Controlling Devices: Flowol: Inputs and Decisions

Aim:	**Success Criteria:**	**Resources:**
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. Children deconstruct and then recreate a flowchart using a decision symbol, based on the input of the sunlight at a lighthouse. I can use a decision symbol based on the status of an input.	I can connect a decision symbol in a flowchart. I can include the use of an input. I can program different outputs based on the status of an input. I can create a repeating loop.	**Lesson Pack** PC /laptop with Flowol 4 software
Key/New Words: Flowol, flowchart, algorithm, control, output, mimic, simulation, insert, symbol, start, stop, delay, process, decision, input, loop.		**Preparation:** Differentiated **Lighthouse Activity Sheet** - as required **Lighthouse Paper Model Sheets** - as required

Prior Learning:	Children will have created flowcharts to control road crossings and traffic lights with one or more outputs in lessons 2 and 3.

Learning Sequence

	**Flowchart Decisions:** Show the first part of a flowchart for the lighthouse lamp. Ask children if they can describe the process, based on the decision symbol. What could it be for? *(Note that the decision is based on the 'input' of the Sun (the outdoor surroundings being light). If the Sun is 'on' (or shining), then lamp is turned off; if the Sun is 'off' (not shining) then the lamp is turned on. The description should also focus on the repeating loop that constantly checks the input).*	
	**Lighthouse Mimic:** *Show the Lighthouse mimic using the Flowol software and test it by turning on and off (input) and the lamp (output). How could we make the light flash when the Sun is not shining? How can we incorporate the foghorn at the same time?*	
	**Inserting a Decision Symbol:** Using Flowol, demonstrate inserting a decision symbol. When dropping the symbol onto the workspace, the choice is automatically presented to select an input. When connecting from the symbol to the next symbol, a choice of 'Y' or 'N' is automatically presented.	
	**Programming the Lighthouse:** Children design a flowchart to operate the lighthouse based on the input of the Sun and using a decision symbol.  Design a flowchart for a program to control the lighthouse. Turn lamp on and off based on sunlight. Use the differentiated **Lighthouse Activity Sheets** for additional guidance.  Design a flowchart for a program to control the lighthouse. Make lamp flash on and off, based on sunlight, and turn on foghorn. Use the differentiated **Lighthouse Activity Sheets** for additional guidance.	
	**Adding Text Labels:** Show one example of a working flowchart for the Lighthouse or Greenhouse mimic. Children talk through what is happening in the program. Demonstrate adding text labels to the flowchart to annotate.	

Task*it*

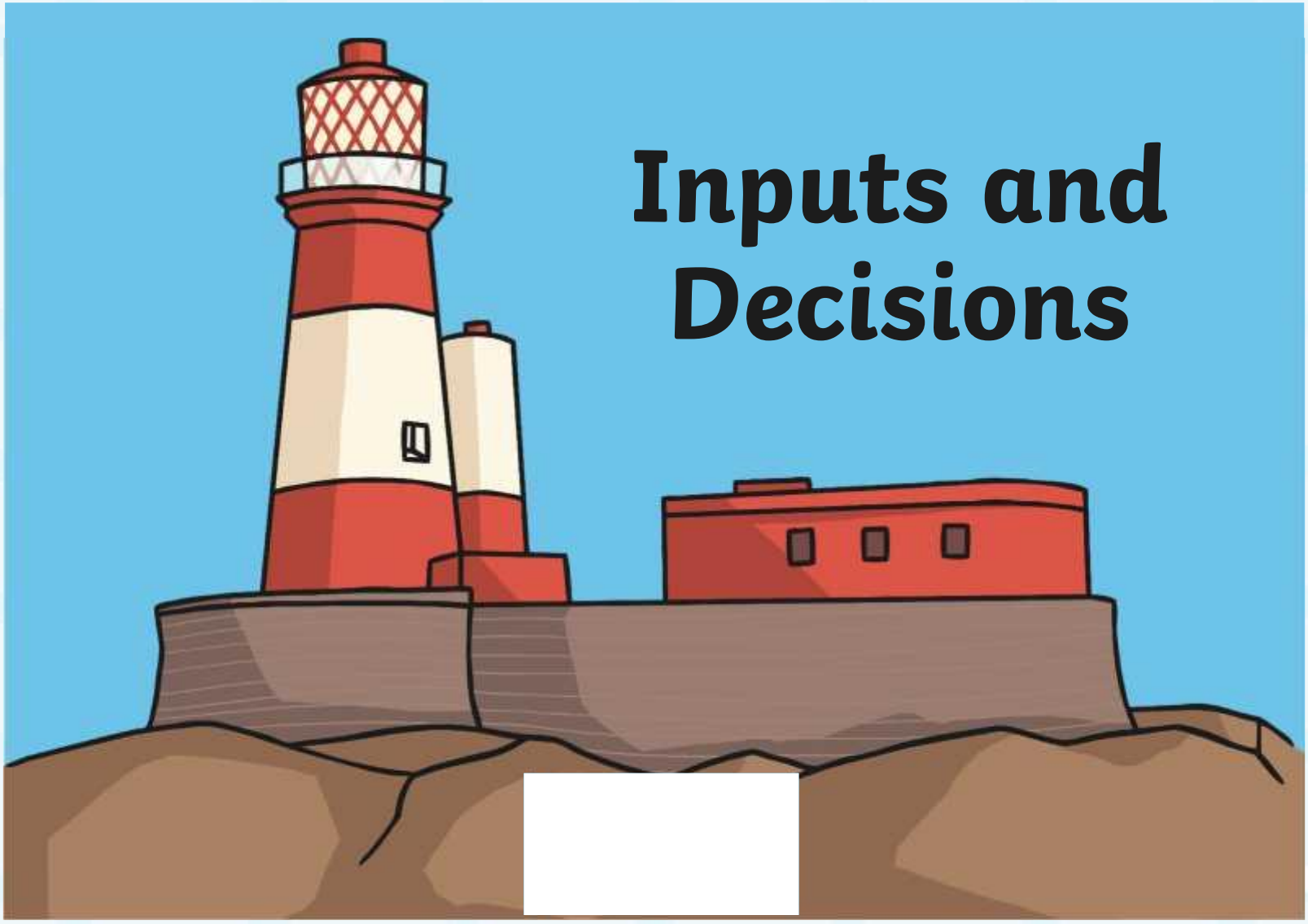
***Research*it:** Research existing lighthouses that still operate. Most are automatically controlled now instead of having people manually turn the lights on/off.

***Draw*it:** Draw your own lighthouse picture or model.

***Make*it:** Make your own model lighthouse using the _____

Computing

Controlling Devices: Flowol


Inputs and
Decisions

Aim

- I can use a decision symbol based on the status of an input.

Success Criteria

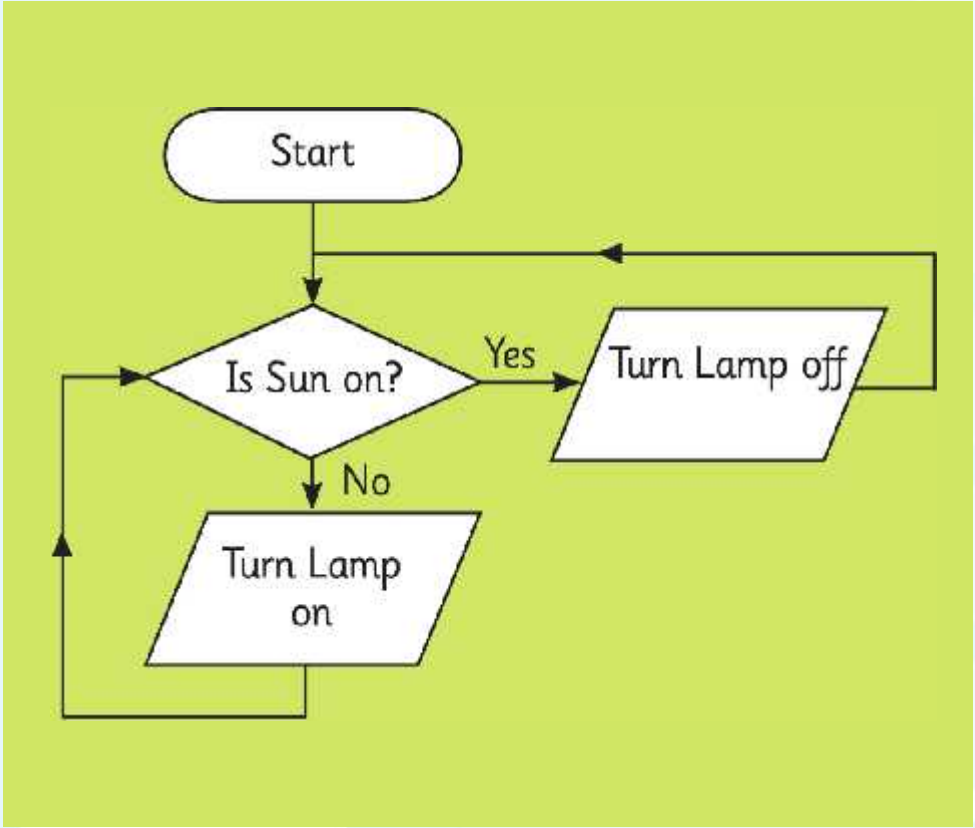
- I can connect a decision symbol in a flowchart.
- I can include the use of an input.
- I can program different outputs based on the status of an input.
- I can create a repeating loop.

Flowchart Decisions

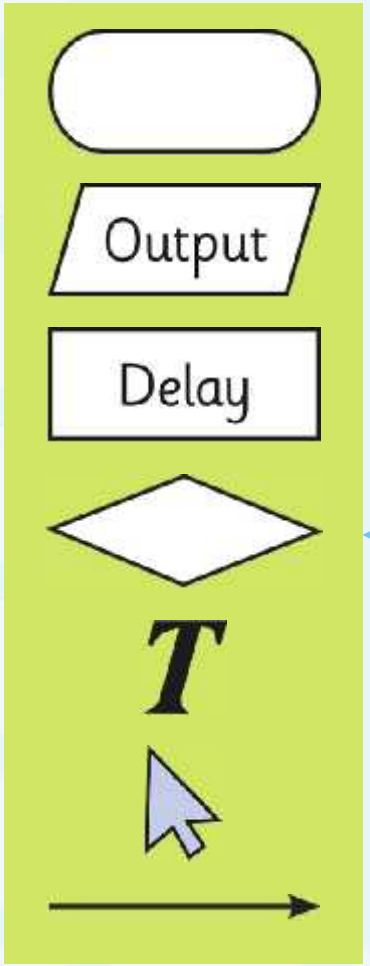
Look at this first part of a flowchart.

Can you describe the process, based on the decision symbol?

What could the flowchart be for?



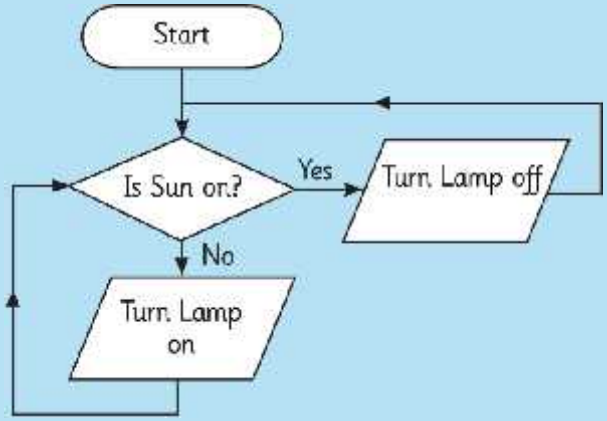
Flowchart Decisions



This is the beginning of a flowchart for a lighthouse.

The decision symbol is based on the 'input' of the Sun (the outdoor surroundings being light).

If the Sun is 'on' (or shining), then the lamp is turned off.
If the Sun is 'off' (not shining) then the lamp is turned on.



Note the repeating loop that constantly checks the input.

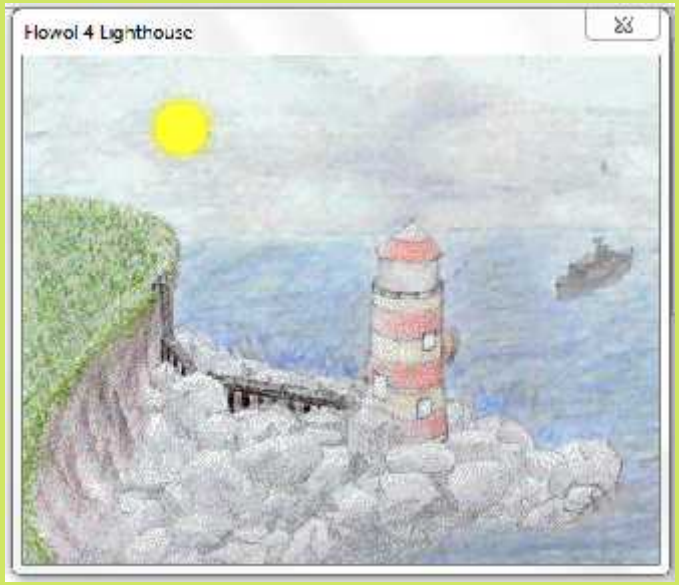
Lighthouse Mimic

Look at the Lighthouse mimic using the Flowol software.

We are going to test it by turning on and off the Sun (input) and the lamp (output).

How could we make the light flash when the Sun is not shining?

How can we incorporate the foghorn (that makes a loud sound to alert passing ships) at the same time?



Inserting a Decision Symbol

Using Flowol, we can insert a decision symbol.

When dropping the symbol onto the workspace, the choice is automatically presented to select an input.

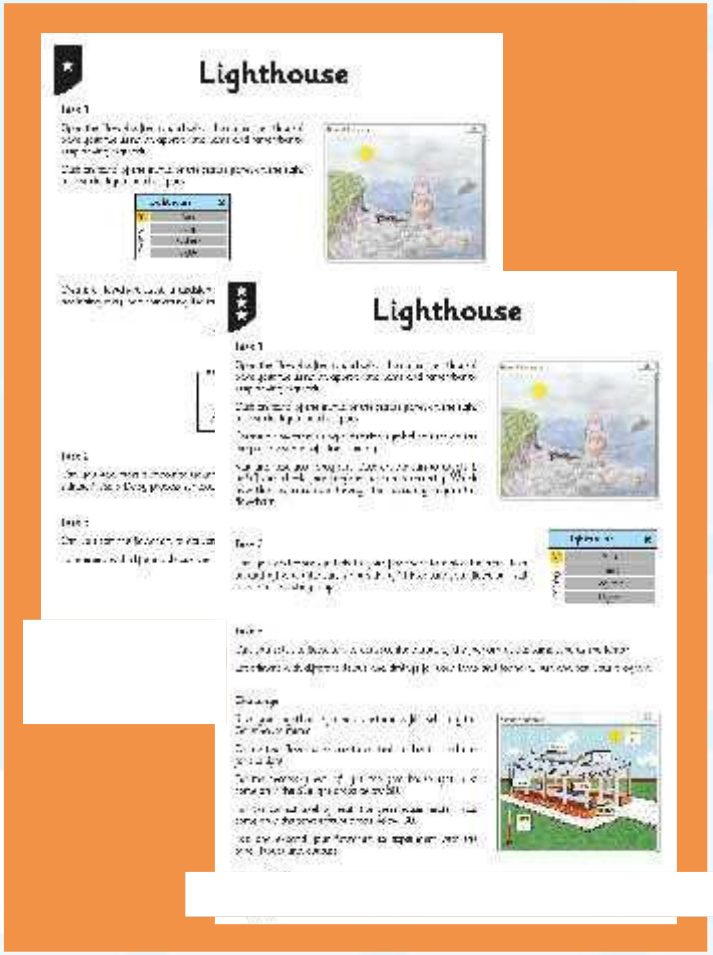
When connecting from the symbol to the next symbol, a choice of ‘Y’ or ‘N’ is automatically presented.

Programming the Lighthouse

Can you design a flowchart to operate the lighthouse based on the input of the Sun and using a decision symbol?

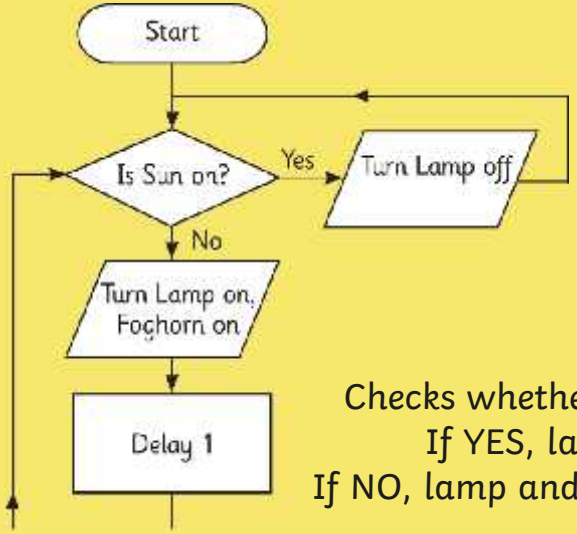
If possible, make the light flash on and off whenever the Sun is not shining. Add the output of the foghorn at the same time too!

Use the activity sheet to help you.



Adding Text Labels

Using an example of a working flowchart for the Lighthouse or Greenhouse mimic, can anyone talk through what is happening in the program?



Checks whether Sun is on (shining).
If YES, lamp is turned off.
If NO, lamp and foghorn are turned on.

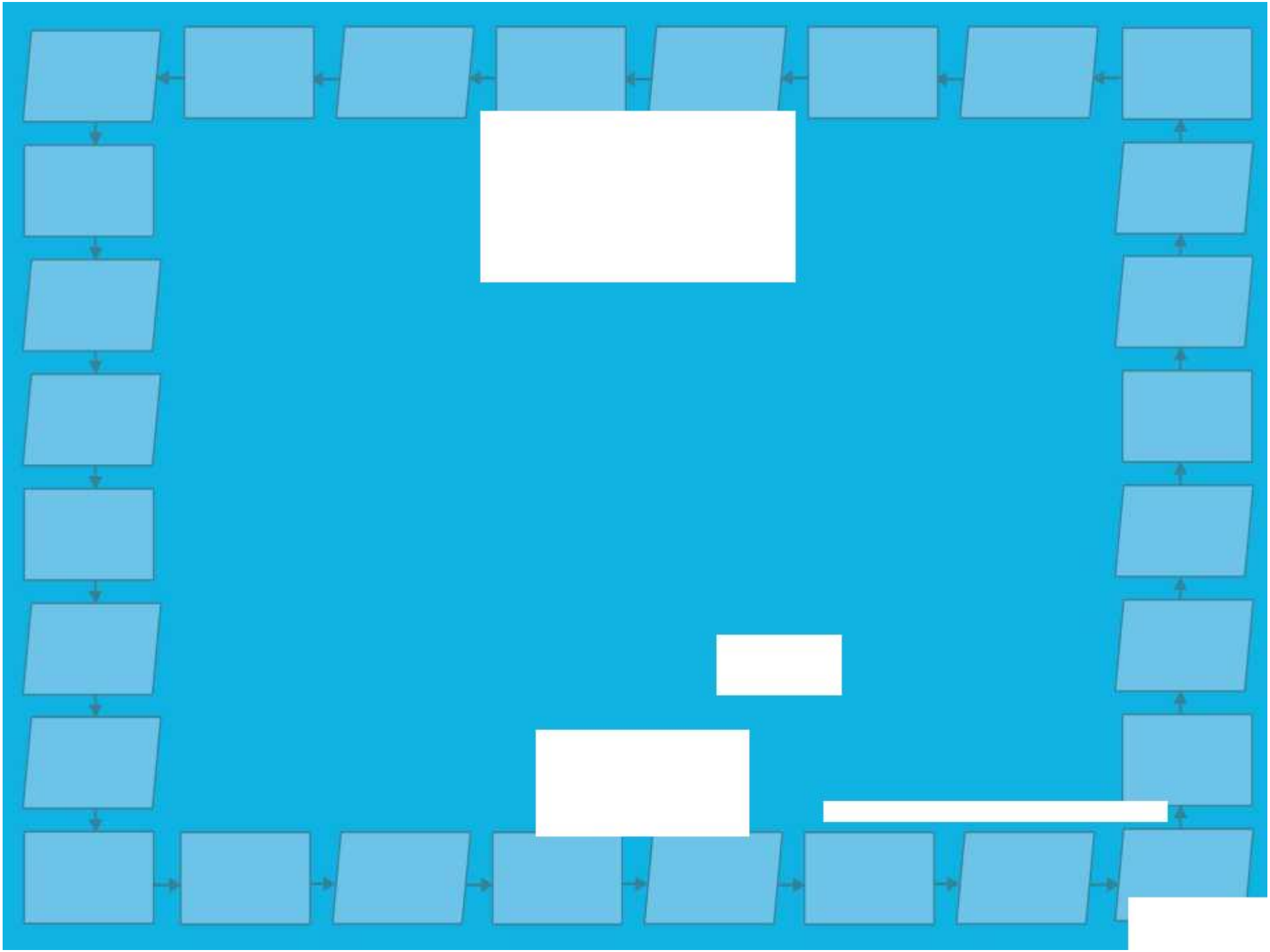
To help explain what a flowchart is supposed to do, we can add text labels.

Aim

- I can use a decision symbol based on the status of an input.

Success Criteria

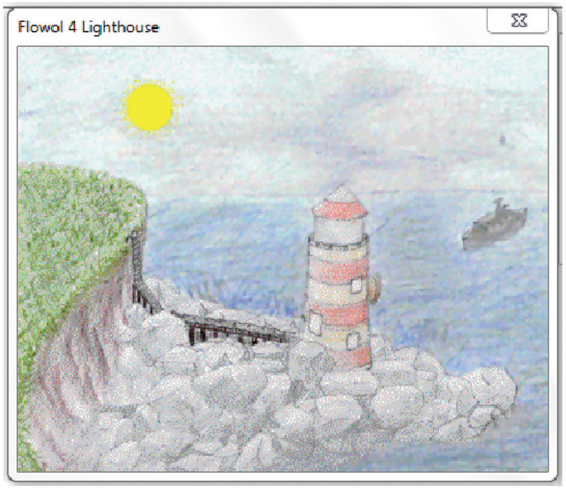
- I can connect a decision symbol in a flowchart.
- I can include the use of an input.
- I can program different outputs based on the status of an input.
- I can create a repeating loop.

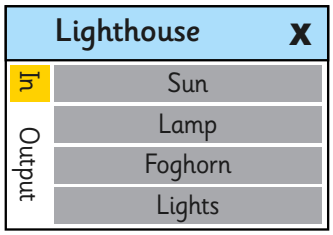


Lighthouse

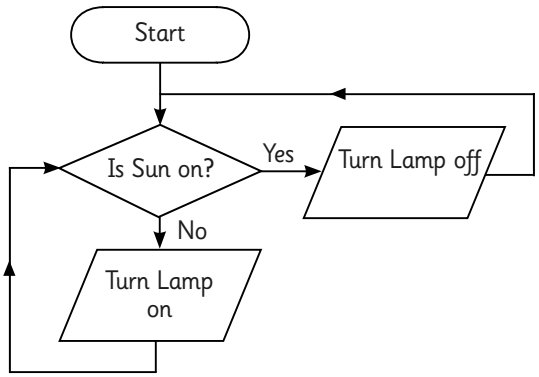
1: Open the Flowol software and select the mimic 'Lighthouse'. Save your file using an appropriate name and remember to keep saving regularly.

Click on parts of the mimic or the status panel on the right to test the inputs and outputs.





Create a flowchart using a decision symbol to turn on the lamp if the sun is 'off' (not shining). The beginning may look something like this:



2: Can you add more symbols to your flowchart to make the lamp flash on and off when the sun is not shining? Use a Delay process symbol. Make sure your flowchart still runs in a repeating loop.

3: Can you edit the flowchart to activate the output of the foghorn at the same time as the lamp? Experiment with different delays and timings for your lamp and foghorn. Run and test your program.

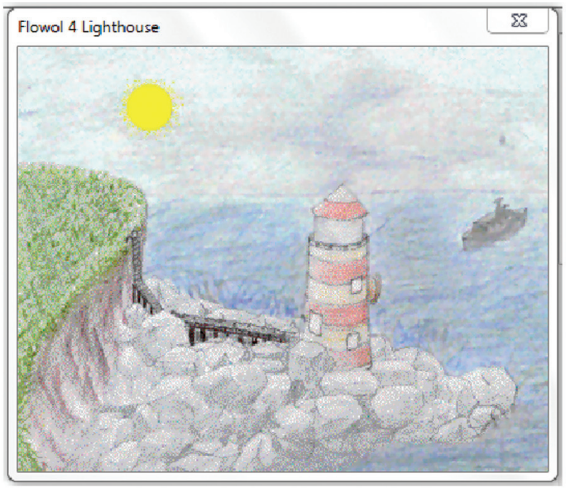
Lighthouse

1: Open the Flowol software and select the mimic 'Lighthouse'. Save your file using an appropriate name and remember to keep saving regularly.

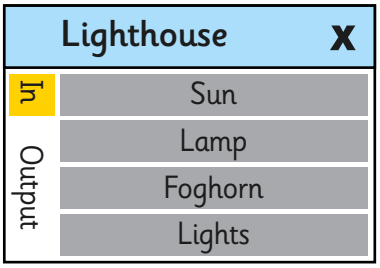
Click on parts of the mimic or the status panel on the right to test the inputs and outputs.

Create a flowchart using a decision symbol to turn on the lamp if the sun is 'off' (not shining).

Run and test your program. Click on the sun to toggle it on/off and check your program responds correctly. Watch how the sequence runs through the repeating loop in the flowchart.



2: Can you add more symbols to your flowchart to make the lamp flash on and off when the sun is not shining? Make sure your flowchart still runs in a repeating loop.



3: Can you edit the flowchart to activate the output of the foghorn at the same time as the lamp? Experiment with different delays and timings for your lamp and foghorn. Run and test your program.

Challenge

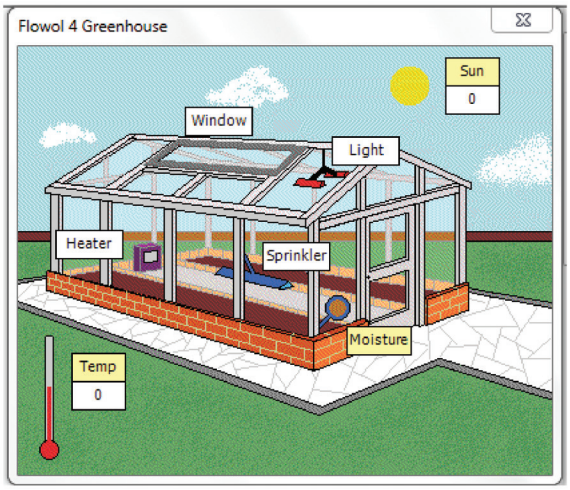
Save your Lighthouse file and start a new file, selecting the Greenhouse mimic.

Create two flowcharts: one to control the heater and one for the light.

For the necessary level of light, the greenhouse light must come on if the Sunlight drops below 50.

For the correct level of heat, the greenhouse heater must come on if the temperature drops below 30.

Edit and expand your flowchart to experiment with the other inputs and outputs.



Adult Guidance

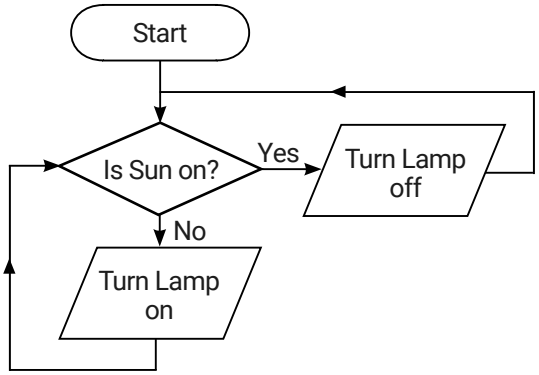
This lesson is designed for use with Flowol software (intended for use with Version 4, but adaptable to earlier versions) and the Lighthouse mimic.

Children deconstruct and then recreate a flowchart using a decision symbol, based on the input of the sunlight at a lighthouse. The outputs are primarily a lamp and foghorn; there are also lights inside the lighthouse which are not used in this lesson.

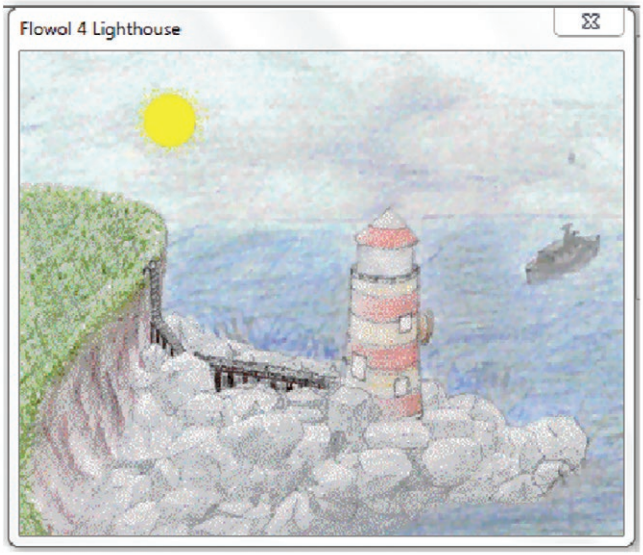
Note that there is no automatic sound played when the foghorn is activated, however sounds can be added to the flowchart by using external .wav files.

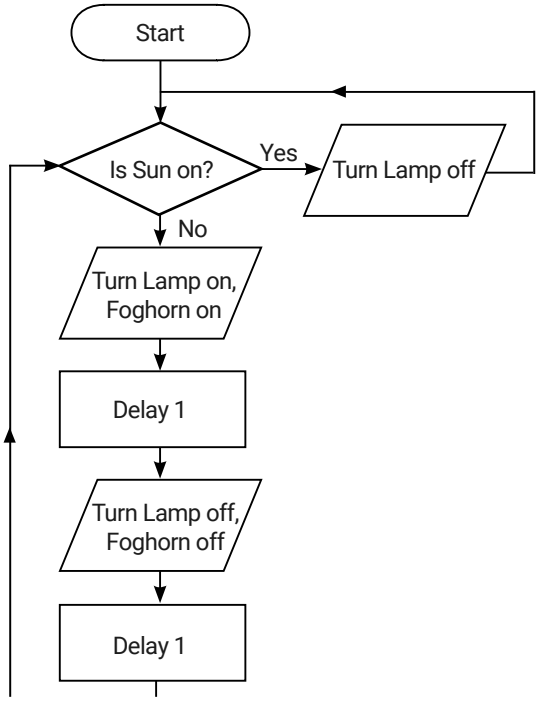
Solutions to Lighthouse mimic

The initial part of the flowchart required to demonstrate the decision symbol can be presented like the one below.



The full version of the flowchart required can be presented like the one below. Individual children's solutions may differ but should be tested and viewed for accuracy.

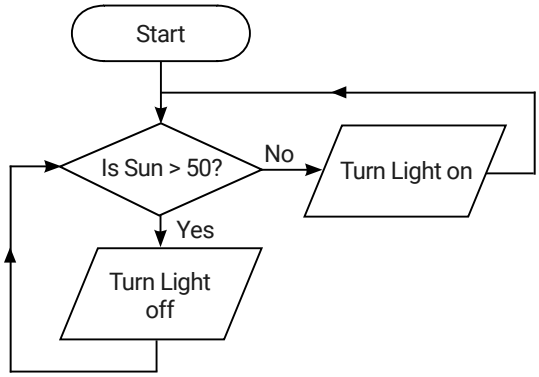


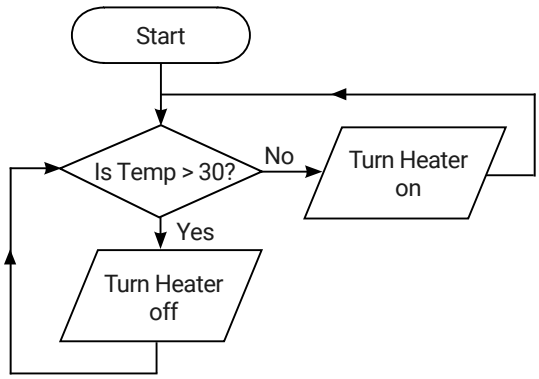


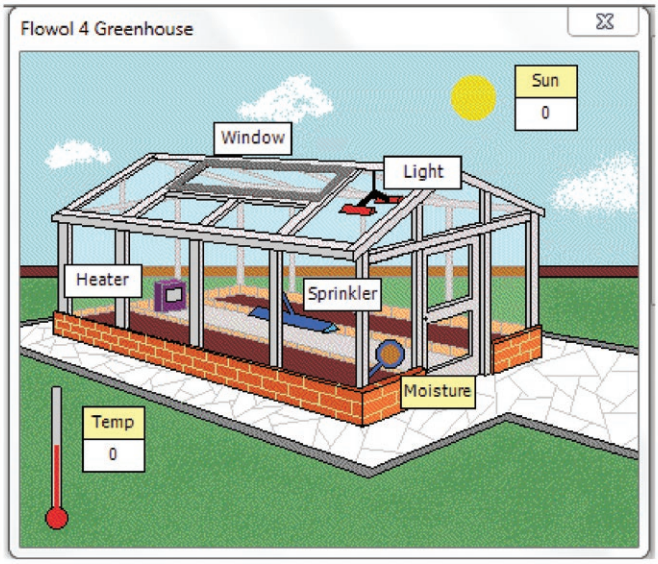
Adult Guidance

Solutions to Greenhouse mimic

The initial part of the flowcharts required can be presented like this.







Avery Template: Name Badge Label, 8 per sheet | **Compatible Products**:15395, 25395, 42395, 45395, 48395, 5395, 8395, 88395, 85395.

Controlling Devices: Flowol | Inputs and Decisions

I can use a decision symbol based on the status of an input.		
I can connect a decision symbol in a flowchart.		
I can include the use of an input.		
I can program different outputs based on the status of an input.		
I can create a repeating loop.		

Controlling Devices: Flowol | Inputs and Decisions

I can use a decision symbol based on the status of an input.		
I can connect a decision symbol in a flowchart.		
I can include the use of an input.		
I can program different outputs based on the status of an input.		
I can create a repeating loop.		

Controlling Devices: Flowol | Inputs and Decisions

I can use a decision symbol based on the status of an input.		
I can connect a decision symbol in a flowchart.		
I can include the use of an input.		
I can program different outputs based on the status of an input.		
I can create a repeating loop.		

Controlling Devices: Flowol | Inputs and Decisions

I can use a decision symbol based on the status of an input.		
I can connect a decision symbol in a flowchart.		
I can include the use of an input.		
I can program different outputs based on the status of an input.		
I can create a repeating loop.		

Controlling Devices: Flowol | Inputs and Decisions

I can use a decision symbol based on the status of an input.		
I can connect a decision symbol in a flowchart.		
I can include the use of an input.		
I can program different outputs based on the status of an input.		
I can create a repeating loop.		

Controlling Devices: Flowol | Inputs and Decisions

I can use a decision symbol based on the status of an input.		
I can connect a decision symbol in a flowchart.		
I can include the use of an input.		
I can program different outputs based on the status of an input.		
I can create a repeating loop.		

Controlling Devices: Flowol | Inputs and Decisions

I can use a decision symbol based on the status of an input.		
I can connect a decision symbol in a flowchart.		
I can include the use of an input.		
I can program different outputs based on the status of an input.		
I can create a repeating loop.		

Controlling Devices: Flowol | Inputs and Decisions

I can use a decision symbol based on the status of an input.		
I can connect a decision symbol in a flowchart.		
I can include the use of an input.		
I can program different outputs based on the status of an input.		
I can create a repeating loop.		