Book 3 – Switches, My Blocks and more

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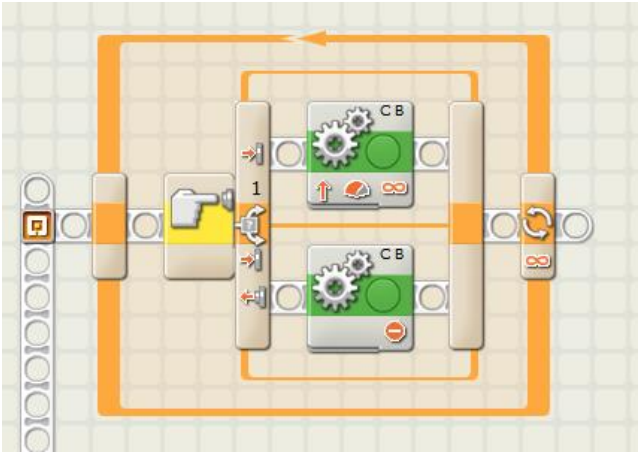
Congratulations on achieving your Green Ps.

In this booklet you will learn how to use:

1. Switches so your robot can choose between two different arms of the program.
2. 'My Blocks' so you can save parts of your program into blocks that can be used over and edited.
3. Collect data using the View menu and use this in your programs.

Challenge 1 –

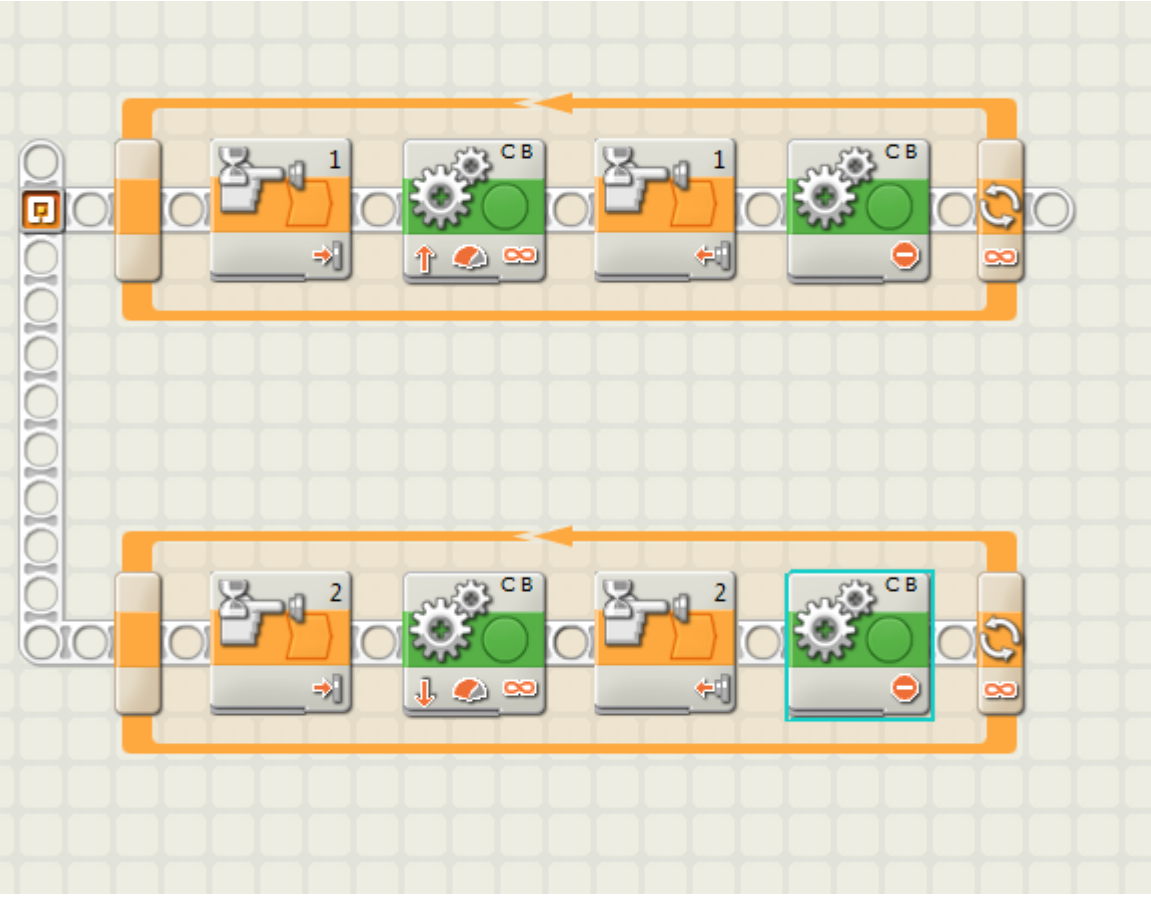
Program a Touch Sensor Remote Control using 1 touch sensor and a switch.



This program tells the robot to move forwards when the touch sensor on Port 1 is pressed and stop when the touch sensor is released.

Or Advanced

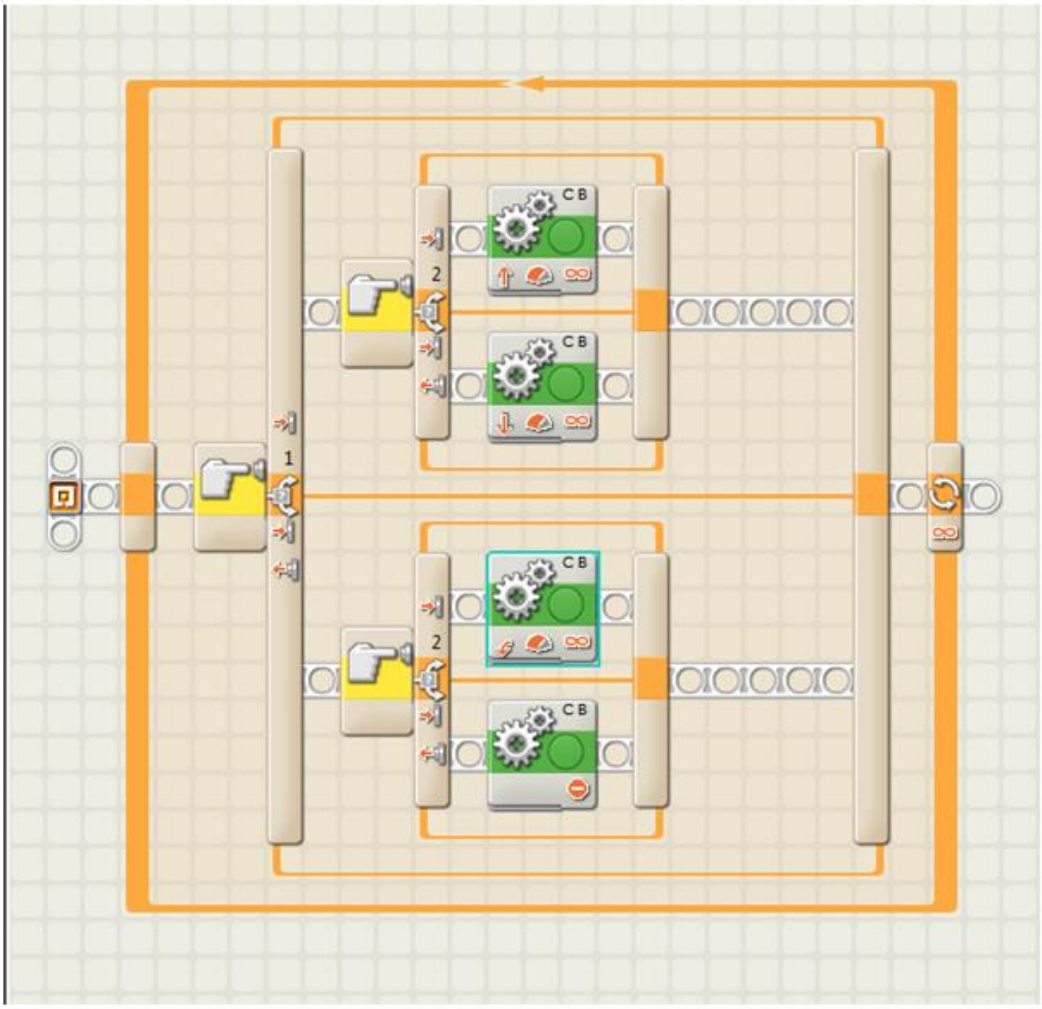
Program a Touch Sensor Remote Control using 2 touch sensors on parallel sequence beams.



Advanced – Option two (more controls)

This is called embedded switches.

Double remote control switch



When touch sensors 1 and 2 are pressed the robot moves forwards.

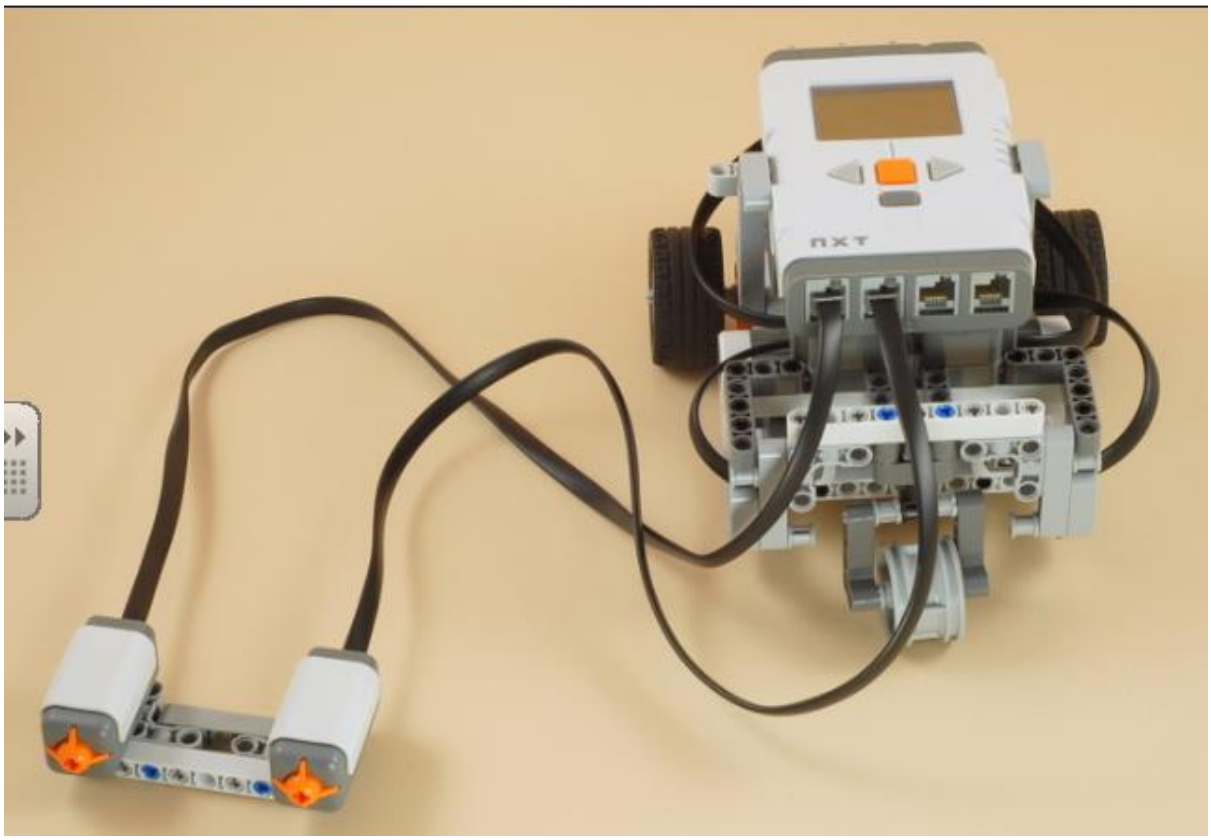
When only touch sensor 1 is pressed the robot reverses

When only touch sensor 2 is pressed the robot turns

When no touch sensors are pressed the motors stop.

Challenge 2 –

Design and build a remote control touch sensor for 2 touch sensors.



You may use building instructions.

Or Advanced

Design and make your own design.

Challenge 3 (everybody)

You will be using the symbols:

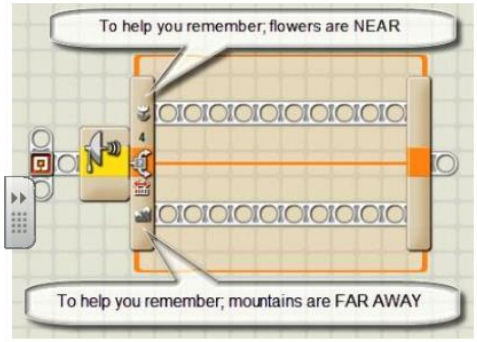
Less than < e.g. 5 is less than 10 or 5<10

Greater than > e.g. 15 is greater than 7 or 15>7

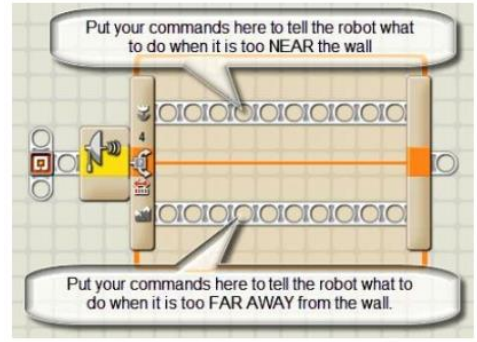
Complete the activities on the marking sheet

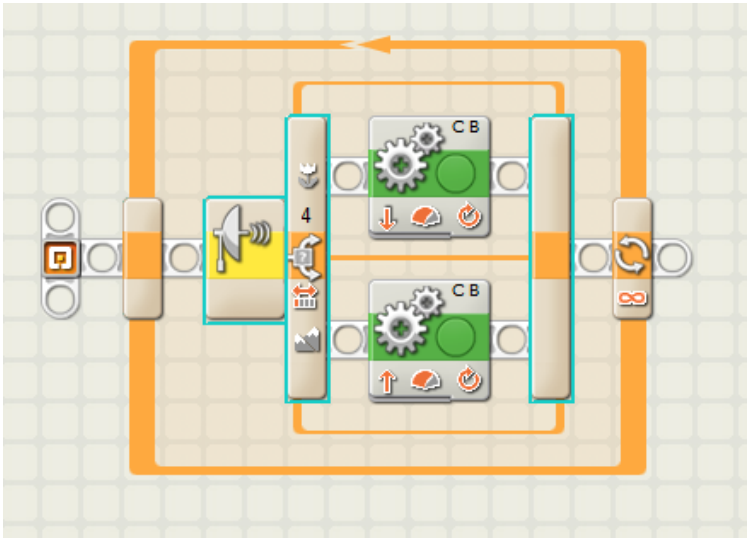
Challenge 4

Use a switch and the ultrasonic sensor to program the robot to move **forwards for 2 rotations** when it is **greater than 25cm away from an object** and **reverse for 2 rotations** when it is **closer than 25cm from an object.**



Now let us tell our robot to move away from the wall when it is too NEAR the wall.





Or Advanced

Write the program above and add appropriate sounds.

Challenge 5 - Everybody

Use your light sensor and the 'View menu' on your robot to read how much light is reflected from yellow, red, green, white and black stripes. Your light sensor must be facing down and only a couple of mm from the coloured surface.

Hint: Go to 'My Files' on your NXT and use the grey arrows to find the view menu.

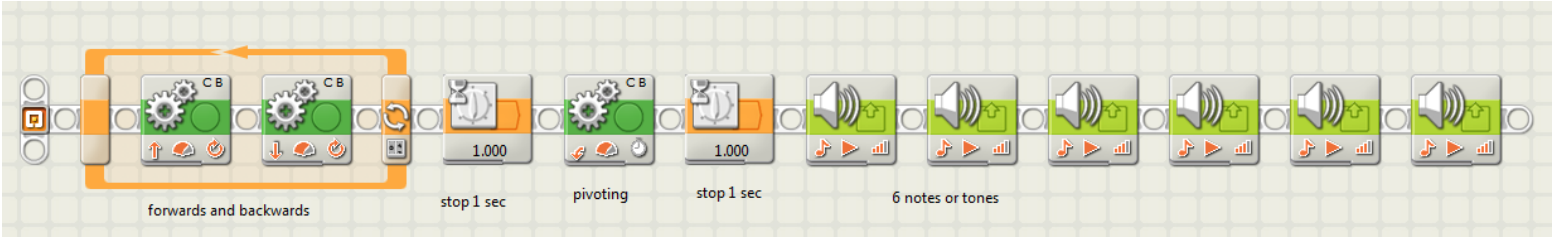
Select Light sensor, reflected light and Port 3.

Record your readings on your 'Marking Sheet.'

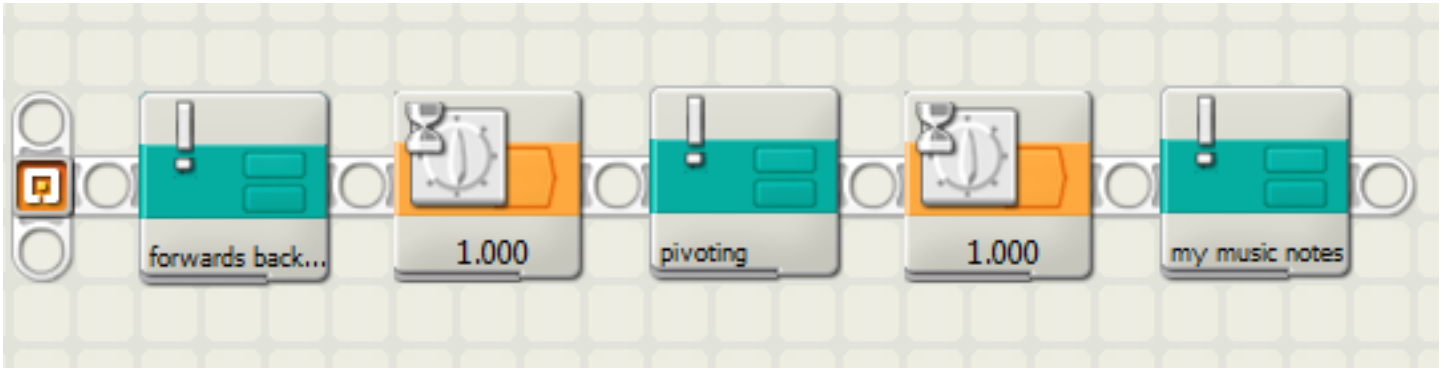
Challenge 6 (everybody)

Write the following program and condense the chunks into 'My Blocks'.

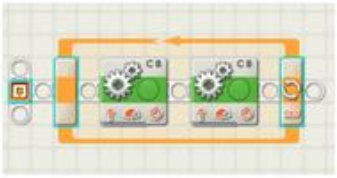
Robot moves forwards and backwards 3 times, stops for one second, robot pivots for 4 seconds, stop for one second, play some music that you have composed with at least 6 notes.



Create 'My Blocks' for the different chunks or parts.

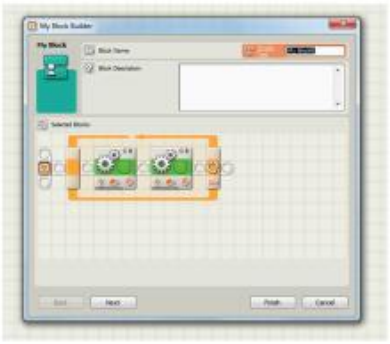


Creating ‘My Blocks’



Highlight part of program you want

Press create ‘My Block’ button



Name your ‘My Block’ and press next

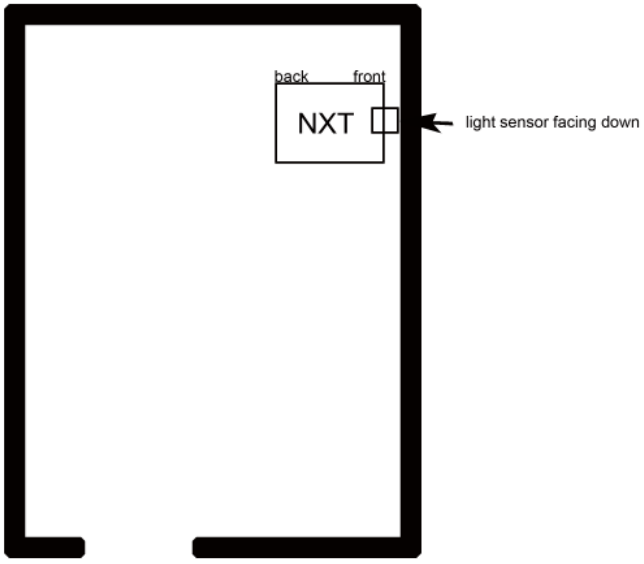
Click on the icon or picture that you want and press Finish

Level 3 Driving Test

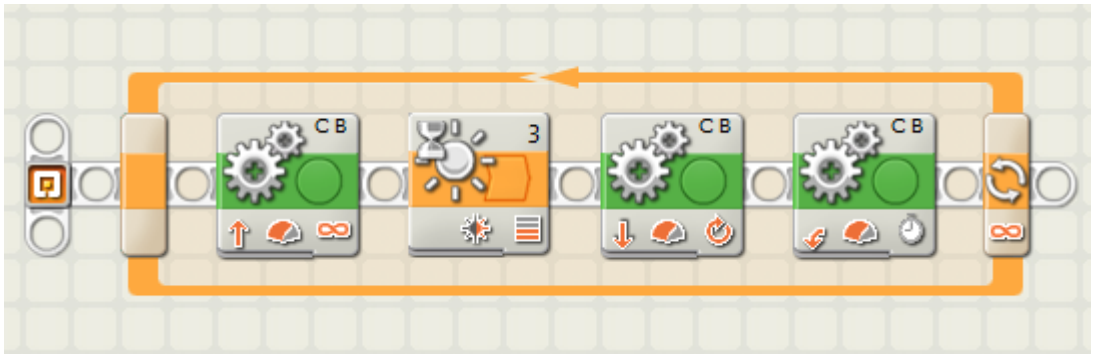
Bug in a Box

Set up your robot as shown with the light sensor facing downwards a few mm from the ground. Collect a 'Bug in a Box Sheet' from the back of the room where the sinks are.

Program your robot to escape as quickly as possible from the box starting as shown in the diagram. Time how long your escape takes.



You may use Level 1 program below



Where motors C and B move forwards unlimited

Continued next page

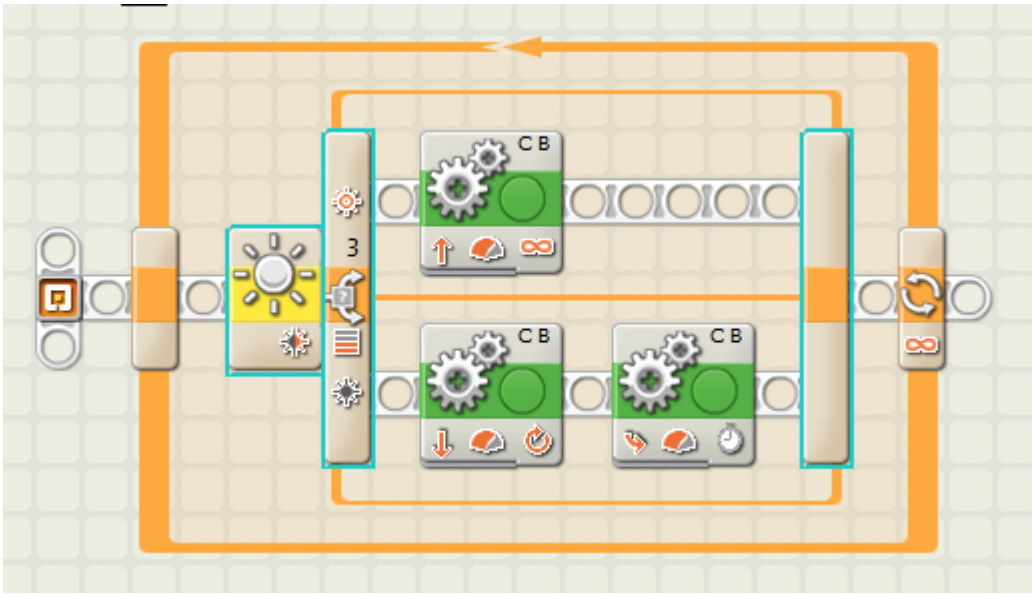
The light sensor attached to port 3 waits for the amount of reflected light to be less than 40 percent

Then the robot reverses a short distance eg 2 rotations

The robot pivots backwards for a short time eg 2 seconds

Program returns to the beginning and the robot moves forwards again…and the loop continues

<u>Or use Level 2</u>. Same as above but program uses a switch. The light sensor reading should be less than 40% reflected light i.e. <40% reflected light



Forwards unlimited

<u>Reverse for a short time and then turn</u>

Or Advanced (Wall Following Robot).

Program your NXT to follow a black wall…the black wall of the big table in the classroom.

You will need to have your ultrasonic sensor facing to the side at the level of the wall.

Super advanced

Program your NXT to follow a black wall…the black wall of the big table in the classroom.

Add a touch sensor at the front so when the robot hits an object it reverses slightly and turns and then continues following the wall.

You will need to have your ultrasonic sensor facing to the side at the level of the wall.

These tests must be marked by your teacher.

Congratulations you now have your Open Drivers' Licence (regular or advanced).

The real fun begins now……..see your teacher for the next instalment.

Level 3 Driving Test Marking Sheet

Bug in a Box

Set up your robot as shown with the light sensor facing downwards a few mm from the ground. Collect a 'Bug in a Box Sheet' from the back of the room where the sinks are.

Program your robot to escape as quickly as possible from the box starting as shown in the diagram. Time how long your escape takes.

Level 1 program used ☐

or Level 2 program used ☐

Or Advanced (Wall Following Robot).

Program your NXT to follow a black wall…the black wall of the big table in the classroom. ☐

Or Super advanced

Program your NXT to follow a black wall…the black wall of the big table in the classroom.

Add a touch sensor at the front so when the robot hits an object it reverses slightly and turns and then continues following the wall. ☐

Teacher's signature_____ **date**_____

Congratulations you now have your Open Drivers' Licence (advanced or regular)

The real fun begins now……..see your teacher for the next instalment.

Book 3 –Marking sheet

Challenge 1 –

Program a Touch Sensor Remote Control using 1 touch sensor and a switch. 

Or Advanced

Program a Touch Sensor Remote Control using 2 touch sensors and two switches on parallel sequence beams.

Write in your own words **on the marking sheet** what the program is telling the robot to do.

_____
_____
_____

Extra Advanced – Hard but very fun!!!

Marking partner name_____signature_____date_____

Challenge 2 –

Design and build a remote control touch sensor for 2 touch sensors. You may use building instructions.

Or Advanced

Design and make your own design.

Marking partner name_____signature_____date_____

Challenge 3 (everybody)

Use the < and > symbols

6 ___ 4 5____10 3.2_____9.6 40_____100 92_____100

Draw the less then symbol Draw the greater than symbol

Marking partner name_____signature_____date_____

Challenge 4

Use a switch and the ultrasonic sensor to program the robot to move **forwards for 2 rotations** when it is **greater than 25cm away from an object** and **reverse for 2 rotations** when it is **closer than 25cm from an object.**

Or Advanced

Write the program above and add appropriate sounds.

Marking partner name_____signature_____date_____

Challenge 5 - Everybody

Use your light sensor and the 'View menu' on your robot to read how much light is reflected from yellow, red, green, white and black stripes.

% reflected light from the following colours:

Yellow_____ red_____ green_____

White_____ black_____

Marking partner name_____signature_____date_____

Challenge 6 (everybody)

Write program and condense the chunks into 'My Blocks'.

Marking partner name_____signature_____date_____