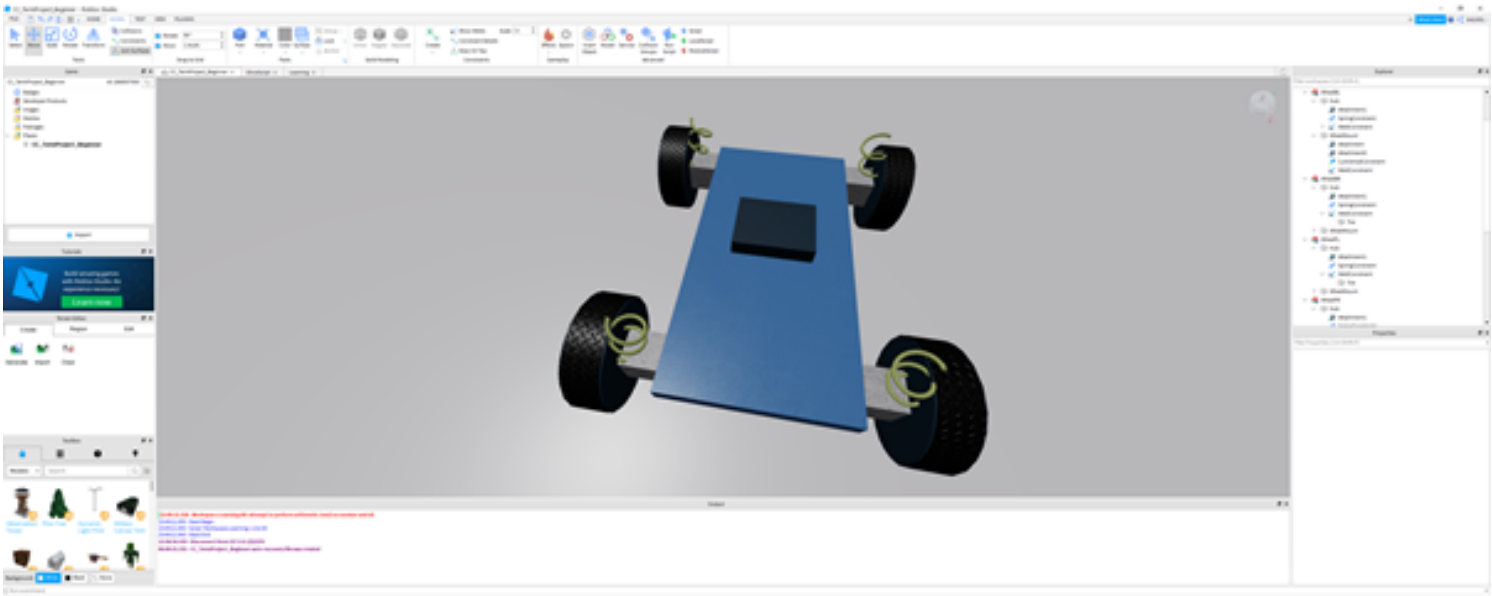
2. Let's test our spring's settings by anchoring the spring (tick the checkbox).



3. Once you're satisfied with the "springiness", continue to the next step.Next, we should move the wheels next to the base using the move tool..

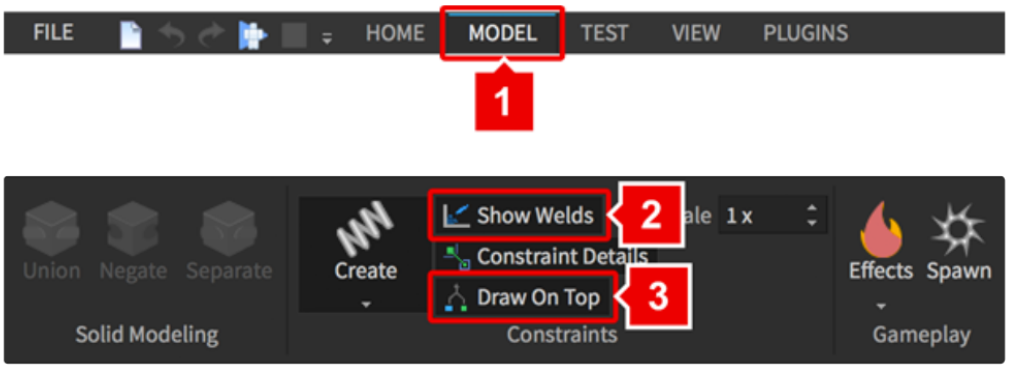


4. Next, we can duplicate this wheel four times to give our four driving wheels.

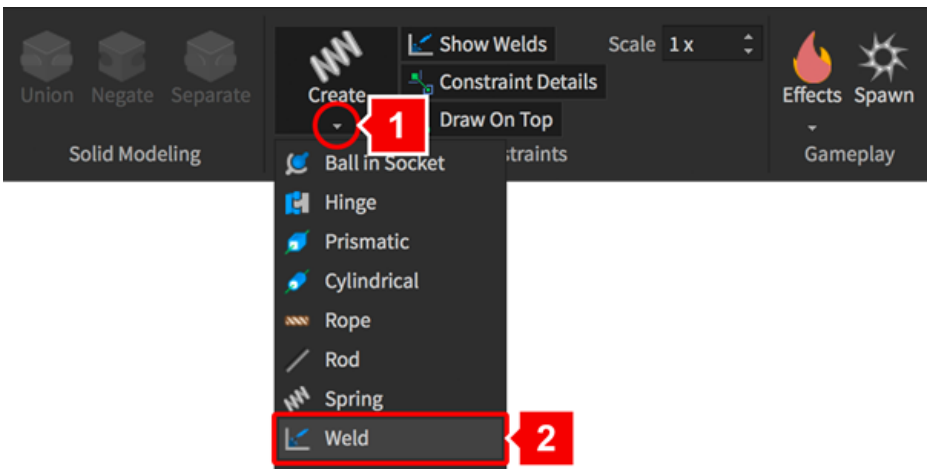


5. Next, let's weld the wheel mounts to the base so they don't fall off when we start driving!

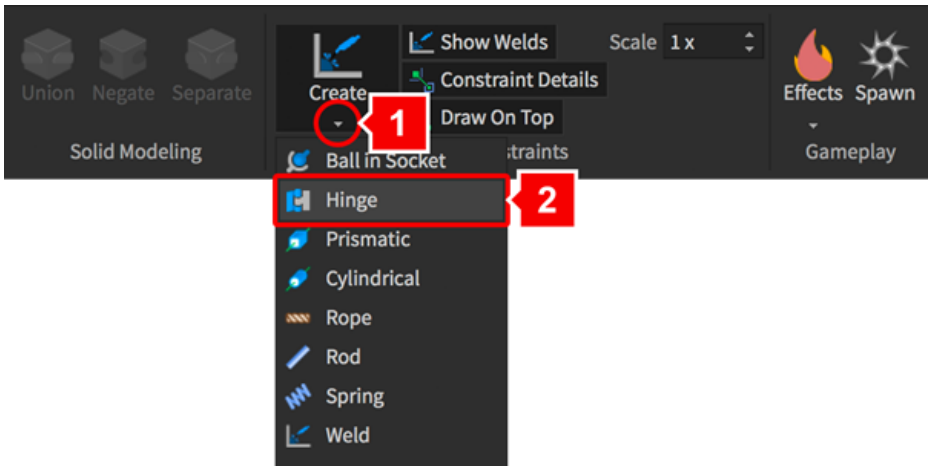
Protip: Before we start, let's show the weld details so we know what we're working with. In the Models tab, check show welds.



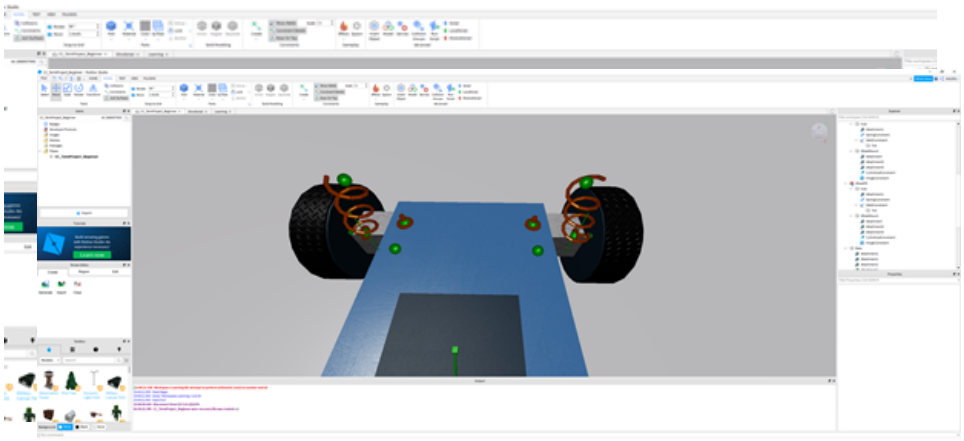
6. Select welds from create. Click the wheel mount, then the blue base. This should create a single weld. Repeat this for both back wheels (wheels further from seat).



7. Next, we should hinge the front wheels. Let's select the hinge constraint from the model tab.



Then select the wheel mount and the closest attachment point on the blue base. It should look like this:



8. We should select both hinges in the Explorer and set their properties. We should change the default properties to the following.

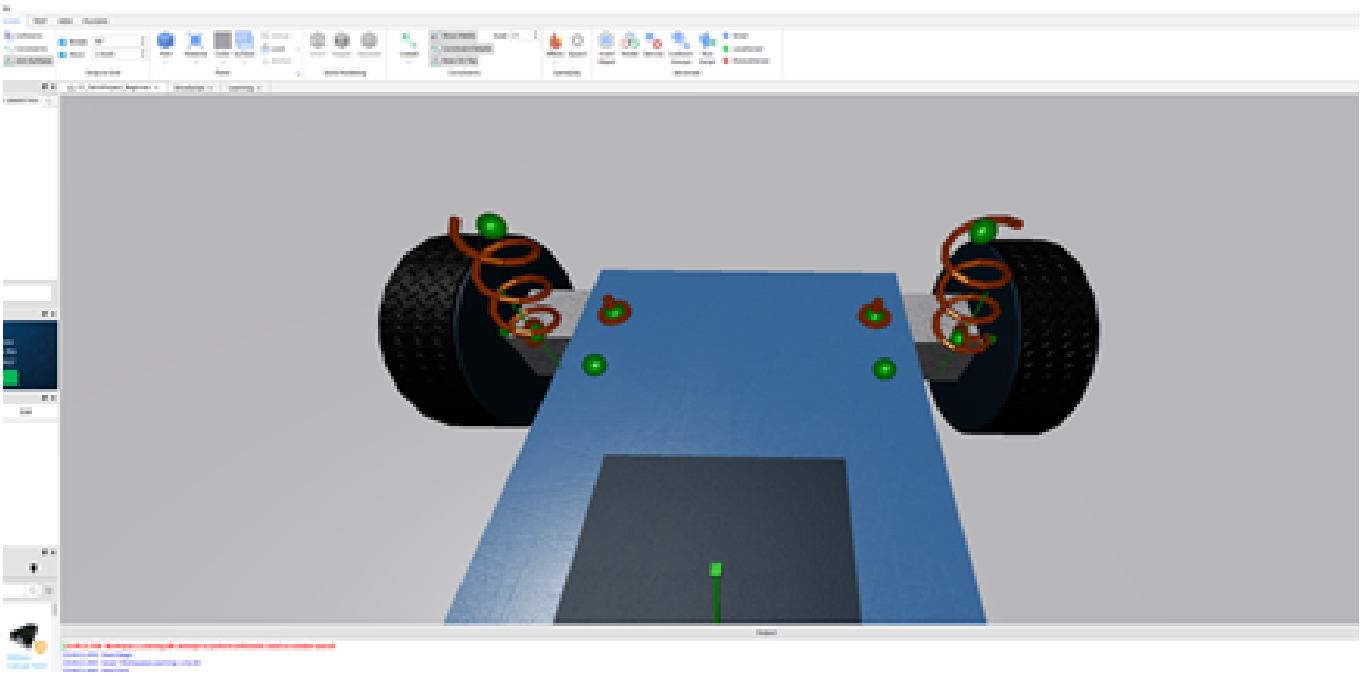
B. Set Hinges as Servos

Properties - HingeConstraint "HingeConstraint"	
Hinge	
ActuatorType	Servo
LimitsEnabled	☐

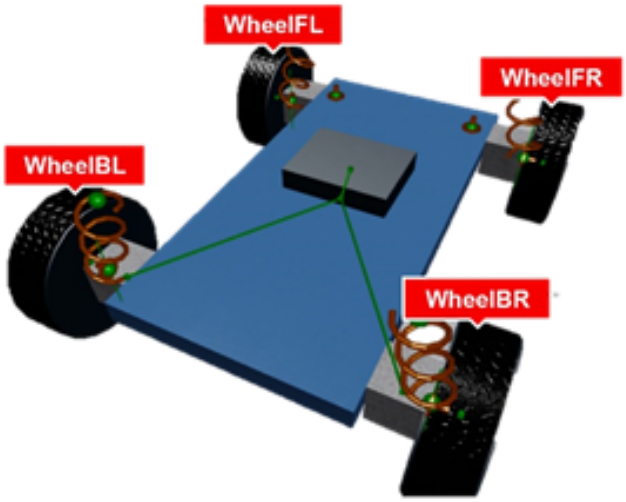
C. Set Servo Properties

Servo	
AngularSpeed	5
ServoMaxTorque	100000
TargetAngle	0

9. Finally, let's move the hinge attachment points closer to the base so that the car turns better. Move the attachment point on the wheel mount one click towards the blue base. You should end up with the following result.



10. Don't forget to rename our four wheels to: WheelBL, WheelBR, WheelFR, WheelFL.

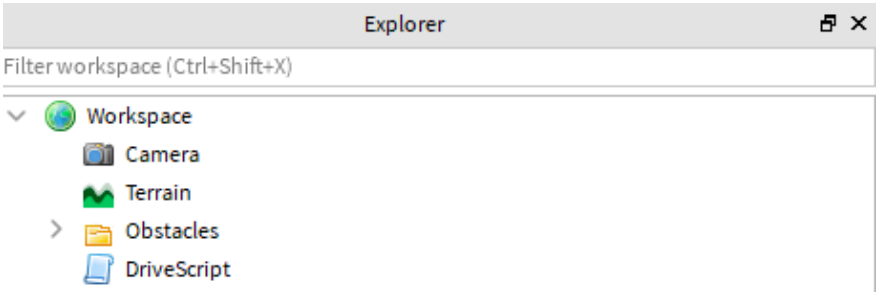


Have fun customising your vehicle!

Try adding colours, shapes, changing springiness or other components we've covered in this course.

TERM PROJECT: PT 2 CODING IN LUA

1. Navigate to your DriveScript file under the project Workspace.



Once this is done, we can enter the template file and start creating variables!

2. In the **TUNING VALUES** section, we should enter the parameters of the vehicle.

These are the numbers which determine how fast the vehicle can go, how it turns corners and much more!

Start by creating the variables and then setting them to the recommended values in the table below:

Scope	Variable	Recommended Value	Description
Local	TORQUE	10000	How hard the wheels can "push" the vehicle across the floor.
Local	BRAKING_TORQUE	9000	How hard the vehicle can "stop" itself from moving.
Local	MAX_TURN_ANGLE	30	How tight of corners the car can turn.
Local	MAX_SPEED	140	How fast the car can actually go.

Once that's done, you're code should look something like this:

```
-- TUNING VALUES
----------------------------------------
local TORQUE = 10000
local BRAKING_TORQUE = 8000
local MAX_TURN_ANGLE = 30
local MAX_SPEED = 140
----------------------------------------
```

4. Under the **DRIVE LOOP** section, create a new Comment called: **INITIAL MOTOR VALUES**

```
-- DRIVE LOOP HERE
----------------------------------------

----------------------------------------


-- INITIAL MOTOR VALUES
----------------------------------------

----------------------------------------
```

5. Now we want to create a bunch of **local variables** to describe the car's current velocity and motor properties.

Start by creating the variables and then setting them to the recommended values in the table below:

Scope	Variable	Recommended Value	Description
Local	currentVel	getAverageVelocity()	This function will be provided to students. An explanation for the parenthesis can include "it tells our program to run a separate piece of code that tells us the average velocity of the car".
Local	targetVel	0	This variable sets the initial target velocity for the motor to 0.
Local	motorTorque	0	This variable sets the initial torque of the motor to 0.

6.Once our variables are added, our program should look like this:

```
1  -- DRIVE LOOP
2  ----------------------------------------
3
4  ----------------------------------------
5
6  -- INITIAL MOTOR VALUES
7  ----------------------------------------
8  local currentVel = getAverageVelocity()
9  local targetVel = 0
10 local motorTorque = 0
11 ----------------------------------------
```

4. Finally, lets add some if/else statements which tell the car whether it should idle, increase speed, or decrease speed.

- **If** the **throttle** (the value which controls whether we want the motors to start or stop) **is less than 0.1:**
    - we should **set the torque** (how hard the wheels push the car across the floor) **to a small number,** namely 100. We will call this "idling".

```
-- Idling
if math.abs(throttle) < 0.1 then
        motorTorque = 100

```

- **If** the **throttle** is **greater than 0.1:**
    - we should **set the torque** to a **high number** to get the car moving once the target speed is set.
    - **Copy** the **else if** statement from the end of the file in **--ACCELERATION CODE** section

```
-- Accelerating
elseif math.abs(throttle) > 0.1 then
        -- Reduce torque with speed (if torque was constant, there would be a jerk reaching the target velocity)
        -- This also produces a reduction in speed when turning
        local r = math.abs(currentVel) / MAX_SPEED
        -- Torque should be more sensitive to input at low throttle than high, so square the "throttle" value
        motorTorque = math.exp( - 3 * r * r ) * TORQUE * throttle * throttle
        targetVel = math.sign(throttle) * 10000  -- Arbitrary large number
```

- Finally to break the car, we set the **motor torque** to **equal** BRAKING_TORQUE in the **else statement**.

```

-- Brakingif
else
        motorTorque = BRAKING_TORQUE
end
```

- Don't forget to **end** your code.