Kai's Clan Lesson Plan – Level 2 Driver's Licence

Kai's Clan Education Driver's Licence

Now that you have a Level 1 Red Provisional Driver Licence it's time to "Learn" and build skills to gain a Level 2 Green Provisional Driver Licence

"Let's Learn"

Level 2: Green Provisional Driver Licence

Now we will move up to the next level by programming Kai robots to move on the Adventure Mats. There are five mats to choose from.

Mars Discovery   Automated Warehouse   Smart City

Rescue Run   Create Activity Mat
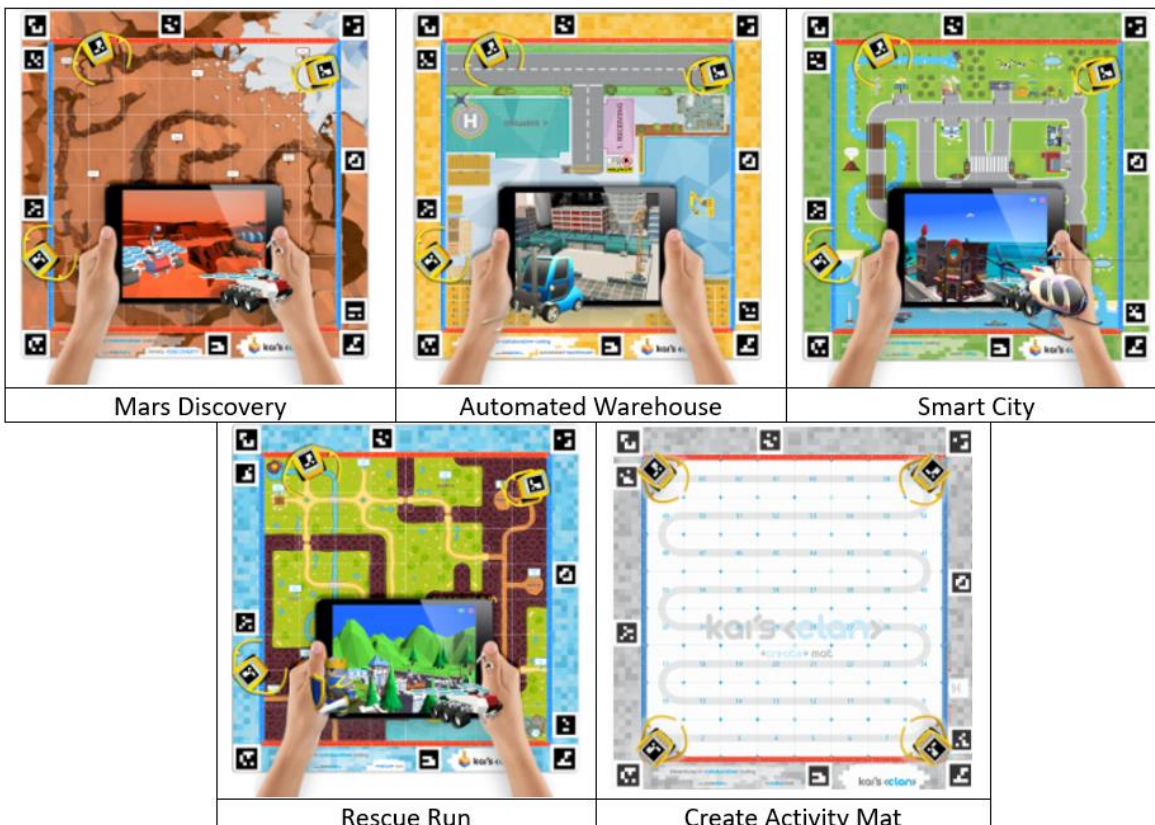
When using the mats, you will need to set up a smartphone on a tripod running the Kai's Eye app. This helps to track the robots as they move around on the mat. This way the physical mat and robots connect in a matching digital environment.

To begin the setup, follow the User Guide and the Quick Start Video on YouTube.
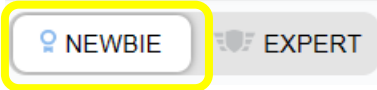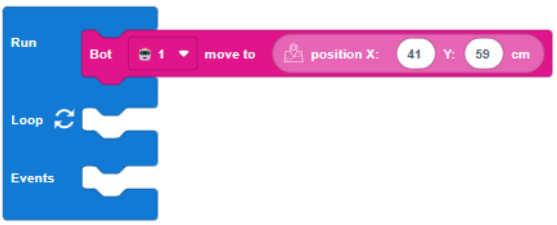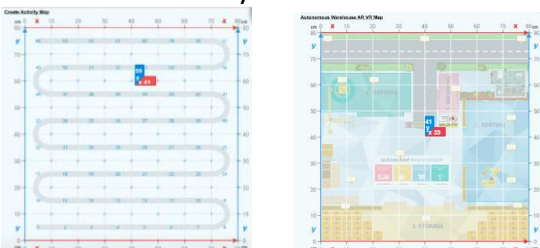

User Guide

Once setup you will be ready to program the Kai's Clan robots around the physical adventure mat using a laptop or iPad device.

Mat Movement

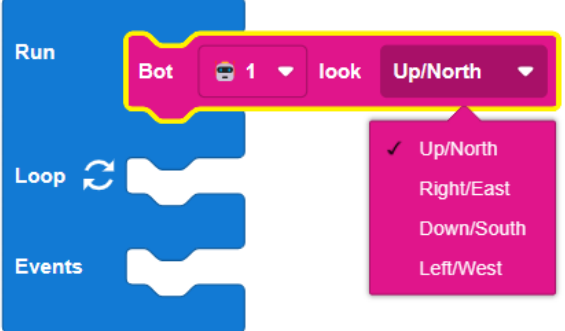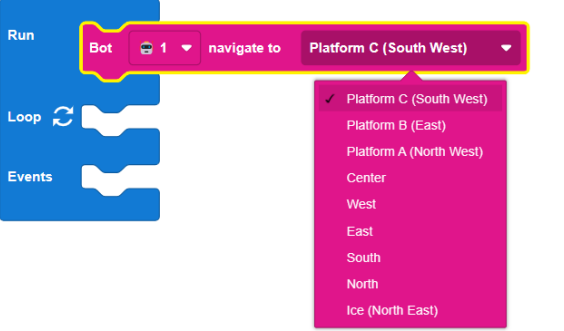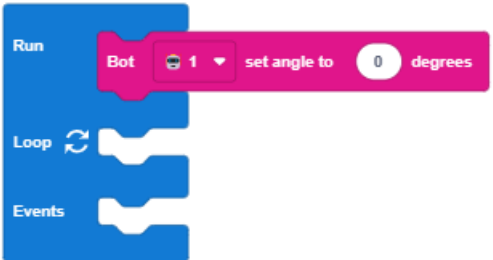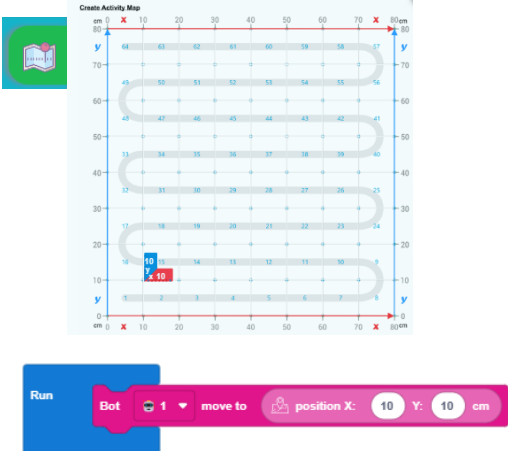Learn to move a Kai robot on the mat. Each robot can be tracked on the mat through co-ordinates to a precise location. Look at the ruler borders around the mat. They are designed to assist with co-ordinates to move a robot to a specific X, Y location. Red is for the horizontal x-axis and blue is for the vertical y-axis.

Now that you can move and turn the robot freely, the next step is to control the robot on the surface of a mat using coordinates. You can also watch the following video for a visual explanation of the code blocks. An Introduction to Newbie & Expert Coding

Beginners: Choose NEWBIE option	**Motion:** Mat Movement
To move to a specific location on a mat, use the x and y coordinates block. Coordinates are numbers which determine the position on a map	The virtual mat helps to see the location using the coordinates. Remember the red horizontal line is the x-axis, and the blue vertical line is the y-axis.
Look: Use the Look block to make the robot face a specific direction. It means Kai will rotate quarter and half turns (90 or 180 degrees) on the spot to face the direction of travel.	**Navigate:** This block will make the robot move to a specific position on the mat without x and y coordinates. The list of destinations depends on what mat you are using.

| **Task 1**	**Task 2**
Choose any mat to program your robot to move along a specific track. Have your robot visit 5 specific destinations on the mat using any of the Newbie mat movement blocks and return to the start.	Collect the treasure and take it to the king. Place an item at a specific coordinate on a mat. Use the x and y coordinate block to navigate to the treasure, collect it and take it to the king at his castle.
Advanced: Choose EXPERT option	**Motion:** Mat Movement
Set direction: Type in the degrees to make your robot face a specific direction. North is 0 degrees; South is 180 degrees. What would East and West be?	**X and Y coordinates:** You can click on the virtual mat to locate coordinates and then type them into the block. The robot will move to that position.

Stop: To avoid crashing into an object or another robot on the mat use the coordinates + stop block. The measurement is calculated from the centre of the robot.


Position: Some blocks can fit inside other blocks. For example, the light pink blocks can fit inside the dark pink blocks for more options to position a robot.
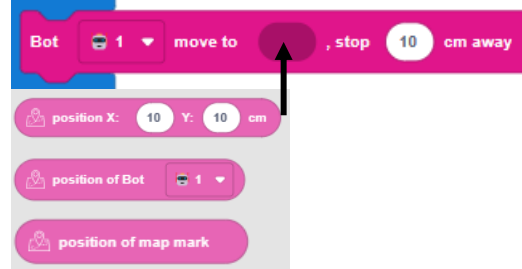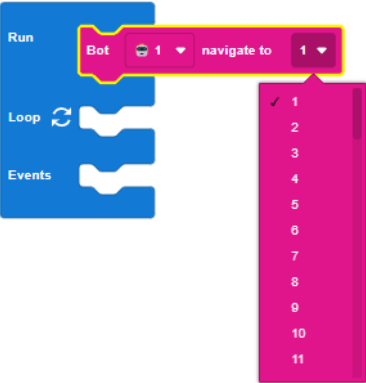

Position of Bot: This block will navigate your robot to another robot on the mat without knowing the coordinates of the other robot.
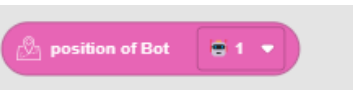
Position of map mark: This block will move the robot to a specific position that you mark on the virtual map.
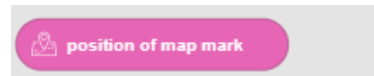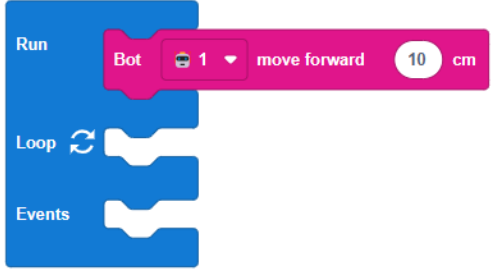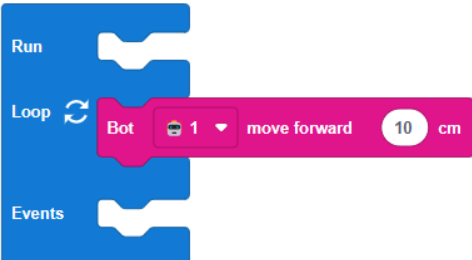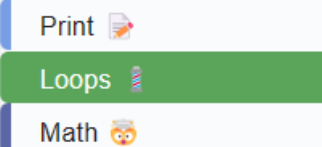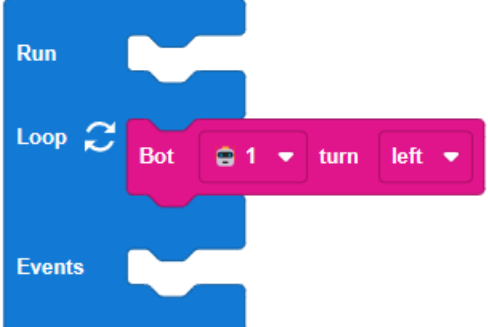
Take a look at the AI Navigation options. To use these blocks the robot needs the camera with Kai's Eye overlooking the mat to see the coordinates.
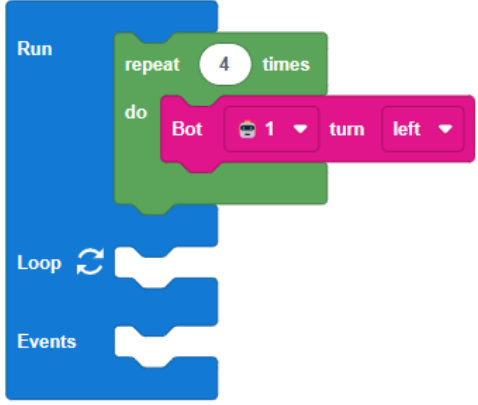
AI Navigation: The robot will navigate to a specific spot on the mat using computer vision and doesn't require line following. The options change depending on which mat is used.	**Navigate to X and Y:** This option will send the robot to a coordinate position to any location on the mat.
Create Map: This option will take the robot to a specific square between 1 and 64 on the create map.	**Warehouse/Mars/Smart City/Rescue Mats:** Directional positions are available on each of these mats.
Task 3 Set up a pathway for the robot to follow on the mat. Try each of the mats to see different effects. Add some extra activity like open and close grippers. Try and collect an object.	**Task 4** Place some obstacles along a pathway. What happens if the pathway is blocked by an object or another robot?

Repeat: Round and round we go

So far, we have used the **Run** option to run the program once. Now it is time to see what this looks like using the **Loop** option to run the code over and over. There are two ways to make a program loop. Use the loop repeat blocks in the Run section OR place the code in the Loops section.

Run	**OR**	Loop
You can drive Kai forward 10 cm once by placing the block in the Run section.	**OR**	Place the same code in the Loop section and watch Kai move forward in a straight line without stopping.
Beginners: Choose NEWBIE option		**Loops:** Repeat block
Enter how many times the action needs to be repeated in the green Repeat block and add the pink action to the do section. Place in the Run section and watch Kai move. In this example Kai will turn 360° once.	**OR**	Now try the same action without the green Repeat block. Place the pink action block in the Loop section and watch the robot spin around 360° without stopping.

Both actions are the same but the blocks used are different – and this one keeps going.

Task 5
Using the **Run** section, what shapes can you program Kai to make? Squares and circles will be easy. Can you make a triangle, hexagon, octagon?

Task 6
Using task 5 turn the shape movement into repetitive dance moves to some fun music using the **Loop** section without the green repeat block.

Level 2 Green Provisional Driver Licence test

Now it's time to take the test to gain your Level 2 Provisional Driver Licence. Set up a space so students can demonstrate the following:

1. Move to an X and Y coordinate position on a mat.
2. Make the robot face a particular direction.
3. Navigate to a point on the mat without coordinates.
4. Move around the mat and stop at a specific point.
5. Demonstrate turns in degrees.
6. Repeat movements across the mat.
7. Make the robot dance in a specific place on the mat.
8. Add music to movement.

Did you pass? Well done!

P Green P Plate Licence

Level 2 Kai Robot Licence

Awarded to: _____

Class: _____

I can successfully program a Kai robot to:

- navigate to a position on a mat
- move to X and Y coordinates
- face a particular direction
- turn using degrees
- repeat movements using Run and Loop
- demonstrate a dance routine with music

Green P Plate Licence

Level 2 Kai Robot Licence

Awarded to: _____

Class: _____

I can successfully program a Kai robot to:

- navigate to a position on a mat
- move to X and Y coordinates
- face a particular direction
- turn using degrees
- repeat movements using Run and Loop
- demonstrate a dance routine with music

For more information

Please visit our webpage https://csermoocs.adelaide.edu.au/lending-library
Email cser@adelaide.edu.au