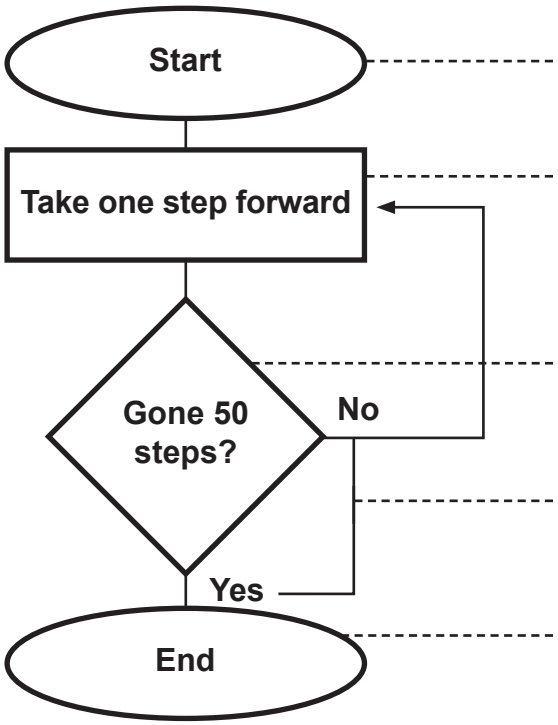
All About Flowcharts

Flowcharts

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. _____

_____

_____

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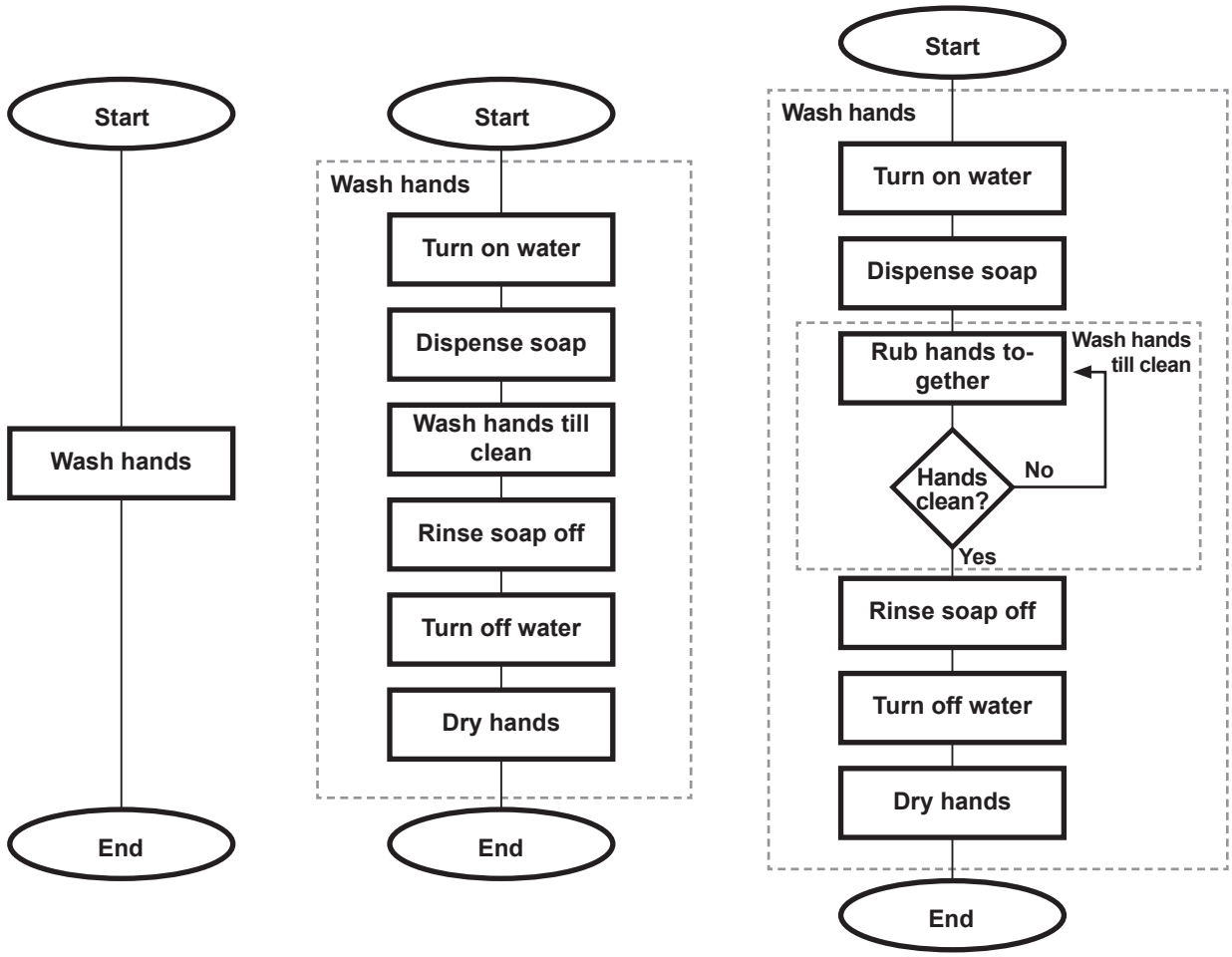
Writing Flowcharts

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

5. 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**

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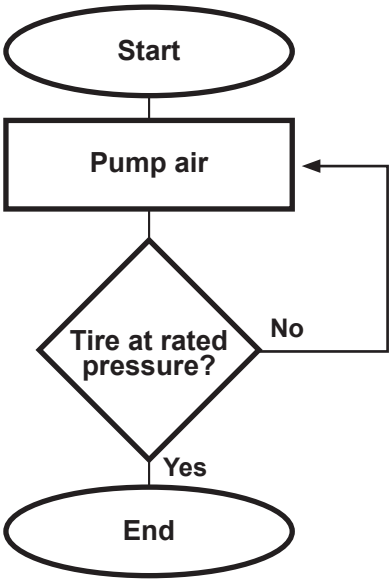
Exercises

6. What behavior does the flow chart below describe?



7. Create flowcharts to represent these short tasks:

- **a.** "If it's raining, bring an umbrella."
- **b.** "Take twenty paces, then turn and shoot."
- **c.** "Go forward until the Touch Sensor (on port 1) is pressed in, then stop."
- **d.** "Follow Liberty Avenue for 2 miles, then take a left turn onto 40th Street. Go until you reach the bridge, but don't cross the bridge. Instead, make a right turn onto Foster Street, then take the first left turn. Follow that road until you reach the National Robotics Engineering Consortium building."
- **e.** "Turn on oven. Cook turkey for 4 hours or until meat thermometer reaches 180 degrees."

8. Make a flow chart for the process of crossing the street.
Hint: Looking both ways won't do any good unless you use that information to make some decisions.

9. Bonus: Write a flow chart that tells you how to read flow charts.

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