PRIMO

PROGRAMMING AND PLAY

Lesson plan for the KS-1 National Computing Curriculum.

LESSON PLAN AND KS-1

According to the national curriculum pupils should be taught to:

1) Understand what algorithms are, how they are implemented as programs on digital devices, and that programs execute by following precise and unambiguous instructions."
This aim is a very good fit with the Primo product; children are required to put together an algorithm in order to get Cubetto around a course. Since they must choose the order for the instructions, the program is precise and unambiguous by default.

2) Create and debug simple programs
The set of instructions that children will put together will essentially be a simple program. The debugging aspect of the curriculum will be met when children have to correct a set of erroneous instructions for getting Cubetto around a certain course. This will be achieved either when their attempt at a solution does not work, or alternatively by providing them with an incorrect set of instructions and asking them to fix it. They would then have to notice that the 'program' is not working, identify what the cause of the error is and what will fix it. This is a debugging process.

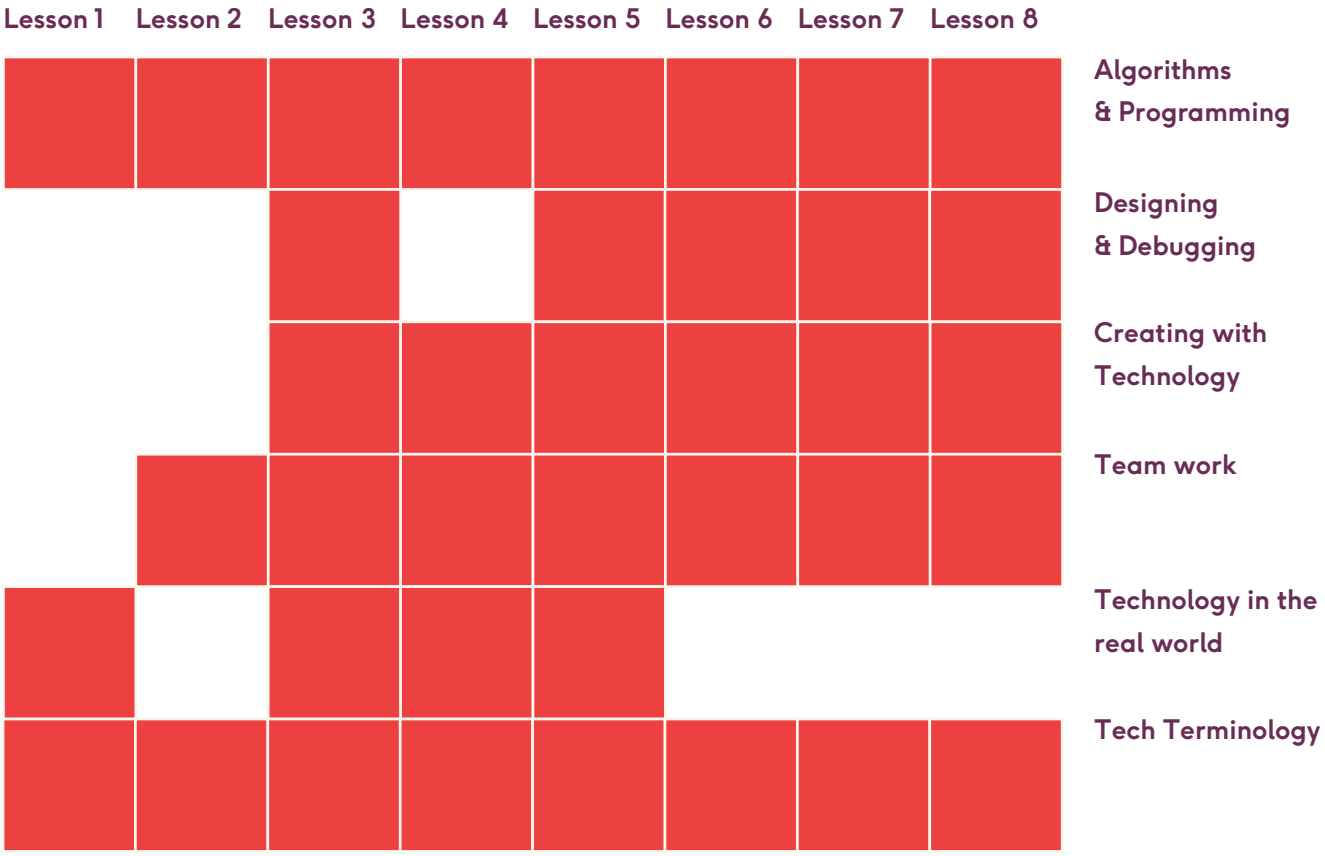
3) Use logical reasoning to predict the behaviour of simple programs
Children can be given a set of instructions, and be asked to draw the course that Cubetto will take. In doing so, they must follow the algorithm logically to work out what will happen. This will also aid their Non-Verbal Reasoning skills.

4) Use technology purposefully to create, organise, store, manipulate and retrieve digital content

5) Recognise common uses of information technology beyond school

6) Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies
These three aims are not specifically addressed by Primo, although the function line will introduce children to the idea of 'storing and retrieving digital content'. However, by talking about the idea of programming a machine to do something, the idea of IT beyond school can be introduced by relating it to everyday items like televisions, video games and dishwasher, amongst others.

LESSON PLAN OVERVIEW



Designed for classrooms

We care about children, the things they learn and how they learn them. We created the Primo Play Set to be magical, fun and effective.

But we also care about the needs of teachers, and understand that ease of comprehension and implementation is key to a rewarding and complete learning experience for both students and teachers.

Key Stage 1

This document contains an all encompassing lesson plan structure that fully and effectively covers all the Key Stage 1 National Computing Curriculum requirements.

We Make it straight-forward and easy for teachers to understand and implement the course with suggested activities on each lesson

THE CUBETTO PLAYSET

A tangible programming interface that teaches children between 4 and 7 programming logic away from the screen.

3 to 7 years old

The Cubetto Play Set allows children to learn basic programming logic through a tactile programming interface.

Children can write real programs for Cubetto, a small robot, using colourful blocks, providing a magical experience that hides all the electronics inside a charming wooden character.

Cubetto's electronics can also double up as a powerful prototyping board. Users can build new robots with simple plug-and-play sensors and an illustrated manual to help guide the experience.

For schools and homes

The play set is a powerful learning tool, delivering exceptional educational value, suitable across an entire range of ages.

The Cubetto Playset is also great for use at home. The experience is intuitive requiring little to no adult intervention or supervision for play.

Product specs

Material: Birch plywood, ABS
Battery intake: 8 x AA batteries
Connection: Mini USB
Manual language: English

Compatibility

iOS devices (iPhone, iPad, iPod touch)
Latest Android phones that support BLE.

Supporting material

We provide a constant stream of tutorials and activities that customers can access freely from our website.

Box content

1 x Cubetto Robot
1 x Interface board
16 x Instruction blocks
1 x Cubetto world map
2 x Playset manuals

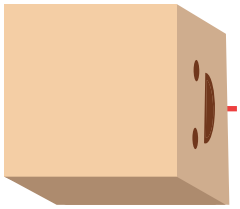
Packaging specs

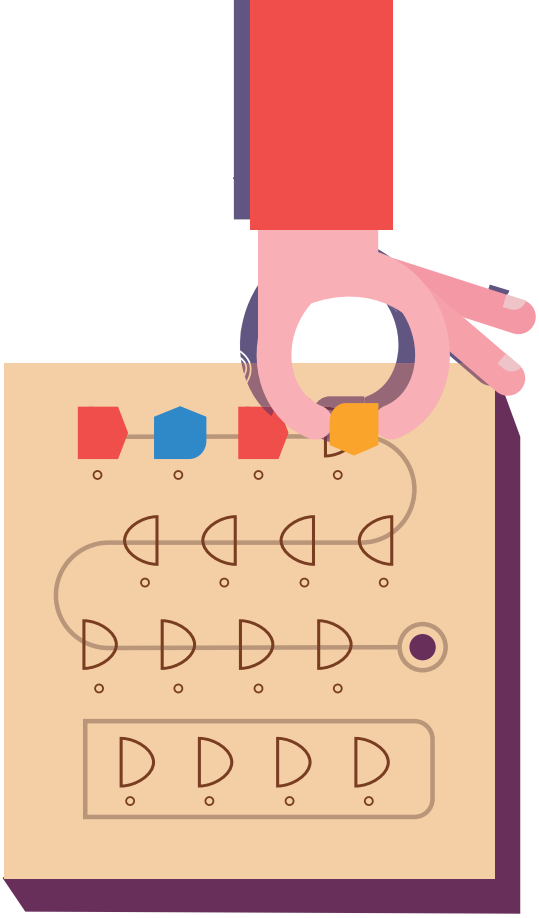
Box dimensions: 300 x 400 x 90mm
Box weight: 1.50Kg
Box type: Printed corrugated cardboard
Box sleeve: Full colour sleeve
Custom sleeve: On 10,000+ unit orders

HOW IT WORKS

Write a program for Cubetto using the blocks: Forward, Left, and Right.

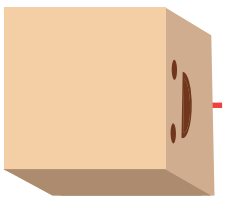
Press the go button and watch Cubetto execute the program.

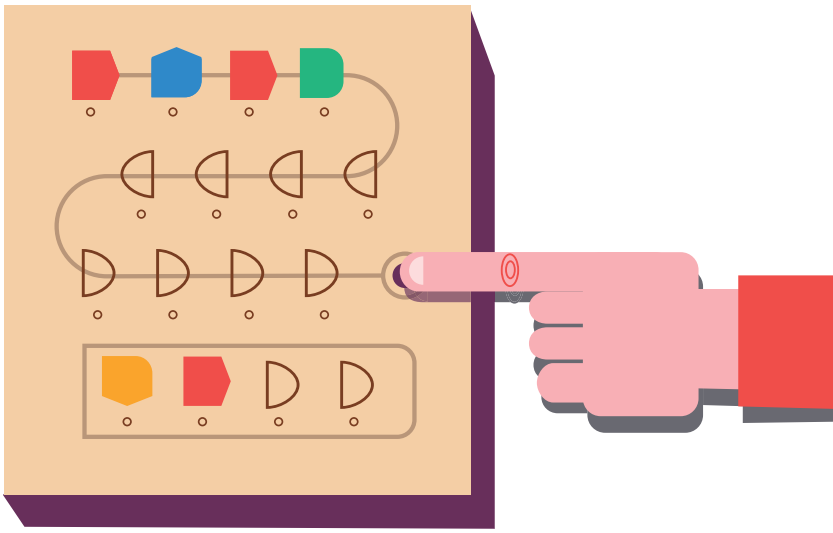




Write a program for Cubetto using the blocks: Forward, Left, and Right.

Press the go button and watch Cubetto execute the program.





LESSON 1

Learning objectives

Introducing the idea of programmable digital devices. Children learn that both digital and physical products are programmable.

Learning outcome

Children should:

Be able to understand what a programmable device is, and what makes a device programmable (receiving exact instructions and executing them).

Children should also be able to name common programmable devices around the house, both digital and physical devices.

Suggested Activities

Show the children the basic functionality of Primo – forwards, left and right. Emphasise that it will do exactly what you tell it to do, regardless of its surroundings (in other words, it has no 'mind' – it just does as it is told).

After the preliminary introduction to Primo, engage the class in a discussion about household devices that must be 'programmed' in order to perform tasks. For example, clocks, televisions, washing machines, etc...

In any remaining time, let the children try Primo one by one, discovering firsthand what each of the commands can do.

LESSON 2

Learning objectives

Introducing the concept of an algorithm as a defined set of instructions. Show how instructions for Cubetto are all algorithms, continuing from Lesson 1's objective.

Learning outcome

Children should:

Understand the term 'algorithm', and that the order of instructions matters in order to achieve an outcome.

Children should be able to put together a short algorithm as an intentional program, even if incredibly simple. In other words, input a sequence of command blocks with a specific goal in mind.

Suggested Activities

More actively teach children about the concept of an algorithm. For example, show them that 'forward and then left' does not give the same result as 'left and then forward'.

When children are comfortable with this, let them make algorithms to take Cubetto home (at this stage the programs should be simple, for example forward, left, forward; perhaps adding an extra step or two).

Allow children to take turns one after the other on the Play Set to try out an algorithm, a spe- cific sequence designed for an outcome.

LESSON 3

Learning objectives

Creating a simple program, and debugging it when making mistakes. Understanding the concept of debugging.

Children will be using logical reasoning to try to predict the behaviour of their simple pro- grams and correct them.

Introduce the idea of planning Cubetto's journey without a play set in front of you. Give some simple examples, and build it up.

Learning outcome

Children should:

Be able to describe the steps required to get Cubetto to travel along a short path. Be able to work together with other children to get Cubetto to travel along a more complicated route.

Children should also be able to name common programmable devices around the house, both digital and physical devices.

Suggested Activities

Introduce the idea of planning Cubetto's journey without a play set in front of you. Give some simple examples, and build it up.

Now split the children up into groups of three, and give them a handout (like a maze, or trea- sure map). The groups must plan the route without a Primo set. As they finish, they go to the Primo set and test their set of instructions. If it does not work, they must go back to their plac- es and try to correct the error, before returning to the set.

LESSON 4

Learning objectives

Using logical reasoning to predict the behaviour of simple programs.
Recognising some more uses of information technology beyond school.
Using technology safely and respectfully.

Learning outcome

Children should:

Have improved their ability to predict the behaviour of Cubetto. Be aware of further uses of information technology beyond school. Know to use technology safely and respectfully.

Suggested Activities

Split the class into evenly sized groups and then rotate them around the following activities.

Drawing an A3/A2 map (e.g. road map, treasure island, etc) with a path drawn for Cubetto to follow. Keep them for next lesson. If children finish their maps quickly, and you think they are sufficiently complicated, then have them attempt to write the set of instructions that Cubetto would need to follow in order to reach the target. (This is what they will be doing next lesson, but with somebody else's map).

A discussion about information technology.

Creative play with Cubetto. Have the children work in groups; one person makes a set of instructions and the others guess what happens. They can add obstacles etc - essentially just have the children play constructively.

LESSON 5

Learning objectives

Debugging programs

Predicting the behaviour of simple programs.

Discussion about information technology and/or using technology safely.

Learning outcome

Children should:

Have further improved their ability to predict the behaviour of simple programs.

Know more about information technology, its uses and how to use it safely.

Have been able to identify problems with their algorithms and correct them if appropriate; i.e. they will have debugged their algorithm.

Suggested Activities

Retrieve the maps from the previous lesson, and hand them out so that no-one has their own map. Give children 10-15 minutes to write a potential set of instructions for the required route. Then split the children into three groups and rotate them around:

Testing their algorithms and correcting them if necessary. Discussion about technology.

Working through a worksheet which gets them to write algorithms to get Cubetto to a certain point, and to mark on a grid where Cubetto will be after following some given instructions. cific sequence designed for an outcome.

LESSON 6

Learning objectives

Debugging simple programs
Predicting the behaviour of simple programs.

Learning outcome

Children should:

Understand the term ‘debug’.

Be able to debug algorithms with 2 or 3 mistakes in.

Suggested Activities

Show the children the concept of debugging. At this stage, they should already be familiar with the concept as they will have performed the action when correcting their mistakes in previous lessons.

Now split them into two groups, and swap them between the following activities:

Give one group worksheets on debugging, where they need to identify where the algorithm is wrong and how to fix it.

Set the other group up with incorrect algorithms (more complicated) and have them attempt to correct them.

LESSON 7

Learning objectives

Creating simple programs (now using the pause command)

Using logical reasoning to predict and plan the behaviour of simple programs

Learning outcome

Children should:

Be able to understand some occasions where a pause command might be useful in digital systems.

Be able to use the pause command with two Cubettos.

Suggested Activities

Introduce the pause instruction [NOTE: this is based on the assumption that a pause instruction block is added].

Show them what it does, and ask the children in what situations they think it might be useful. Link to pelican crossings it would be safe to cross the road only when the light for the cars is red. Helps to reinforce road safety.

Have the children create an algorithm that utilises the pause instruction to either prevent two Cubettos from colliding or to offer a potential pedestrian the opportunity to cross the road.

LESSON 8

Learning objectives

Introduces the idea of storing and retrieving digital content.

Creating simple programs.

Learning outcome

Children should:

Be able to use the function line to call a subroutine.

Suggested Activities

Introduce the function line. At first do this very simply, with two instructions (e.g. forward and left) in the function line and combine with one more instruction in the algorithm. Change one instruction in the function line and ask what they think will happen. Build up more in- structions as they grasp the concept.

If necessary split the class up to enable children to get time to work in small groups with a Primo set to try to use the function line themselves.

When not with the play set, children can complete a worksheet asking them where Cubetto will end up (using function line).