#1 VEHICLE INSPECTION

Congratulations on becoming the owner of a brand new Pro-Bot. The Pro-Bot is a great vehicle that you can use to learn with.

You can program your Pro-bot to do many different things.   These Learner Driver Cards will help you learn the basics so your Pro-Bot will be hitting the race track in no time.

## Time for a vehicle inspection!

Before you take your Pro-Bot for it's first spin, you need to do a vehicle inspection to know how it works.   A Pro-Bot has many great features including:

- Front touch bumper sensor, rear touch bumper sensor, light sensor and sound sensor.
- Keys you can press to program the Pro-Bot
- An LCD Screen to display your program
- A pen holder that allows your Pro-Bot to draw
- Fully functional headlights using light sensors
- Voice activated functions

Task

Conduct a vehicle inspection on your Pro-Bot.

Use the diagrams shown here as your reference. Locate each of the parts and features shown on your own Pro-Bot.
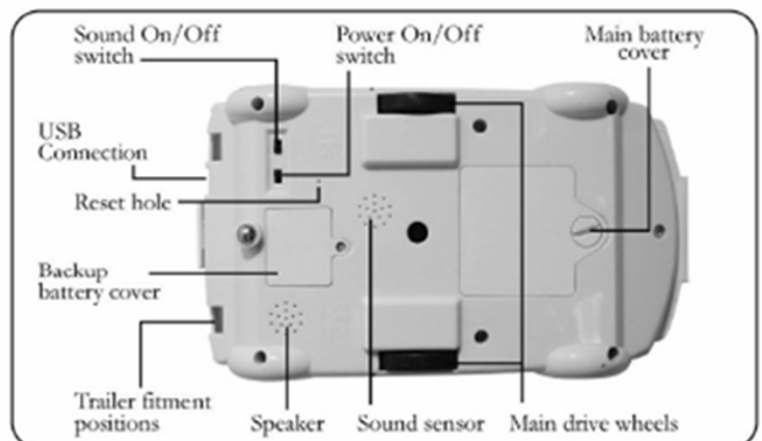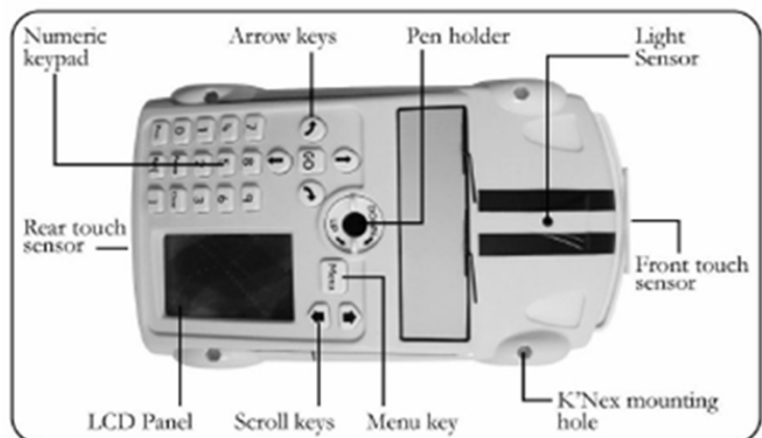
#2 A SPIN AROUND THE BLOCK

It's time for your first Pro-Bot Driving Lesson.
Let's turn your Pro-Bot car on and take it for a spin
around the block.   To do this, we are going to use the
four arrow keys and the go key that is on the top of
your Pro-Bot. When you press these, the commands
you enter will appear in the LCD screen.

How the keys work

Press the **forward button**
to move forward 25cm.

Press the **back button** to
move back 25cm.

or

Press to **rotate** 90 degrees

.

Press the clear button if you make a mistake. You can also hold the
clear button down for three seconds to get to a menu that will allow
you to clear all of the instructions you have entered.

Press the go button to **start** your pro-bot.   You can also press this
button at any time when your pro-bot is moving to make it **stop**.

The Pro-Bot is not limited to 25cm steps and 90 degree turns. But for now,
we'll just focus on moving it with these increments.

Tasks

1. EXPLORE

Now that you know how the buttons work, spend some time programming
the Pro-Bot to move forward and backwards and to turn and go in different
directions.

2. CHALLENGES

Program your Pro-Bot to:

- move around a square shaped block with 25cm sides.
- move around a rectangle shaped block.

#3 CRUISE CONTROL

Before you can hit the race track or the streets, we need to make sure you can control your Pro-Bot. You will need to be able to estimate how far the Pro-Bot needs to travel and to then be able to program the Pro-Bot to move that distance.

In your last driving lesson, you learnt how to program the Pro-Bot to move forward and back in 25cm increments.   In this driving lesson, you'll learn how to program the Pro-Bot to move in other increments.

Setting the distance

To make the Pro-Bot go different distances you press the forward or back button and then enter the number of cm you want the Pro-Bot to move.   To move the Pro-Bot 37 cm, you would press the forward button, then press the 3 and the 7 buttons and then press go.

Tasks

1. **TEST DRIVE**
   Have a go trying to move your Pro-Bot forwards and backwards different distances. Can you program your Pro-Bot to move forward 38cm, back 12cm and then forward 90cm?

2. **CONVERTING DISTANCES**

   You can only program the pro-bot to move in centimetre increments. If you want your pro-bot to move more than a metre, you will need to convert the amount into centimetres.

   Can you program your pro-bot to:

   a) Move forward 1.67m
   b) Move backwards 2.9m

3. **STOP SIGN**

   Create a stop sign and place it in a position away from your Pro-Bot. Estimate how far it is away from your pro-bot and then program your pro-bot to drive towards it. See how close you can get to the sign without hitting it.

#4 STOPPING AND STARTING

Did you know that police will fine you if you don't bring the wheels of your car to a complete halt at a stop sign?   This is one of the most important road rules that help keep us safe.

When you are driving your pro-bot, the same rule applies when you reach a stop sign.   You have to make the pro-bot stop and then restart it's journey after a moment.

Can you figure out how to do this?   Look at the buttons on your pro-bot and see if you can work out.
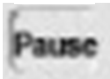
Stop and Start

To program your pro-bot to stop completely and then go, you will need to use the pause button.

Try this:

Press the **forward** button to move forward 25cm.

Press the **pause** button and press the **3** button to tell the pro-bot to wait three seconds.

Press the **forward** button to move forward 25cm.

Task

1. **CREATE A T JUNCTION INTERSECTION**
   A T Junction Intersection is an intersection where two roads meet.   The sign shown here shows what a T Junction looks like.   Your first task is to use materials in your classroom to design your own T Junction intersection that your pro-bot can drive along. For safety, a T Junction intersection always has a stop sign for the cars travelling on the road that ends.   Place a stop sign in your T Junction.

2. **STOPPING AND STARTING AT THE T JUNCTION**

   Program your Pro-Bot so it drives towards the T Junction, stops for 3 seconds at the Stop Sign and then turns left or right.

#5 MASTERING TURNS

If you're going to master driving the pro-bot, you're going to need to master making turns with different angles.

So far you've already mastered making turns that are 90 degrees. This is really useful as the majority of turns you need to do when driving around the streets are 90 degree turns.   Sometimes though, you'll come across roads that are shaped differently. An example of this is when you reach a Y Junction. The sign shown here indicates that a Y Junction is ahead.   When a driver reaches a Y Junction, the road splits into two different roads at an angle which is usually 45 degrees.

Turning at different angles

To program your Pro-Bot to turn at any number of degrees, you press the right or left rotate buttons and then type in the number of degrees you want your pro-bot to turn.

If your pro-bot reached a Y Junction and you wanted it to turn left, you would enter:
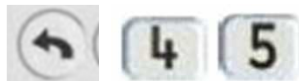
This would make your pro-bot turn left at a 45 degree angle.   You can turn your angle at any degrees simply by changing the numbers you enter after the rotate button.

Task

1. **TURNS AT DIFFERENT ANGLES**
   Program your pro-bot to drive along and then make turns at a number of different angles.   You could begin with a 45 degree angle by following the instructions above. You could then try some angles of your choice.

2. **CHANGING DIRECTIONS**
   Your pro-bot is going in the wrong direction.   Program your pro-bot to turn so that it is in the same spot but facing the opposite direction. What degree angle did you use?

3. **360 DEGREE TURNS**
   Program your pro-bot to rotate 360 degrees. What happens?

#6 ALPHABET ROADS

In the last two activities, you've explored how you can program your pro-bot to drive through T and Y intersections.   These are just two of the shapes we find in roads that are given names after letters of the alphabet. You may have also heard of U turns and S bends.

In this activity, you'll be practising programming your pro-bot to make turns in different angles as you get the pro-bot to write different letters from the alphabet.

Drawing with your Pro-Bot

Your pro-bot has a pen holder which can hold a pen or whiteboard marker. When a pen is inserted into the pen holder and the holder is positioned down, your pro-bot will draw as it moves.   This means you can get it to draw lines, shapes, patterns, pictures and just about anything you can imagine and program.

Try this:

1. Place your pen in the pen holder of your pro-bot.   Check that the pen reaches the bottom of the centre wheels of your pro-bot.

2. Place your pro-bot on a piece of paper, cardboard or a whiteboard and program the pro-bot to move forward 25 centimetres.

Task

1. LETTER WRITER CHALLENGE

Can you get your pro-bot to write some of the letters of the alphabet?

See how many letters you can program your pro-bot to draw.   You can use a piece of paper to draw your chosen letter on and plan your program before using the pro-bot.

E Y U   N H   L S W

#7 FAST & EFFICIENT

One of the key things car designers
aim for is to make cars that are efficient.

The designers of the pro-bot also wanted to make
driving a pro-bot as efficient as possible.   For
this reason, they have included two buttons you
can use together to get your pro-bot to repeat
instructions. This saves you time when
programming your pro-bot.

Let's look at how you can use these buttons.

Task 1. Around the block – Tortoise Style

Let's program your pro-bot to move around a block that has sides that are
25cm in length. We're going to do this the slow way. **Enter the following**:

Press **go** to watch your pro-bot go for a spin around the block. That's fairly
easy but there's a more efficient way of doing this.

Task 2. Around the block – Hare Style

There is a quicker way to program the pro-bot to go for a spin around the
block.   This involves using the repeat buttons.   These are the two buttons
that contain brackets at the bottom of your keypad.

Enter the following into your pro-bot:

Press **go** to watch your pro-bot go for a spin around the block. Your pro-bot
will move around the block just as it did the first time you programmed it.

So who won?

Both of the programs you just entered and tested had the same end result.
The pro-bot went for a spin around the block and it took the same amount of
time to complete the journey. The second way was more efficient in terms of
the time and amount of commands you had to enter.   By using the repeat
buttons, you can save time when programming. This is a skill worth
mastering as it will not only make you more efficient, but it will give you the
edge when you take on your classmates in pro-bot races and challenges.

#8 SHORT CUTS

In the last card, you learnt how you can use to repeat keys to make your program more efficient and save time.   There is another way you can take short cuts when programming your pro-bot.   This involves using procedures.

What are Procedures?

So far when you have been programming your pro-bot, you have been adding commands into the Main program of the pro-bot. You can tell that you are in the Main program as it has Main at the top.   You can also have other programs programmed into the pro-bot which you can call on in your main program.   These **secondary programs** are called **procedures** and they can each be set up to do a different task.

Types of Procedures

The pro-bot has 40 procedures in total.   Procedure number 1 – 32 can be set up by you to program the pro-bot to do what you want. Procedures 33 – 37 are run when the touch, light or sound sensors are activated. You can edit these procedures to tell the pro-bot what to do when they are activated. Procedures 38 – 40 are procedures that draw special shapes. We will look at these drawing procedures in a later activity.

Task

In this activity, we'll create a procedure and then call it from the main program. Follow these steps:

1. Press the **Menu** button to go to the main menu.

2. Use the **arrows** next to the **Menu** button to select the **New Proc** option. Press **menu** to select this option and create a new procedure.

3. Move to **Proc 1** which is procedure 1 and press **Menu** to select it.

4. Enter the following to set up this procedure to draw a square:

5. Press **Menu** to save the procedure and return to the main program.

6. **Enter the following** to make the probot move forward and then draw the square by calling the procedure. **Press Go** to see your program run.

#9 BUMPER CAR

Your pro-bot is very special as it has front and rear touch sensors. The touch sensors are located in the front bumper bar and licence plate and the back licence plate. You can use these to convert your pro-bot into a bumper car that can change directions and move away from obstacles when it hits them.

Task

In this activity, you'll follow a series of steps to get your pro-bot to bump into something and then change direction.

Step 1 – Turning the Touch sensors on.

1. Press the **menu** button to go to the main menu.

2. Use the arrow keys next to the menu button to highlight the **Sensors** option from the menu. Press **menu** again to select the sensors option.

3. In the sensors menu, use the arrow keys to move down and select the **Touch sensor**. This should have the word **off** next to it. Press **menu** again to turn the sensor **on**. You can go back into the Sensor menu to confirm that it is on by selecting the menu button and selecting the sensor menu again. You use this same process if you want to turn the sound and light sensors on.

Step 2 – Setting up the procedure for the Touch Sensor.

1. Press the menu button to go to the main menu.

2. Use the arrow keys next to the menu button to highlight the Edt Proc option. This is the option that lets you edit the pro-bots built in procedures (33 – 37).

3. You are now going to choose and edit procedure number 33 which is the front touch sensor procedure. To find this, press the up arrow next to the menu button. Select the front sensor procedure (33) and press menu.

4. You will now see the text 33 FRONT at the top of the screen. This shows you are editing the procedure for the front touch sensor. You can now put in what you want the pro-bot to do when it bumps into something. Enter the following:

Step 3 – Setting up the procedure

5. You will now be back editing the **main procedure** for your pro-bot. Enter the following:

6. Place an object 2 metres in front of your pro-bot. Press **Go** to get your pro-bot to move forward. When it hits the object, it should reverse, change direction and drive forward. If not, try again by working through the steps above.

#10 BEEP BEEP!

As a learner driver, chances are from time to time you'll need to beep your horn to tell other cars and people to get out of your way.

To make your pro-bot beep the horn, you need to use a special command. The pro-bot has a range of special commands you can add into your main program and secondary procedures. These include:

Light On	**Sound 1**	**Pen Up**
Light Off	**Sound 2**	**Pen Down**
	Sound 3	
	Sound 4	
	Sound 5	
	Sound 6	
	Sound 7	

Task

In this activity, you will learn how to access the special commands and to add them to your program.   You will also program your pro-bot to put on a musical performance complete with lights, honks and beeps.   If you have more than one pro-bot, you could program each pro-bot differently to create a pro-bot orchestra.

1. Access the **Special Commands** Menu by **holding the Menu button down for 1.5 seconds**.

2. Use the **arrow keys** next to the Menu button to **select** one of the seven sounds.

3. Press the **Menu** button to select the sound and return to the main program.

4. Press **Go** to listen to the sound you have added to your program.

5. **Repeat steps 1 – 4** and choose different sounds or alternatively try one of the light commands.   **Build up** your program so that you have lots of different special commands being used. You should have a lovely symphony of lights and sounds.

6. Now that you have had a go at using the special commands, press the **Menu** button and select **Clear**. From the **Clear menu** select **Clr Main** to clear your main program. Do this anytime you want to start from scratch creating a program on your pro-bot.

If you have completed all ten Learner Driver Cards you should now be ready to go for your open Pro-Bot licence.   Get ready to hit the road!