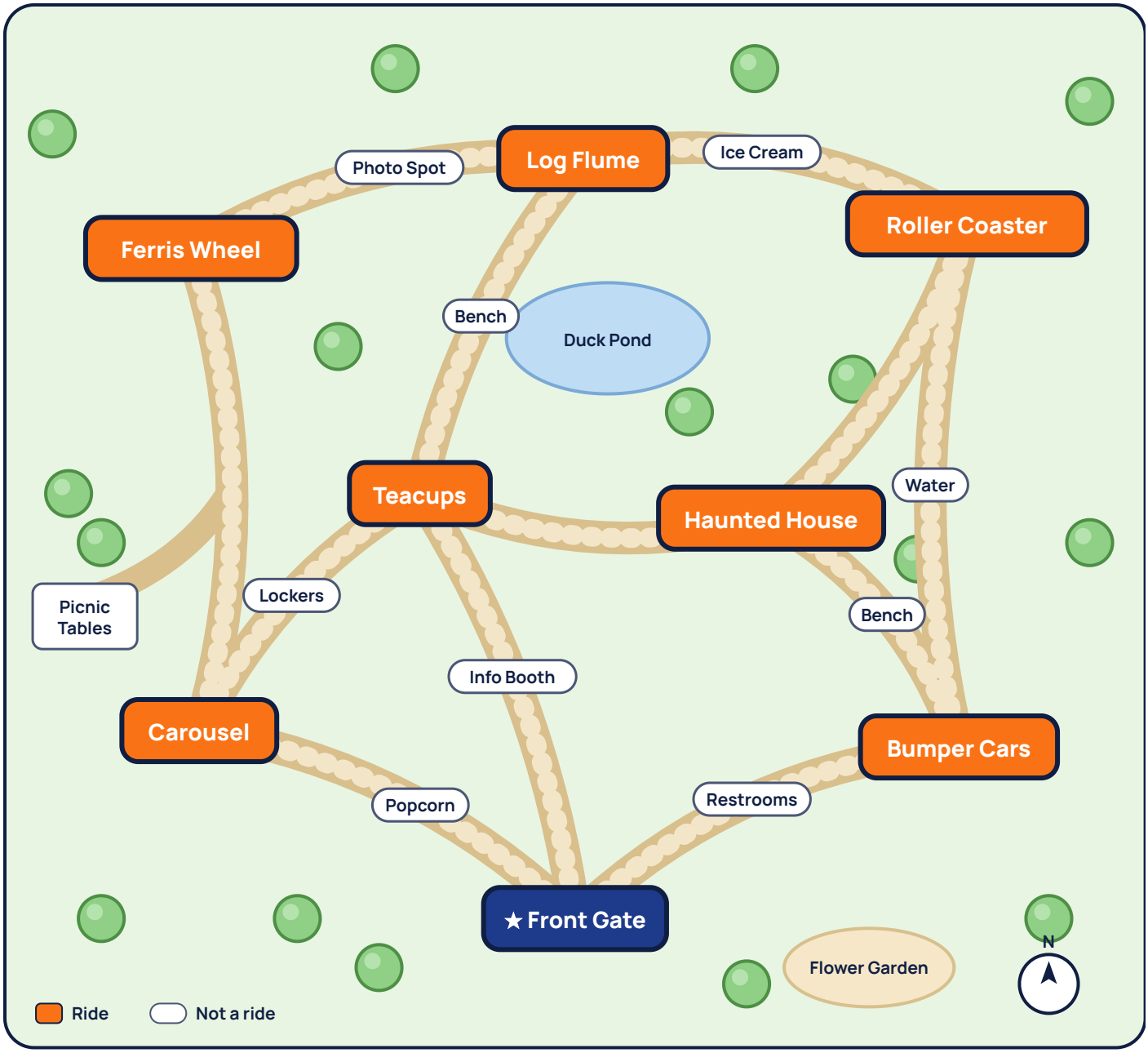
PART 1

Draw the graph

You're the new tour guide at Lakeside Park. Here's the park map. It's packed with detail, but a tour guide only needs to know which rides connect to which.



Your job: On the next page, draw a **graph** of the park. Draw a dot (a **node**) for the Front Gate and each ride. Draw a line (an **edge**) between two of them when a path goes straight from one to the other without passing another ride.

PART 1

Your graph

Draw only what a tour guide needs. Labels can be short.

Name _____

Your graph of Lakeside Park

Leave it out

List three things on the park map that you left out of your graph.

1.

2.

3.

Why?

Why does leaving them out make it easier to plan a tour? Computer scientists call this **abstraction**.

Now plan a tour. Using your graph, find a tour that starts at the Front Gate, visits every ride exactly once, and ends back at the Front Gate. Write it on a route sheet, then trade with a partner and trace it.

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ROUTE SHEET

Write the tour as steps

Map: _____ Use only the rows you need, then skip to the last row.

Name _____

STEP		PLACE
1	Start at the	**Front Gate**
2	Then go to the	
3	Next go to the	
4	Next go to the	
5	Next go to the	
6	Next go to the	
7	Next go to the	
8	Next go to the	
9	Next go to the	
10	Next go to the	
11	Next go to the	
12	Next go to the	
13	Finally, go back to the	**Front Gate**

Trace it

Trade sheets with a partner. Put a finger on the Front Gate and follow the steps exactly as written, ticking off each ride. Don't fix anything as you go.

- ☐ It starts at the Front Gate.
- ☐ Every step uses a path that's on the map.
- ☐ It visits every ride.
- ☐ It never visits a ride twice.
- ☐ It ends at the Front Gate.

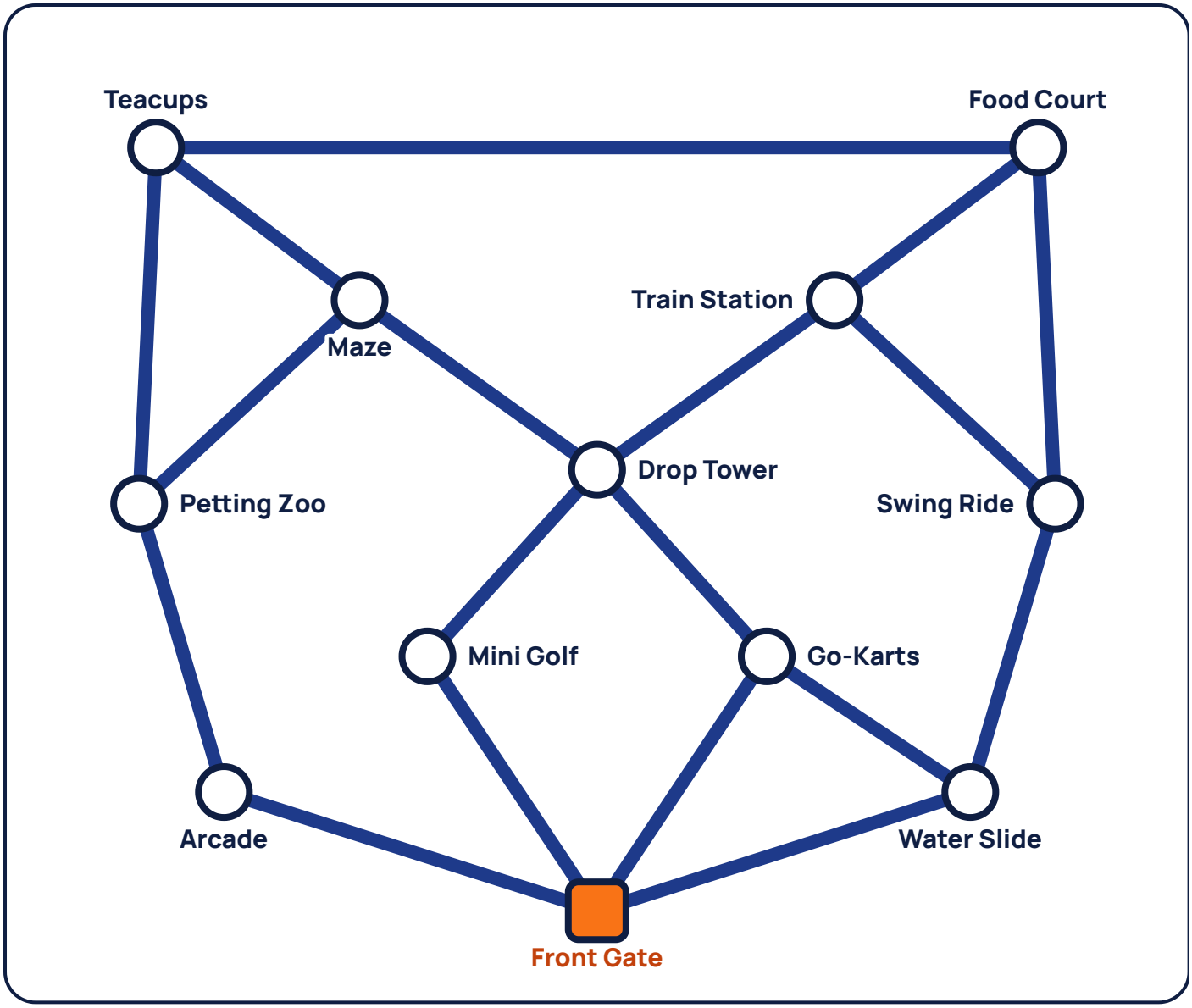
Traced by _____ **Bug found at step** _____ **(or none)**

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PART 2

Map B: The full park

The park has grown. Find a tour that starts at the Front Gate, visits every ride exactly once, and ends back at the Front Gate.



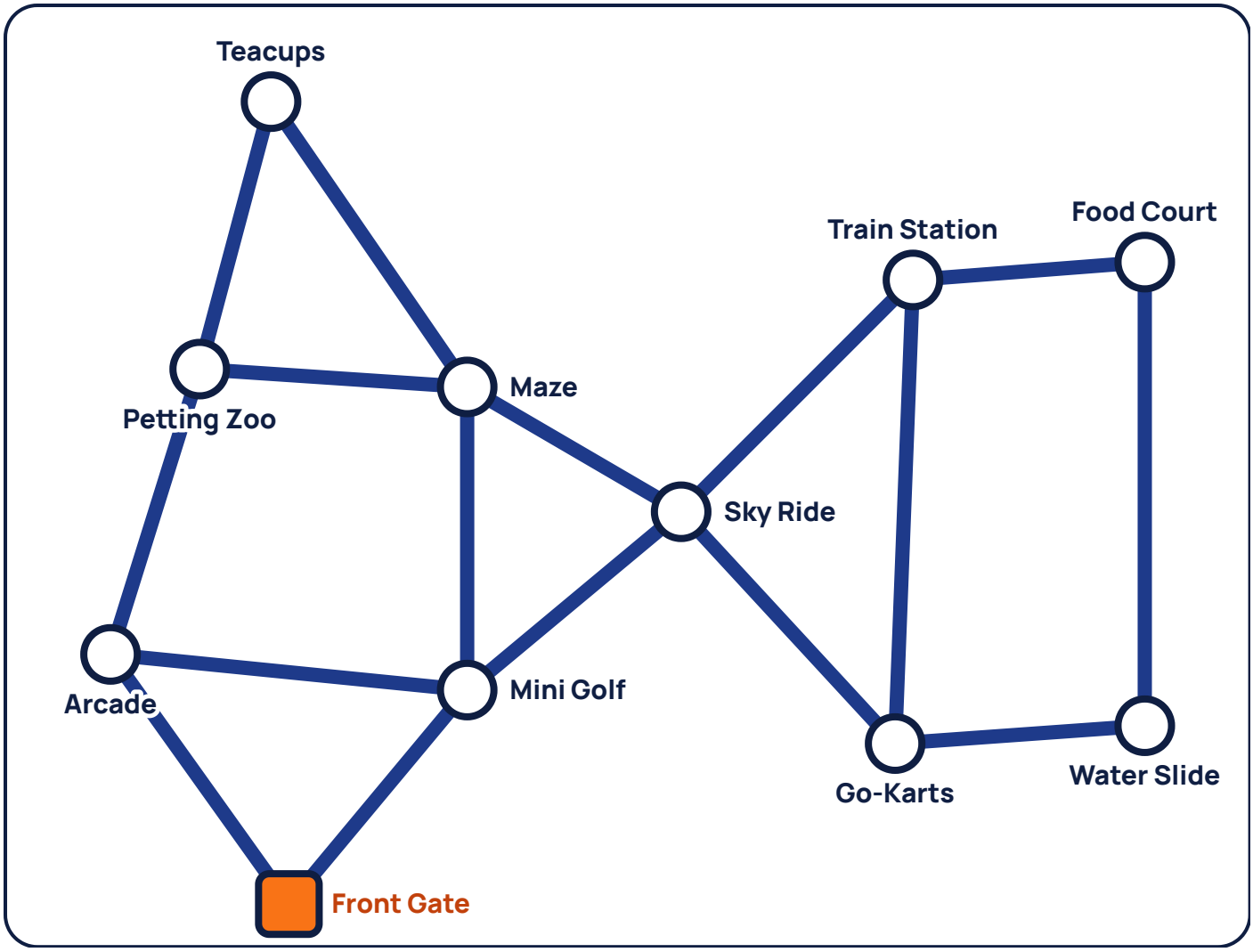
Tip: Some rides have only two paths. What does that tell you? Write your tour on a route sheet, then have a partner trace it.

PART 3

Map C: The new Sky Ride

The park opened a Sky Ride that connects the west side to a new east side. Find a tour that visits every ride exactly once and ends back at the Front Gate.

Name _____



Can't find one? Maybe there isn't one. It's not enough to say "I tried and it didn't work." Explain how you know *no one* could ever find a tour of this map.

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PART 4

From a route to an algorithm

Your route for Map B works for Map B only. A tour guide who moves to a new park needs something better: rules that help find a tour on *any* map.

Name _____

A route is a list of steps that solves one problem.
An algorithm is a set of steps that solves any problem of the same kind.

Think about it

1. A ride has only two paths. What must the tour do there?
2. A ride already has two tour paths marked. What about its other paths?
3. You get stuck. What should you do next?
4. How could you tell quickly that a map has no tour at all?

Your tour-finding rules

1.

2.

3.

4.

5.

6.

Test your rules

Use **only your rules** to find a tour of Map D on the next page.

Which rule helped most? _____

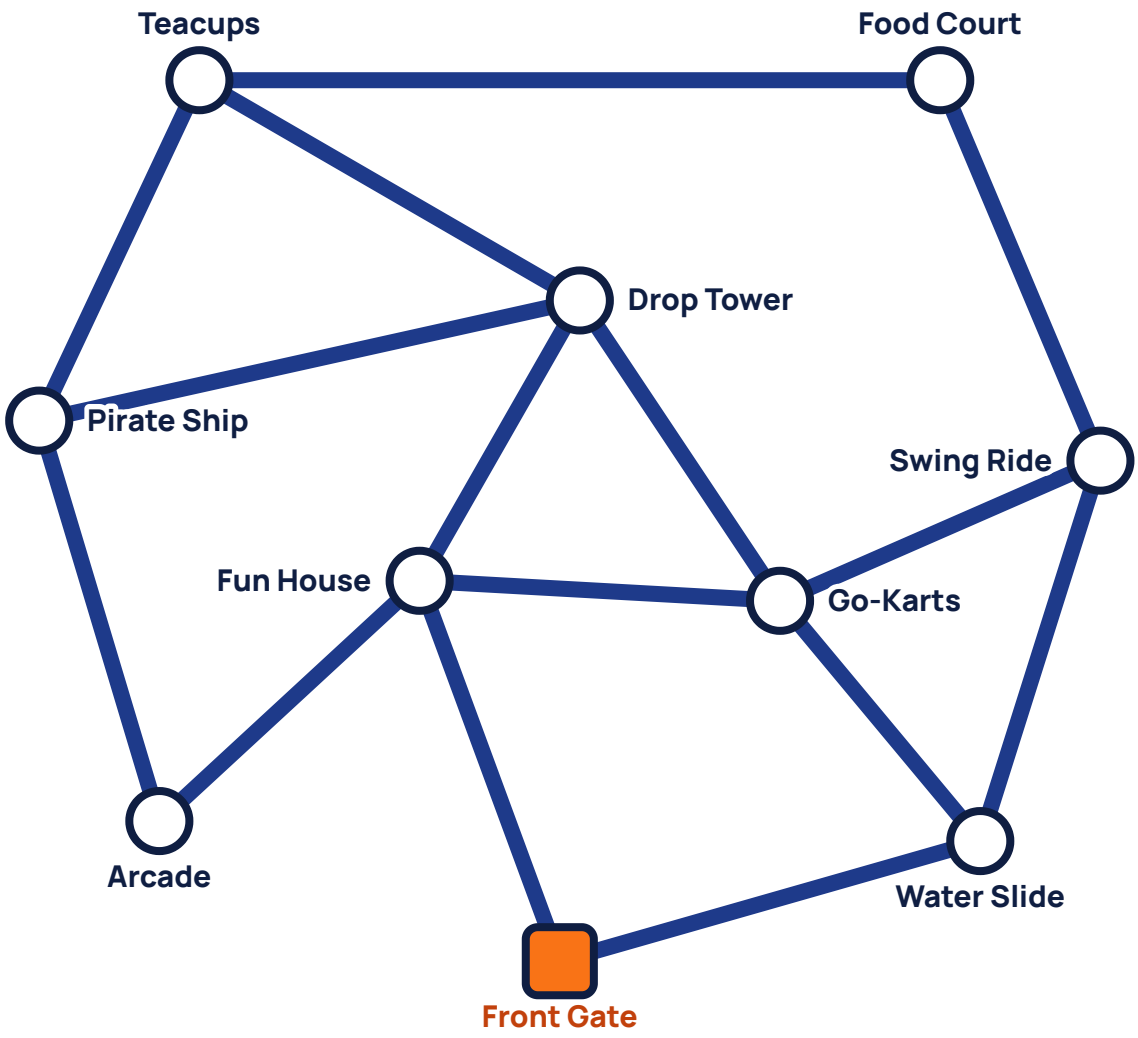
Which rule needs fixing, and how? _____

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PART 4

Map D: A park you have never seen

Follow your rules, step by step. Mark each path the tour must use, and cross out each path it can't use.



Did your rules find a tour? If you had to guess at some point, that's a sign your rules need another step.

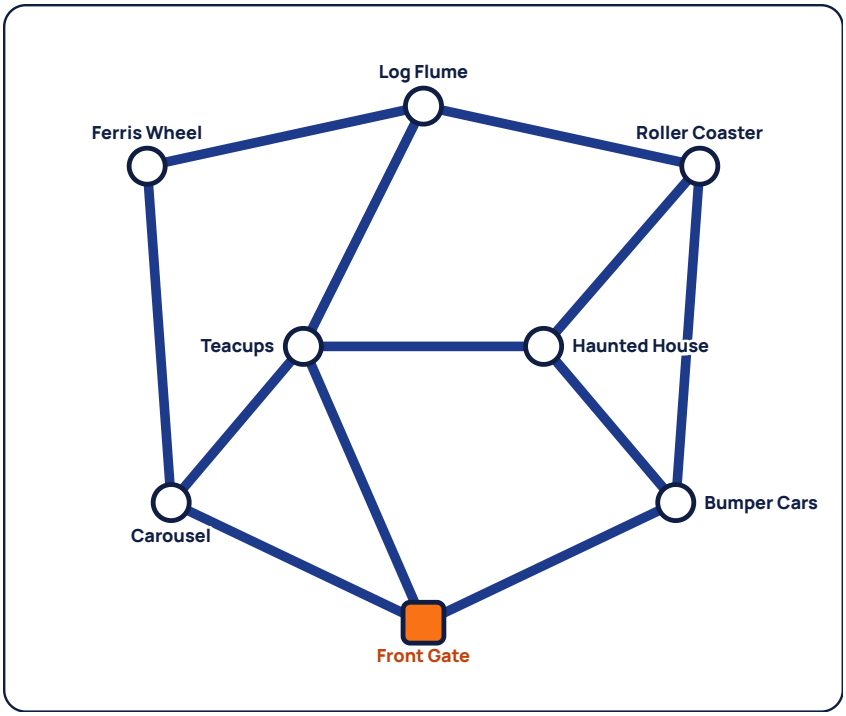
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EXTRA

Debug the tour

Five new tour guides wrote these tours of Lakeside Park. Trace each one on the graph below. Which tours work? For each one that doesn't, find the bug.

Name _____

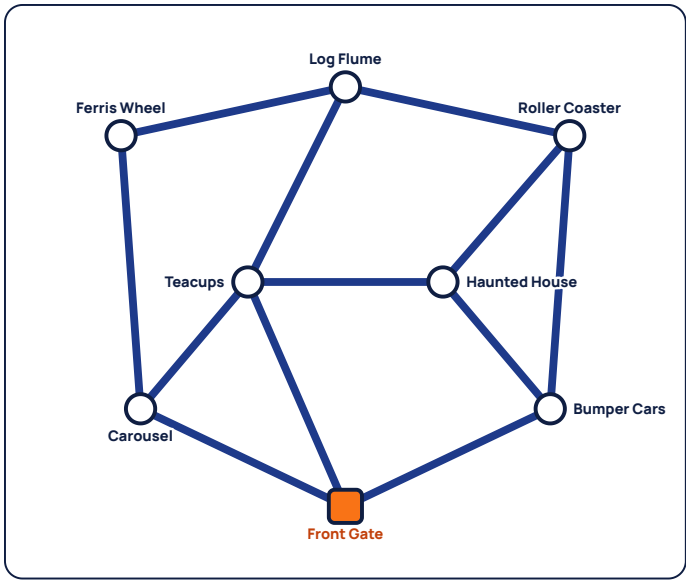


Tour	Works?	The bug
1. Front Gate → Bumper Cars → Haunted House → Roller Coaster → Log Flume → Ferris Wheel → Carousel → Teacups → Front Gate		
2. Front Gate → Carousel → Ferris Wheel → Log Flume → Roller Coaster → Bumper Cars → Front Gate		
3. Front Gate → Teacups → Carousel → Ferris Wheel → Log Flume → Haunted House → Roller Coaster → Bumper Cars → Front Gate		
4. Front Gate → Carousel → Ferris Wheel → Log Flume → Teacups → Haunted House → Bumper Cars → Roller Coaster → Bumper Cars → Front Gate		
5. Front Gate → Bumper Cars → Roller Coaster → Log Flume → Ferris Wheel → Carousel → Teacups → Haunted House		

ANSWER KEY

Parts 1 and 2

Part 1: Lakeside Park graph



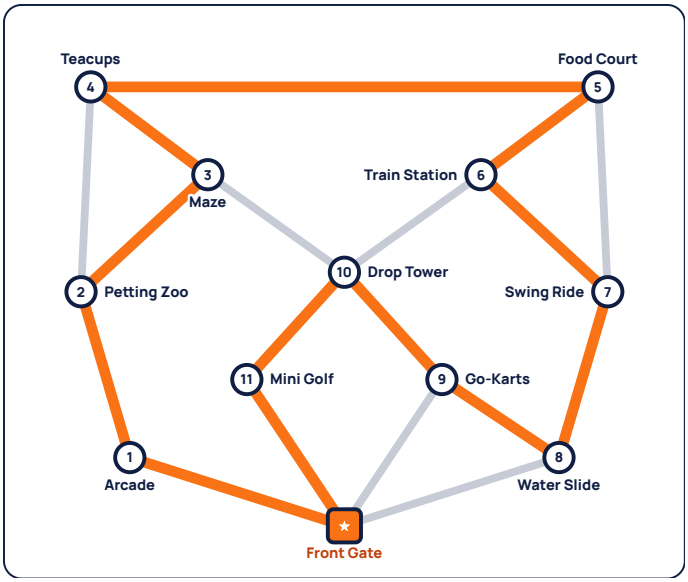
The picnic tables, food stands, benches, restrooms, pond and trees are all left out. Any drawing that keeps the same 12 connections is correct, even if it looks different.

Lakeside Park tours

There are three. Any of them can also be followed in reverse.

1. Front Gate → Carousel → Ferris Wheel → Log Flume → Teacups → Haunted House → Roller Coaster → Bumper Cars → Front Gate
2. Front Gate → Carousel → Ferris Wheel → Log Flume → Roller Coaster → Bumper Cars → Haunted House → Teacups → Front Gate
3. Front Gate → Bumper Cars → Haunted House → Roller Coaster → Log Flume → Ferris Wheel → Carousel → Teacups → Front Gate

Part 2: Map B



Front Gate → Arcade → Petting Zoo → Maze → Teacups → Food Court → Train Station → Swing Ride → Water Slide → Go-Karts → Drop Tower → Mini Golf → Front Gate. This is the only tour (or its reverse). The Arcade and Mini Golf have only two paths each, so the tour must use all four of those paths.

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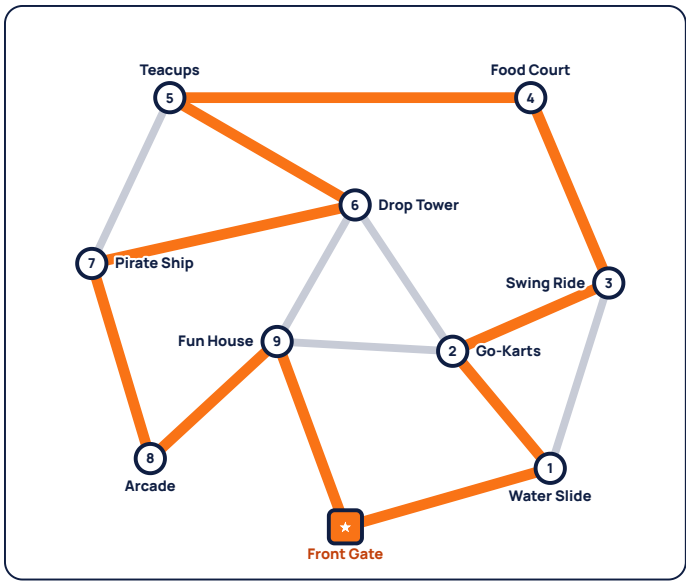
ANSWER KEY

Parts 3 and 4, and Debug the tour

Part 3: Map C

There is no tour. The Sky Ride is the only way between the west side and the east side. A tour has to cross to the east side and come back, so it must go through the Sky Ride twice. That breaks the rule of visiting each ride once.

Part 4: Map D



Front Gate → Water Slide → Go-Karts → Swing Ride → Food Court → Teacups → Drop Tower → Pirate Ship → Arcade → Fun House → Front Gate. This is the only tour (or its reverse).

Sample rules

1. If a ride has only two paths, the tour uses both. Mark them first.
2. When a ride has two tour paths marked, cross out its other paths.
3. Never mark a path that closes a loop before every ride is in it.
4. If a ride ends up with fewer than two paths left, undo your last guess and try a different path.
5. If one ride is the only way between two parts of the park, there is no tour.

On Map D, rule 1 marks the paths at the Front Gate, the Arcade and the Food Court. Rule 2 then crosses out the Fun House's paths to the Go-Karts and Drop Tower, and the rest follows with little or no guessing.

Debug the tour

1. Works. It meets every requirement.
2. Misses the Teacups and the Haunted House.
3. There is no path from the Log Flume to the Haunted House.
4. Visits the Bumper Cars twice.
5. Doesn't end at the Front Gate (and the Haunted House has no path to the gate).

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