Edbot Dream Scratch

Teacher's Guide

Table of Contents

Introduction

This unit is suitable for students in KS2 and KS3 and covers the following criteria:

- design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems
- solve problems by decomposing them into smaller parts
- use sequence, selection and repetition in programs; work with variables and various forms of input and output
- use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

Number of lessons

Recommend 4 x 1 hour teaching lessons, although this will work with slightly shorter or longer lessons.

The timings shown are colour coded to help you split up the lesson timings to fit your length of lesson.

Pink	Short activities
Yellow	Medium length activities
Blue	Longer activities

Suitability

This unit is suitable for mixed ability classes.

Differentiation

Lessons are differentiated by outcome and this is reflected in the success criteria and part of each lesson involves the students working independently, freeing up the teacher to offer more one-to-one help to the students who need it. There are also instructions in the lesson plans on how to adapt the lesson for lower or higher ability students.

Preparation needed by the teacher

The teacher needs to make sure that they are familiar with the contents of each lesson and the activities and questions involved which will help them with assisting the students in the lesson.

The teacher will need to be familiar with the Edbot Dream Scratch blocks. The documentation is available via the Edbot Software by selecting “Documentation…” in the “Help” menu. The teacher can use the Edbot_Dream_Scratch_Intro.pptx presentation to introduce the new Scratch blocks.

Each student should be issued with a mark sheet at the beginning of the unit.

The Edbot Software should be installed on all the PCs and it is a good idea to have the students log in with their individual user names if they have them. This makes it easier to find their PC in the Edbot Software to give them control of the Edbot Dream. You also need to ensure the Edbot Software is configured correctly on the teacher’s PC with the Edbot Dream connected via Bluetooth.

Make sure the Edbot Dream’s battery is fully charged and installed correctly.

Before the first lesson you will need to convert the Scratch projects so they reference the particular name you’ve given to your Edbot Dream. Use the Edbot Software to do this. You’ll find the project converter in the Scratch menu. Copy the converted files into a shared area that the students will be able to access.

Assessing without Levels

“As part of our reforms to the national curriculum, the current system of ‘levels’ used to report children’s attainment and progress will be removed. It will not be replaced.

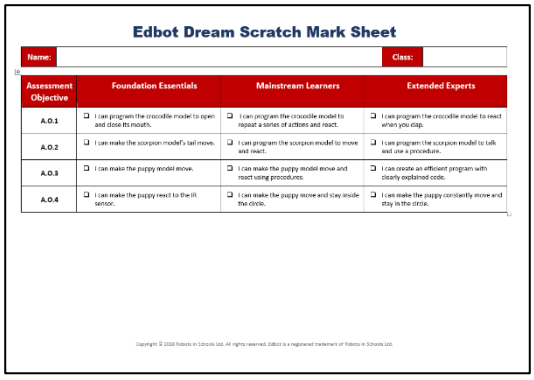
We believe this system is complicated and difficult to understand, especially for parents. It also encourages teachers to focus on a pupil’s current level, rather than consider more broadly what the pupil can actually do. Prescribing a single detailed approach to assessment does not fit with the curriculum freedoms we are giving schools.” [1]

With this in mind, we have developed a three-tier system which can easily be adapted to any system your school has implemented. We have referred to these bands as

- Foundation Essentials
- Mainstream Learners
- Extended Experts

Assessing Progress

Each student should be given a mark sheet on which they will need to write their name, so that they can get the same sheet back each lesson and could be kept in a work folder which they can refer to every lesson.



Edbot Dream Scratch Mark Sheet

Name: Class:

Assessment Objective	Foundation Essentials	Mainstream Learners	Extended Experts
A.O.1	❑ I can program the crocodile model to open and close its mouth.	❑ I can program the crocodile model to repeat a series of actions and react.	❑ I can program the crocodile model to react when you clap.
A.O.2	❑ I can make the scorpion model's tail move.	❑ I can program the scorpion model to move and react.	❑ I can program the scorpion model to talk and use a procedure.
A.O.3	❑ I can make the puppy model move.	❑ I can make the puppy model move and react using procedures.	❑ I can create an efficient program with clearly explained code.
A.O.4	❑ I can make the puppy react to the IR sensor.	❑ I can make the puppy move and stay inside the circle.	❑ I can make the puppy constantly move and stay in the circle.

The assessment sheet is based on “A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom’s Taxonomy of Educational Objectives”[2] and avoids use of the old national curriculum levels altogether. This means that the same unit can be used in years 3, 4, 5, 6, 7, 8 or 9 and the students can still show they have made progress.

The assessment should be completed at the end of every lesson by the students as a form of self-assessment and the last slide in each presentation tells the students the skills that they have covered. The students tick the box next to the objective if they feel they have fully met that criteria. The teacher can then use this as a basis to help them assess the students’ ability along with class observations, questioning students and viewing the students’ work.

[1] Taken from www.education.gov.uk/schools/teachingandlearning/curriculum/nationalcurriculum2014/a00225864/assessing-without-levels downloaded on 5th March 2014

[2] Anderson, L.W. (Ed.), Krathwohl, D.R. (Ed.), Airasian, P.W., Cruikshank, K.A., Mayer, R.E., Pintrich, P.R., Raths, J., & Wittrock, M.C. (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom’s Taxonomy of Educational Objectives (Complete edition). New York: Longman.

Edbot Dream Scratch Lesson 1 of 4

Lesson objective:	I can control a motor and use a sensor. I can use "forever" loops, "if..then" statements and procedures.	
All will be able to: Program the crocodile model to open and close its mouth.	**Most will be able to:** Program the crocodile model to repeat a series of actions and react.	**Some will be able to:** Program the crocodile model to react when you clap.

Differentiation

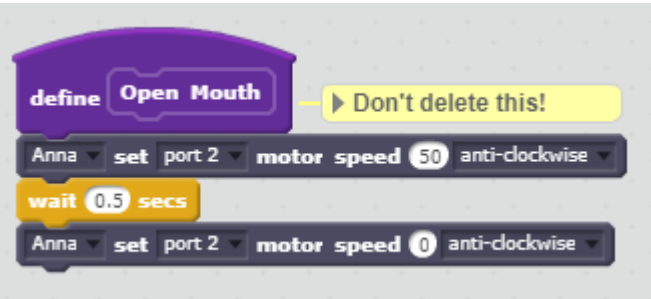
Low Ability: Will be given a program file which has been preloaded with the correct blocks. Students will experiment to combine them correctly.	**High Ability:** Students will be expected to work independently. They will be able to use sensors to make the crocodile react.

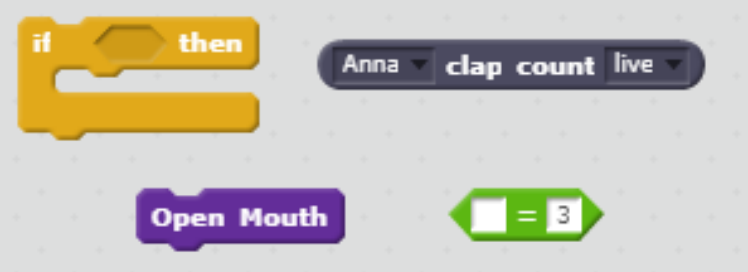
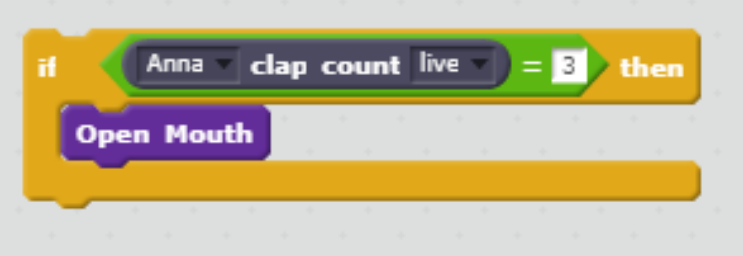
Starter

Time	Description	Resources
Short Activity	***The lesson presumes that the crocodile model is already built and ready to use. Models take between 45-60 minutes to build depending on ability. Factor in 15 minutes or so to disassemble old models.*** **What are inputs and outputs?** Get students to discuss and see if they can come up with any examples? Show images of examples of inputs and outputs. Inputs send data/information into a digital device. Outputs are what come out of a digital device. Keyboard, mouse = all inputs. Speaker, projector, monitor, printer = all outputs. **What about a tablet computer?** Well the screen seems like it is one thing, but most are made up of two parts: the screen (output) and a capacitive touch layer (input). Today we are going to be using an IR (infrared) sensor and a motor. **What is an IR sensor?** It detects how close something is. **What is a geared motor?** It creates movement. Demo the crocodile model moving. Put your hand/finger in its mouth and it will shut. It then opens after a set time. **What is the input and what is the output?** Input - IR SENSOR, Output – Mouth moving You are going to program the crocodile to react like that.	Crocodile model Edbot_Dream_Scratch_Lesson_1.pptx Slides 1 – 6 Lesson_1_Demo.sb2

Main Activities

Time	Description	Resources
Medium Activity	**So what do we need to tell the model to do?** Break down what we want to happen? Decompose the problem. 1) The mouth must open and close and 2) React to your hand/finger. Agree to start making the mouth open and close. Students to open the Scratch file with blocks already added. (Lesson_1a_Croc.sb2)	Lesson_1a_Croc.sb2 Slide 7 - 9

	 Ask the students to carefully read the blocks, discuss and arrange them by joining them together to create a program that will make the mouth open and close. Click on the blocks to test. *This is where the students will need to be given control of the crocodile model in order to test their code.* Extension Challenges (display on board) - Can you make the mouth open faster or slower? - Can you make it repeat 5 times? - Can you make the mouth open when you press a key? **You may need to add or change blocks. Note: slow motor speeds might not provide enough power to lift the weight of the crocodile's mouth.** Students to attempt the above and test on crocodile model as necessary. Review solutions with class. Get students to help you build/write the solution. Show how you can make the open and close actions into procedures using Build Your Own Blocks (BYOB).	
Long Activity	Get students to open the 2nd Scratch file. (Lesson_1b_Croc.sb2) Open and close instructions have been made into procedures using BYOB. When you click the ***open mouth*** block it runs the defined procedure.  The purple blocks are procedures. Don't delete the define block and attached blocks. We now have a mouth that will open and close. Now we need to make it react. **What makes it close its mouth?** Discuss. Put your hand in its	Lesson_1b_Croc.sb2 Slides 10 - 11

	mouth, **what input are we using?** Now use the blocks that are not attached to create a program that will make the crocodile close its mouth when you put your hand in its mouth.  You will need to put a value in the green block where the X is.	
Medium Activity	**Extension.** Using the following blocks can you make the crocodile open its mouth when you clap 3 times?  Answer  	Slide12

Review

Time	Description	Resources
Short Activity	**What are the purple blocks?** Discuss and review. *Procedures. They allow us to simplify a program.* **What is an input / output?** Give me an example from the crocodile model. **Can you give me any other examples?**	Slide13

Self-Assessment

Time	Description	Resources
Short activity	Give out the mark sheet “Edbot Dream Scratch Mark Sheet” and make sure your students write their name on it. They read through the highlighted objectives and if they feel they have met the criteria fully they need to tick the box. If they do not feel they have met the objective they should not tick the box.	Edbot_Dream_Scratch_Mark_Sheet.pdf Slide 14

Edbot Dream Scratch Lesson 2 of 4

Lesson objective:	I can control multiple outputs with a sensor. I can use “forever” loops, “if..then” statements and procedures.	
All will be able to: Make the scorpion’s tail move.	**Most will be able to:** Program the scorpion to move and react.	**Some will be able to:** Program the scorpion to talk and use a procedure.

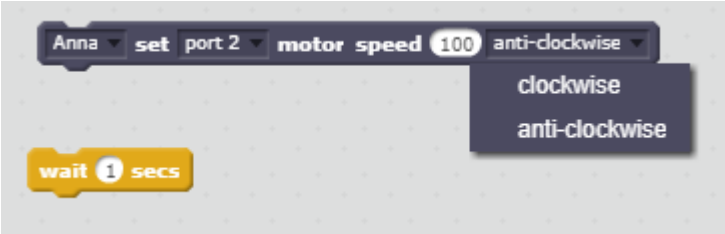
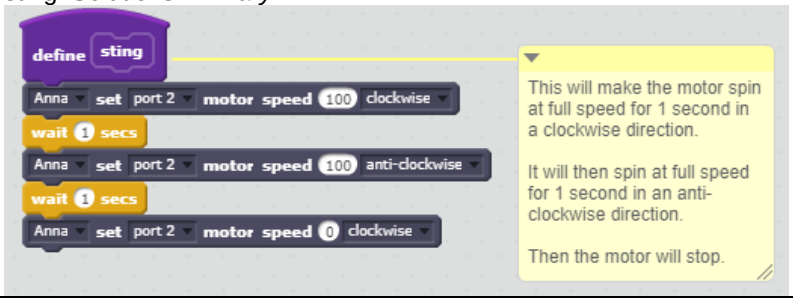
Differentiation

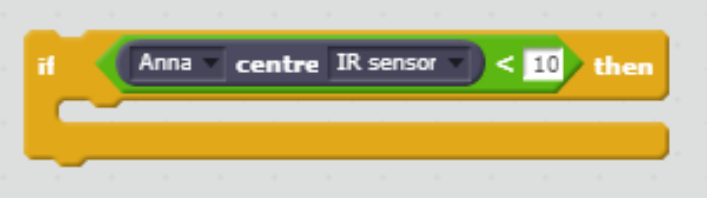
Low Ability: Will be given a program file which has all the blocks they will need already included. Focus on getting the tail and legs to move only. Students will experiment with blocks and combine them correctly.	**High Ability:** They should be using BYOB in their program and attempt to make the scorpion talk.

Starter

Time	Description	Resources
Short Activity	***The lesson presumes that the scorpion model is already built and ready to use. Models take between 45-60 minutes to build depending on ability. Factor in 15 minutes or so to disassemble old models.*** Demo the scorpion with the default program. **What are the inputs and outputs being used?** Students to discuss. Inputs – IR Sensor, Outputs - 2 motors and speakers from computer.	Scorpion model Lesson_2_ Scorpion.sb2 Edbot_Dream_Scratch _Lesson_2.pptx Slides 2 - 3

Main Activities

Time	Description	Resources
Medium Activity	Set students a challenge - **Can you make the tail sting?** Discuss what that means? Tail moves and then stops. Students to work to build a program that makes the tail sting. Give students a hint if needed of the blocks/instructions they need.  *Motor is plugged into port 2 according to the instructions.* Ask students to turn this into a procedure (using BYOB).	Lesson_2a_ Scorpion.sb2 Slide 4
Short activity	Review solutions with the class and show how to turn the program into a procedure. Get the class to help you code a solution to the sting. *Solutions will vary* 	Lesson_2a_ Scorpion_Solution.sb2 Slide 5

	Why does the motor need to move clockwise and anti-clockwise each time? The lever on the scorpion's tail limits the movement of the motor to 180º so the motor needs to reset to the initial position each time. When the motor moves in a clockwise direction the tail will sting. The tail will sting again when the motor moves in an anti-clockwise direction.	
Long Activity	Can you make the scorpion react when someone gets too close? You must: - make it move - make it sting - make the scorpion react to something getting too close Show demo again if needed. Discuss with the students decomposing the problem. **What have we already worked out?** Sting. **What is the next step?** Movement. This could be changed into a procedure (BYOB). Give this code block clue to students who are finding the IR sensor difficult to work out.  Extension - Can you make it speak as well? - Can you add procedures to your code?	Lesson_2b_ Scorpion.sb2 for LA students. Slide 6 - 7
Medium Activity	Students should comment their code. **Can you add a note to explain what it does? Summarise it.** Right click on the block and choose 'add comment'	Slide 8

Review

Time	Description	Resources
Medium Activity	Get students to share their solutions. Get them to explain their code, by summarising what it does. If needed show possible solution, Lesson_2b_Solution_ Scorpion.sb2, which uses BYOB.	Lesson_2b_ Scorpion_Solution.sb2 Slide 9 & 10

Self-Assessment

Time	Description	Resources
Short activity	Give out the mark sheet "Edbot Dream Scratch Mark Sheet" and make sure your students write their name on it. They read through the highlighted objectives and if they feel they have met the criteria fully they need to tick the box. If they do not feel they have met the objective they should not tick the box.	Edbot_Dream_Scratch_Mark_Sheet.pdf Slide 11

Edbot Dream Scratch Lesson 3 of 4

Lesson objective:	I can program behaviours using inputs and outputs. I can use "forever" loops, "if..then..else" statements and procedures.	
All will be able to: Make the puppy move.	**Most will be able to:** Make the puppy move and react using procedures.	**Some will be able to:** Create an efficient program with clearly explained code.

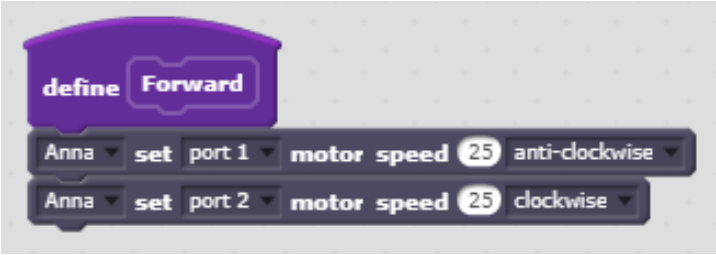
Differentiation

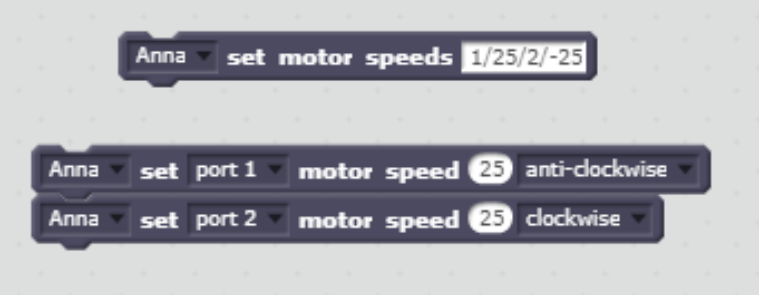
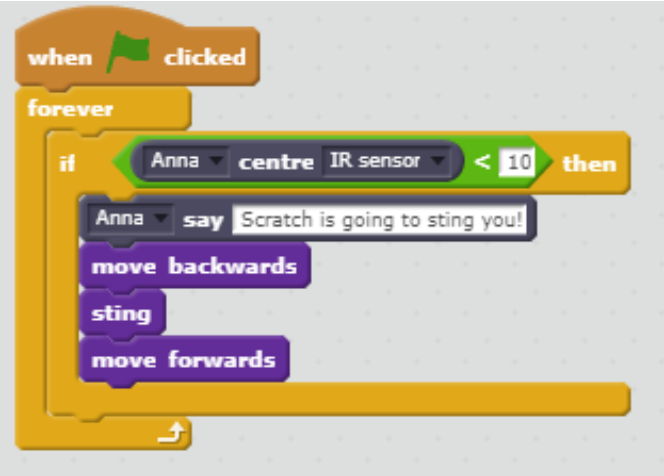
Low Ability: Will be given a program file which has been preloaded with all the blocks they will need. Focus on just getting the puppy to move forward.	**High Ability:** They should be using BYOB in their program and have more efficiency in their program. Students should be encouraged to explain their code by adding comments.

Starter

Time	Description	Resources
Short Activity	***The lesson presumes that the puppy model is already built and ready to use. Models take between 45-60 minutes to build depending on ability. Factor in 15 minutes or so to disassemble old models.*** Show students puppy model – **What are the inputs and outputs?** Students to discuss and review what they have already learnt about. It has 2 motors and IR (infrared) sensors.	Puppy model Edbot_Dream_Scratch _Lesson_3.pptx Slides 2 - 3

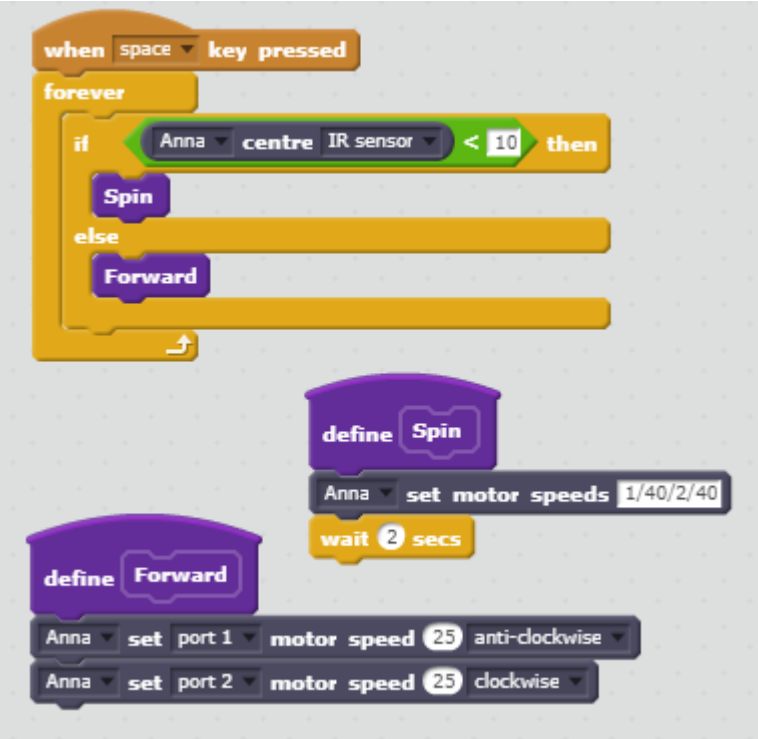
Main Activities

Time	Description	Resources
Medium Activity	Demonstrate the puppy moving along the floor/table. Set students challenge. - Can you make the puppy move forward? - Can you then turn the program into BYOB procedure? (Example below) Give students a few minutes to experiment and then groups will feedback. Extension – Ask students to: - make the puppy chase its tail (spin). - make it move forward, turn around 180 degrees, then move forward again, like the puppy is patrolling.	Lesson_3a_ Puppy.sb2 Example code for moving. Slides 4 - 5
Short Activity	Get students to share their solutions. Lead students towards a solution that uses BYOB. *Example:*  Show blocks below and discuss. **What do both of these sets of blocks do?** Spin.	Slide 6

	What is the difference between "set port 1 motor speed" and "set motor speeds" blocks? - "set port 1 motor speed" only controls one motor - "set motor speeds" controls more than one motor, 2 in this example. (1/25 = motor 1 at speed 25)  **Which solution is better?** Discuss. 1st block is more efficient, it is only one block. 2nd is easier to read.	
Long Activity	**Can you make the puppy spin around if you get too close?** *(Linked to scorpion work from lesson 2, where we made the scorpion move backwards and sting when you got too close)* Explain the Task - I want the Puppy to move forward slowly and if someone or something gets too close, spin around for a few seconds before moving forward again. Discuss the parts of the problem. **How do we decompose it? What has to happen?** Puppy must - move forwards - spin - react to someone getting close. Students can look back at previous work as needed. Show example scorpion code from lesson 2. Hint that you need to create a BYOB procedure for each behaviour.  As students work, look out if students are using set motor speeds or set port 1/2 motor speed blocks. Encourage HA students to think about efficiency of their program. Extension – Start to look at challenges in the next lesson. **Can you make the puppy stay inside a circle?**	Lesson_3b_ Puppy.sb2 Contains example program and solution. Slide 7 - 8

Medium Activity	Students should comment their code. **Can you add a note to explain what it does? Summarise it.** Right click on the block and choose 'add comment'	Slide 9

Review

Time	Description	Resources
Medium Activity	Get students to show and explain their code and solutions by summarising what it does. *Possible solution:* 	Lesson_3b_ Puppy.sb2 Contains example program and solution. Slide 10

Self-Assessment

Time	Description	Resources
Short activity	Give out the mark sheet "Edbot Dream Scratch Mark Sheet" and make sure your students write their name on it. They read through the highlighted objectives and if they feel they have met the criteria fully they need to tick the box. If they do not feel they have met the objective they should not tick the box.	Edbot_Dream_Scratch_Mark_Sheet.pdf Slide 11

Edbot Dream Scratch Lesson 4 of 4

Lesson objective:	I can program behaviours using inputs and outputs. I can use “forever” loops, “if..then..else” statements and procedures.	
All will be able to: Make the puppy react to the IR sensor.	**Most will be able to:** Make the puppy move and stay inside the circle.	**Some will be able to:** Make the puppy constantly move and stay in the circle.

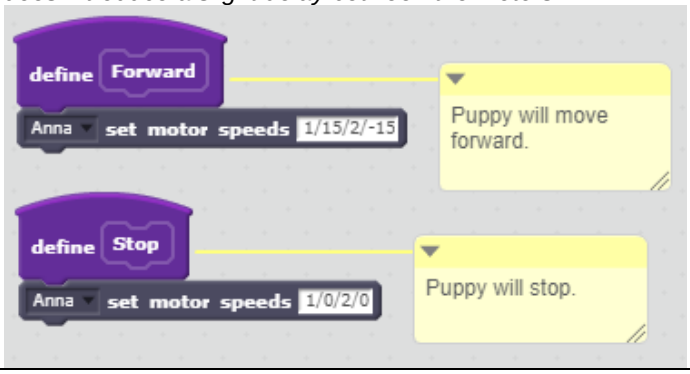
Differentiation

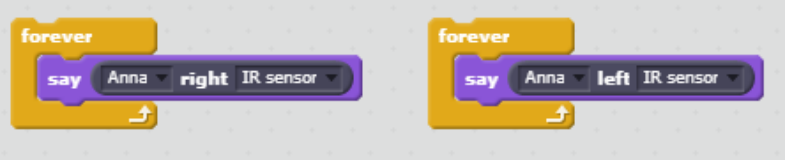
Low Ability:	**High Ability:**
They will build on previous work and be given a program file which has been preloaded with pre-build blocks. Focus on just getting the puppy to move forward and stop when something is in front of the puppy. You will be using the Centre IR sensor.	The puppy will be able to move around and stay within the circle. Students should be encouraged to explain their code by adding comments.

Starter

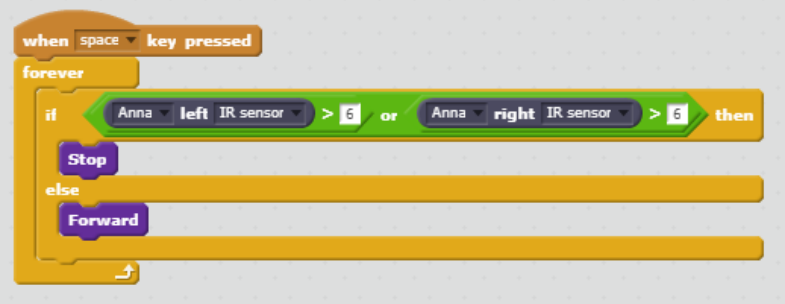
Time	Description	Resources
Short Activity	Review - **What did we program the puppy to do last lesson?** *I want the puppy to move forward slowly and if someone or something gets too close, spin around for a few seconds before moving forward again.* Choose a piece of code from the previous lesson. Ask students to discuss and summarise what it does.	Puppy model Edbot_Dream_Scratch_Lesson_4.pptx Slides 2 - 3

Main Activities

Time	Description	Resources
Medium Activity	Place the puppy inside a circle (using the provided mat) Show the puppy moving around and stopping at the edge of the circle. Pick up the Puppy and place back in the middle and it will move again. **What is happening? Can you describe the algorithm/program?** *Possible answer - The Puppy moves forwards, a sensor on the bottom detects the line and then it stops.* Decompose this further. The Puppy must: - Move forward - Detect - Stop **Which of these do we know how to do?** Discuss and write some code. You should get something like the example below. *Please note that we are using one block to turn on both motors at the same time. (2/-15 = Turn on motor at port 2 at speed -15, i.e. reverse.) You could use two separate blocks, but this does introduce a slight delay between the motors.* 	Lesson_4a_ Puppy.sb2 Contains demo code. Slides 4 - 8

Long Activity	Students to combine knowledge from lesson 3 to create a program that will act like the demonstrated example. The puppy will stop at the edge of the circle. If needed give a hint on how to configure the sensor. The values may need to be explored as different lighting can affect the values. Remind them that there are two sensors, a left and right. Using blocks like this will allow you to click and check the values of the sensors. Please note you can only check one value at a time.  Extension – Once they have the puppy stopping, can they get the puppy to turn and continue moving? Show puppy moving like this. Please note that in the example the puppy turns away from the left or right depending on how it detects the line. This is a subtle addition but would be good to point out with HA students.	Lesson_4b_ Puppy.sb2 Contains demo code for turning puppy.

Review

Time	Description	Resources
Medium Activity	Discuss possible solutions to problem. Students to explain any issues they had and how they went about overcoming them. Below is a possible solution. 	Slide 9

Self-Assessment

Time	Description	Resources
Short activity	Give out the mark sheet “Edbot Dream Scratch Mark Sheet” and make sure your students write their name on it. They read through the highlighted objectives and if they feel they have met the criteria fully they need to tick the box. If they do not feel they have met the objective they should not tick the box.	Edbot_Dream_Scratch_Mark_Sheet.pdf Slide 10