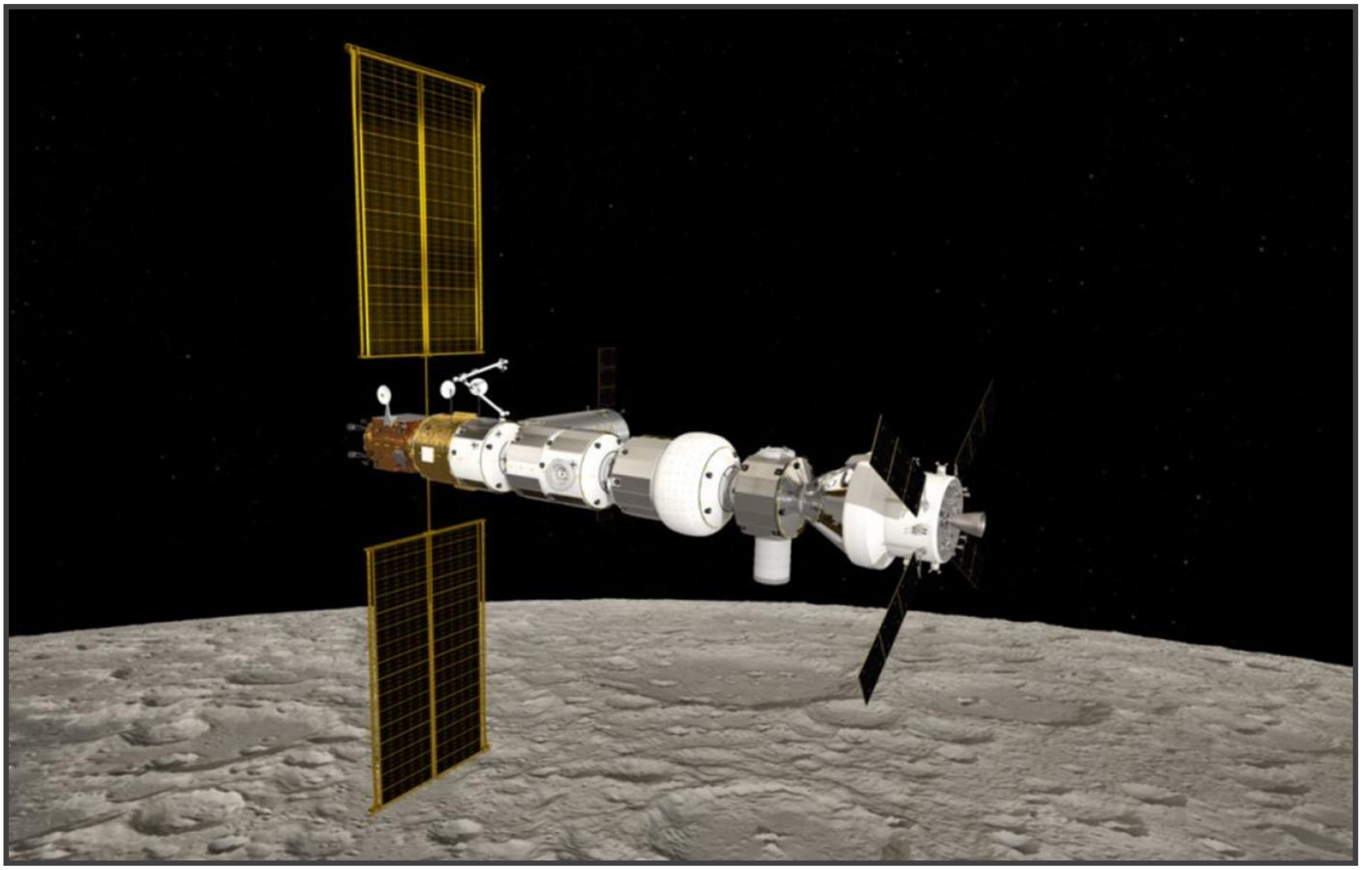
Spacegate Station Season 3
Episode 18



The Concept of Coding

Resource Content

- Guided Notes
- Flowchart Activity
- Next Generation Sunshine State Standards (Florida)
- Next Generation Science Standards

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Word Bank

algorithm	arrows	compare	decide	ending	express
flowchart	if-then	input	lines	multiple	node
outcomes	output	ovals	programming	rectangle	rhombus
specific event	start				

Overview

An ________________is a set of guidelines that describes how to perform a task. They are step-by-step instructions where the main goal is to solve a specific problem by performing a particular action.

In____________, these steps involve transforming _______data into ________data and turning that data into usable actions or knowledge that is presented in a way humans can understand.

A ____________is a picture of the separate steps of a process in sequential order. It is a generic tool that can be adapted for a wide variety of purposes and can be used to describe various processes.

The decision ______________in programming is essentially a map of the possible outcomes of a series of related choices.

The flowchart in coding typically starts with a single_________, which branches into possible outcomes.

Each of those _____________leads to additional nodes, which branch off into other possibilities. A node is the term used to describe the point of intersection or connection in the flowchart.

Flowcharts

The beginning and end of a flow chart is represented by____________. This shape tells you where the flowchart starts and stops. It shows the entry point of your flowchart and the exit point.

To designate the ________of your flowchart, you would fill this shape with words like **Start** or **Begin**. To designate the __________point of the chart, this shape is filled with words like **End, Exit,** or **Return**.

Flowcharts contain _______ with __________that go from shape to shape. These direct the flow through the chart. Flowcharts are usually drawn from top to bottom or left to right.

A decision is represented by a __________that shows the question to be asked. The answer to the question, based on input data, determines which arrow you follow out of the decision shape, yes goes one way and no another.

An action or outcome is represented by a __________which is one of the most-seen shapes. It is used to show a process, task, action, or operation. It shows something that must be done or an action that must be taken by the computer running the program.

Conditional Statements

A conditional statement is a type of coding instruction used to _________values and ____________and make decisions. A conditional statement tells a program to execute an action depending on whether a condition is true or false. It is often represented as an ________________ statement.

Event handler

An event handler is a part of a computer program created to tell the program how to act in response to a_____________. Some examples of events are pressing a key on a keyboard, moving the mouse, and clicking on objects on the screen, or sensing specific colors or sounds.

The event handlers would then ___________an action they'd like to perform. For a robot this could be such things as moving in a specific direction, talking, making music, or operating levers.

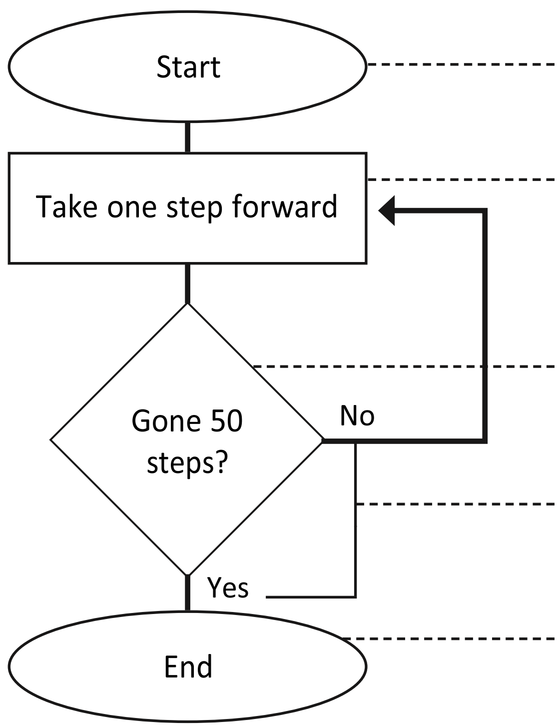
There can be _____________event handlers functioning at the same time so for example a robot could be looking for a specific color and listening for a specific sound independently of each other.

Flowchart Activity

A flowchart visually represents and organizes the steps used to write the program—it is a diagram of the "flow" of the process. When programmers write code, they need to give the robot instructions that are both sequential and specific. Flowcharts enable programmers to work these steps out before needing to translate their behaviors into code.

Reading Flowcharts

Move from step to step in the chart by following the lines between them. Perform any action listed when you reach a Statement Block (rectangle), and then choose from several different paths to follow when you reach a Decision Block (diamond).



PARTS of a FLOW CHART

Start of Program – Marks the beginning of the program, begin here. Follow the line to get to the next block.

Statement Block – A statement to execute, or a behavior to perform.

Decision Block – A decision point in your program. Ask a simple question, and do different things depending on the answer.

Yes/No (also True/False, etc.) – Answers to the question posed in the decision block. Follow the line labeled with the appropriate answer.

End of Program - Marks the end of the program. If you reach this point, the program is done!

Exercises

1. In the flowchart above, what will be the first action you take? ________________

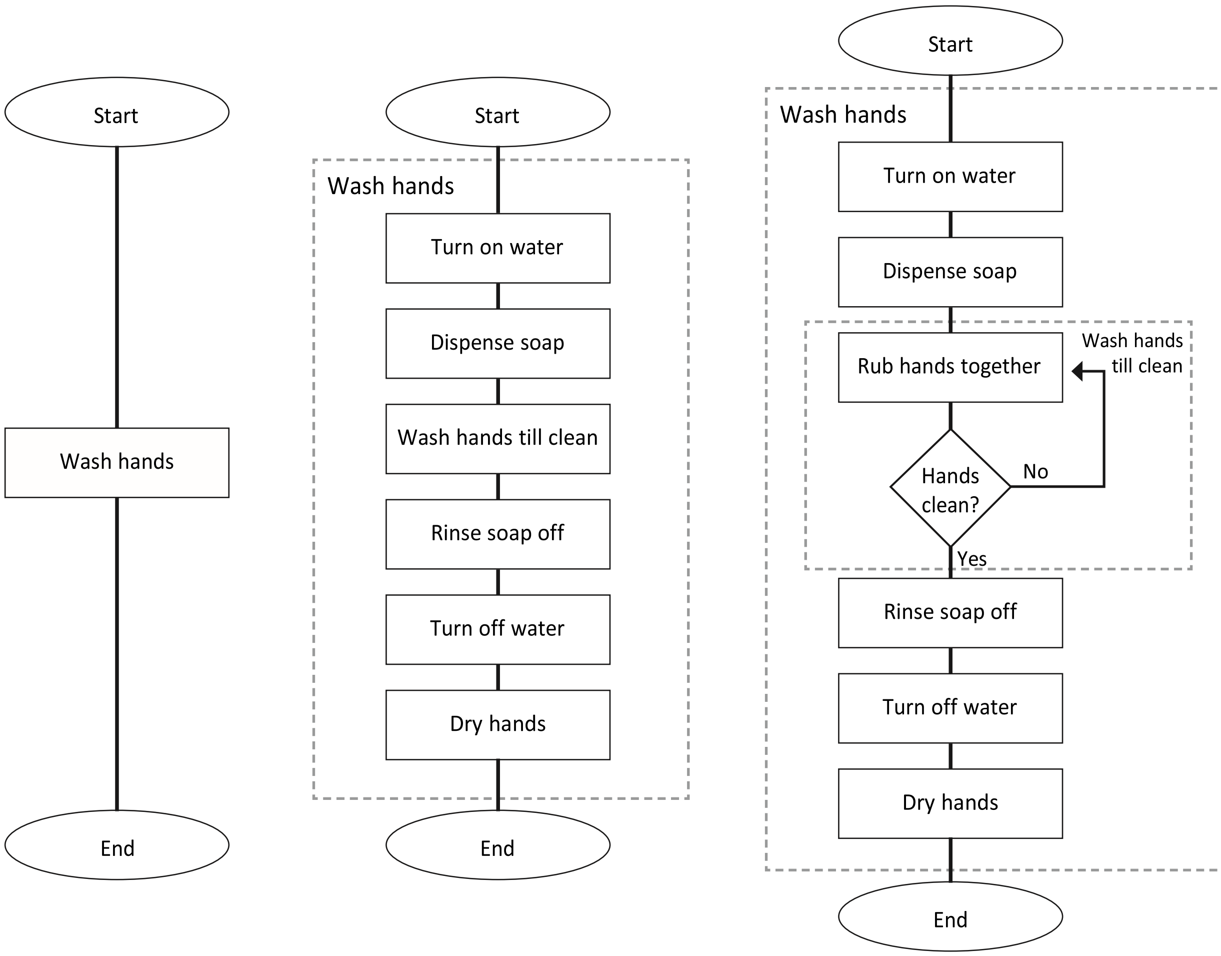
2. If you haven't gone 50 steps yet, what will you do next? ________________

3. If you've gone 50 steps, what do you do? ________________

4. Describe the eventual result of your actions if you follow the flowchart above from start to finish. ________________

Writing a Flowchart

How do you get from a complex task to an organized flowchart describing how to do it? Start with a flowchart containing just the task. Now break it down into smaller, more specific steps in another flowchart. Then, go back and see if you can break down any of those behaviors into simpler parts. Keep on repeating this process until you've reached steps that are simple enough for your robot to perform!



Exercise

On a separate sheet of paper, make a flowchart organizing the "flow" of getting ready to go to school in the morning. Be sure to include the following steps in your chart, but don't be afraid to add other things if you need them!

Select something to wear	*Look for your shoes*	*Put your shoes on*
Take a shower	*Brush your teeth*	*Hit snooze button*
Eat breakfast	*Put toast in the toaster*	*Get dressed*
Leave house for school	*Check your alarm clock*	*Comb your hair*
Get out of bed	*Turn on shower*	*Check the time*

Next Generation Sunshine State Standards (Florida)

SC.4.N.1.2 Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.

SC.5.N.1.1 Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

SC.6.N.1.1 Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

SC.6.N.1.4 Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.

SC.6.N.1.5 Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.

SC.6.N.3.4 Identify the role of models in the context of the sixth grade science benchmarks.

SC.7.N.1.1 Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions

SC.7.N.3.2 Identify the benefits and limitations of the use of scientific models.

SC.8.N.1.1 Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

SC.8.N.3.1 Select models useful in relating the results of their own investigations.

Next Generation ELA Standards (National)

3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3 Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.