Cubetto in Space - Unit 1

Reception, Ages 4 to 5, UK National Curriculum

Subjects covered:

Physical Development

Expressive Arts & Design

Understanding the World

Resources provided:

Solar system guide

Materials required:

6x Cubettos

6x Boards

6x Sets of Blocks

6x Space Maps

Introduction

The Cubetto Playset is a Montessori inspired coding toy that allows children ages 3 to 6 to program a friendly wooden robot without screens and is powered by a programming language you can touch.

New technology can sometimes be overwhelming to understand and adopt. The activities contained in this guide were created by educators for educators.

We want to make it simple for you to integrate the Cubetto Playset and its tangible programming language into your teaching.

Development and learning in other key areas

Beyond coding

The collaborative nature of Cubetto makes it an extremely versatile tool for the classroom. Cubetto fosters learning in key development areas that go beyond programming.

Communication

Children practice listening through a range of stories and narratives in relation to Cubetto, accurately anticipating key events and responding with comments, questions or actions. They also develop their own narratives and explanations.

Dexterity

Children develop coordination in large and small movements around the playset. They negotiate the placement of obstacles around the world map and place blocks on our tangible interface.

Social-Emotional

Children become confident by trying new, open-ended activities that remove “wrong” outcomes, and easily encourage group work. The open nature of the maps allows them to choose the resources they need for their play session.

Mathematics

Children add and subtract blocks to a sequence. They solve problems, including doubling and halving to get Cubetto from A to B. They discuss size, shapes and patterns, distance, position, and time to solve problems.

Logical reasoning

The blocks allow children to create and debug simple programs with their hands. They use technology purposefully to create, organise, store, manipulate and retrieve meaningful sequences.

Introducing the Playset

Introducing Cubetto

Introduce Cubetto as a friendly robot that children can program. Children should be told that Cubetto cannot think for himself, and can only move as programmed by the child, just like any other machine. If in a group setting, sit children in a circle, and allow them to pass Cubetto around to one another, saying hello or acknowledging the presence of the object.

Doing so forms a bond with Cubetto, in the same way they would with a stuffed animal, or a toy, and solving problems through narratives later on is more engaging.

Introducing the Board

Introduce the Board as a remote control that children can use to send instructions to Cubetto.

Without the Board, there is no way of sending Cubetto his instructions.

It is important for children to understand Cubetto is only able to move with a human's command. This is not only empowering, but also key to understanding computing.

Encourage children to also explain what other objects in their homes and lives function within a similar paradigm. A television needs a human to change its channels for example, or a washing machine needs a human to select its settings.

These examples, like Cubetto, are machines that need human programming to do their job.

Introducing the Blocks

Introduce the Instruction Blocks as the directions Cubetto follows when inserted in the Board and sent by pressing the action button.

Different Blocks represent different instructions, and an unambiguous, distinct command. These Blocks are what make up Cubetto's hands on coding language, and are key in the learning of computational thinking.

When each block is inserted in the Board, a child should be encouraged to predict what Cubetto will execute before pressing the "Go" button.

This is key in understanding concepts like program design, and it helps develop abstraction.

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Unit 1 Overview

Reception

By the end of the unit pupils will be able to:

- Understand what an algorithm is and that programs execute by precise instructions.
- Pupils will also be able to create a simple algorithm and use logical reasoning to predict the behaviour of simple programmes.

	Lesson 1	Lesson 2	Lesson 3	Lesson 4
NC Computing Objectives	To control a digital device	To explore a digital device	To understand that programmes execute by precise instructions	To understand what an algorithm is
Outcomes	• I can talk about Cubetto's parts • I can describe space	• I can make Cubetto move • I can compare Earth and the moon	• I can put things in the right order • I understand that planets move around the sun	• I can say what an algorithm is • I can use and name different turns
EYFS Focus	Understanding the World (ELG 14)	Understanding the World (ELG 14)	Physical Development (ELG 4 & 15)	Physical Development (ELG 4 & 15)
Computational Thinking	Tinkering	Algorithms, Tinkering	Algorithms, Collaborating	Algorithms, Persevering
Main Activities	Cubetto's Planets 1. Introduce Cubetto and space theme through video and discussion of differences between earth and moon. 2. Discuss Cubetto: what it does, how it works and what it's made of. Open it up, identify parts and materials. 3. Explore Cubetto, the map and the blocks: can you make Cubetto move? 4. Explore wet sand and different materials to recreate surface of moon. 5. Water play using different materials found on Cubetto – discuss their properties. 6. Role play packing what you would take on a journey to the moon. 7. Make moon surface bubble paintings.		Cubetto's Solar System 1. Identify parts of our solar system on Primo map, and learn that planets move around the sun. 2. Create a model of our solar system in hall/playground, each child following different orbit. 3. Use forward, left and right turn to direct each other blindfolded around room, focussing on order of instructions. 4. Identify Primo blocks and explore creating algorithms to make Cubetto move. 5. Create keep fit routine for astronauts to follow in space. 6. Make constellation art using black card, stars & white pencil. 7. Order different space-themed objects.	
Challenge	Can you talk about what we could and couldn't do if we didn't have gravity?	Can you make Cubetto go backwards?	Can you find each of the planets, and the solar system on the Primo map?	Can you write an algorithm for a friend to test?
Resources	Images of space, Fairy liquid, paint, cups, paper, Screwdrivers/coins, Sand and water areas		Solar system guide, Tape/cones to mark orbits, Sun and eight planet signs, Blindfolds, Fruit/ objects to order by size, Black card, stars and white pencils	
Assessment	List of questions, Paintings, Verbal statements, Photos, Observation		Solar system models, Ordered objects and routines, Verbal statements about block functions, Photos, Observation	

	Lesson 5	Lesson 6	Lesson 7	Lesson 8
NC Computing Objectives	To use logical reasoning to predict behaviour of simple programmes	To use logical reasoning to predict behaviour of simple programmes	To create a simple programme	To create a simple programme
Outcomes	• I can predict what algorithm will do • I can choose an instrument to make a sound	• I can programme Cubetto to follow a simple route • I can compare different sounds	• I can write a simple algorithm • I can identify a liquid and a solid	• I can write a simple algorithm • I can say what the function block does
EYFS Focus	Expressive Arts & Design (ELG 16 & 17)	Expressive Arts & Design (ELG 16 & 17)	Understanding the World (ELG 14)	Understanding the World (ELG 14)
Computational Thinking	Logic, Creating	Logic, Creating	Algorithms, Collaborating	Algorithms, Collaborating
Main Activities	Cubetto's Space Orchestra 1. Listen to different pieces of music and discuss sounds in space. 2. Explore what sound an asteroid, stars or rocket would make, then explore and choose an instrument to recreate the sound. 3. Predict what will happen when certain blocks are used. 4. Make a new alien language using different instruments. 5. Predict if Cubetto will hit an asteroid when following an algorithm. 6. Draw or paint what you feel as you listen to music. 7. Tell the story of Cubetto's journey as he moves around the map.		Cubetto's Journey Home 1. Discuss returning home and what foods you would miss in space. 2. Create instant space food, describe the taste and explore using more/less water. 3. Explore using the function block and discuss why it's useful. 4. Make your own space map and move Cubetto around it. 5. Write algorithms to make Cubetto move between different parts of the solar system. 6. Move Cubetto from the rocket to Earth. 7. Role play the first thing you would do on returning home.	
Challenge	Can you move from the moon to the sun without touching the asteroids?	Work in a group to programme Cubetto & make a matching soundtrack.	Can you use fewer blocks in your algorithm?	Can you look at a friend's algorithm and predict what it will do, then test it?
Resources	Pictures of space e.g. rocket, stars, asteroids, Pens, paints, paper and card, Percussion instruments, Headphones (if available)		Instant dried food, Spoons, straws, ziplock bags, jugs, pots, A3 2 x 3 grids	
Assessment	Space sounds, Alien languages and justification for sounds, Algorithm predictions, Photos, Verbal statements, Observation of instrument choices, Headphones (if available)		Created algorithms, Space food exploration, Verbal statements about liquids and solids, Photos, Observation	

Lesson 1: Cubetto's Planets (1 of 2)

EYFS focus: Understanding the World (ELG 14)

NC Objectives
To explore a digital device

Outcomes
- I can talk about Cubetto's parts
- I can describe space

Resources Needed
- Images of space
- Washing-up liquid, cups and paints
- Objects to drop into water

Prep Needed
- Check batteries.
- Check video and sound.
- Prepare areas for wet sand and water play.
- Prepare materials for dropping into water.

Resources Provided
- N/A

Key Vocabulary
- Space
- Gravity

Computational thinking concept

Logic

Computational thinking approach

Tinkering

Teacher-led Introduction (introducing Board, Blocks and Cubetto – not the map just yet)

1. Introduce Cubetto to the class (try not to give anything away other than his name). Ask: What would you like to find out about Cubetto? Collect the pupils' questions on the board to refer back to at the end of the lesson.
2. Explain that Cubetto is a robot that they control and that, over the term, they will be helping Cubetto explore an exciting place.
3. Show an image of space and ask pupils if they know what this is. Ask: What do you know about space? What do you think it's like in space? What would you like to find out about space? Collect pupils' questions about space and keep these on a wall for the entire unit.
4. Explain that in space there is no air, no water and no gravity. Ask: What is gravity? Have you seen pictures or videos of people in space? Can you describe how they move and what their movements look like?
5. Show video of astronaut washing her hair in space: https://goo.gl/fqSNuX and ask: What do you notice about her hair and the water?
6. Explain that being in space feels like swimming underwater – you float around. Clarify that gravity keeps us and other things on the ground; when there is no gravity, everything floats around!

Lesson 1: Cubetto's Planets (2 of 2)

Activity 1: Opening up Cubetto

1. Look at Cubetto from the outside and discuss what he does and what he is made from. What materials can you see?
2. Open up Cubetto using the play screwdrivers or coins. What can you see? Can you see any metal?
3. Why do you think Cubetto is made from these materials? What if Cubetto was made from glass? Or brick?

Activity 2: Exploring Cubetto's movement

1. Explore what Cubetto does and how he works.
2. Put different blocks in the Board (without direction) and press the Go button. Can Cubetto move without you doing anything?
3. Look at the map. Can you make Cubetto move one square?

Activity 3: Bubble painting

1. Use washing-up liquid, cups and grey/white/black paint to create the moon's surface.

Activity 4: Wet sand moon craters

1. Look at the moon pictures. What shapes can you see?
2. Can you make the sand look like the surface of the moon? Try adding water to the sand. What happens?
3. Can you use other things to make it look like the moon's surface?

Activity 5: Water play

1. What materials is Cubetto made from?
2. Find some things made from wood, plastic and metal.
3. What do you think will happen when you put each one in water?
4. Put each one in the water and see if you can change whether they float or sink. Can you use a yoghurt pot to make one float?

Activity 6: Role play

1. Imagine you're going on a journey to the moon!
2. What would you pack in your very small suitcase?

Challenge

Can you talk about what we could and couldn't do if we didn't have gravity?

Plenary and Assessment

1. Ask: What is Cubetto? A computer. What can Cubetto do? What do the blocks do? Can Cubetto move without you doing something?
2. Look at the list of questions created at the beginning of the lesson. What have we learnt? What do we still want to find out?
3. Pupils share and discuss wet sand and water play.
4. Ask: What is it like in space? What do they not have in space?
5. Ask: What is gravity and why do we need it on Earth? What happens when there is no gravity?

Lesson 2: Cubetto's Planets (1 of 2)

EYFS focus: Understanding the World (ELG 14)

NC Objectives

To explore a digital device

Outcomes

- I can make Cubetto move
- I can compare Earth and the moon

Resources Needed

- Images of space
- Washing-up liquid, cups and paints
- Objects to drop into water

Prep Needed

- Check batteries.
- Check video and sound.
- Prepare areas for wet sand and water play.
- Prepare materials for dropping into water.
- Play screwdrivers/ coins
- Play area for sand and water activities
- Transparent water tank/bowl

Resources Provided

- N/A

Key Vocabulary

- Moon
- Earth
- Planet
- Same
- Different

Computational thinking concept

Algorithms

Computational thinking approach

Tinkering

Teacher-led Introduction

1. Show the first 2-3 minutes of this video of the moon (without sound): https://goo.gl/X2u2w. Discuss what the video contains and what the pupils can see.
2. Show this video of Earth from 1:00 to 3:00: https://goo.gl/yb3bN. Collect the pupils' ideas about what they just saw.
3. Explain that Earth is a planet.
4. Ask: What did you see at the end? The moon. So what does this tell us about Earth and the moon? They move near to each other.
5. Show an image of the moon and Earth side by side to demonstrate scale, then pictures of the moon and Earth close up and from far away.
6. Ask: What do you spot that is the same between Earth and the moon? What do you see that's different?
7. Ask: What makes Earth special? Explain that Earth has been called the Goldilocks planet because it's not too hot and not too cold for living things to grow and live on.

Lesson 2: Cubetto's Feelings (2 of 2)

Activity 1: Opening up Cubetto

1. Look at Cubetto from the outside and discuss what he does and what he is made from. What materials can you see?
2. Open up Cubetto using the play screwdrivers or coins. What can you see? Can you see any metal?
3. Why do you think Cubetto is made from these materials? What if Cubetto was made from glass? Or brick?

Activity 2: Exploring Cubetto's movement

1. Explore what Cubetto does and how he works.
2. Put different blocks in the Board (without direction) and press the Go button. Can Cubetto move without you doing anything?
3. Look at the map. Can you make Cubetto move one square?

Activity 3: Bubble painting

1. Use washing-up liquid, cups and grey/white/black paint to create the moon's surface.

Activity 4: Wet sand moon craters

1. Look at the moon pictures. What shapes can you see?
2. Can you make the sand look like the surface of the moon? Try adding water to the sand. What happens?
3. Can you use other things to make it look like the moon's surface?

Activity 5: Water play

1. What materials is Cubetto made from?
2. Find some things made from wood, plastic and metal.
3. What do you think will happen when you put each one in water?
4. Put each one in the water and see if you can change whether they float or sink. Can you use a yoghurt pot to make one float?

Activity 6: Role play

1. Imagine you're going on a journey to the moon!
2. What would you pack in your very small suitcase?

Challenge

Can you make Cubetto go backwards?

Plenary and Assessment

1. Look at the list of questions created at the beginning of Lesson 1. What have we learnt today? What do we still want to find out?
2. Pupils share their discoveries with the rest of the class.
3. Ask: How does Cubetto know what to do? What do the blocks do and how does Cubetto work?
4. Pupils share how they made Cubetto move.
5. Ask: What does the moon look like? What does Earth look like?
6. Ask: What is special about Earth? What is the same between the moon and Earth? What is different?

Lesson 3: Cubetto's Solar System (1 of 2)

EYFS focus:Physical Development (ELG 4 & 15)

NC Objectives

To understand that programs execute by precise instructions

Outcomes

- I can put things in the right order
- I understand that planets move around the sun

Resources Needed

- Tape/cones to mark orbits
- Nine signs for the eight different planets and the sun
- Blindfolds
- Different-sized fruit or objects (for modelling)
- Black card, paper stars and white pencils

Prep Needed

- Check batteries.
- Check video and sound.
- In a large space, mark out eight concentric rings increasing in size.
- Prepare nine signs for the children to hold.
- If possible, project the video in the hall while pupils make their model.

Resources Provided

- Solar system guide

Key Vocabulary

- Planets
- Solar system
- Forward
- Right
- Left
- Programmer

Computational thinking concept

Algorithms

Computational thinking approach

Collaborating

Teacher-led Introduction

1. Ask: What planet do we live on? Ask: Do you know the names of any other planets? Clarify that the moon isn't a planet.
2. Show video: https://goo.gl/cDxFdz and ask: Does anyone know what this is? How many planets can you see? How are they moving?
3. Explain that this is our solar system, but that it's much bigger in real life. The solar system is made up of a sun, as well as many planets and moons.
4. Ask: Can you find Earth? Where is the sun? Are they all moving at the same speed?
5. Show pupils the solar system guide and explain that planets move around the sun in a particular order. Some are nearer to the sun and others are further away.
6. Ask nine pupils to stand up. Hand out the signs to each one in any order.
7. Using the picture for reference, ask: Can you tell the planets where to stand so that they are in the right order?

Lesson 3: Cubetto's Solar System (2 of 2)

Activity 1: Solar system model (in hall/playground)

1. Take a planet or sun sign.
2. If you're the sun, where do you stand? Repeat question for planets.
3. Each child with a sign stands on their circle and moves anti-clockwise around the sun.
4. If the video is projected, ask pupils to imitate the same speed.

Activity 2: Blindfold instructions

1. Get into pairs: one is blindfolded and one is the programmer.
2. Decide where you will start and finish.
3. Using only forward, left turn and right turn, the programmer guides their partner around the room carefully.

Activity 3: Putting blocks in order (without blue at first)

1. Take three blocks, put them in the Board and press the Go button.
2. What happens if you put them in a different order? Do you get to the same place? What happens if you miss out a block?
3. Now try using four blocks, then five.

Activity 4: Keep fit routine in space

1. Did you know that Tim Peake, who went into space in 2016, ran a marathon on the space station?
2. Make up a simple routine for astronauts to do to keep fit in space.
3. Remember that astronauts can't move very far so no running unless it's on the spot!

Activity 5: Constellation art

1. Put some stars on your black card.
2. Using the white pencil, join the stars together by drawing lines.
3. Can you see any patterns or pictures?

Activity 6: Ordering by size

1. Look at the different objects. Can you sort them into groups?
2. Can you put one group in order from smallest to biggest?
3. Can you mix up your order and ask a friend to put them back in order?

Challenge

Can you find each of the planets, and the whole solar system, on the Primo map?

Plenary and Assessment

1. Ask: What are the planets, moons and sun called? How do the planets move? What do they move around?
2. Show the different planets and ask pupils to come to the front to put them in order.
3. Ask: What else do we put in order?
4. Ask: Why is it important to put blocks in the right order? Pupils share ordered examples and discuss what would happen if they tried to change the order of these.
5. Pupils share their discoveries and work.

Lesson 4: Cubetto's Solar System (1 of 2)

EYFS focus:Physical Development (ELG 4 & 15)

NC Objectives

To understand what an algorithm is

Outcomes

- I can say what an algorithm is
- I can use and name different turns

Resources Needed

- Tape/cones to mark orbits
- Nine signs for the eight different planets and the sun
- Blindfolds
- Different-sized fruit or objects (for modelling)
- Black card, paper stars and white pencils

Prep Needed

- Check batteries.
- Check video and sound.
- In a large space, mark out eight concentric rings increasing in size.
- Prepare nine signs for the children to hold.
- Example algorithms.
- If possible, project the video in the hall while pupils make their model.

Resources Provided

- N/A

Key Vocabulary

- Order
- Forward
- Right
- Left
- Algorithm
- Programmer

Computational thinking concept

Algorithms

Computational thinking approach

Persevering

Teacher-led Introduction

1. Ask: When is it important for us to do things in the right order? Putting on clothes, playing games (taking turns), spelling words.
2. Ask: What would happen if we mixed up these orders? Collect ideas.
3. Show the Primo Board and explain that the blocks have to be put in the right order or Cubetto won't move correctly.
4. Ask three pupils to stand at the front. Ask one to move forward, one to turn right and one to turn left respectively.
5. Ask each volunteer to choose their corresponding coloured block depending on their movement.
6. Clarify green = forward, red = right, yellow = left.
7. Model telling pupils where you want Cubetto to start and finish, then put the blocks in the Board and press the Go button.
8. Explain that a set of blocks in the right order which make Cubetto move is called an 'algorithm'. Practice saying the word together.

Lesson 4: Cubetto's Solar System (2 of 2)

Activity 1: Solar system model (in hall/playground)

1. Take a planet or sun sign.
2. If you're the sun, where do you stand? Repeat question for planets.
3. Each child with a sign stands on their circle and moves anti-clockwise around the sun.
4. If the video is projected, ask pupils to imitate the same speed.

Activity 2: Blindfold instructions

1. Get into pairs: one is blindfolded and one is the programmer.
2. Decide where you will start and finish.
3. Using only forward, left turn and right turn, the programmer guides their partner around the room carefully.

Activity 3: Putting blocks in order (without blue at first)

1. Take three blocks, put them in the Board and press the Go button.
2. What happens if you put them in a different order? Do you get to the same place? What happens if you miss out a block?
3. Now try using four blocks, then five.
4. What do we call these blocks in the right order?

Activity 4: Keep fit routine in space

1. Did you know that Tim Peake, who went into space in 2016, ran a marathon on the space station?
2. Make up a simple routine for astronauts to do to keep fit in space.
3. Remember that astronauts can't move very far so no running unless it's on the spot!

Activity 5: Constellation art

1. Put some stars on your black card.
2. Using the white pencil, join the stars together by drawing lines.
3. Can you see any patterns or pictures?

Activity 6: Ordering by size

1. Look at the different objects. Can you sort them into groups?
2. Can you put one group in order from smallest to biggest?
3. Can you mix up your order and ask a friend to put them back in order?

Challenge

Can you write an algorithm for a friend to test?

Plenary and Assessment

1. Ask: What is an algorithm? Why is it important to put Cubetto's blocks in the right order?
2. Pupils share ordered examples and discuss what happened if/when they changed the order.
3. With all pupils standing, show one block at a time and ask pupils to show how that block makes Cubetto move. Repeat for all three blocks.
4. Show the Primo map and ask: What blocks would I use to go from the moon to Earth? Discuss.

Lesson 5: Cubetto's Space Orchestra (1 of 2)

EYFS Focus: Expressive Arts & Design (ELG 16 & 17)

NC Objectives

To use logical reasoning to predict the behaviour of simple programs

Outcomes

- I can predict what an algorithm will do
- I can choose an instrument to make a certain sound

Resources Needed

- Pictures of space (e.g. rocket, stars, asteroids)
- Pens, paints and crayons
- Percussion instruments
- Paper and card
- Headphones (if possible)

Prep Needed

- Check batteries.
- Check sound.
- Prepare algorithms for children to predict (for activities 2 & 4).

Resources Provided

- N/A

Key Vocabulary

- Algorithm
- Instrument
- Drum
- Trumpet

Computational thinking concept

Logic

Computational thinking approach

Creating

Teacher-led Introduction

1. As pupils enter, play Chris Hadfield's cover of 'Space Oddity' filmed in the space station: https://goo.gl/IJL5ET and discuss.
2. Explain that writing or playing music are both similar to making Cubetto move: the notes have to be in the right order.
3. Ask: What would it sound like if all the notes were in the wrong order?
4. Ask: What do we call it when a set of blocks are in the right order? Algorithm.
5. Play theme tune to '2001: Space Odyssey' film: https://goo.gl/WqsUgE and ask: How does the music make you feel? Which part is exciting, scary or calm? Can you name one of the instruments being played?
6. Ask: Why did the composer choose a drum? Why a trumpet? What changes to the trumpet sound?
7. Show the percussion instruments and ask: What other instrument could we use to make a noise similar to the trumpet?

Lesson 5: Cubetto's Space Orchestra (2 of 2)

Activity 1: Sounds in space

1. Look at the pictures of space and talk about what sounds might be made there.
2. Explore the instruments and the sounds they make.
3. Decide on one sound and which instrument you would use for this.
4. Play different sounds in turn and guess what each sound is for.

Activity 2: Predicting blocks

1. Look at the algorithm. What blocks can you see and what order are they in?
2. Try to work out how the algorithm will make Cubetto move.
3. Put the same blocks in the Board and test out the algorithm. Were you right?

Activity 3: Alien language

1. Choose one instrument. What different sounds can it make?
2. What happens when you hit it softly? Hard?
3. Create an alien language! What sound would mean yes/no? What would mean hello/goodbye?
4. Optional: show Clangers video.

Activity 4: Avoid the asteroids (teacher-led)

1. Look at the Primo map. Can you find the flying asteroids?
2. Place Cubetto on the sun, facing west.
3. Look at the algorithm: green, green, red, green.
4. Where will Cubetto end up? The volcano.
5. Will Cubetto hit the asteroids? Repeat for other algorithms.

Activity 5: Painting music

1. Choose one of the pieces of music from the start of the lesson.
2. As you listen, use paint, pencils or crayons to draw whatever you want to. Try not to lift your paintbrush or pen off the paper!
3. When you finish, what shapes or patterns can you see?

Activity 6: Story telling

1. Join a group using Cubetto and watch the journey he is making.
2. As Cubetto moves, tell the story of what he is passing and landing on, on the map.
3. How does Cubetto feel in space? What can he see? Smell? Hear? Touch?

Challenge

Can you travel from the moon to the sun without getting hit by the asteroids?

Plenary and Assessment

1. Ask pupils to share their space sounds and alien languages. Ask the rest of the class: Can you guess what that sound is for?
2. Ask: Why did you choose that instrument? What different sounds can it make?
3. Ask volunteers to share what it was like trying to work out where Cubetto lands. How did you work it out? How did you work together?
4. Show an algorithm on the Board and ask children to work out what it will do.
5. Ask a pupil to come to the front and test it out. Discuss.

Lesson 6: Cubetto's Space Orchestra (1 of 2)

EYFS Focus: Expressive Arts & Design (ELG 16 & 17)

NC Objectives

To use logical reasoning to predict the behaviour of simple programs

Outcomes

- I can predict what an algorithm will do
- I can compare the sounds from different instruments

Resources Needed

- Pictures of space (e.g. rocket, stars, asteroids)
- Pens, paints and crayons
- Score for 'Jupiter'
- Percussion instruments
- Paper and card
- Headphones (if possible)

Prep Needed

- Check batteries.
- Check sound.
- Prepare algorithms for children to predict (for activities 2 & 4).

Resources Provided

- N/A

Key Vocabulary

- Algorithm
- Predicting
- Recycled
- Treasure

Computational thinking concept

Logic

Computational thinking approach

Persevering

Teacher-led Introduction

1. Play Gustav Holst's 'The Planets': https://goo.gl/qE9Xuu and show the music for 'Jupiter'.
2. Ask: Does anyone know what these symbols mean? Explain that they are musical notes.
3. Explain that these notes are similar to the blocks used with Cubetto because the notes tell the musicians what to play, just like the blocks tell Cubetto where to move. Reinforce that computers can't do anything without humans telling them what to do.
4. Ask: What do we call a set of blocks in the right order? An algorithm.
5. Explain that we can predict what an algorithm will do before we press Go - this can help us make sure it's correct.
6. Explain that predicting is when we use our knowledge of past experiences to tell us what will happen in the future.
7. Show a simple algorithm and ask pupils to predict where Cubetto will move. Pupils test out their predictions and discuss.

Lesson 6: Cubetto's Space Orchestra (2 of 2)

Activity 1: Sounds in space

1. Look at the pictures of space and talk about what sounds might be made there.
2. Explore the instruments and the sounds they make.
3. Decide on one sound and which instrument you would use for this.
4. Play different sounds in turn and guess what each sound is for.

Activity 2: Hidden Treasure

1. Look at the algorithm. What blocks can you see and what order are they in?
2. Try to work out how the algorithm will make Cubetto move.
3. Put the same blocks in the Board and test out the algorithm. Were you right?

Activity 3: Alien language

1. Choose one instrument. What different sounds can it make?
2. What happens when you hit it softly? Hard?
3. Create an alien language! What sound would mean yes/no? What would mean hello/goodbye?
4. Optional: show Clangers video.

Activity 4: Avoid the asteroids (teacher-led)

1. Look at the Primo map. Can you find the flying asteroids?
2. Place Cubetto on the sun, facing west.
3. Look at the algorithm: green, green, red, green.
4. Where will Cubetto end up? The volcano.
5. Will Cubetto hit the asteroids? Repeat for other algorithms.

Activity 5: Painting music

1. Choose one of the pieces of music from the start of the lesson.
2. As you listen, use paint, pencils or crayons to draw whatever you want to. Try not to lift your paintbrush or pen off the paper!
3. When you finish, what shapes or patterns can you see?

Activity 6: Story telling

1. Join a group using Cubetto and watch the journey he is making.
2. As Cubetto moves, tell the story of what he is passing and landing on, on the map.
3. How does Cubetto feel in space? What can he see? Smell? Hear? Touch?

Challenge

Work in a group to program Cubetto & make a matching soundtrack.

Plenary and Assessment

1. Ask: What does predict mean? What do we predict will happen tomorrow? Collect children's ideas.
2. Ask: Why is it helpful to predict what Cubetto will do before we press Go?
3. Ask pupils to share how they programmed Cubetto to move, what their predictions were and if they were correct.
4. Ask: How did you avoid the asteroids on the map? What did you do differently?

Lesson 7: Cubetto's Journey Home (1 of 2)

EYFS Focus: Understanding the World (ELG 14)

NC Objectives

To create a simple program

Outcomes

- I can write a simple algorithm
- I can identify a liquid and a solid

Resources Needed

- Instant dried food (e.g. chocolate milk drink, custard, oats)
- Spoons, pots, jugs, straws, bags
- A3 2 x 3 grids

Prep Needed

- Check batteries.
- Check dietary requirements (including allergies).
- Prepare different dried/instant foods and drinks in different pots with cold and warm water in jugs.

Resources Provided

- N/A

Key Vocabulary

- Liquid
- Solid
- Function

Computational thinking concept

Algorithms

Computational thinking approach

Collaborating

Teacher-led Introduction

1. Tell pupils to close their eyes and think of a long journey they have been on. Ask: Where were you going? What was it like?
2. Explain that Cubetto is finally on his way home after a very long time in space.
3. Ask: How long do you think astronauts can spend in space? Tim Peake was in space for over 6 months (186 days) in 2016!
4. Ask: What would you miss if you were in space for a long time? Who would you miss? Which foods or things?
5. Show video of an astronaut cooking (and eating!) spinach in space: https://goo.gl/0kztlr and ask: How is it the same as we cook? How is it different?
6. Explain that a lot of food in space is dry so that it lasts a long time. Ask: What did Chris do to the dried spinach before eating it?
7. Explain that by adding water (a liquid) to the food (a solid), the astronaut can eat it.
8. Explain that today pupils will be experimenting with liquids and solids, making space food and helping Cubetto on his journey home.

Lesson 7: Cubetto's Journey Home (2 of 2)

Activity 1: Space food

1. Spoon some of the dried food/drink into the plastic bag.
2. Pour in a small amount of water.
3. Zip the bag closed and mix it together (be careful!).
4. Open the corner and put in the straw, then try it. Is it nice?
5. What happens to the dried powder? Try adding more/less water.

Activity 2: Blue block (teacher-led)

1. What do you think the blue block does? Explore using it.
2. This is called the function block and it works like a backpack – it holds up to four other blocks inside it.
3. Look at the function line on the board. Experiment and discuss.

Activity 3: Space map (guided)

1. On the 2 x 3 grid, make your own space map, just like Cubetto's!
2. Mark on planets, the moon and the sun.
3. Mark one square with 'Start' and one with 'End'.
4. Place Cubetto on your map and write an algorithm to move him from Start to End.

Activity 4: Planet hopping

1. Choose two parts of the solar system on the map (not too far away from each other!).
2. Write an algorithm to move Cubetto from Start to End.
3. Did it work the first time? Why? What did you change/keep?

Activity 5: Journey home

1. Place Cubetto on the rocket.
2. Write an algorithm to get Cubetto from the rocket to Earth.
3. How many blocks did you use? Can you use fewer blocks?
4. Can you use the function block?

Activity 6: Role play

1. Imagine you are returning home from a long time away in space.
2. Role play coming back to your house and seeing your family or friends.
3. How do you feel? What's the first thing you would do? What would you eat?

Challenge

Can you use fewer blocks in your algorithm?

Plenary and Assessment

1. Show different dried foods and ask: Is this a liquid or a solid? Repeat for water and milk.
2. Ask pupils to share what happened when they added liquid to the dried food. Ask: What did it taste like? What did it feel like?
3. Ask: What other things do we add water to? What happens when we add it?
4. Ask pupils to share their algorithms and discoveries about the function block.

Lesson 8: Cubetto's Journey Home (1 of 2)

EYFS Focus: Understanding the World (ELG 14)

NC Objectives

To create a simple program

Outcomes

- I can write a simple algorithm
- I can say what the function block does

Resources Needed

- Instant dried food (e.g. chocolate milk drink, custard, oats)

Prep Needed

- Check batteries.
- Prepare algorithms for pupils to predict and test out.
- Check dietary requirements (including allergies).
- Prepare different dried/instant foods and drinks in different pots with cold and warm water in jugs.

Resources Provided

- N/A

Key Vocabulary

- Algorithm
- Function
- Backpack

Computational thinking concept

Algorithms

Computational thinking approach

Creating

Teacher-led Introduction

1. As children enter, play the cover of 'Happy' about algorithms: https://goo.gl/fkyl0Y.
2. Ask: What word did you hear in the song that we've been learning about? What did the song tell us algorithms do?
3. Explain that each part of an algorithm is very important, just like every block makes Cubetto do something different.
4. Introduce the function (blue) block and ask: Has anyone used this block yet? What does it do? Clarify that it is like a backpack –
5. it holds up to four other blocks inside it.
6. Model using it by placing two green blocks in the main sequence and press the Go button. Then, clear the board and put the two green blocks in the function line instead. Place one function block in the main sequence and press the Go button.
7. Ask: What happened? If there's only one blue block, why does Cubetto move two squares?
8. Model adding a second function block in the main sequence and press the Go button again. Allow time for the children to discuss.
9. Explain that today they will be using the function block by helping Cubetto return home, making their own maps and role playing.

Lesson 8: Cubetto's Journey Home (2 of 2)

Activity 1: Space food

1. Spoon some of the dried food/drink into the plastic bag.
2. Pour in a small amount of water.
3. Zip the bag closed and mix it together (be careful!).
4. Open the corner and put in the straw, then try it. Is it nice?
5. What happens to the dried powder? Try adding more/less water.

Activity 2: Blue block (teacher-led)

1. What do you think the blue block does? Explore using it.
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Activity 3: Space map (guided)

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2. Mark on planets, the moon and the sun.
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4. Place Cubetto on your map and write an algorithm to move him from Start to End.

Activity 4: Planet hopping

1. In pairs, choose two parts of the solar system on the map
2. (not too far away from each other!).
3. Write an algorithm to move Cubetto from Start to End.
4. Did it work first time? Why? What did you change/keep?

Activity 5: Journey home

1. Place Cubetto on the rocket.
2. In pairs, write an algorithm to get Cubetto from the rocket
3. to Earth.
4. How many blocks did you use? Can you use fewer blocks?
5. Can you use the function block?

Activity 6: Role play

1. Imagine you are returning home from a long time away in space.
2. Role play coming back to your house and seeing your family or friends.
3. How do you feel? What's the first thing you would do? What would you eat?

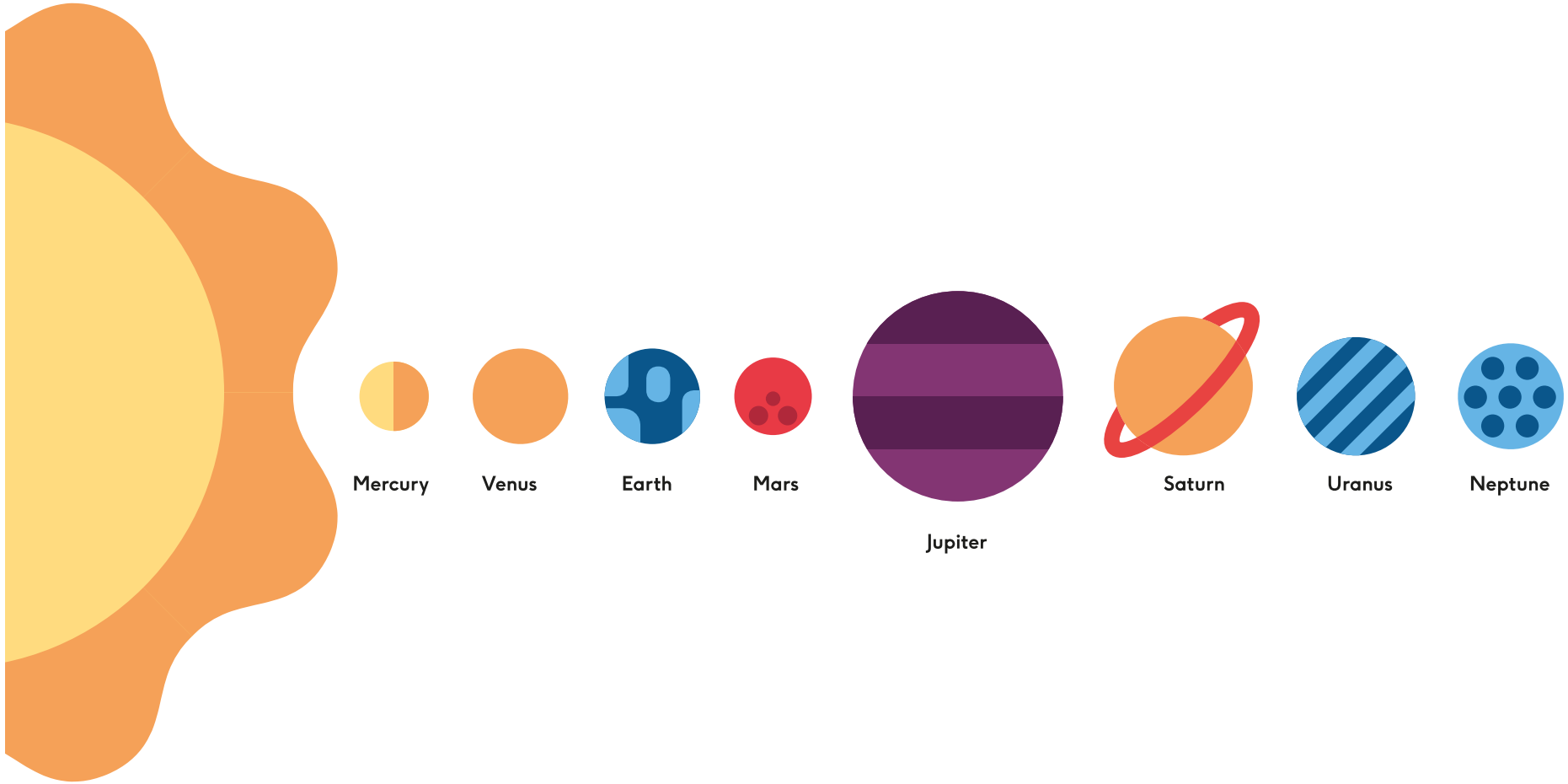
Challenge

Can you look at a friend's algorithm and predict what it will do, then test it out?

Plenary and Assessment

1. Ask: How does the function block work? How is it like a backpack? Why is the function block helpful?
2. Pupils share their algorithms moving from planet to planet, and from the rocket to Earth.
3. Ask pupils who created a space map to share their map and algorithm. Ask: Where does your algorithm start and end?
4. Show an example algorithm and ask: What do you predict this will do? Collect answers and ask pupils to come to the front to test.

Our solar system



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