

Edbot Advanced

Teacher's Guide



Table of Contents

Introduction.....	2
Number of lessons	2
Suitability	2
Differentiation	2
Preparation needed by the teacher.....	2
Assessing without Levels	3
Assessing Progress	3
Lesson 1 – Recap the basics	4
Lesson 2 – Questions	5
Lesson 3 – Variables.....	6
Lesson 4 – Lists	7
Lesson 5 – More advanced programs	8
Lesson 6 – Put it all together.....	9

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 6 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 (under 5 minutes each)

Yellow Medium length activities (between 6 and 12 minutes long)

Blue Longer activities (over 12 minutes long)

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 and the students should have completed the unit entitled Edbot Basics prior to starting this unit as these lessons do assume prior knowledge of programming Edbot with Scratch.

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.

Each student should be issued with a mark sheet at the beginning of the unit. Some lessons use videos to teach the students the skills they need; this will require the teacher to make sure that they have speakers attached and switched on.

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. You also need to ensure the Edbot Software is configured correctly on the teacher's PC with the Edbot connected via Bluetooth.

Make sure the Edbot's batteries are fully charged and installed correctly.

Before the first lesson you will need to convert the Scratch projects in the **Student Files** and **Teacher Files** folders so they reference the particular name you've given to your Edbot. Use the Edbot Software to do this. You'll find the project converter in the Scratch menu. Copy the converted student 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.

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 based on the students’ self-assessment, class observations, questioning students and viewing the students’ work.

Assessment Objective	Foundation Essentials	Mainstream Learners	Extended Experts
A.O.1 Recap the basics	<input type="checkbox"/> I can explain what is meant by the term “humanoid robot” <input type="checkbox"/> I can control Edbot with simple commands	<input type="checkbox"/> I can make Edbot’s servo lights change colour <input type="checkbox"/> I can add script to separate sprites to allow Edbot to be controlled by clicking on the sprites.	<input type="checkbox"/> I can explain the difference between a forever and a repeat loop.
A.O.2 Questions and blocks	<input type="checkbox"/> I can write a program and use the users answers in my programming <input type="checkbox"/> I can use loops and if statements in my programming.	<input type="checkbox"/> I can create my own blocks of script to be used in my programs	<input type="checkbox"/> I can explain why is it necessary to sometimes create your own blocks of script.
A.O.3 Variables	<input type="checkbox"/> I can explain what a variable is used for	<input type="checkbox"/> I can switch servo motors on and off <input type="checkbox"/> I can manipulate parts of Edbot and save the servo positions as a variable	<input type="checkbox"/> I can use variables and mathematical operators to work out the average of 3 numbers entered
A.O.4 Lists	<input type="checkbox"/> I can explain the difference between a variable and a list	<input type="checkbox"/> I can create lists and enter data onto a list	<input type="checkbox"/> I can store a list of commands in the form of a list that Edbot can play back.
A.O.5 Servo manipulation	<input type="checkbox"/> I know how to change multiple servo light colours in a single line of code	<input type="checkbox"/> I can manipulate the position of servos using complex commands <input type="checkbox"/> I can alter the speed at which the servos move	<input type="checkbox"/> I can make Edbot move into different poses that are not in the standard library of motions
A.O.6 Summary	<input type="checkbox"/> I can create a detailed program and make an attempt at solving some of my programming errors myself	<input type="checkbox"/> I can create a detailed working solution to a programming problem and some many of the programming error myself	<input type="checkbox"/> I can complete a complex working program that includes the extension activities and solve most or all of my programming errors myself.

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 Advanced

Lesson 1 – Recap the basics

Lesson objective:	Recap the basics of programming with Edbot.	
All will be able to: Explain what is meant by the term “humanoid robot”. Control Edbot with simple commands.	Most will be able to: Make Edbot’s servo lights change colour. Add script to separate sprites to allow Edbot to be controlled by clicking on the sprites.	Some will be able to: Explain the difference between a forever and a repeat loop.

Differentiation

Low Ability: Be prepared to remind them about the programming they would have encountered in the previous unit. If they have only recently joined the school or missed the previous unit, sit them with a student who can work with them and help them catch up on the basics quickly.	High Ability: Allow them to experiment with the motions and the servo lights. They should be encouraged to experiment rather than only creating the prescribed programs.
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Starter

Time	Description	Resources
Short Activity	Before the lesson, display the starter questions on the board so that the students can get started as soon as they enter the classroom. Give them time to talk about the questions together in pairs and then ask random pairs for their answers. Introduce the class to “the Big Picture” on slide 3 to explain what the unit is about.	EDBOTAdvanced_Lesson1.pptx Slides 2 – 3 EDBOTAdvanced_Answers.pdf

Main Activities

Time	Description	Resources
Short Activity	Explain the objectives to the class.	Slide 4
Long Activity	Ask them to open the file L1_Recap.sb2 and remind them to change the name to whatever name the class has selected for your Edbot. Ask them to write the program and test it out to recap what they have learnt from the previous unit. Go through the answer on slide 6 to make sure everybody feels comfortable with the programming used. Ask them to alter the program to change the servo light colours. Go through the answer on slide 8 with the whole class.	Slide 5-8 L1_Recap.sb2
Long Activity	Allow them time to practise and remind themselves of the programming by asking them to work in small groups to navigate Edbot around a simple obstacle course. Make sure you start Edbot in the same position each time rather than leave Edbot halfway through the course as their programming will not work.	Set up a simple route around the floor using objects to act as the edges of the course.

Plenary

Time	Description	Resources
Long Activity	Remind the class about sprites and how to add script to sprites (this is covered in more detail in the previous unit). They need to add the correct script to each sprite. If you have more than one robot you can play them against each other in teams but if you only have one, they can practise scoring goals from different positions.	Slide 9 L1_FootballSprites.sb2 An object to act as a football.

Self-Assessment

Time	Description	Resources
Medium Activity	Give out the mark sheet (EDBOTAdvanced_MarkSheet.pdf) 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.	EDBOTAdvanced_MarkSheet.pdf Slide 10

Edbot Advanced

Lesson 2 – Questions

Lesson objective:	Create your own blocks of script.	
All will be able to: Write a program and use the user's answers in their programming. Use loops and if blocks in their programming.	Most will be able to: Create their own blocks of script to be used in their programs.	Some will be able to: Explain why it is necessary to sometimes create their own blocks of script.

Differentiation

Low Ability: If they are stuck give them leading questions to help them find the answer rather than simply telling them the answer. This will encourage them to think more independently and not rely on you as the first response. Encourage them to break a larger problem into smaller sections and verbalise what it is they want each section to do.	High Ability: They should try to use loops in their light sequence.
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------

Starter

Time	Description	Resources
Short Activity	Ask the class to answer the questions about the program shown.	EDBOTAdvanced_Lesson2.pptx Slide 2 EDBOTAdvanced_Answers.pdf

Main Activities

Time	Description	Resources
Short Activity	Explain the objectives to the class.	Slide 3
Medium Activity	Ask them to open L2_ Questions.sb2 and create a maths quiz program based on the program they looked at in the starter but which also keeps score.	Slide 4 L2_ Questions.sb2
Long Activity	Watch the video on slide 5 about how to create your own blocks in Scratch. Go through the questions to recap what they have learnt on slide 6 and ask them to open the file called L2_Blocks.sb2 . Once everybody has had a go, go through the answer on slide 6. Open the file called walkabout.sb2 and ask the class what they think the program will do. Open the file and allow the students to see the program working. As the sensor can be a little sensitive it will take a reading 5 times in half a second and then work out an average of those 5 readings in order to work out a more accurate distance.	Slides 5 - 7 L2_Blocks.sb2 walkabout.sb2

Plenary

Time	Description	Resources
Long Activity	They should work individually if possible or in pairs to create the program as outlined on slide 8.	Slide 8 L2_MoreBlocks.sb2

Self-Assessment

Time	Description	Resources
Short Activity	Give out the mark sheet from the previous lesson. The students should 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.	EDBOTAdvanced_MarkSheet.pdf Slide 9

Edbot Advanced

Lesson 3 – Variables

Lesson objective:	Use variables in your programming.	
All will be able to: Explain what a variable is used for.	Most will be able to: Switch servo motors on and off. Manipulate parts of Edbot and save the servo positions as a variable.	Some will be able to: Use variables and mathematical operators to work out the average of 3 numbers entered.

Differentiation

Low Ability: Help them break a larger problem into smaller sections so the task does not seem so daunting.	High Ability: In the final challenge ask them to work out how a loop and another variable storing the colour can be used to shorten the program.
----------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------

Starter

Time	Description	Resources
Short Activity	Go through the questions with the whole class. Option to demonstrate with L3_Starter.sb2.	EDBOTAdvanced_Lesson3.pptx Slide 2 L3_Starter.sb2 EDBOTAdvanced_Answers.pdf

Main Activities

Time	Description	Resources
Short Activity	Explain the objectives to the class.	Slide 3
Medium Activity	Ask what the program (on slide 4) will do and then ask them to open up L3_Average.sb2 . They need to alter the program on slide 4 to work out the average of the 3 numbers that have been entered rather than the total. Go through the answer on slide 5.	Slides 4 - 5 L3_Average.sb2
Long Activity	Recap what servos are and then ask the class to open the program called L3_Mirror.sb2 . They will need to create a variable called servoposition to store the current position of a servo. Work through the slides to complete the program.	Slides 6 – 9 L3_Mirror.sb2

Plenary

Time	Description	Resources
Short Activity	Go through the questions on slide 10 to recap why you would create your own blocks. Set them the challenge on slide 11 to work through and then go through the possible answer on slide 12.	Slides 10 - 12

Self-Assessment

Time	Description	Resources
Short Activity	Give out the mark sheet from the previous lesson. The students should 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.	EDBOTAdvanced_MarkSheet.pdf Slide 13

Edbot Advanced

Lesson 4 – Lists

Lesson objective:	Create and use lists in your programs.	
All will be able to: Explain the difference between a variable and a list.	Most will be able to: Create lists and enter data into a list.	Some will be able to: Store a list of commands in the form of a list that Edbot can play back.

Differentiation

Low Ability: Encourage them to talk through what they want the program to do and write down the steps to help them visualise the problem.	High Ability: They work through the extension activity on slide 9 to improve their program.
-----------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------

Starter

Time	Description	Resources
Medium Activity	Ask the class to work in pairs to complete the program described using the flow diagram. (See slide 5 for a possible answer)	EDBOTAdvanced_Lesson4.pptx Slide 2

Main Activities

Time	Description	Resources
Short Activity	Explain the objectives to the class.	Slide 3
Short Activity	Use slide 4 to explain the problem if they only use separate if statements in their solution to the starter. Go through the correct answer using the solution on slide 5.	Slides 4 – 5 L4_NumberList.sb2
Long Activity	Explain what a list is and watch the video on slide 7 to explain how to create lists in Scratch. Go through the questions on slide 8 to recap what they have learnt. Ask your students to create the program as outlined on slide 9.	Slide 6 – 9 EDBOTAdvanced_Answers.pdf

Plenary

Time	Description	Resources
Long Activity	Hand out the L4 Edbot List document and ask the students to work through it to complete the challenge. Give them time to try it out to see the steps being recorded in a list and then played back. Open the program called lights.sb2 and ask somebody to explain what they think the program will do. Demonstrate it to the class and show the servos being added to the list as it is running.	Slide 10 L4_Edbot_List.pdf L4_DanceList.sb2 lights.sb2

Self-Assessment

Time	Description	Resources
Short Activity	Give out the mark sheet from the previous lesson. The students should 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.	EDBOTAdvanced_MarkSheet.pdf Slide 11

Edbot Advanced Lesson 5 – More advanced programs

Lesson objective:	Manipulate multiple Edbot servos using single lines of code.	
All will be able to: Change multiple servo light colours in a single line of code.	Most will be able to: Manipulate the position of servos using complex commands. Alter the speed at which the servos move.	Some will be able to: Make Edbot move into different poses that are not in the standard library of motions.

Differentiation

Low Ability: Talk them through how to find the mirror position for a servo. Allow them to handle Edbot to help them remember the numbers of the servos. Remind them that to get the mirror opposite, it is 300 minus the first servo's position.	High Ability: Challenge them to see what other poses they can place Edbot in without it falling over.
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------

Starter

Time	Description	Resources
Medium Activity	They open the file called L5_Starter.sb2 and work in pairs to complete the challenge. See slide 4 for a possible answer.	EDBOTAdvanced_Lesson5.pptx Slide 2 L5_Starter.sb2

Main Activities

Time	Description	Resources
Short Activity	Explain the objectives to the class.	Slide 3
Short Activity	Go through the possible answer to the starter challenge with the whole class using the solution on slide 4.	Slide 4
Long Activity	Working through the slides, explain how to manipulate the servos and ask the class the questions when prompted. Give out the handout called L5_Poses and ask them to work in pairs to put Edbot into the correct positions. They will need to work out the servo positions based on the images given.	Slides 5 – 14 L5_Poses.pdf L5_Poses.sb2 EDBOTAdvanced_Answers.pdf

Plenary

Time	Description	Resources
Medium Activity	They work in pairs to make Edbot sit on the floor as shown in the image. Go through the answer on slide 16 with the whole class.	Slides 15 - 16

Self-Assessment

Time	Description	Resources
Short Activity	Give out the mark sheet from the previous lesson. The students should 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.	EDBOTAdvanced_MarkSheet.pdf Slide 17

Edbot Advanced

Lesson 6 – Put it all together

Lesson objective:	Create a working solution to a complex programming problem.	
All will be able to: Create a detailed program and make an attempt at solving some of the programming errors themselves.	Most will be able to: Create a detailed working solution to a programming problem and solve many of the programming errors themselves.	Some will be able to: Complete a complex working program that includes the extension activities and solve most or all of the programming errors themselves.

Differentiation

Low Ability: Help them by asking leading questions to allow them to find the solution on their own.	High Ability: Work through the extension activities on slide 5.
---------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------

Starter

Time	Description	Resources
Medium Activity	They talk through what the program will do and then open L6_Starter.sb2 and alter the program so that it uses loops and fewer lines of code.	EDBOTAdvanced_Lesson6.pptx Slide 2 L6_Starter.sb2

Main Activities

Time	Description	Resources
Short Activity	Explain the objectives to the class.	Slide 3
Short Activity	Go through the possible solution to the starter activity using the solution on slide 4.	Slide 4
Long Activity	They work through the challenge outlined on slide 5 (using a blank Edbot scratch file).	Slide 5 EDBOTAdvanced_Answers.pdf

Plenary

Time	Description	Resources
Medium Activity	Allow them time to look at each other's programs to see how others solved the problem. Open the program called capture.sb2 and demonstrate how the program works by switching off some of the servos using the sprites (you need to switch off the ones you want to move) and then moving the limbs. This will add the servo positions to the list. This can then be played back.	capture.sb2

Self-Assessment

Time	Description	Resources
Medium Activity	Give out the mark sheet from the previous lessons. The students should read through all the objectives from the entire unit 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.	EDBOTAdvanced_MarkSheet.pdf