Controlling Devices: Flowol: What is a Flowchart?

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. Children are introduced to flowcharts and practise reading them as a sequence of instructions, they then design their own. I can draw and interpret a flowchart with the correct symbols.	I can follow a sequence of written instructions in a flowchart. I can draw a flowchart using the correct symbols. I can connect symbols in a sequence.	**Lesson Pack** Whiteboards & pens No computer is required for this lesson.
	Key/New Words: Flowol, flowchart, algorithm, control, output, mimic, simulation, insert, symbol, start, stop, delay, process, decision.	**Preparation:** **Brushing Teeth, Running a Bath, Snakes** and **Ladders and Crossing the Road Activity Sheets** - as required

Prior Learning:	It will be helpful if children have an understanding of sequencing instructions, such as using Turtle Logo or other programmable devices.

Learning Sequence

	What is a Flowchart? Ask the children if anyone can describe what is meant by a flowchart and what is it for. Children could describe or draw their responses. Explain that a flowchart is a way of visually displaying a set of instructions (or an algorithm) for any particular task and decomposing a problem into smaller parts. They have many uses but are one way of showing the sequence of instructions for an automatic computer system.	
	Example Flowchart: Show an example flowchart for making a cup of tea and talk through each stages together, following the 'flow' of the arrows. Pay particular attention to the 'loop' when waiting for the kettle to boil and the two possible options from the 'decision' symbol.	
Whole Class	**Flowcharts in Computing:** Can children make the link between flowcharts and computing? A flowchart can represent the algorithm (or set of instructions) for a computer or a computer controlled system. This could be anything from a set of traffic lights, a central heating system on a timer or an electric kettle.	
	Flowchart Symbols: Show each of the conventionally used symbols and establish what the difference is between each one; name the shapes for each one. Use key vocabulary for types of flowchart symbols: 'process' and 'decision'.	
	Creating a Flowchart: Can children design and draw their own flowchart for a given process? ★ Children re-order the task on the **Brushing Teeth Activity Sheet.** They then arrange the instructions on the **Running a Bath Activity Sheet** into a blank flowchart. ★★ Children arrange the instructions on the **Running a Bath Activity Sheet** into a blank flowchart. They then plan their own instructions using the **Snakes and Ladders Activity Sheet.** ★★★ Children plan the instructions and arrange them into a blank flowchart using the **Snakes and Ladders Activity Sheet**. They then design their own flowchart using the **Crossing the Road Activity Sheet.**	
Whole Class	**Match the Symbols:** Match the symbols to the correct shape name and description.	

Task*it*

***Pick*it:** Pick a new task or process and design your own flowchart for a sequence of instructions. Ask a friend or family member to try following them.

Computing

Controlling Devices: Flowol

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What is a Flowchart?

Aim

- I can draw and interpret a flowchart with the correct symbols.

Success Criteria

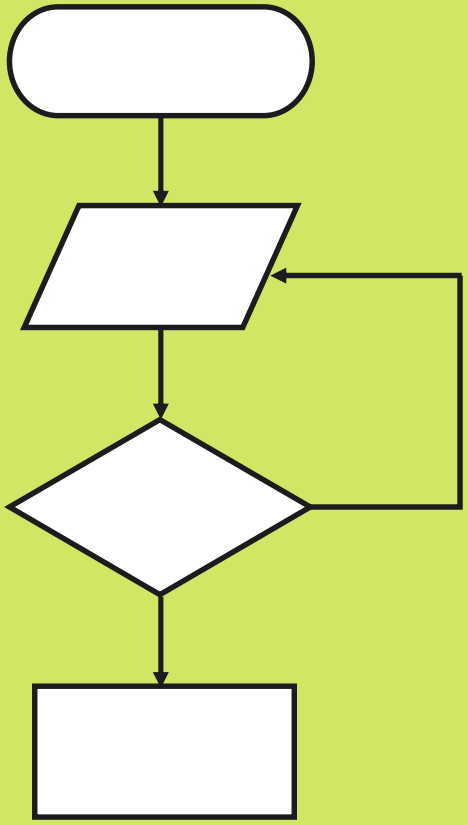
- I can follow a sequence of written instructions in a flowchart.
- I can draw a flowchart using the correct symbols.
- I can connect symbols in sequence.

What is a Flowchart?

What is meant by a flowchart and what is it for?

A flowchart is a way of visually displaying a set of instructions (or an algorithm) for any particular task.

Flowcharts have many uses and are one way of showing the sequence of instructions for an automatic computer system.

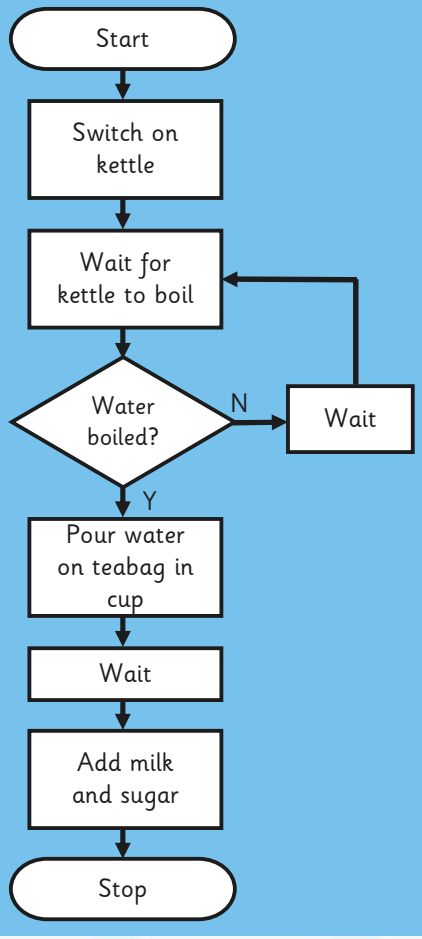


Example Flowchart

Can you tell what process this flowchart is designed to show?

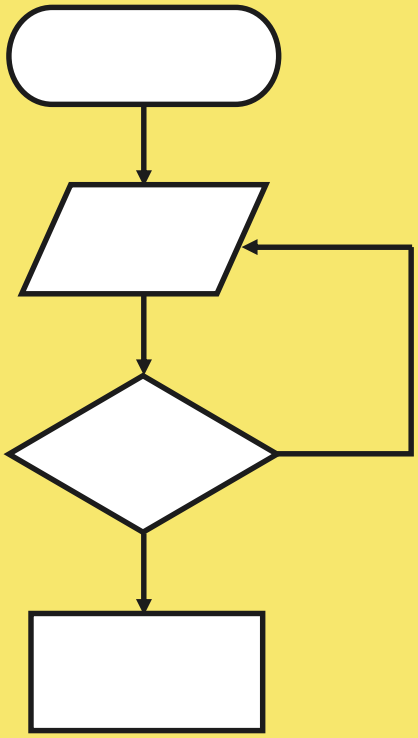
It is for how to make a cup of tea.

What do you notice that is different about this symbol and its arrows, compared to the others?



Flowcharts in Computing

Can anyone suggest how flowcharts might be linked to computing?



A flowchart can represent the algorithm (or set of instructions) for a computer or a computer controlled system. This could be anything from a set of traffic lights, a central heating system on a timer or an electric kettle!

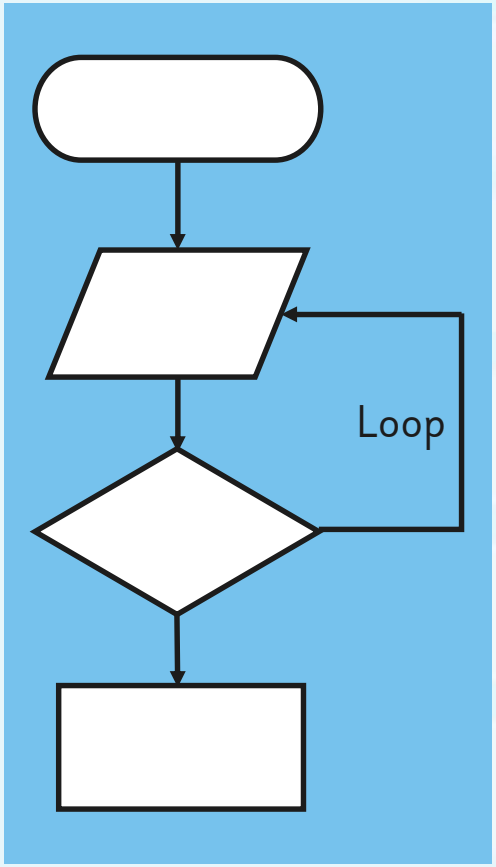
Flowchart Symbols

'Termination' symbol (Start/Stop).

Data (Output) symbol (e.g. a light or sound device).

Decision symbol (Two possible outcomes 'Y' or 'N').

Process symbol (something being done).



Creating a Flowchart

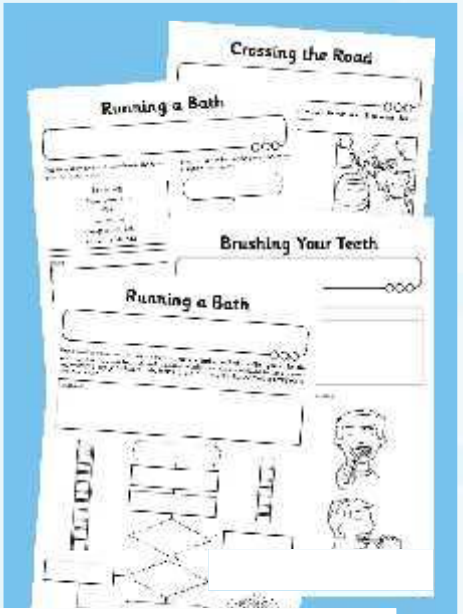
Can you design and complete your own flowchart for a given process?

brushing your teeth

running a bath

playing snakes & ladders

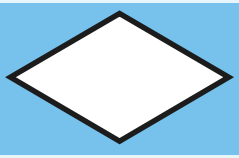
crossing the road



Use the activity sheets to help you.

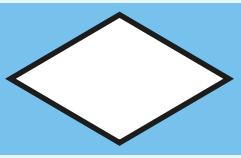
Match the Symbols

Can you match the correct symbols with the labels and describe what each one does?

Process symbol	
Decision Symbol	
Termination symbol (Start/Stop)	
Data (Output) symbol	

Match the Symbols

The answers are shown below.

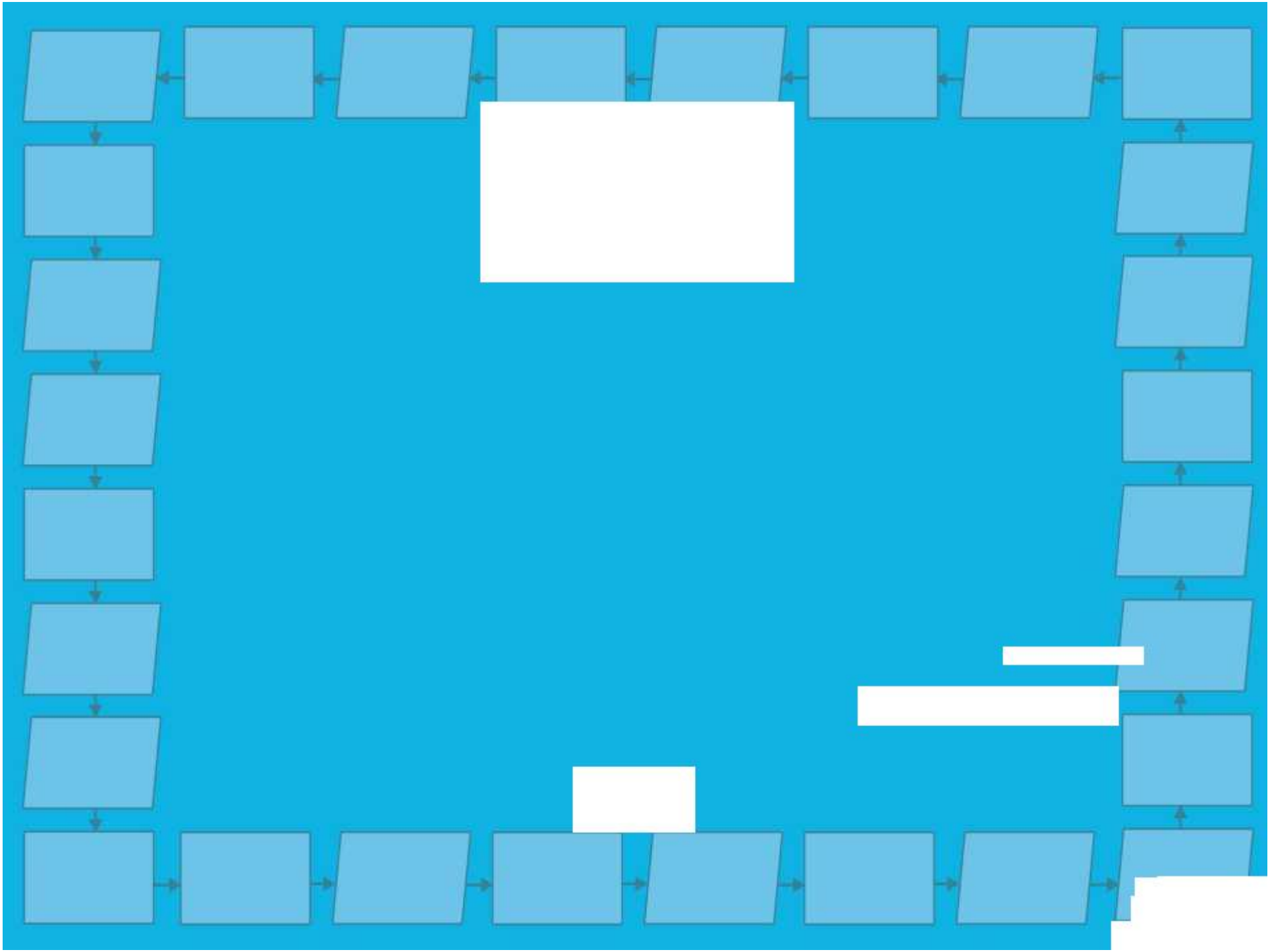
Process symbol	
Decision Symbol	
Termination symbol (Start/Stop)	
Data (Output) symbol	

Aim

- I can draw and interpret a flowchart with the correct symbols.

Success Criteria

- I can follow a sequence of written instructions in a flowchart.
- I can draw a flowchart using the correct symbols.
- I can connect symbols in sequence.



Brushing Your Teeth

Rearrange these tasks and write them in the correct order.

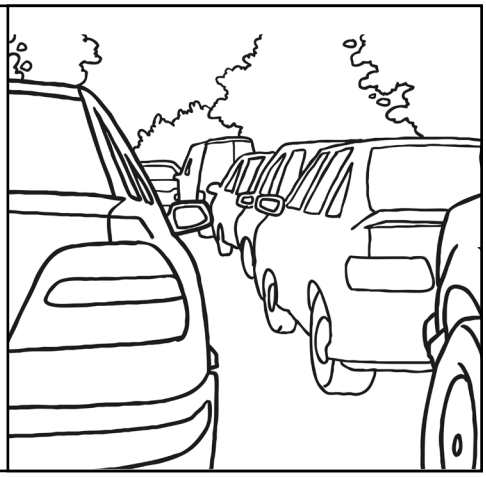
	Start
Rinse	1.
Take toothpaste and toothbrush	2.
Brush for 2 minutes	3.
Put toothpaste onto brush	4.
	End

Now put the tasks into the correct boxes to complete the flowchart:

Crossing the Road

Write a set of instructions in the box below describing how to cross the road safely. Think about what you need to do when approaching the road and when to cross.

Instructions:



Now use the conventional symbols to create your own flowchart that illustrates the process.

Use this type of symbol at the start and end of your flowchart.

Use this type of box for a 'process'.

(something to be done)

Use this type of box for 'decisions'.

(where there are two possible outcomes such as 'Y' or 'N').

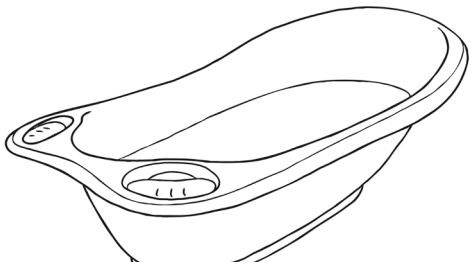
Connect your flowchart symbols using arrows to show the direction, or 'flow' of the process.

Running a Bath

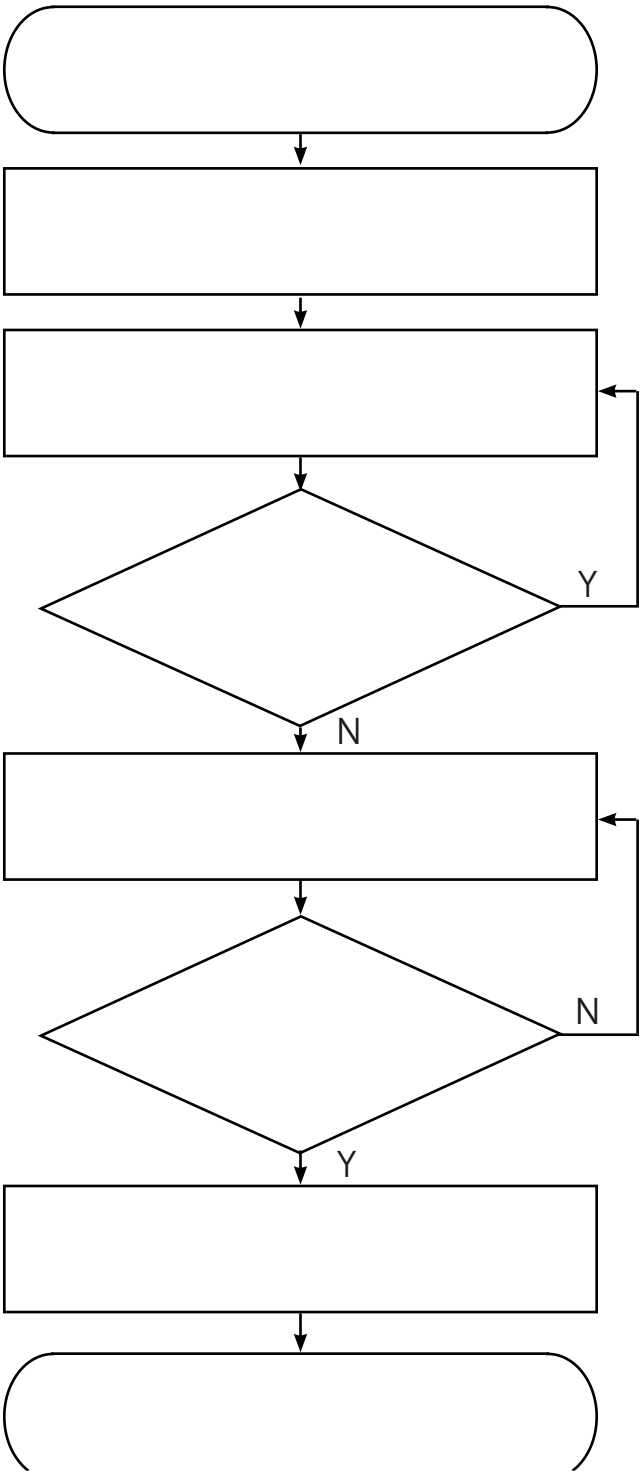
Rearrange these tasks and write them in the correct order in the box below.

Turn taps off
Adjust temperature
Wait
Turn taps on
Enough water? (Y/N)
Too hot or cold? (Y/N)

Start
1.
2.
3.
(Yes: Go back to 2 / No: Go to 4)
4.
5.
(Yes: Go to 6 / No: Go back to 4)
6.
End.



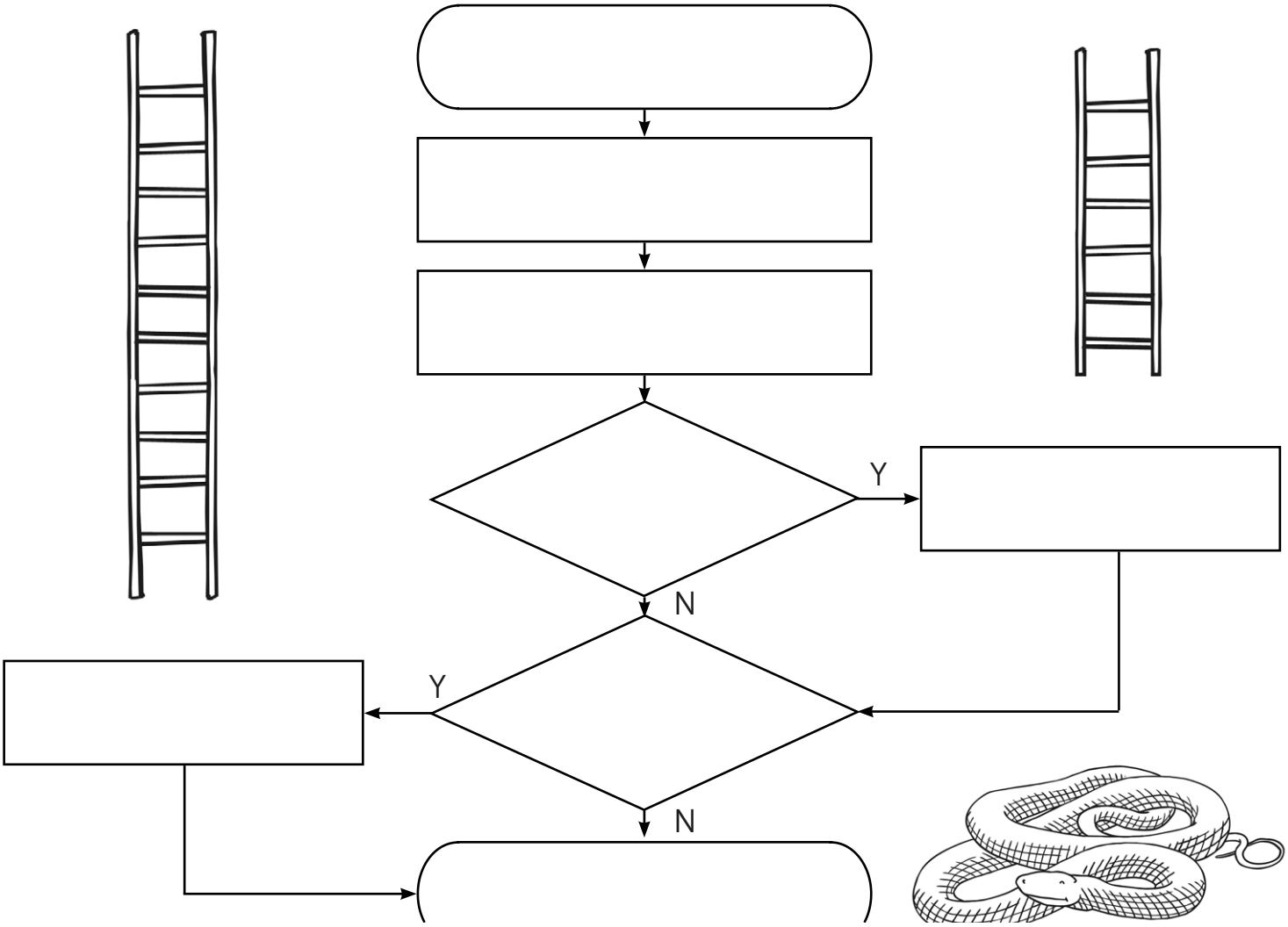
Now put the tasks into the correct boxes to complete the flowchart.



Snakes and Ladders

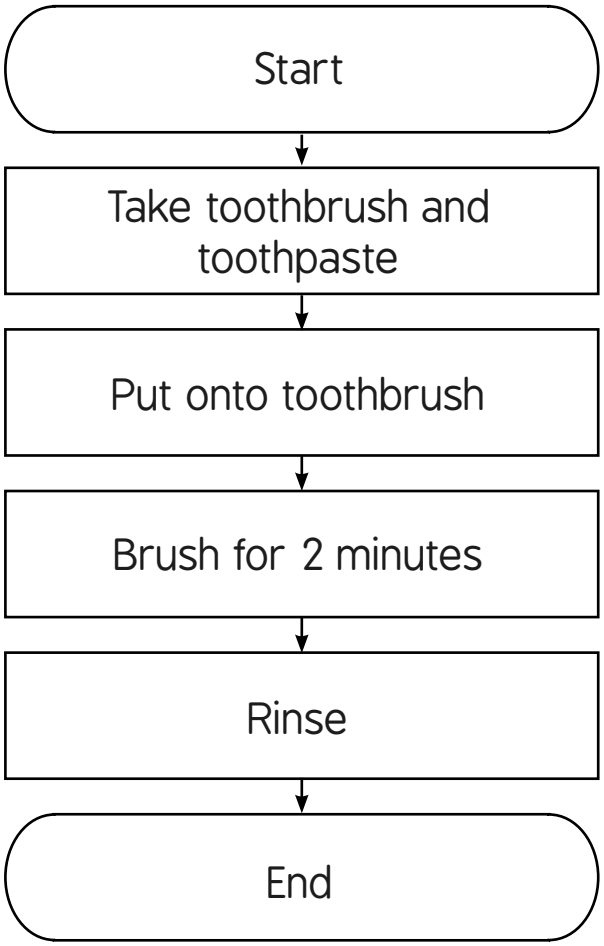
Write a set of instructions for taking a turn in a game of Snakes and Ladders. After you've rolled the dice and moved your counter, you'll need to consider whether or not you've landed at the top of a snake and whether or not you've landed at the bottom of a ladder. After writing your instructions, complete the flowchart template below or create your own.

Instructions:

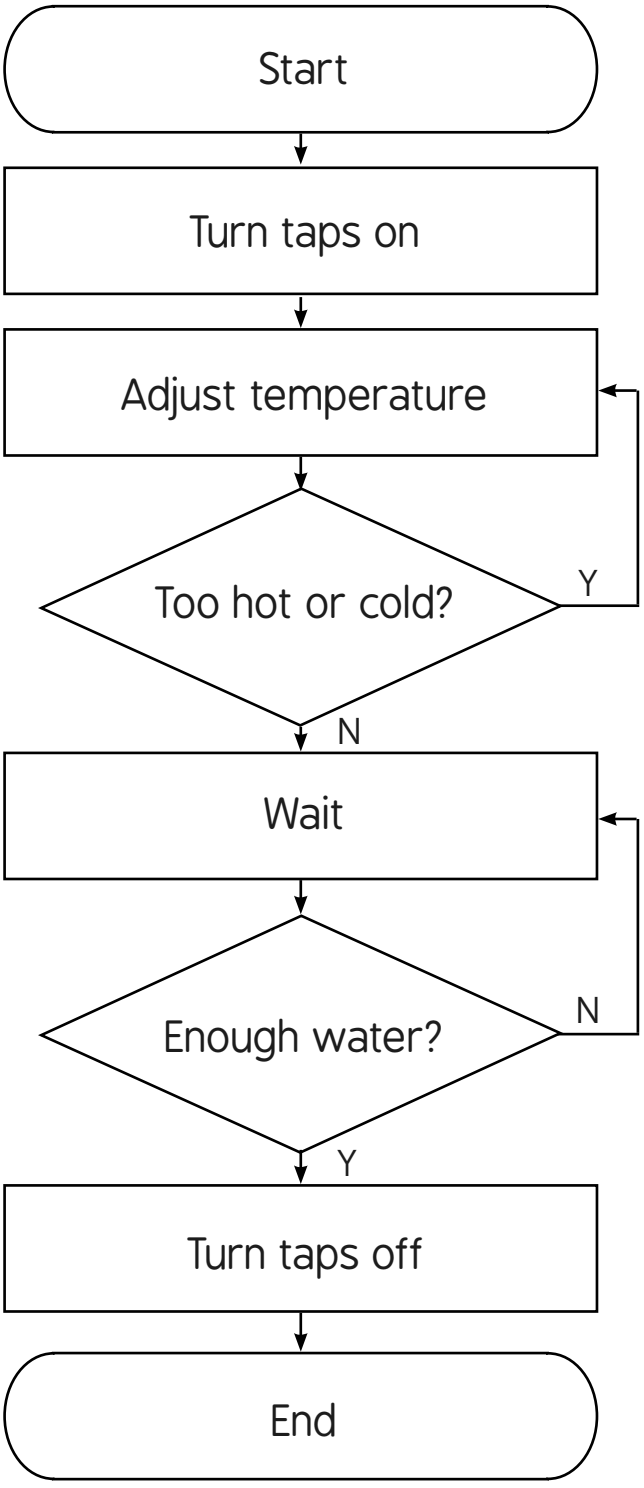


Adult Guidance

Brushing Your Teeth



Running a Bath



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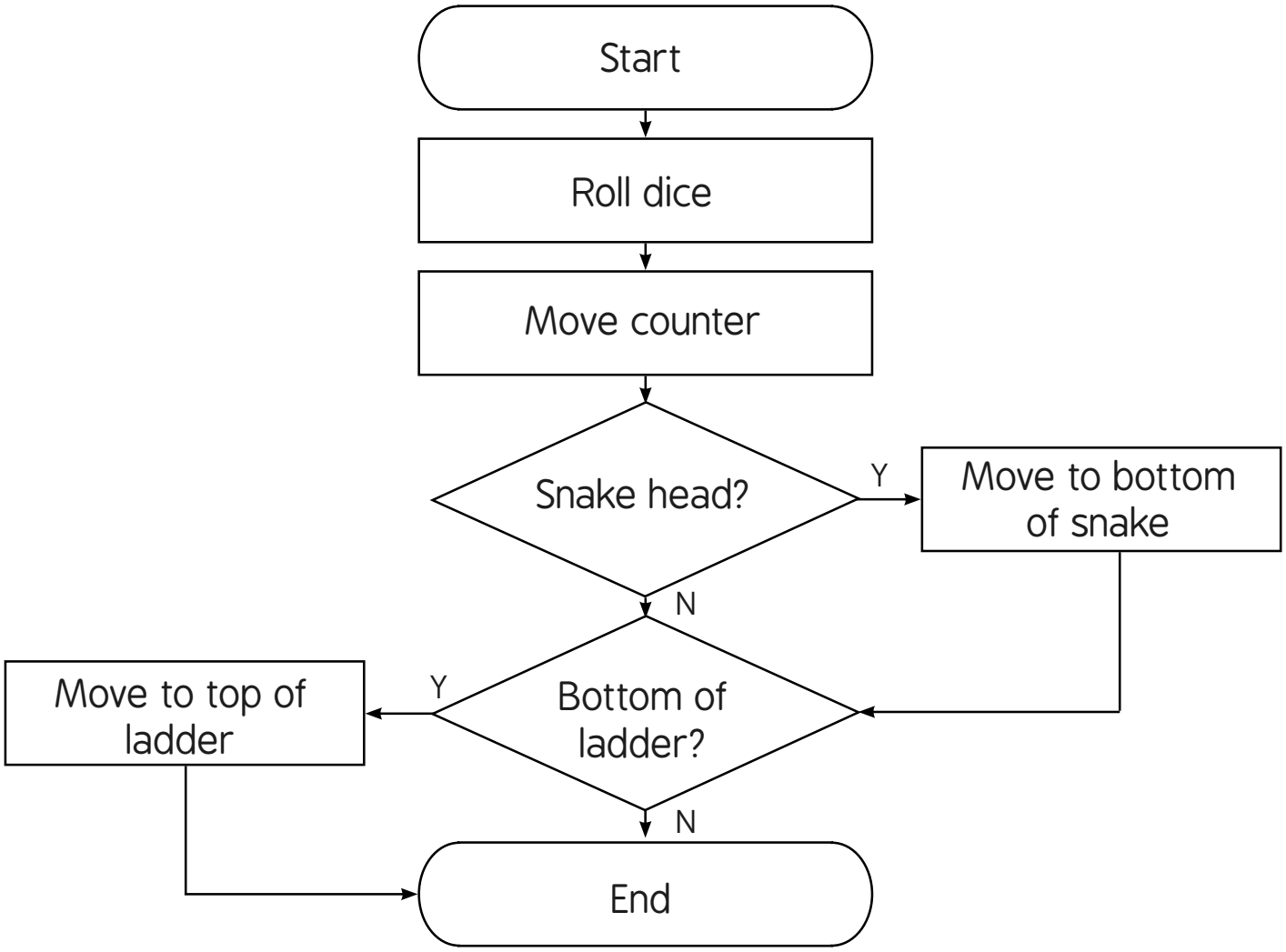
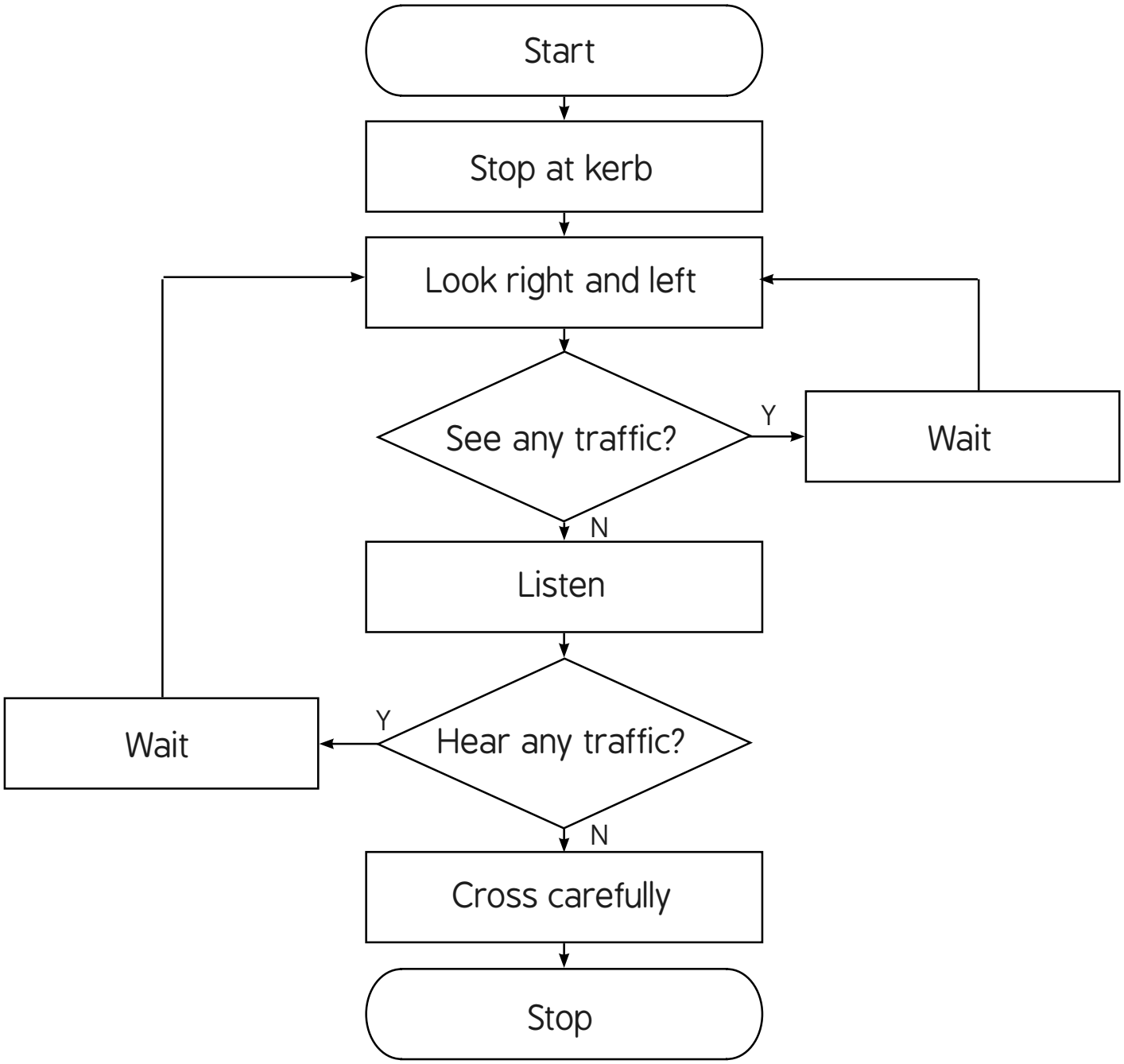
Snakes and Ladders

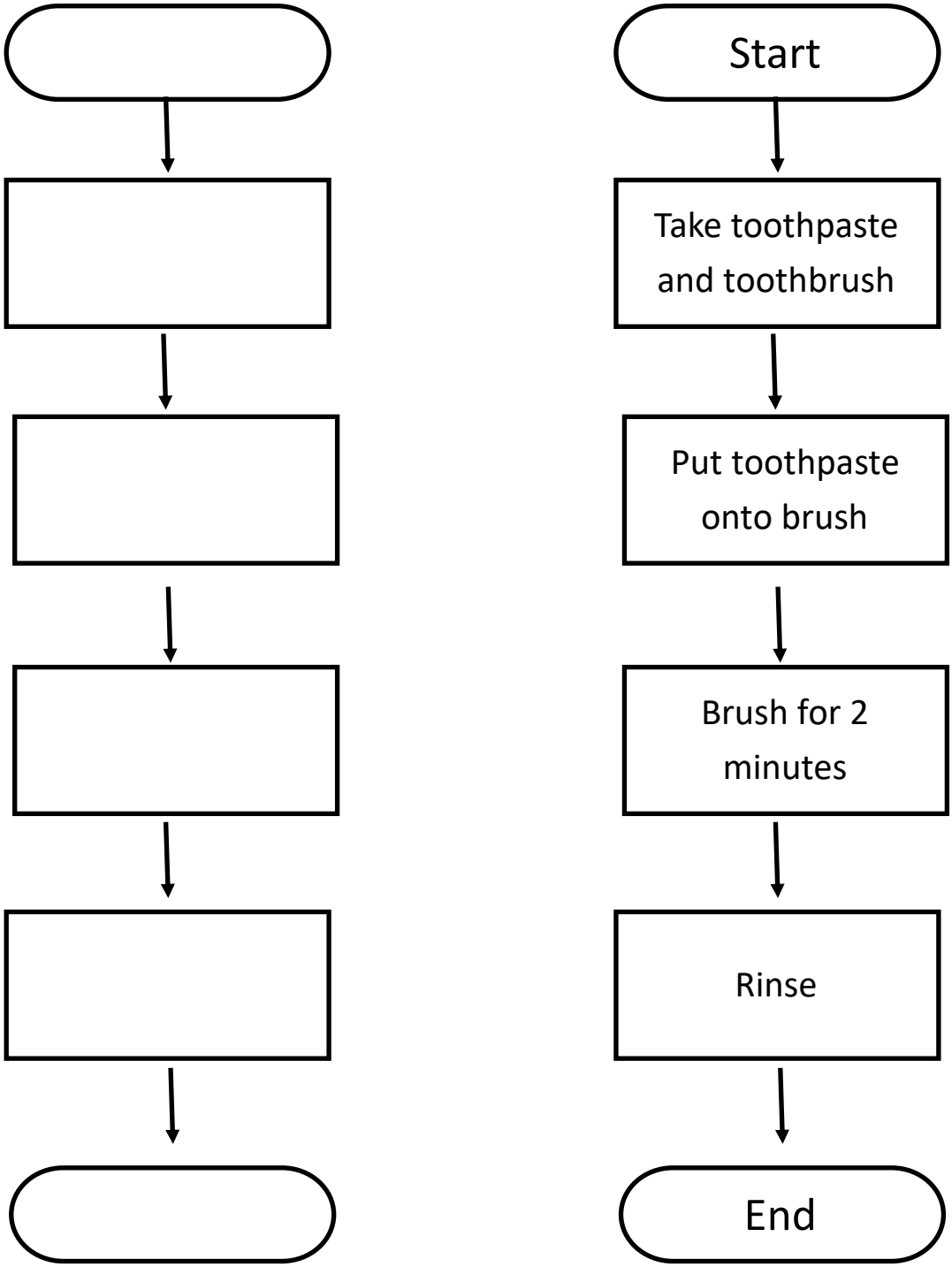


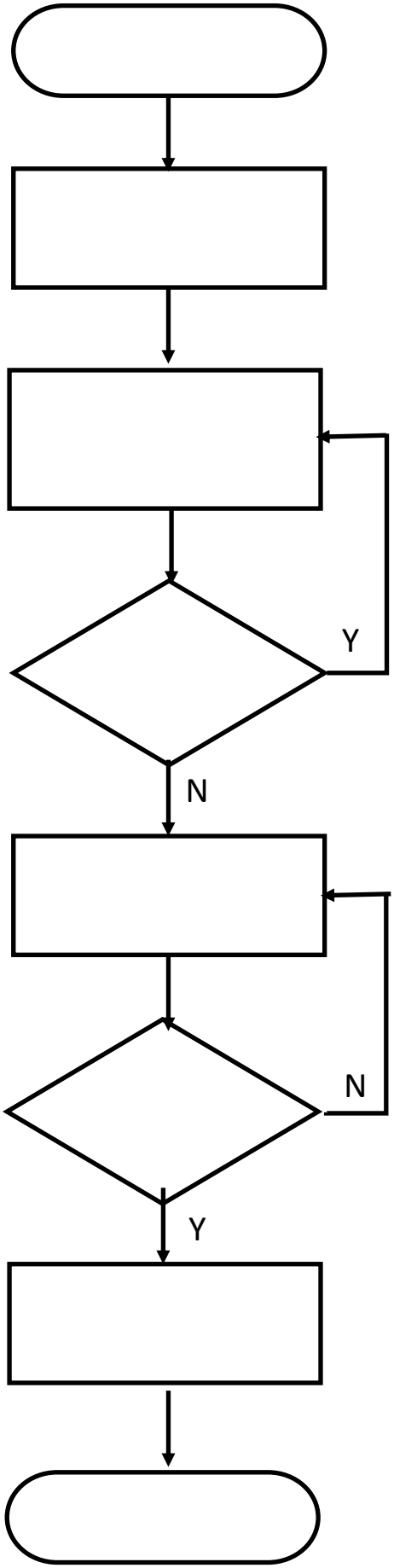
Adult Guidance

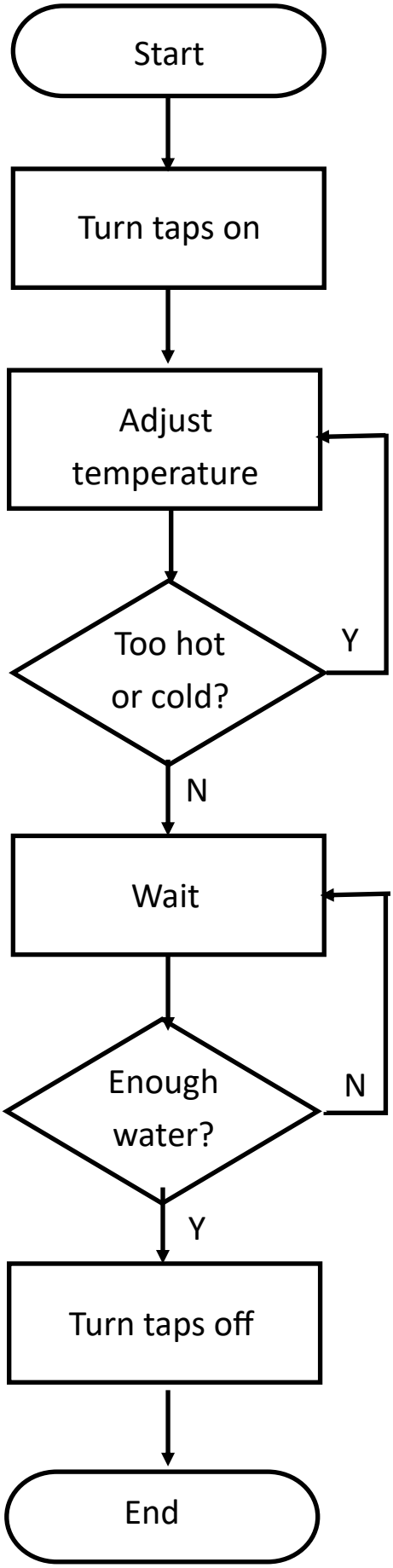
Snakes and Ladders

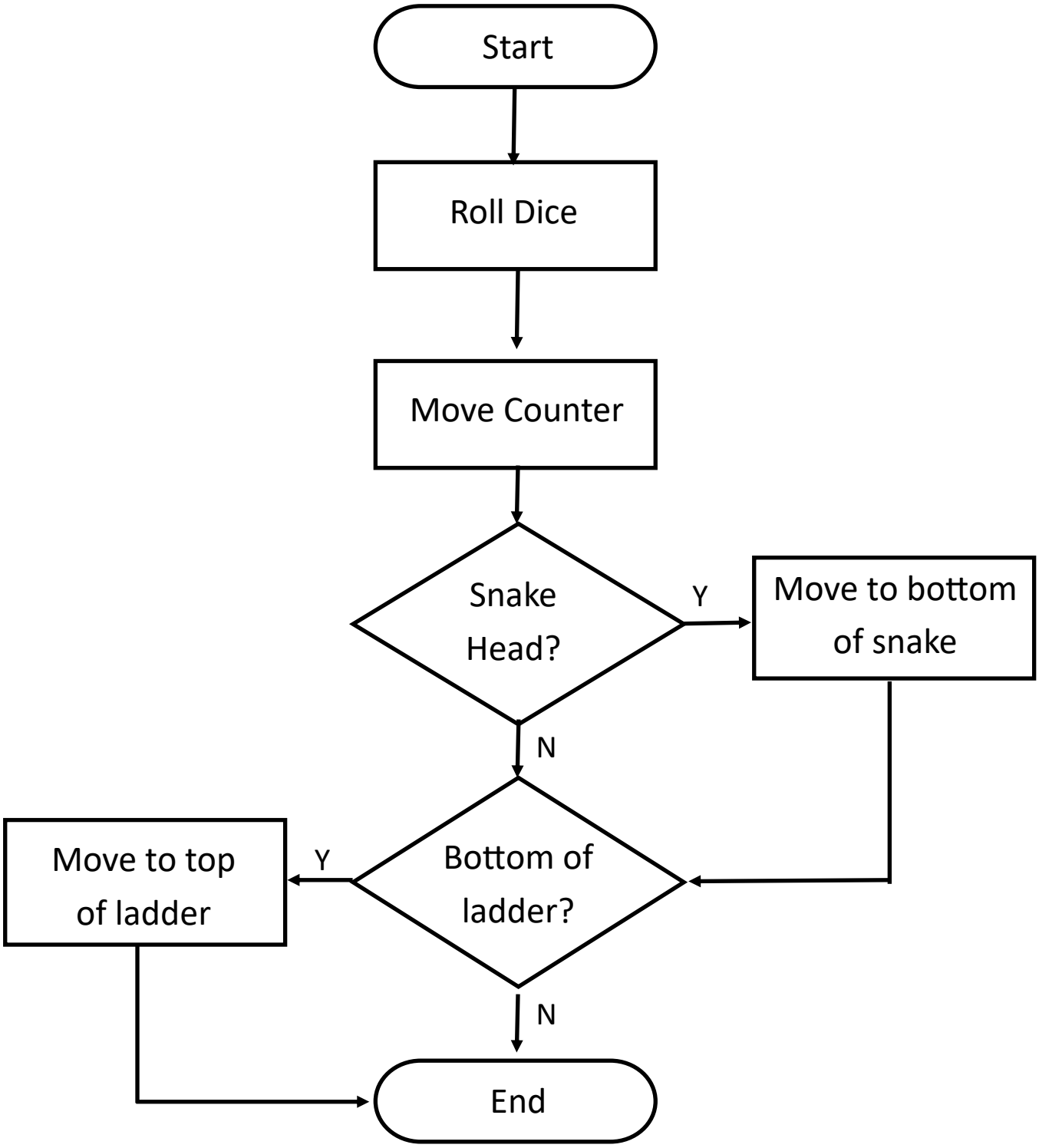
In this activity no blank template is provided for children, thefore solutions may vary.

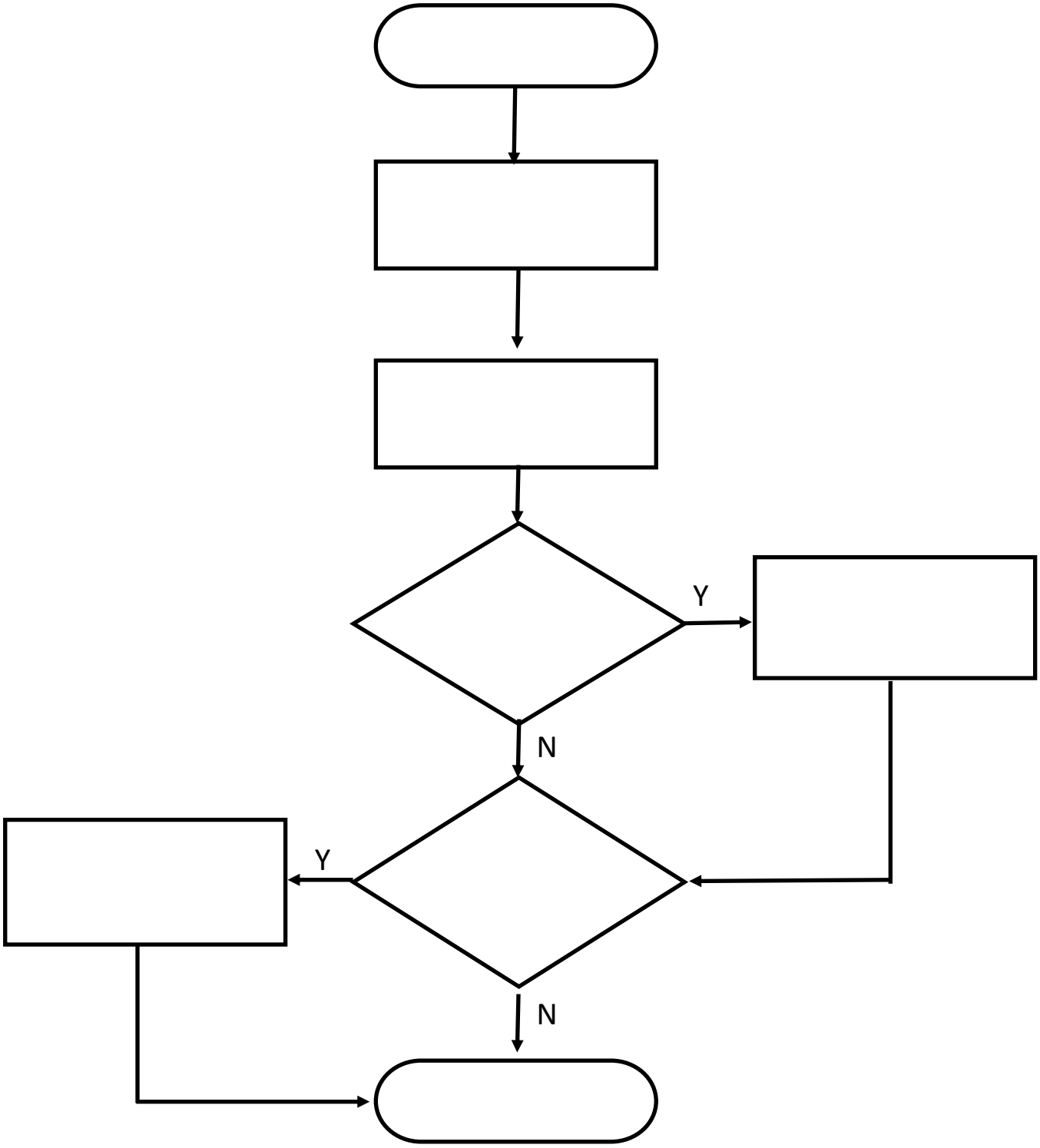


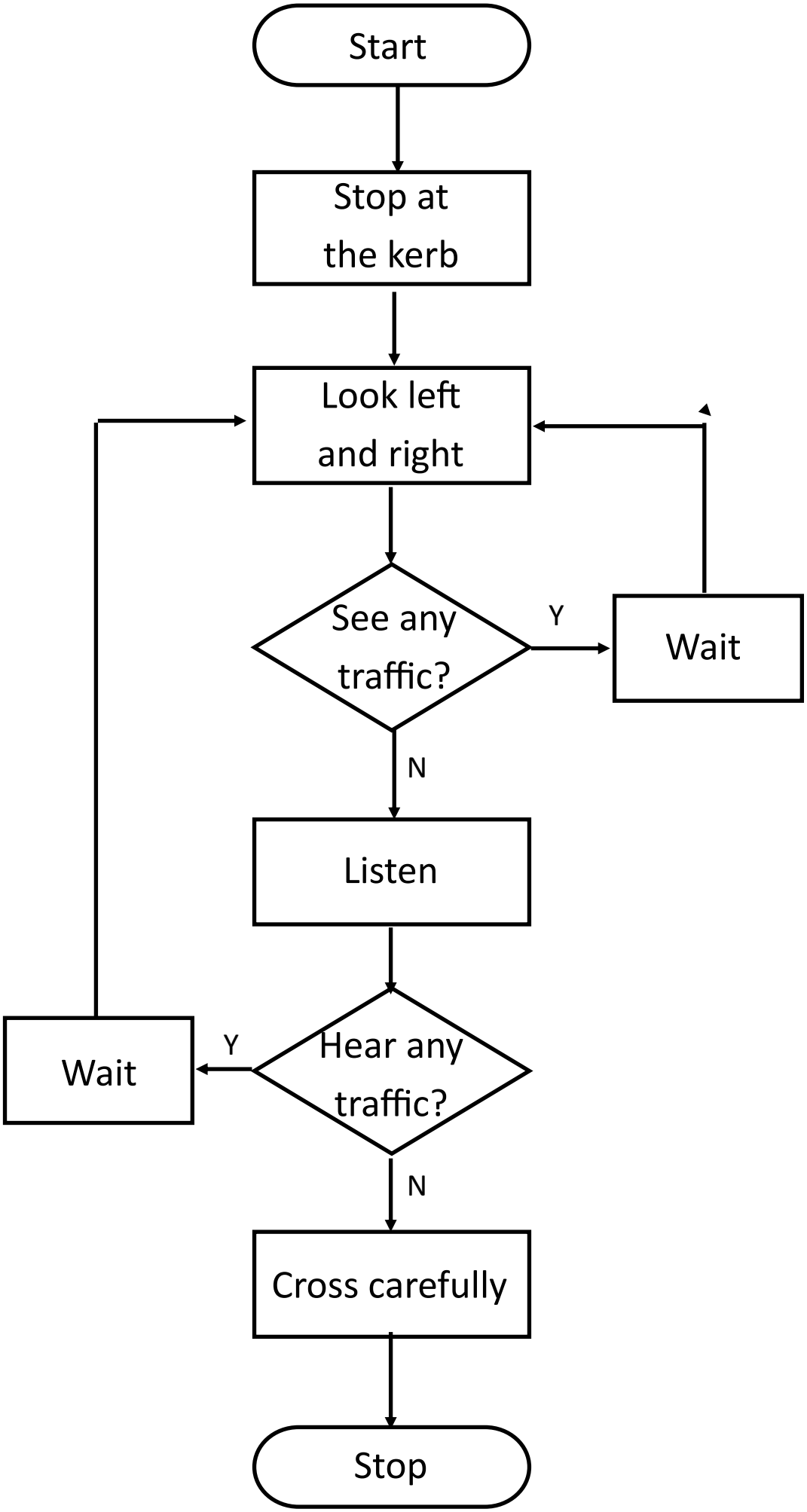

Start
Take toothpaste and toothbrush
Put toothpaste onto brush
Brush for 2 minutes
Rinse
End

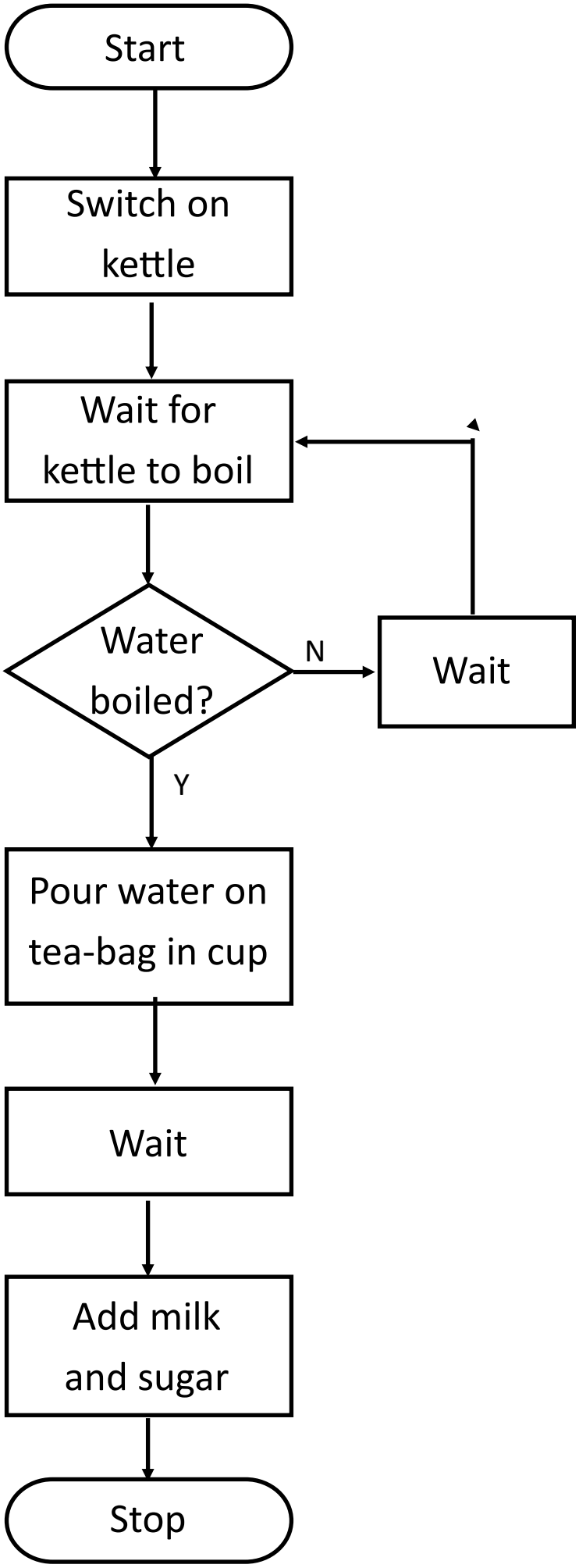

Y
N
N
Y


Start
Turn taps on
Adjust temperature
Too hot or cold?
Y
N
Wait
Enough water?
N
Y
Turn taps off
End


Start
Roll Dice
Move Counter
Snake Head?
Y
Move to bottom of snake
N
Bottom of ladder?
Y
Move to top of ladder
N
End


Y
N
Y
N


Start
Stop at the kerb
Look left and right
See any traffic?
Y
Wait
N
Listen
Hear any traffic?
Y
Wait
N
Cross carefully
Stop


Start
Switch on kettle
Wait for kettle to boil
Water boiled?
N
Wait
Y
Pour water on tea-bag in cup
Wait
Add milk and sugar
Stop

Controlling Devices: Flowol | What is a Flowchart?

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