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# Computational Thinking and Programming



## Topic: Understanding Instructions and Logical Thinking

### About this unit:

In this unit the children will learn how to give and follow instructions in order to make things happen. They will learn how to sequence instructions, so that others can follow them, and to predict what will happen. The children will learn that machines or devices follow instructions and that they need to be switched on and off or controlled. They will recognise the need for accuracy, definition, and common language. They will understand that algorithms are simply a list of instructions which can be implemented as simple programs on a range of digital devices.

### Expectations

By the end of this unit it is expected that:

- *All children will* understand that a set of instructions can predict an outcome and produce a set of instructions for others to follow.
- *Most children will* read a set of instructions which will sometimes predict the correct outcome. Most children will produce instructions, but may still make incorrect predictions.
- *Some children will* have progressed further and will understand what algorithms are, use logical reasoning, predict the behaviour of simple programs beforehand and create a simple program according to a list of precise instructions.

### Key vocabulary

- Algorithm
- Program
- Sequence
- Order
- Instruction

### Resources

- Remote controlled toys, for example Bee Bots, Walkie Talkies etc.
- iPads/tablets
- Diagram (prepared by the teacher)



# Lesson 1: Controlling Devices

## Setting the scene: whole class activity

### Learning objectives

- To use on/off switches and control buttons
- To understand that technology can be controlled
- To be aware of safety issues when using devices

### Resources

- Technology devices
- Electronic toys
- Computer
- Tablet
- Optional: Microphone

### Whole class activity

Discuss with the class the technology that they see or use, e.g. televisions, microwaves, washing machines, electronic toys, iPads/tablets, smartphones, traffic lights or supermarket checkouts. Explain how this equipment is operated, for example by pressing on/off buttons, turning dials, touch interface, remote controls etc.

Show the class some battery and electronic operated toys. Ask them to tell you what each object is and to talk about how, in order to use them, we need to turn them on and off or sometimes how we have to press dials or touch the interface to get them to start working.

Hold up a battery operated toy. Ask the children if the toy 'is alive' or 'what makes it work'. Explain that the toy needs 'power' to turn it on and off (battery/charge). Switch it on. Pretend you are confused because nothing has happened yet – what else do you have to do to make it work? Talk about how you need to press follow up buttons to control the device/technology. Introduce the children to a computer or tablet. Ask one or two children to come up to the front of the class and show the other children how to turn it on and off. Then ask them how do they make it work?

Discuss safety issues and why it is important to turn things off and keep devices away from water and liquid spills. Can the children think of other situations when they need to be careful while using technology? As a group, ask the children to record their voices using a computer, tablet or microphone. Ask them to explore how to turn it on, record their voice, and turn it off. Allow the children to explore and tell them that each child should have a turn.

### Plenary session

Discuss the recording task. Did the children have any problems? Listen to some of the recordings the children have produced. Can the children explain the sequence or step by step instructions, of how they managed to record their voices. What was their process?



# Lesson 2: Sequencing Instructions

## Setting the scene: small group activity

### Learning objectives

- To understand that technology can be controlled by a sequence of actions
- To understand that sequencing affects outcomes
- To put instructions in the correct sequence to achieve the correct results

### Resources

- Paper and pencils

### Small group activity

Recap the previous lesson with the children. Ask them to imagine that they have been asked to explain to someone else how to make toast. Do they think it would be easy to do? What do they think would be their first task? Together as a class, come up with a step by step process of how to make the toast. This is not an easy task for such young children so it may be helpful for the children to have some visual props.

Ask the children, if the steps were re-arranged, could they still make the toast? Is it still possible to make the toast using a new sequence of instructions?

Explain that it is sometimes very important to get steps in the right order when doing things, or else something may go wrong. Compare this with a recipe for making a cake. Is it important to follow a recipe in the right order? What might happen if you do not? Talk about how important it is to do the things in the correct order, such as making a telephone call. Take the children through the stages of making a call using a telephone or a mobile phone.

Now, encourage the children to do an activity in a group of four. Tell them that they will be putting instructions together to create a jam sandwich. (See the worksheet overleaf). Offer them a set of laminated cards and ask to put them in the order that they think will be best to create a jam sandwich. Allow them to explore the different possibilities and to work together in groups. Ask them if there is a correct answer. The worksheet includes some blank cards so that the children can add instructions if they need to.

When the children have had a go, ask a group or two to offer their step by step instructions. Do all the children agree? Has any group drawn a new card? What were their instructions and why? Can the order be different and still work? What would happen if, for example, butter or margarine was spread last? Would it make a difference?

### Differentiation

For a group that has finished, ask them to choose an actor. The actor will act out their set of instructions as they have laid it out. The children may want to read it out to their actor. The children can take turns becoming actors.



# Jam Sandwich Instruction Cards

Cut out each picture. Put them in the right order to show how to create a jam sandwich.  
There are also some blank cards so that you can create and draw your own pictures.

